

EMPLOYMENT, GROWTH, AND PRICE LEVELS

HEARINGS
BEFORE THE
JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES
EIGHTY-SIXTH CONGRESS
FIRST SESSION
PURSUANT TO
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MAY 25, 26, 27, AND 28, 1959

**PART 4—THE INFLUENCE ON PRICES OF CHANGES
IN THE EFFECTIVE SUPPLY OF MONEY**

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EMPLOYMENT, GROWTH, AND PRICE LEVELS

MONDAY, MAY 25, 1959

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Joint Economic Committee met at 10 a.m., pursuant to call, in room 457, Old Senate Office Building, Senator Paul H. Douglas presiding.

Present: Senators Douglas and Bush; Representatives Curtis and Widnall.

The CHAIRMAN. Gentlemen, the committee will come to order.

The fourth set of hearings which begins this morning are designed to review the so-called classical inflation and deflation caused by increases and decreases in the effective supply of money and credit with relationship to the quantity of transactions.

The committee is interested in determining the circumstances under which changes in the money supply necessarily lead to changes in prices and those under which no price change follows:

For example, if substantial recourses of labor and capital are unemployed, will an increase in the money supply necessarily lead to an increase in prices?

In addition, the committee will study the effect of the changes in the effective supply of money on growth, employment, and economic stability.

We are very glad to welcome as the initial witness an old colleague of mine, one of the most brilliant American economists, Mr. Milton Friedman, professor of economics, University of Chicago.

STATEMENT OF MILTON FRIEDMAN, UNIVERSITY OF CHICAGO AND NATIONAL BUREAU OF ECONOMIC RESEARCH

Mr. FRIEDMAN. Thank you. I almost said Professor Douglas.

I am honored to appear before this committee. The issues that you are examining are among the most crucial facing the Nation. Unless we can achieve both a reasonably stable economy in the short run and a reasonably stable price level in the long run, our free enterprise economy is unlikely to be permitted to survive. And without a predominantly free enterprise economy, we shall neither preserve political freedom nor attain healthy economic growth, which in a free society means the possibility for individuals to use their resources effectively to promote their own aspirations.

With respect to the technical issues covered in the two papers I have submitted, it will probably be most fruitful if in the main I answer questions rather than try to cover the ground in full again.

As a background for such a discussion, I shall in this introductory statement sketch the course of recent academic thinking about monetary matters and summarize a few central ideas, covered more fully in the submitted papers, bearing on the relation between the stock of money and other economic magnitudes.

The past three decades have seen first a sweeping revolution against previously accepted economic thought about the role of monetary factors in economic change and then a counterrevolution that is still incomplete but promises to be no less sweeping. As with any successful counterrevolution, the result has not been simply to restore the status quo ante. In the process, views initially held rather uncritically have been reexamined and improved, and some elements of the revolutionary interlude absorbed.

Before the great depression of the early 1930's, accepted economic doctrine attached great importance to the stock of money as a determinant of the level of money income and of the price level. This view rested on experience covering centuries in time and spanning the globe in space. On numerous occasions, substantial increases in the stock of money relative to output had been associated with substantial increases in prices, and substantial decreases in the stock of money relative to output with substantial decreases in prices. And there were no known cases in which substantial changes in either money or prices had occurred without a similar change in the other magnitude.

The theoretical relation suggested by this experience was generally termed "the quantity theory of money." Like most established orthodoxies, it became unduly rigid in form and structure and thereby gave rise to expectations that were bound to be disappointed. In particular, in the 1920's, it was a major element in the widespread belief that the Federal Reserve System could and, what is even more extreme, would succeed in producing for an indefinitely prolonged period a high degree of economic stability, itself a major ingredient in the belief in a new era.

The great depression spawned a revolution in views. Though on a retrospective examination the depression is a tragic testimonial to the potency of monetary factors—the stock of money fell by a third from 1929 to 1933—the failure of the monetary authorities to stem the depression was taken as evidence that they could not have done so. And in any event, the obvious disorders in the economy and the urgent need for a remedy made the world in general and the economic profession in particular receptive to new ideas.

John Maynard Keynes was the chief architect of the subsequent intellectual revolution. He shifted emphasis from the relation between the stock of money and the flow of income which was at the heart of the quantity theory to the relation between different flows, in particular between the flow of capital expenditures and the flow of income. He regarded changes in the stock of money as of minor importance in times of unemployment, and as exercising a significant influence only in times of full employment. His disciples, as disciples will, went much farther than the master. The view became widespread that "money does not matter", that the stock of money was a purely passive concomitant of economic change and played no independent part except as it might affect interest rates, and that hence

the only role for monetary policy was the minor one of keeping interest rates low so as to avoid interfering with the investment regarded as needed to offset the secular stagnation that was confidently expected to be the major problem for the future.

Two forces combined to produce a counterrevolution in ideas. One was strictly academic. Scholarly criticism and analysis of Keynes' ideas demonstrated a logical fallacy in one of his central propositions; namely, the proposition that, for a given stock of money, there might, even in principle, exist no price and wage level consistent with full employment; or, to put the proposition differently, that even in the economist's never-never land of the long run, and even if all prices and wages were perfectly flexible, a free market system might have no inherent tendency to full employment.

It has turned out on analysis that Keynes' proposition involved an error of omission. He neglected to take account of the effect of different levels of prices on the real value attached by the community to its wealth relative to its income, and of the effect of changes in this ratio, in its turn, on consumption expenditures. When this effect is taken into account, there is always in principle a price and wage level consistent with full employment, though of course frictions or other disturbances may prevent the economy from attaining such a position at any point in time. Unemployment, that is, cannot be attributed to an inherent "flaw in the price system;" it requires explanation in terms of such other forces as rigidities in adjustments, external disturbances, and the like.

The second, and more obvious, though perhaps not more important, factor that produced a counterrevolution was the brute force of events. Many countries in the postwar period, including the United States, pursued cheap-money policies, partly under the influence of the ideas derived from Keynes that I have so briefly sketched. Every such country experienced either open inflation or a network of partly effective, partly ineffective, controls designed to suppress the inflationary pressure. In every case, the stock of money rose as a result of the cheap-money policies and so did prices, either openly or in whatever disguise was most effective in circumventing the controls. No country succeeded in stemming inflation without adopting measures that made it possible to restrain the growth in the stock of money. And every country that did hold down the growth in the stock of money succeeded in checking the price rise.

Western Germany's "economic miracle" after the monetary reform of 1948 was the most dramatic episode, but the experiences of Italy, of Great Britain, and of the United States differed only in detail. And French experience, prior to the monetary reforms at the turn of this year, is equally striking testimony by its contrast in both policy and outcome.

These developments in the world of scholarship and of affairs have produced a rebirth of interest in monetary changes. It is by now clear, and widely accepted, that money does matter and matters very much. There has been an increasing amount of research by economists during recent years on just how monetary forces operate, on what the relation is between monetary changes and other economic changes, and on the structure and operation of our financial system. I venture to predict that this trend will continue.

The modern version of the quantity theory that has been developed as a result of this work is more sophisticated and subtle than the earlier version. Like that earlier version, however, it attaches great importance to the quantity of money as a determinant of prices and like it, also, it is consistent with centuries of experience.

An examination of the role of money must distinguish sharply between the arithmetic and the economics of the relation between money and other magnitudes.

As a matter of arithmetic, we can always express national income in two different ways:

First, as the product of the amount of money and its velocity of circulation.

Second, as the product of an index of the quantity of goods and services produced and an index of the average price of these goods and services.

The two products are always equal, which gives the famous quantity equation: $MV = Py$, in its income form, where M is the stock of money at any time; V , the income velocity of circulation of money; P , the price level, and y , the rate of flow of real income.

As it stands, this equation is simply a definition of velocity; for any values of the price level, real income, and the stock of money, all of which can be observed directly, we can compute the value of V that will make it true. It says nothing about the factors that might produce a change in the stock of money or about the effect of such a change. Conceivably, such a change might be absorbed entirely in V , without affecting prices or output at all—this is the result implicit in the views of the extreme and rigid disciples of Keynes. Or the change in M , the stock of money, might be entirely absorbed by prices, without affecting velocity or output at all—this is the result predicted by the extreme and rigid quantity theorists. Or the change in money might be partly offset by a change in velocity, and the remainder reflected partly in prices, partly in output—this is the result experienced in the United States in the longer period movements of the past century. Or the change in money might be reinforced by a change in velocity in the same direction, the combined effect being reflected in both prices and output, but in widely varying proportions, depending on circumstances—this is the result experienced in the United States during the shorter period movements, the so-called business cycles, of the past centuries. And still other combinations are possible.

The economic issue concerns the circumstances under which one or another of these outcomes is likely to occur and the process whereby it does occur. This in turn depends on the factors that determine the quantity of money, the problem of the supply of money; the factors that determine the amount of money people want to hold, the demand for money; and the factors that determine the process whereby the amount of money people want to hold is adapted to the amount available, the adjustment between demand and supply.

Under present conditions in the United States, the Federal Reserve System essentially determines the total quantity of money; that is to say, the number of dollars of currency and deposits available for the public to hold. Within very wide limits, it can make this total anything it wants it to be. Of course, it cannot do so instantaneously

or to the precise dollar, and it frequently expresses its proximate objectives in terms of other magnitudes, letting the quantity of money be whatever is consistent with these other objectives. But there is no doubt that, if it wanted to, it has both the formal power and the actual technical capacity to control the total stock of money with a timelag measured in weeks and to a degree of precision measured in tenths of 1 percent.

Broadly speaking, therefore, the public cannot by itself affect the total number of dollars available to be held. For any one individual separately, it both appears to be true and is true that he can control the amount of cash that he holds. He can increase his cash balances by selling some assets for cash or spending less than he receives from other sources. He can reduce his cash balances by spending on assets or for other purposes more than he receives. For all individuals combined, however, the appearance that they can control their cash balances is an optical illusion. One individual can reduce or increase his cash balance only because another individual or several others are induced to increase or reduce theirs; that is, to do the opposite of what he does. If individuals as a whole were to try to reduce the number of dollars they held, they could not all do so, they would simply be playing a game of musical chairs. In trying to do so, however, they would raise the flow of expenditures and of money income since each would be trying to spend more than he receives; in the process adding to someone else's receipts, and, reciprocally, finding his own higher than anticipated because of the attempt by still others to spend more than they receive. In the process, prices would tend to rise, which would reduce the real value of cash balances; that is, the quantity of goods and services that the cash balances will buy.

While individuals are thus frustrated in their attempt to reduce the number of dollars they hold, they succeed in achieving an equivalent change in their position, for the rise in money income and in prices reduces the ratio of these balances to their income and also the real value of these balances. The process will continue until this ratio and this real value are in accord with their desires.

Conversely, if individuals were to try to increase the number of dollars they held, they could not do so if the Federal Reserve System did not increase the number available to be held. But in their attempt to do so, individuals would try to spend less than they received, which would lower the flow of spending and reduce the level of money income and of prices. This would raise the ratio of cash balances to income and the real value of cash balances.

This essential difference between the situation as it appears to the individual, who can determine his own cash balances but must take prices and money income as beyond his control, and the situation as it is to all individuals together, whose total cash balances are outside their control but who can determine prices and money income, is perhaps the most important proposition in monetary theory and certainly the source of greatest confusion to the layman.

It follows from this analysis that if the nominal stock of money changes, but the public at large wants to hold the same real stock of money, the monetary change will be reflected fully and proportionately in prices after adjustment has been made to the change. In the interim, the effect on prices might be less or more and real income

might also be affected. However, systematic discrepancies over any period between movements in prices and in the stock of money must reflect changes in the real stock of money that the public at large wishes to hold.

It is pointed out in greater detail in the technical papers that have been submitted that the main factors affecting the real stock of money the public wishes to hold are:

- (1) The level of income.
- (2) The cost of holding money.

The level of real income affects desired real cash balances in two ways:

In the first place, a change in real income affects the total volume of transactions to be effected; that is, the amount of work, as it were, for money to do. This effect would lead to a change in the desired real stock of money in roughly the same proportion as in output.

In the second place, if there is a change not only in total real income but also in per capita income, it means that people are at a higher or a lower level of living. With such a change in the level of living, they may want to increase their stock of money more or less than proportionately, just as an increase in level of living means a less than proportionate increase in expenditures on bread but a more than proportionate increase in the stock of durable consumer goods. It turns out empirically that in this respect money is like durable consumer goods rather than like bread, so that an increase in real level of living is on the average associated with a more than proportionate increase in the real stock of money.

A very recent and rather novel finding is that the income to which cash balances are adjusted is the longer term level of income that can be expected, rather than the income currently being received. This finding goes far to explain much that has hitherto been puzzling in the cyclical behavior of the stock of money relative to income.

The cost of holding cash balances depends mainly on two factors: The rate of interest that can be earned on alternative assets, and the expected rate of change of prices.

If a Government bond, for example, yields 4 percent, it costs an individual \$4 a year to hold \$100 in cash instead of in the form of a bond. If prices are rising at the rate of 4 percent per year, for example, it will take \$104 in cash to buy at the end of the year as much as \$100 at the beginning, so that it costs an individual \$4 a year to hold \$100 in cash instead of in goods initially worth \$100. In consequence, the higher are interest rates and the higher is the expected rate of change in prices, the greater is the incentive for individuals to economize on cash balances, and conversely.

Empirical evidence suggests that interest rates have a systematic effect in the expected direction but that the effect is not large in magnitude. The experienced rate of change in prices has no discernible effect in ordinary times, when prices are not expected to change by much. On the other hand, the rate of change in prices has a clearly discernible and major effect when price change is rapid and long continued, as during extreme inflations and deflations.

In recent years, both interest rates and the expected rate of change in prices have been working in the same direction in the United States. Expectations of inflation have become more and more wide-

spread and, partly for that reason, interest rates have risen. These changes doubtless help to explain the recent tendency for the ratio of the stock of money to income to decline despite a rise in real income per capita.

Of course, even after allowance is made for changes in real income per capita and in the cost of holding money, the ratio of cash balances to income is not perfectly steady. But the remaining fluctuations are minor, certainly far smaller than those that occur in the stock of money itself.

In concluding this introductory statement, I should like to emphasize two points that seem to me of central importance in fashioning a wise national monetary policy.

The first is the closeness, regularity, and predictability of the relation among the stock of money, the level of price, and the level of output over any considerable period of years.

The second is our present inability to predict at all accurately this same relation over very short periods, from month to month, quarter to quarter, even year to year.

The first proposition means that in order to attain a reasonably stable price level over the long pull, we must adopt measures that will lead to a growth in the stock of money at a fairly steady rate roughly equal to or slightly higher than the average rate of growth of output.

The second proposition means that in the present state of our knowledge we cannot hope to use monetary policy as a precision instrument to offset other short-run forces making for instability. The attempt to do so is likely merely to introduce additional instability into the economy, to make the economy less rather than more stable.

It should be emphasized that this conclusion about short-run changes is valid not only monetary policy but also for fiscal or other policies. All these policies operate with a long lag and with a lag that varies widely from time to time. We know too little about either these lags or about what the economic situation will be months or years hence when the chickens we release come home to roost, to be able to be effective in offsetting the myriad of factors making for minor fluctuations in economic activity. This is one of those cases in which the best can be the enemy of the good.

As I examine the past record of stability in the United States, I am impressed by the number of occasions on which major fluctuations have been a consequence of changing and at times erratic governmental policies with respect to money. This record offers much support for the view that, if the monetary framework were stable, our private enterprise economy is sufficiently adaptable to the other changes that occur to yield a high degree of economic stability in the short run as well as the long run.

For this reason, the urgent need, I believe—and here I am venturing farthest from any academic ivory tower—is to keep monetary changes from being a destabilizing force, as they have been through much of our history. In my view, this can best be done by assigning the monetary authorities the task of keeping the stock of money growing at a regular and steady rate, month in and month out. This would at one and the same time provide a stable monetary background for short-run adjustments and assure long-run stability in the purchasing power of the dollar.

The elimination of monetary uncertainty would promote healthy economic growth by providing a stabler environment for both individual planning and social action. But it would be no panacea. The springs of economic progress are to be found elsewhere; in the qualities of the people, their inventiveness, thrift, and responsibility, in public policies that give a free field for private initiative and promote competition and free trade at home and abroad. Mistakes in monetary policy can render these forces impotent. A stable monetary environment can give them an opportunity to be effective; it cannot create them.

Thank you.

The CHAIRMAN. Thank you very much, Mr. Friedman.

I have a few questions.

I wonder if you have checked the theoretical development with the actual movements of the supply of money, production, or price levels in recent years; that is, have you tested your equations inductively?

Mr. FRIEDMAN. Yes, Senator Douglas.

We have conducted a number of empirical studies comparing the behavior of these various magnitudes and have computed empirical equations of the kind that are suggested in the chapter submitted to the committee.

As I said in my general statement, for most of the period for which we have studied this relation, rates of changes of prices don't have much effect except during the wartime periods, because over most of the period, the rates of changes of prices were rather small.

For the postwar period, and particularly for recent years, the computed equations work very well except for one discrepancy, which is that over the past 4 or 5 years the velocity of circulation of money, that is to say, the ratio of income to the stock of money, has been at a higher level than would have been anticipated from these equations alone.

The CHAIRMAN. That brings me to this point. In the years 1954-57, the increase in the total of demand deposits was only from \$134.4 billion to \$138.6 billion, or about \$4.2 billion—approximately 3 percent.

On the other hand, the increase in the total gross national product reduced to constant purchasing power, 1958 dollars, was \$403.2 billion to \$451.1 billion, or an increase of roughly \$48 billion of constant purchasing power, or of 12 percent.

If these were the only factors you would expect, therefore, a decrease in the price level of some 8 percent. Instead of that, the price level rose by 4 to 5 percent.

Do you have any explanation for that?

Mr. FRIEDMAN. Yes.

May I say first that with respect to the stock of money, the definition we have used for most of our work is rather broader than the one you suggest. In addition to currency and demand deposits, we have included time deposits in commercial banks—not all time deposits, but time deposits in commercial banks. There is one compelling statistical reason for this procedure.

Before 1914 when the Federal Reserve System was established, it was impossible statistically to separate time deposits in commercial banks from demand deposits. Under the National Banking Act, re-

serve requirements for both were the same on demand and time deposits and there was no necessity for the banks to distinguish them. Since our studies go back to 1867 and cover, therefore, a very long period indeed, this statistical reason itself would be decisive.

The CHAIRMAN. If I may interject, it would be desirable for the purposes of your study, but what about the current situation when you have both sets of figures—namely, demand deposits and time deposits?

Mr. FRIEDMAN. I was coming to that, Senator Douglas.

In addition, we have examined which of these concepts seems to give the closer relation with other magnitudes and there is a slight margin, not an overwhelming margin, but a slight margin, in favor of the broader concept which includes commercial bank time deposits, but not other time deposits.

One important reason, if I may say so, is that since commercial bank time deposits carry smaller reserve requirements than demand deposits and since both are in the same banks, commercial banks have a strong incentive to try to produce some shift of deposits from one category to the other when they are under reserve pressure. In consequence, it turns out for the period when figures on both time and demand deposits are available, you get somewhat better results by looking at the broader category.

Over the period from 1954 to 1957 that you mentioned in particular, commercial bank time deposits expanded very substantially. This was partly because of a change in the interest rates which they were permitted by the Federal Reserve System to pay on time deposits. Thus, in the 3 years from June 1954 to June 1957, currency plus adjusted demand deposits rose from \$126.7 billion to \$135.2 billion or by less than 7 percent; currency plus adjusted demand deposits plus time deposits in commercial banks from \$172.2 billion to \$188.9 billion, or by nearly 10 percent.

The second thing is that the particular dates you chose were from the trough of the business cycle to the peak of the business cycle. Over such a period it has always been true historically that velocity tends to rise as ordinarily measured, and that was the case in this period, so that in point of fact when this experience is put in the context of earlier experiences, the discrepancy between what you would expect from the earlier experiences and this one is not very great. Nonetheless, there is an appreciable discrepancy in the direction you suggest.

The CHAIRMAN. I was going to say, because the Federal Reserve Board publishes the figures on the velocity of bank deposits in New York and outside, when you use those values for the cycles in your equations do you get a correspondence or is there a discrepancy?

Mr. FRIEDMAN. I have not been able to use those values in my equations because my equations are computed for another concept. The Federal Reserve Board figures are for a deposit turnover concept, and most of our work has been done with an income velocity concept. With the income velocity concept, velocity rose more from 1954 to 1957 than one would have expected from earlier experience, though the bulk of the movement is consistent with earlier experience.

The CHAIRMAN. How do you account for this rise in velocity?

Mr. FRIEDMAN. Let me separate the two things: One, the rise in velocity that generally occurs during a business cycle. Second, the still greater rise which occurred in this episode.

The CHAIRMAN. How do you account for that?

Mr. FRIEDMAN. Which one?

The CHAIRMAN. The second.

Mr. FRIEDMAN. I think myself it is largely accounted for by a spreading notion that prices are going to be rising, by a widening anticipation of rising prices in the future.

The CHAIRMAN. Could it have been caused by an increase in the interest rate, making the cost of holding inventory more costly?

Mr. FRIEDMAN. Yes, indeed, but such a relation is already included in our estimate of the rise that would have been expected from earlier experience. In our work we have allowed for the effect of interest rates, and hence interest rates do not explain the rise over and above that which we could account for on the basis of historical relations.

I have no doubt that in general the rise in interest rates is one of the factors that accounts for a tendency for velocity to rise during the cycle.

The CHAIRMAN. That presents a problem, that if the Federal Reserve Board would attempt to slow down the rate of increase in money supply versus the interest rate, thus preventing inflation from coming in through the front door by speeding up velocity, may it not permit inflation to come in through the back door?

Mr. FRIEDMAN. No.

The CHAIRMAN. Why not?

Mr. FRIEDMAN. Because not the whole of the effect is dissipated. For the reason you mention the effect of holding down the rise in the stock of money is not as far-reaching as one might expect if he did not take account of the effect on velocity through the interest rate. However, it isn't all dissipated. Indeed, the fact that the interest rate rises is in a sense a sign that there is a pressure of demand for loans on the market.

May I make one more statement in this connection, because I believe that it is very misleading to look at the effect of Federal Reserve policies in terms of an interest rate?

Very often when the interest rate rises, it would be appropriate to say that the Federal Reserve is following an easy money policy, and when the interest rate falls it would be appropriate to say it is following a tight-money policy.

If one adopts the view often adopted that any rise in interest rate betokens tight money and any fall in interest rate betokens easy money, that implies that a constant interest rate would be a neutral policy, and we all know from our own experience with the bond support program that a monetary policy which pegs interest rates is anything but a neutral policy.

If one looks instead, as I think one should, at the behavior of the stock of money, not of interest rates, then you will find that the Federal Reserve System has been typically and traditionally easy during periods of boom and tight during periods of contraction, and, consequently, it has tended, not intentionally, of course, to contribute to the instability in our system rather than the reverse.

The CHAIRMAN. Mr. Friedman, I gathered from your final comments that you believe that the Federal Reserve policy should have

a total money stock increase and approximately a constant rate roughly equal to, or perhaps somewhat higher than, the gross national product.

Mr. FRIEDMAN. Net national product, I would say, in real terms, of course.

The CHAIRMAN. Deducting depreciation?

Mr. FRIEDMAN. Yes.

The CHAIRMAN. And you don't think Reserve policy should be used as a short-run stabilizing factor?

Therefore, you think Federal Reserve policy should be used particularly for long-run stability, but not for short-run stability?

Mr. FRIEDMAN. Yes.

The CHAIRMAN. What are you going to do about the business cycle?

The Federal Reserve Board thinks that it is trying to stabilize and prevent the cycle. You are saying it should not try to do so and, similarly, you say the Government should not try to do so. Who is going to do it?

Mr. FRIEDMAN. Senator Douglas, the question is what one thinks the major problem is and what one thinks has in fact been the effect of governmental policies in these areas in the past.

The statement I made is based upon the conclusion that, despite intentions, the policy measures actually taken have historically been a destabilizing factor.

In light of experience, the most urgent need is not to have some ever-present back-seat driver who is going to be continually correcting the driver's steering, but to get off the road the man who has been giving the car a shove from one side to the other all the time and making it difficult for the actual driver to keep it on the straight and narrow path. To leave the analogy, in point of fact, despite the intention of monetary and fiscal policy, the effect has been to destabilize the economy.

It is often said about the kind of statement I have made that it is all right in theory, but it wouldn't work in practice. I think the situation in this case is exactly the opposite. I can see nothing to be said in theory for the proposal I am making.

As a matter of theory, obviously the sensible thing to do if you can is to try to be relatively tight in money and fiscal policy during a period of expansion and to be relatively easy during a period of contraction.

In theory, that would be the sensible thing to do, but if one looks at the practice and asks what in fact has occurred as a result of the attempt of people to follow such a policy, he will find that the effect has been just the opposite, that in fact it is so difficult to do the job, that the effects have been destabilizing. Why is this?

If monetary and fiscal policy were like a water tap so that as soon as you turned it on it ran and as soon as you turned it off it stopped, it is hard to believe that it could have the adverse effects I have suggested. But that isn't the case. Monetary and fiscal policy is rather like a water tap that you turn on now and that then only starts to run 6, 9, 12, 16 months from now. It is because of this long lag in the reaction to policy that you have this tendency for policy in fact to have an effect opposite to that intended.

The CHAIRMAN. That is said to be one of the difficulties in fiscal policy in periods of recession or prosperity, but is it a defect of mone-

tary policy which is supposed to work more immediately and not have such a time lag?

Mr. FRIEDMAN. I think we have to distinguish between two different problems: How fast you can change the money supply, and how fast the money supply changes economic activity.

With respect to the first, the changes in the money supply, that can be brought about very rapidly.

The CHAIRMAN. You mean by open market operations?

Mr. FRIEDMAN. Yes, sir. That can be brought about very rapidly by open market operations, discount rates, and so on. But the second, the time lag between the changes in the money supply and the changes in economic activity, is a different matter.

If one studies the chart 2 that is over there, which shows for the period from 1907 to date the monthly rate of change in the money stock, not the absolute money stock but the percentage by which it is changing month to month, you find that peaks in the rate of change of the money stock preceded the peaks in general business by something like 16 months on the average, and the troughs preceded the troughs in general business by something like 13 to 14 months on the average. And what is true for this period is true also for the earlier period.

What is even worse, the lag is not always the same. Thus you have a situation such that, when the Federal Reserve System takes action today, the effect of that action may on some occasions be felt 5 months from now and on other occasions 10 months from now, on other occasions 2 years from now. That is the major reason why it is so difficult as a technical matter in the present state of our knowledge to know what measures one ought to take at any given time.

The CHAIRMAN. Therefore, do not do anything except keep the supply of money expanding at the general rate?

Mr. FRIEDMAN. Senator Douglas, that would be quite a lot. I realize that it is hard to describe this alternative policy as anything other than just a foolishly simply policy. It seems as if any fool could do better, but in fact very wise men have been unable to. If one goes back and examines the difference month by month between the actual behavior of the stock of money and the behavior under the alternative I suggest of a constant rate of increase, you will find that the actual behavior has been less consistent with what in retrospect you would have regarded as desirable than the alternative.

Let me illustrate from the immediate period we are in now.

From July 1957, which was the peak of the business cycle, to April 1958, which was the trough of the business cycle, the stock of money, using the narrower definition of currency plus demand deposits adjusted, fell at the rate of 1 percent per annum during that period. If you take my broader definition of currency plus adjusted demand deposits, plus commercial bank time deposits, it rose at the rate of 3 percent per year.

Let's look at the subsequent period, the period of recovery, from April 1958 to April 1959, the latest date for which we have figures on the stock of money.

Over that year, currency plus demand deposits rose by 4 percent, and the broader concept by 5½ percent. Thus, if you look at what actually happened over this period, the alternative policy of increasing the stock of money at a steady rate would have been more expansionary during

the recession and less expansionary during the recovery from the recession.

Senator BUSH. Will the Senator yield?

The CHAIRMAN. Yes, certainly.

Senator BUSH. According to your calculations of the money supply under the broader concept, there really was no contraction in the money supply during the recession that you mentioned, was there?

There was an increase?

Mr. FRIEDMAN. Yes.

This is the usual experience, Senator Bush. If you look back over the whole period from 1867 to date, the money supply has had a very strong upward trend and it has usually risen during contractions as well as expansions in business, but at a slower rate.

The CHAIRMAN. Is that true of 1929-33?

Mr. FRIEDMAN. Let me give the exceptions, because they are a very interesting series of dates and you will see it is not an accidental sequence of dates.

The only occasions on which the stock of money fell absolutely during the business cycle are 1873 to 1879, 1893 to 1894, 1907 to 1908, 1920 to 1921, 1929 to 1933, and 1937 to 1938.

The CHAIRMAN. Those are periods of depression?

Mr. FRIEDMAN. Those are the periods of great depression.

The CHAIRMAN. Yet you say that the money supply increases during the period.

Mr. FRIEDMAN. No, I beg your pardon. I said on the average during the usual kind of a mild contraction, the money supply increases, but at a slower rate than during expansion.

On the other hand, the only occasion on which the money supply falls is in the great depressions. In every great depression, it has fallen.

My main point is really that an essential precondition for avoiding great depressions is that we keep the money supply growing at a steady and regular rate. To have kept prices stable during past periods, would have required a rate of increase of the money supply of about 4 percent per year.

Senator BUSH. The question that arises from what you say, and going back to the 1957-59 period which you point out, is whether the money supply has had any effect on that recession at all, whether it caused it, or whether it helped us out of it, and I would like you to observe specifically on that. Will you?

Mr. FRIEDMAN. Yes, surely.

Senator BUSH. I would judge from what you say, and your own estimate of the action of the money supply in that time, that it had little to do with the cause of either the recession or the recovery therefrom, as far as the money supply, not the cost of money.

What is your observation?

Mr. FRIEDMAN. I would not want to say that, Senator Bush.

I think the crucial problem in answering your question is what you take as the norm. There is no such thing as no monetary policy. There is some necessity of doing something about the stock of money.

Let me express my views here in a very tentative way, because I think it is extremely difficult ever to say anything about a particular episode. But my own impression is that monetary policy contributed to some extent to the date of the onset of the recession.

The record of the money supply during this past period was that it was relatively tight for a relatively long period prior to 1957. I think this had something to do with the onset.

Senator BUSH. I am talking about the cost of money rather than the supply.

Mr. FRIEDMAN. No, I am talking about the supply, and these are the figures that Senator Douglas was referring to. If one looks at this chart (chart 2), which gives the rate of change in the money supply, the percent change from month to month, the numbers are all relatively low through this period of 1956-57. Then they fell rather sharply during the recession, and this probably contributed to the severity of the recession, though again I am not sure how much weight you can give to it in the particular instance, because this effect might have been felt later on.

More recently, the rapid expansion in the money supply was undoubtedly a factor that has contributed to the rate of expansion, though again most of its effects will probably be felt this coming year or next year.

Representative CURTIS. Mr. Chairman, for the sake of the record, that chart No. 2 is in the record, is it, or will be?

The CHAIRMAN. It will be in the record.

Representative CURTIS. And Professor Friedman was referring to the third graph, which is the bottom graph of chart 2?

The CHAIRMAN. That is correct.

Mr. FRIEDMAN. Thank you very much.

The CHAIRMAN. I will ask just one more question, Mr. Friedman, and that is this:

You have been advocating, I think, that the supply of money should increase approximately at the rate of growth of the net national product, or perhaps a little more.

I take it you feel it should increase at a rate somewhere between 3 and 5 percent a year, possibly 4 percent a year.

I would like to ask your view of that principle. Do you think the money supply was allowed to increase adequately during the period from 1954 to 1957; and the increase over the period as a whole, so far as demand deposits and currency are concerned, was only 4 percent for 3 years, whereas on a 4-percent-a-year basis it would have been 12 percent?

Mr. FRIEDMAN. The number that one wants to use for the desirable rate of growth of the money supply depends very critically on the concepts of money supply that is used.

I would not recommend the same number for currency plus demand deposits as for currency plus demand deposits plus commercial bank time deposits because, historically, time deposits have been a growing fraction of the total money supply and therefore one must be very careful not to carry over a number like 4 percent from one concept to another. One must adjust the number to each concept.

The CHAIRMAN. How much weight did you give to time deposits in commercial banks as compared to demand deposits?

Did you give dollar for dollar?

Mr. FRIEDMAN. Yes, dollar for dollar.

The CHAIRMAN. Obviously time deposits are much more passive than demand deposits. I mean they are not drawn upon from expenditures and not checked out as much.

I wonder if you would not reconsider that.

Mr. FRIEDMAN. There is, of course, no simple answer to that. Any treatment has its defects. What is necessary, I think, is that one should try to adjust his analysis to the concept he uses. The dangerous thing is to shift from one concept to another without notice.

We have, I should say, some studies underway in an attempt to see whether it would be better to use a fractional part of savings deposits. In particular, these have to do with mutual savings bank deposits, and some of the preliminary results suggest that a fractional value would be an improvement, and I quite recognize that it might well be a decided improvement. As of the moment, what we have done is take it dollar for dollar.

Another problem is that one has to be careful what date he starts from. If one starts at a particular date like the bottom of a depression, 1954, or another date like the top of a boom, it is not clear that one would want to attach a stable rate of change of the money supply to any such particular date. I would say that taking the period as a whole, if you had started from somewhere at the average level around 1952 or 1953, somewhere when you were not either at a trough or at a peak, and from then on had expanded the total of currency plus demand deposits, plus commercial bank time deposits, by something like 4 percent per year, you would have had a monetary policy better adapted to the fluctuations we have had than the policy actually followed.

Such a constant rate of rise in the money supply would have meant a slower rate of rise than we actually had during 1955 and a faster rate of rise during 1956 and 1957. It would have meant a faster rate of rise during the period of the recession and a slower rate of rise since April 1958.

The CHAIRMAN. Mr. Curtis.

Representative CURTIS. Professor, I was very interested in your recital of those periods before World War II of monetary contraction and then the fact that you did not list 1949, 1950, and 1954, 1955, and 1957 and 1958, when we have had what people have called recessions, and others use different titles.

May I conclude from that that you regard those three postwar recessions as of a different nature than the ones that you recounted?

Mr. FRIEDMAN. Yes. The difference in nature is partly one of degrees, but I think it is more than that.

I think that one can in fact distinguish historically among two different classes of depressions or of recessions, relatively mild depressions and relatively deep depressions. The kinds of depressions or recessions we have had since the end of World War II have been relatively mild depressions. The kinds I was citing as occurring in 1920-21, 1929-33, and 1937 to 1938 were deep depressions.

I think that our studies establish an enormously strong case that in every deep depression monetary factors play a critical role. Monetary collapse has been a major source of deep depressions, and if I were being a bit more unguarded, I would say the primary source.

On the other hand, if one takes the minor recessions, such as 1948-49, 1953-54, 1957-58, then monetary factors may have contributed to them, but it is not possible on the basis of evidence to say that they were dominated by monetary factors, and it may well be, and I am in-

clined myself to believe that it is true, that other factors played the main role.

Representative CURTIS. Could we turn it around, though, and say that possibly wise monetary policies helped to prevent the post-World War II recession from becoming deeper?

Mr. FRIEDMAN. If by wise monetary policy you mean avoiding the kind of catastrophic mistakes in monetary policy that were made in 1929 to 1933 and again in 1920-21, yes. The behavior of the stock of money since World War II, and particularly since about 1950, has been very much more conducive to economic stability than it was in the earlier period, and it has been conducive to economic stability because it has come very much closer to the kind of straight line policy that I have been suggesting.

It is a fascinating thing to examine chart 2, if I may call your attention to it. Disregard the very rapid short-run movements in it because that is a question of mistakes in the figures, the fact that the figures are very inaccurate and you have statistical errors.

What I would like to call your attention to, if I may, are the longer swings. You will note that whenever you have a period when the swings are very sharp, we have had a period of great economic instability, and whenever the curve is relatively stable and the swing is rather small we have had economic stability. There is a stable period just before World War I and again in the 1920's—I am sorry the chart breaks here because if it didn't, you could see that the stable period extends all the way from 1922 to 1929—and again in the postwar period, and those are the three periods which by common consent would be regarded as the most stable periods in economic activity.

Senator BUSH. While you are there, may I just ask one question?

Representative CURTIS. Certainly.

Senator BUSH. In 1933 you have the sharpest break in the money supply.

Mr. FRIEDMAN. That is a question of statistics. It is not a real one.

The explanation of this particular movement in the series has to do with the closing of the banks during the bank holiday. Before the bank holiday, many banks had restrictions on the withdrawal of deposits, but all of those deposits were counted as part of the money supply. After the closing of the banks, only some banks were allowed to open. The deposits in the banks that were not allowed to open are excluded from the recorded figures and that is really the explanation of this particular drop.

Senator BUSH. While you are there, how about the similar drop in 1929?

Mr. FRIEDMAN. That was a very real one. It was a reflection of the stock market break that occurred in the fall of 1929. The withdrawal of out-of-town funds from the New York stock market caused bank pressure, caused an immediate very sharp contraction; then as funds were thrown into the market, particularly the reserve funds, there was a reaction. That is why I say these very short-term movements are in many cases statistical figments.

For example, these movements through here (1943-45) are a reflection of the Government's war bond campaigns. These figures exclude Government cost balances. On the occasion of a war bond campaign, deposits were transferred from private accounts to Government ac-

counts. Then, as Government paid them out again, they came back into private accounts, and that is what accounts for these sharp fluctuations and also for these during the First World War.

Representative CURTIS. Professor, in your statement you state that:

Under present conditions in the United States, the Federal Reserve System essentially determines the total quantity of money,

and then you go on to develop that. And in the concluding sentence of the same paragraph, you say:

There is no doubt that, if it wanted to, it has both the formal power and the actual technical capacity to control the total stock of money with a timelag measured in weeks,

and so forth.

Really that surprised me a bit. You stated it that way and it led me to thinking that maybe my basic concepts of what you regard as money need correction.

Am I correct in the assumption that the measurement which you use for quantity of money is on the theory that that will best reflect the amount of credit that will be extended as well, or how do you relate credit and money? That is where my difficulty comes.

Mr. FRIEDMAN. I am very glad you asked that question, because I think it is a very important question and one that is the center of much confusion. It is important to distinguish between what one might call monetary policy and what one might call credit policy.

By the stock of money, I mean literally the number of dollars people are carrying around in their pockets, the number of dollars they have to their credit at banks in the form of demand deposits, and also commercial bank time deposits. That is the stock of money at any moment of time.

The amount of credit, on the other hand, is something that flows, loans outstanding for 3 months, or for 6 months, or for 9 months, and with any given stock of money you can have widely different amounts of credit. You can have the same stock of money and a large amount of credit or small amount of credit. The two are, of course, very closely connected. They are connected by what from one point of view is a historical accident, that creation of money has been combined in commercial banks with the lending and investing of funds. That isn't a technical necessity. You could have the stock of money completely separated from credit.

For example, if, let's say, gold coins were the only money being used, there would be no connection between them in any direct way.

Under our present system, they are very closely connected. Because of this close connection, there is a tendency to confuse two different kinds of effects of monetary policy.

One effect of monetary policy is on the number of these pieces of paper around to be used.

Another effect is on interest rates through changes in the amount of credit or availability of credit, and these two effects need to be distinguished.

The doctrine that was proposed and carried out largely under the influence of Keynes' writings and that has now come, and from this point of view unfortunately, to dominate the thinking even of the central bankers, is that the stock of money has its influence only through credit. I think that view is wrong.

That is one of the ways in which changes in the stock of money have an influence, but they also influence economic activity more directly because of the desires of the people to make the stock of money they hold conform to their other items of wealth, to their income, and to their situation in general. Thus a change in the stock of money, independently of its effects on credit, will have effects on the rate at which people seek to spend or the rate at which they seek to accumulate cash.

Representative CURTIS. I am glad I exposed my ignorance by asking that question because I am among those who are confused on this subject. Yet it seems to me that one of the big problems that faces us at the legislative level centers more around the question of credit than it does of money.

From an economic standpoint I guess it doesn't make, except from the standpoint of measuring an understanding, too much difference whether it is money or credit, as far as considering the amount of purchasing power, for example, that is available.

Mr. FRIEDMAN. I think it does, Mr. Curtis. I think it makes a great deal of difference.

I think from your point of view in particular, if I may say so, for this reason: The Constitution gives Congress control over what money shall mean and what shall be used as money and as legal tender. Congress has the direct responsibility to specify what our monetary system shall be, so I think control over the amount of money, either directly, or indirectly through specifying the kind of monetary standard we shall have or the rules under which the stock of money shall be changed, is an inescapable part of the legislative responsibilities of Congress.

Control over credit, I think, is in a very different area. Indeed, I personally regard one of the undesirable effects of our present kind of banking system the fact that credit and money are so closely connected that the Congress is led to control credit when what it really should be controlling is money. That is to say, I see no reason why we should necessarily have any stringent control over the borrowing and lending activities of people.

Credit is of many kinds. Most credit in this country does not derive from banks. It derives from personal loans to others in the form of mortgages, or holdings of bonds, or holdings of stocks. It derives from transactions by financial intermediaries such as life insurance companies, investment trusts, and the like.

There is no reason in principle, it seems to me, why these transactions should be controlled by legislation.

Representative CURTIS. I see my time right now has run out, but you have well answered the question.

The CHAIRMAN. Senator Bush.

Senator BUSH. Professor Friedman, I want to go back to something you said a little while ago regarding the Federal Reserve Board and the possibility that it might contribute to instability by its monetary policy.

We have frequently heard the Federal Reserve express their policy as one of leaning against the wind, so to speak, and I would like you to comment on that policy if you understand what is meant by it. I am sure you do.

Mr. FRIEDMAN. Yes.

Senator BUSH. What should the Federal Reserve Board do with demands for credit increasing?

Prior to the most recent recession, we had tremendous increases in the use of installment credit. In fact, there are some pretty reliable opinions that it was overuse of credit by consumers, particularly installment credit, that brought about this recession in business, because it stimulated the purchase of goods beyond the year in which they should be buying them, so to speak, particularly noticeable in the automobile industry, I believe.

What is your general observation about that?

Mr. FRIEDMAN. May I first call your attention, if I may, to a feature of this chart, which I think is fascinating and important.

The Federal Reserve System was introduced in the year 1914.

Representative CURTIS. That is chart 1.

Mr. FRIEDMAN. Thank you.

This is on a ratio scale so that equal distances mean equal percentage changes.

I think you will agree that the striking thing about this chart is that this (the money stock) is a much more stable thing before the Federal Reserve System than it is afterward. It behaves much less irregularly.

If you take the whole period from 1869 to 1914, there is nothing like the instability that prevailed in the period after 1914, and that is true even if you take out the two wars.

Therefore, the Federal Reserve System, established partly with the object of promoting greater stability in the stock of money, has had the result of promoting less.

This isn't because bad people were doing it or because of any bad motives or anything like that.

Senator BUSH. No, I am not assuming that.

Mr. FRIEDMAN. So far as the more recent period is concerned, the policy of leaning against the wind, if you could do it, would be an admirable policy. In theory it is fine.

The problem is to know which way the wind is blowing, not when you act but when your action is effective.

If what I do today has effects maybe 5 months from now, or 10 months from now, or maybe 15 months from now, then I have to know which way the wind is going to blow 5, 10, or 15 months from now. That we do not know, so in practice it is very difficult indeed to lean against a wind when one doesn't know which way it is blowing.

Senator BUSH. Are you saying, then, that because of the difficulty involved there should be no attempt to do it?

Mr. FRIEDMAN. Yes, sir. I am saying that it would be preferable, in my judgment, for the Federal Reserve System to say to itself, or indeed for Congress to instruct it to act in this way, that instead of trying to vary its policy behavior from day to day, instead of looking at credit conditions and the like, it would limit itself to seeing to it that the stock of money grew at a perfectly steady rate month in and month out, year in and year out. This would provide a stable background for the other fluctuations.

Senator BUSH. This assumes, I presume, that the economy would also grow at a stable rate. Is that not so?

Mr. FRIEDMAN. It would not grow at a perfectly stable rate.

Senator BUSH. Would you want the stock of money to increase at a stable rate, 3 or 4 percent a year, regardless of which way the economy was going?

Mr. FRIEDMAN. Yes, sir; because in point of fact, if the economy was tending to go down, this would tend to pull it back up. If it was tending to go too far up, this would tend to pull it back down. It would have the effect of a thermostatic reaction rather than of someone stepping in and opening and closing the window all the time.

Senator BUSH. I thought you said a little while ago that the stock of money really didn't affect the upward or downward movement very much.

Mr. FRIEDMAN. No, sir. If I said it, I misspoke; I didn't intend to say that.

I think the stock of money is extraordinarily important in its effect, but what is important about it is the instability in its behavior.

Take the 1929-33 depression, which is certainly the greatest depression—I shouldn't say that; the 1929-33 or 1838-43 are the two greatest depressions in our history.

Senator BUSH. Let's talk about the last one. We know a little more about that.

Mr. FRIEDMAN. I think there is no doubt whatsoever that the depression would have come to a close at the latest in 1931 if the Federal Reserve System at that time had not allowed the money stock to decline catastrophically. If I may go back to chart 1 and refer to the money stock again, the policy I am suggesting would have had the money stock grow steadily from 1929 on instead of declining sharply. If it had done so, we would never have had the depression of 1929-33.

We might have had a recession. It might have been something like the 1957-58 recession. My own guess is that it would have been over either in late 1930 or the spring of 1931.

Senator BUSH. Would you say that the money stock was inadequate all during the thirties, from 1931 through to 1939?

Mr. FRIEDMAN. That is a very difficult question because the inadequacy or adequacy of the money stock depends on its preceding level. In the abstract, there is no such thing as an adequate or inadequate money supply, but I would say, and I am perhaps quibbling and being overacademic, that by comparison with 1928-29, the money supply was inadequate throughout the thirties, yes.

Senator BUSH. I would like to turn to another line of questioning for a moment.

How do you feel about the question of giving the Federal Reserve Board a little more control over credit, and particularly I have in mind consumer installment credit?

Mr. FRIEDMAN. I think it would be a very bad thing to do. I think the Federal Reserve System now has too many powers, not too few. It is doing things that it ought not to be doing.

It seems to me, as I was saying, that Congress and its agencies have a definite responsibility about money. So far as credit is concerned, free enterprise is just as good for credit as it is for shoes, hats, and anything else. The objective of our policy ought to be to allow credit to adjust itself in a free market, provided we maintain a stable monetary background. Consequently I think it is inappropriate for the Federal Reserve System to have powers over consumer credit.

I think its present powers over margin requirements are equally inappropriate and ought to be eliminated, and I could make some further suggestions along these lines.

Senator BUSH. We would be glad to have them. This is a very important matter.

Mr. FRIEDMAN. I agree.

I think again that emphasis on particular credit controls derives from the confusion we were mentioning earlier between monetary policy and credit policy.

For the purposes of monetary policy, that is to say, of controlling the stock of money, it is unnecessary for the Federal Reserve to have any powers over consumer installment credit, over stock market credit, or over any other type of credit directly.

Senator BUSH. In your opinion, does our current adverse balance of payments call for corrective monetary policy measures?

Mr. FRIEDMAN. No, sir.

Our adverse balance of payments, which involves a gold outflow, is fundamentally a consequence of a whole pattern of policies, including as a very major policy our foreign aid policy. Given our foreign aid policy, it seems to me eminently desirable for the United States that a large part of it should take the form of the outflow of gold rather than of goods, which are more useful in current consumption and current production.

Senator BUSH. You are not particularly concerned at the moment about the trend in our balance of payments?

Mr. FRIEDMAN. No, sir. The crucial question relates to gold.

Senator BUSH. Yes.

Mr. FRIEDMAN. The question of gold is of course very difficult and complicated, but one of great importance.

Personally, if we could have a real honest-to-goodness gold standard, I think there would be much to be said for it. I don't see any prospect whatsoever that we are going to have one.

It seems to me our present gold policy is comparable to our present wheat policy. We have a price support program for gold, with the one exception that we offer the support price to foreigners as well as to domestic producers.

It seems to me that from this point of view it is highly desirable that we get rid of a large part of our gold surplus. We now hold an amount of gold that, in relation to the world's gold, is very much in excess of our fractional importance in any other way. We tried to prevent that gold from influencing our monetary policy when it came in.

It would be a serious mistake to let it influence our monetary policy when it goes out.

Senator BUSH. On that matter of gold at the beginning, it will be discussed again, so I want to ask you one more question there.

We have in the order of \$20 billion worth in our gold supply, but my recollection is about 12-billion-odd dollars of that, nearly \$13 billion, is subject to recall by other governments, by other peoples, which would leave our supply at \$7 to \$8 billion.

Does that seem adequate to you in view of conditions in the world today?

Mr. FRIEDMAN. Yes, Senator Bush, because the calculation you refer to is very questionable since it applies all of these foreign claims against the gold reserve. That is like saying that our commercial banking system is going to fall tomorrow because the reserves in the form of balances with the Federal Reserve System amount to only about 20 percent of the outstanding liabilities.

In point of fact, foreigners are inevitably going to hold dollar balances here for a variety of purposes, and there is no immediate chance that the claim against gold will be exercised, but if it were, I would personally think it a serious mistake for us to promote a major deflationary movement within this country to prevent the gold from flowing out.

I think the better course of policy would be to let it flow out. Indeed, and this is more extreme, I think it would be the better course of policy to permit the price of gold to become a free market price instead of a controlled price.

Representative WIDNALL. Will you yield, Senator Bush?

Senator BUSH. Yes.

Representative WIDNALL. Professor Friedman, do you have any opinion at all as to how it would affect the U.S. economy if Russia should suddenly go on the gold standard?

Mr. FRIEDMAN. I am not sure what it would mean for Russia to go on the gold standard. If Russia were to take some part of our gold and provide us with goods and services, that would be a good thing so far as I can see for us in two ways: It would reduce the amount of goods and services that Russia had, and it would increase the amount that we have.

On the other hand, if by Russia going on the gold standard—well, I am not quite sure what that means. Very many people have been concerned that Russia might dump her gold on foreign markets. That would be a very serious thing for us so long as we maintain our present support price for gold. With that support price for gold, Russia's dumping of gold means we provide Russia with foreign exchange.

Indeed it seems to me a most curious matter. There is much pressure on the part of many people for a rise in the price of gold. The two nations in the world that would benefit most from a rise in the price of gold are two for whom American sympathies are hardly the highest, Russia and South Africa.

Senator BUSH. I certainly commend you for that point of view. I think it is a lot of commonsense.

The thought that we should talk about raising the price of gold at this time or any time in the past has been discussed. One of the principal objectives of this committee's work this year is to try to find out the relationship between the maintenance of employment and price stability.

I would like you to comment on that.

Do you think these are mutually conflicting or not?

How do you feel about that?

Mr. FRIEDMAN. I do not believe they are mutually conflicting. I summarized some of the historical record on this question in one of the papers that was submitted to you and that was published in the compendium last year.

Let's take just the American experience, if I may.

In chart 1 real income shows a period of very rapid growth throughout the period from 1880 to the First World War, except for the sharp depression in the early nineties. The earlier period (before 1890's) was a period during which prices were falling at the rate of 2 percent a year. This later period was a period during which prices were rising at the rate of 2 percent a year.

The period of the twenties, which was also a period of rapid growth, about 1923 to 1929, was a period in which prices were almost exactly stable.

My own conclusion is that what is important for economic growth and economic stability is that prices behave in a regular way, that they not display large fluctuations. The important thing is reasonably stable behavior of prices.

As between various kinds of reasonably stable behavior of prices, my personal conviction is that a reasonably stable price level is the best. If you launch on an explicit policy of having prices rise, you are engaged in a process in which it is very difficult to keep from going farther. If 2 percent is right now, 4 percent will be right a while from now, 10 percent later.

On the other hand, if you were to embark on a policy of trying to pull down wages and prices, you would run into rigidities in wages and great difficulties in adjustment, so that I think that the best kind of a policy would be one which had as its objective a reasonably stable price level.

Senator BUSH. Would you think then, in view of that, that it would be wise for us to amend the Employment Act of 1946 so as to state in the law that price stability is a condition, or requirement, or assist to full employment?

Mr. FRIEDMAN. I think it would be desirable to amend the act to state that a reasonably stable price level is one of the objectives to be sought. I am not sure I would want to say that it is an assist to full employment, because that becomes a technical proposition.

Senator BUSH. However, to just state that it would be a desirable objective?

Mr. FRIEDMAN. Yes, I think it would be desirable to do so.

I should also say in utter frankness that I find it hard to believe that this would be of major practical importance, by comparison with the adoption of measures such as a reasonably stable rate of growth in the monetary supply, that would have the effect of giving us price stability.

Senator BUSH. Thank you very much.

Chairman DOUGLAS. Mr. Widnall.

Representative WIDNALL. It is not clear to me how you arrived at that figure of 3 percent.

What is that based on? Past history, or is it based on population growth?

Mr. FRIEDMAN. Yes.

Representative WIDNALL. What do you relate it to?

Mr. FRIEDMAN. It is based on past history.

Suppose we take the experience in the United States over an 85-year period from 1871 to 1955. That is the long period change. That is the period covered roughly by these charts.

Over that period, just taking it all as an average for a moment and not looking at the fluctuations within it, the stock of money has on the average risen by about $5\frac{3}{4}$ percent a year. That is the average.

One and three-quarter percentage points has represented population increase. About 2 percentage points has represented an increase each year in average per capita real income. About 1 percentage point has been absorbed by decline in velocity: That is, by a growth in the amount of money people want to hold in real terms, and, finally, on the average of this 85-year period, about 1 percentage point has been absorbed by price rises.

If we take the 85-year period as a whole, it would seem that over that period it would have taken something like a 4 or $4\frac{1}{2}$ percent per year rise in the stock of money as I have defined it to have kept prices stable.

I must emphasize that this is for the particular definition of money I have used. You would get a different answer if you used a different definition.

Under present circumstances, the rate of growth of population is on the average perhaps a bit less than it was over this period because these were the periods of great immigration. If one allows for what seems a reasonable expectation of what is likely to happen, about 3 percent would be required on the average to offset growth in total output, allowing for growth in both per capita output and population. The question then becomes, what to do about the secular trend in velocity. On the average it has been about 1 percent. If we take this figure for the past 85 years and assume that it will apply to the future, we get about 4 percent as the annual rate of growth in the money stock required for price stability.

My own feeling is that what is really important is to pick a number and stick to it and that that isn't nearly so important whether that number is 3 percent, $3\frac{1}{2}$ percent, 4 percent, $4\frac{1}{2}$ percent, so long as it is somewhere within that range. Suppose you picked a slightly wrong number. The result would simply be to have a slight tendency for prices either to decline very slightly or rise very slightly, and on the average you would come out about right.

The important thing is to provide a background of certainty in terms of which people can make their plans and in terms of which the system can operate, so you know what policy is going to be and not have it an erratic thing that is subject to change from time to time.

Senator BUSH. If Mr. Widnall will permit me just to ask a question, the thing that troubles me about your plan is the practicality of it.

You thought, of course, a lot about this and you believe it is perfectly practical for the Federal Reserve to step up that stock of money each year at an even rate?

Mr. FRIEDMAN. Oh, yes.

Senator BUSH. Regardless of what the economic conditions may be, or the demand of the Treasury may be, or fiscal policy influences may be. That can still be done practically, in your judgment?

Mr. FRIEDMAN. It is perfectly practical.

This doesn't mean of course, that there won't be some consequences.

If you otherwise have strong inflationary pressure or strong upward pressure in a boom, following this policy would mean that the

interest rates will rise sharply and the Government will have to pay a higher price for its money the same way everybody else does.

Senator BUSH. It is based on a confidence of a gradually rising gross national product?

Mr. FRIEDMAN. Yes, sir.

Senator BUSH. Based on that?

Mr. FRIEDMAN. Yes, sir.

Senator BUSH. You would not advocate that if you looked for a rather stable action of the gross national product?

Mr. FRIEDMAN. It is very hard for me to say because I find it hard to conceive of the circumstances that would produce a stable gross national product.

I think our economy is one which has a strong tendency to grow, that it has grown for 150 years. The basic springs of economic growth are in the abilities and capacities of the people, in their willingness to save some part of their annual income to add to capital, so that I would confidently expect that unless we make serious mistakes in our national policy, we can look forward with great confidence to a growing economy.

Senator BUSH. That is the point I wanted to make, though, that the steady increase in the stock of money is geared to this other specification.

Mr. FRIEDMAN. And that they are related one to the other, that unless you have a steady growth, this may impose obstacles in the way of a growth in the economy, and of course, unless you have the growth in the economy, the steady growth in the stock of money would mean price rises.

As to the practicality of it, Senator Bush, I think that it unquestionably is practicable. I think myself that one ought to specify objectives for an agency that are within its competence. For this reason, I am not myself in favor of instructing the Federal Reserve Board to stabilize the price level, because it may not be able to do so. That is not something over which it has direct control. It has only an indirect effect on the price level insofar as it affects the stock of money.

On the other hand, the stock of money is exactly what it does control.

Representative WIDNALL. Did I understand you to say that savings reduce the velocity of money?

Mr. FRIEDMAN. No, no. I am sorry.

Representative WIDNALL. Cash savings?

Mr. FRIEDMAN. Increase in real cash balances, yes.

Insofar as people save, they are adding to their wealth. Insofar as they are adding to their wealth, they keep some part in the form of money. If they kept in the form of money only the same percentage compared to their income that they did before, velocity would be unchanged. Historically, they have done more than that; that is to say, historically, as people's income has gone up by 1 percent in real terms, that is, in terms of goods and services—they have tended to increase the amount of money they held by something like 1¾ percent, and this has meant a decline in velocity.

Do I get at your point? I am not sure I do.

Velocity is a confusing notion. In many ways I think it would be better if we turned it upside down and used its reciprocal. Let me see if I can put it this way:

Under current circumstances, people are holding in the form of money an amount equal to about 7 months' income. If you go back a hundred years, they were holding in the form of money an amount equal to about 2 months' income. That is what has happened over 100 years. That is what 1 percent a year amounts to over 100 years. It has gone from about 2 months to something like about 7 months.

Of course, the money is not all held by individuals. About half of this 7 months' income held in the form of money is held by business firms and about half by individuals.

As people have gotten richer in terms of their income and their wealth, they have increased the number of months' income which they hold in the form of cash or deposits. That is what a decline in velocity means, when translated into terms that I think are perhaps more meaningful.

Does this answer your question?

Representative WIDNALL. Yes, sir. Thank you.

Mr. FRIEDMAN. So that an accumulation of savings insofar as it increases wealth and insofar as it is held in cash, does lower velocity.

Representative WIDNALL. That is all.

Representative CURTIS. Mr. Chairman, could I ask a question there?

The CHAIRMAN. Representative Curtis.

Representative CURTIS. You mentioned the money. How about the credit expansion?

That has grown tremendously, too, has it not, the amount of outstanding credit?

When you mention assets of 7 months, is that a net balance?

Mr. FRIEDMAN. We want to offset what some people owe against what some people own, and we must distinguish between credit and total wealth, because, for example, if one thinks of credit, A may make a loan to B, and B may make a loan to C, and C may make a loan to D, and if you added the amount of loans outstanding, the total might be very many times as much as the amount of wealth.

Representative CURTIS. I was interested in the way you brought down the average per person of 7 months' earnings and I was just curious to know, inasmuch as I think we have seen a very rapid expansion of consumer credit, about what the figure for per capita there might be.

Mr. FRIEDMAN. Consumer credit?

I am not sure what is the volume of outstanding consumer credit.

Representative CURTIS. I was thinking of the historical trend you gave, and also with respect to consumer credit. It seems to me that it has been in the 20th century that we have seen the tremendous growth there.

Mr. FRIEDMAN. I am not sure what the facts would show. What we have seen is largely a change in the form of credit.

You now have explicit and formalized consumer credit. If we look, not at the credit for the moment, but at the total amount of wealth in the country in the forms of property and so on, this has not changed drastically when you express it in terms of the number of months' income.

Total wealth of the country amounts to something like 3 or 4 years' income. I am speaking just off the top of my head and I can't guarantee the figure. It is something like 3 to 4 years, and apparently it has been something like that for a hundred or more years.

Now, the wealth has taken different forms. It is clear that as the economy has become broader and more complex, an increasing fraction of wealth has been held indirectly through financial intermediaries, through investment trusts and the like, and a decreasing fraction appears to have been held directly. This is particularly true because of the decline of agriculture.

In a farming community, much of the wealth is held directly by the people who are using it and owning it in the form of the agricultural land and equipment. As you go to an industrial society, a much larger fraction is held indirectly. Thus, much emphasis has been placed, for example, on the growth of the whole complex of financial intermediaries. This growth appears to have been a change in the form of wealth and not really at the expense of holding of money balances over the long pull.

If we take the long pull, the ratio of money to income, the number of months' income which takes the form of money balances has grown.

What has happened is that the amount that has taken the form of liabilities of financial intermediaries such as life insurance companies, of time deposits in mutual savings banks, and the like, has grown even faster. The interpretation that seems to me valid is that this has been at the expense of other kinds of wealth—that is to say it has reflected a shift in the form in which people hold their wealth from direct holding to indirect holding.

Does this get at your question?

Representative CURTIS. It is certainly right on it.

Thank you.

Senator BUSH. Mr. Chairman, I just want to go back to one recommendation that you made, Professor Friedman, respecting the powers of the Federal Reserve Board when we were on the subject of credit control.

You observed that you thought, far from extending their powers, they might be restricted further. I was wondering whether that is a recommendation that is part of a package deal, so to speak, including your stable increase of 3 percent, or would you favor, without that steady increase, having their wings clipped, so to speak?

Mr. FRIEDMAN. I would favor having their wings clipped under present circumstances.

What has happened is, of course, that whenever policy leads to results that are undesirable, there is a perennial tendency to say that it has done so because we don't have enough power and we ought to have more power, rather than to say that it has done so because we were unwilling to take the consequences of a correct policy, or made mistakes in policy.

Senator BUSH. I am not conscious of the fact that they have asked for more power. In fact, they rather resisted that.

Mr. FRIEDMAN. If one looks historically at how they got the powers they have, they almost all arose out of the kind of process I have been describing.

In 1929 they felt, erroneously I think, that the stock market boom was a major problem that should affect their current monetary policy, and this was a source of their later powers over margin requirements. It was because they were really unwilling to use their own powers.

The powers over consumer installment credit and the like are in-

directly a reflection of the bond support program during and after the war. If you tie one hand behind your back by a program like that, then it is natural to ask for something to have in the other hand.

I think it is inappropriate for the Federal Reserve System to exercise direct control over particular uses of credit, that the sole objective of the Federal Reserve System should be to control the total stock of money, and that this is true regardless of the particular criterion that is adopted about the appropriate changes in the stock of money, so that my suggestions are not part of a package deal.

Senator BUSH. Thank you.

The CHAIRMAN. Mr. Friedman, if I may make one comment, it seems to me that a large part of your conclusions depend upon treating time deposits as equivalent to demand deposits, and it seems to me that these are much more in the nature of investments by the individual and reinvestments in most cases by the commercial banks, and that therefore you should not include these demand deposits in the total supply. And similarly, the alleged increase in the velocity of the circulation of money may be attributable to the growth of true time deposits which were formerly held by people as cash prior to the banking period, so I merely suggest that you give that careful consideration, which I am sure you will.

Mr. FRIEDMAN. Senator Douglas, the particular numbers I have been citing would be affected by excluding time deposits from money, but the major results and conclusions for policy or for analysis would not be.

I have examined this question and I have found that similar conclusions are justified if you use currency plus demand deposits alone. The major difference is that you have to use a different number.

Instead of speaking, for example, of something in the neighborhood of 3 to 4 or 5 percent as the appropriate growth of the money stock, you would have to speak of a smaller number, of something, perhaps of the order of 2 to 3 percent because of the secular rise in time deposits. However, the conclusions about the relative stability of the relation between money and prices or money and money income all hold if you substitute demand deposits plus time deposits for the broader concept I have used.

So far as the scientific aspects of it is concerned, I of course agree with you completely that a full analysis ought to recognize the difference between, first, currency and demand deposits, then between demand deposits and commercial bank time deposits, mutual savings time deposits, and so on. In some of the more extensive work we have done, we have tried to examine the relation among these different parts.

In that respect, I agree with you completely, but so far as the major conclusions stated here, I have tried to state conclusions which have the property that they would be valid whichever particular definition of money supply you used, except for the numbers that you put into them.

Senator BUSH. Would the Senator yield on that point?

The CHAIRMAN. Yes.

Senator BUSH. I am interested in what you say about this time deposit of the commercial bank.

I am inclined to agree with you from any knowledge of what kinds of deposits those are. A lot of them I believe are corporate accounts

which are idle balances, and they go up and down in the time deposits account, do they not, depending on whether they need the money in the business or not and, rather than leave it there idle without interest, they switch it over on the time, so I think that argues very strongly for the validity of your position.

The rest of them, though, are the thrift accounts, are they not?

Mr. FRIEDMAN. Yes.

Senator BUSH. How do you measure the relative size of those two limits in time deposits on commercial banks?

I have no idea what that is.

Mr. FRIEDMAN. I don't have any figures available.

Senator BUSH. I would say the so-called thrift account might be relatively stable, while the other might be up and down.

Mr. FRIEDMAN. It might well be.

May I make one comment that relates back to the question about specific credit control, consumer credit control, and margin account?

There is one particular credit control that is generally not called that; namely, the power of the Federal Reserve System to fix the rates of interest which member banks may pay on demand and time deposits. This is a species of price fixing and I think it has no place in our System, and that this power of the Federal Reserve ought to be abolished along with the powers to control specific uses of credit. The rate of interest which member banks may pay on time deposits is fixed, the maximum rate, by the Federal Reserve Board, and actual rates have been up against that limit for quite a long time now.

The CHAIRMAN. One final point I should like to mention. In preparation for your testimony, I read the book which you edited, including an introductory essay which contained a rather bewildering type of equations, and I realize things have moved a long way since the days of Irving Fisher, but the equation which I studied was very similar.

I see over here to the right a mysterious chart. I wonder if you at least would not exhibit these charts so that the passing bystander can realize that economics is becoming as complicated as atomic physics (see p. 638).

Mr. FRIEDMAN. Thank you.

Let me suggest what these things are about as we go along, because I am delighted to do so.

These are various equations that were used in the attempt to state a formal structure of the factors that influence the amount of money people want to hold, just as we talk about the factors that influence the amount of shoes they want to buy or the stocks of durable goods. This (equation (1)) is just the relation between their wealth and their income.

This (W) is wealth, and that depends on what the interest rate (r) is, which is on the bottom, and what their income (Y) is, if we include in wealth the value of human capacity.

These expressions (equations (2), (3), (4), and (5)) are attempts to show the relation among different kinds of rates of interest: You take the rate of return which you get on a bond, that depends on the coupon on the bond, plus the rate of change in the price of the bond; that is to say, whether the price of the bond is rising or falling.

The CHAIRMAN. The equations are in the article, copies of which we have in the hands of the committee and are reproduced at the conclusion of Mr. Friedman's testimony.

Mr. FRIEDMAN. These are all attempts to show how the different rates of interest which affect the cost of holding money are related. Equations (2) and (3) were for bond interest, and these equations (4) and (5) are for yields on equities, that is, common stocks. Equation (6) is the rate in change of prices, and you can see that this enters into these other equations, because if you are going to compare the interest rate on bonds with the interest rate on equities, you have to take account of what is happening in prices.

Equation (7) is supposed to be an expression for what determines the quantity of money demanded. The amount of money that people want to hold depends on what the price level is; depends on what the rate of interest on bonds is, corrected for the changing price of bonds; what the yield is on equities, corrected for the changes in the prices of goods and services; what is happening to the price level, whether the price level is rising or falling; what fraction of their wealth they have in the form of the thing we ordinarily call wealth.

Let me put this last item another way:

Suppose 20 percent of people's income is being received from property, on the one hand, or 5 percent on the other. Then in the latter case they will have less wealth in the form of property and they will tend to hold less money.

Equation (13) is the final one. This is a more sophisticated version of the quantity equation that is in a very much simplified form in my introductory statement. This (Y) is simply money income. This (M) is the stock of money, and this (v) is velocity, but written so as to show what the factors are which influence velocity, which make it what it is.

What velocity is depends on what the rate of interest is on bonds in general, what the rate of return is on stocks, that is, equity yield, what is happening to the rate of change of prices, what fraction of people's wealth is in the form of property, what is their real income, and this "u" is a symbol to remind you that there are some other things associated with the utility which the people attach to the holding of cash balances, such as about how readily available banks might be, how fast the mail is, and things like that, which need to be taken into account in a full analysis.

The CHAIRMAN. Mr. Friedman, the Federal Reserve Board loves to brief Senators and Congressmen on economic affairs in order to diminish our economic ignorance, and so does the Council of Economic Advisers.

I wonder if we could arrange a seminar in which you could brief these gentlemen on these equations. I will be glad to invite them and have you brief them on these equations, if you would be willing to come, and of course we will pay you an honorarium for it.

I think an advanced course for the Federal Reserve and possibly even the Council of Economic Advisors would be very good.

Could you do that possibly?

Mr. FRIEDMAN. A professor is always ready to profess.

The CHAIRMAN. Are there any other further questions?

Senator BUSH. One more.

Going back to the Federal Reserve powers again, I want to ask just this question, Professor Friedman. You are for curtailing that power as far as credit control is concerned?

Mr. FRIEDMAN. Yes, sir.

Senator BUSH. Would you also favor curtailing their powers affecting the money supply, as, for instance, their open market policy powers, their power to control the discount rate, and their setting of reserve requirements?

Do you favor restriction of those powers also?

Mr. FRIEDMAN. Yes, sir; I do, Senator Bush.

Senator BUSH. To what extent, or would you abolish them?

Mr. FRIEDMAN. There are two different levels on which I can answer the question. One is in terms of what you might call minor alterations in the present structure of powers. The other is in terms of a much more fundamental reform in our whole monetary and banking structure.

Let me talk about the first.

Senator BUSH. All right.

Mr. FRIEDMAN. With respect to minor alterations, I believe the present structure of powers is an accumulation of powers which have grown over time without any clear logic and in which the basic reason for many of them have disappeared, and I would be in favor of a sharp streamlining of their powers over the quantity of money.

Taking the present structure, I would do the following things, and I am being dogmatic because of the limited amount of time. I would:

One, abolish rediscounting. It is an anachronistic survival of an earlier day.

The CHAIRMAN. If I may interject, I am so glad you say that, because I have been urging this for several years, finding almost no one to support me, and I have urged that control be exercised directly over the money supply through open market operations and not operating on the interest rate, and I am delighted to have you say that. I feel as though I have had great reinforcement on this point.

Mr. FRIEDMAN. Thank you.

Senator BUSH. I think you have a great audience here this morning.

Mr. FRIEDMAN. I would abolish discretionary control over Reserve requirements. Both of these are very poor instruments of policies from a technical point of view. I would require the system to operate exclusively through open market operations. This is essentially what Senator Douglas has said and I think it is a technical matter of streamlining it.

Whatever criterion of policy you are going to adopt, this would be a technically more effective set of policies, the reason being as follows, if I may indicate briefly:

So far as discounting is concerned, its original purpose was to provide a lender of last resort to commercial banks in difficulty. The establishment of the Federal Deposit Insurance Corporation in 1934 eliminated that purpose. It no longer has that role.

The situation is now one such that in order to stay in one place, the Federal Reserve System has to change the discount rate. Suppose it holds it the same and that market pressures are making for rise in interest rates. Then the same discount rate becomes more expansionary, so in order to stay in step, it has to keep with the market.

There are two ways of solving this problem. One is the way that the Canadian Central Bank has attempted, of saying that the discount rate will be one-quarter of 1 percent or something like that above the market rate the week before on a particular kind of bill, and in this way tying the discount rate explicitly to the market rate.

The other way of doing it would be to abolish discounting. Discounting serves only one function now. That is the function of fining member banks for not meeting reserve requirements.

You need to have some device for that purpose, because if the member bank accidentally does not meet the reserve requirements, there has to be some fine. I would substitute for the discount rate an explicit set of fines at rates which would be punitive from the point of view of the interest rate. They wouldn't be very serious for the banks since the fines would be only to correct for minor differences. So I would abolish discount rates and discounting.

With respect to reserve requirement changes, they are a very poor tool because, in the first place, they are discontinuous. You don't change reserve requirements by one one-hundredth of 1 percent. You invariably tend to change them by 1 percent or a half of 1 percent, and a half of 1 percent is a lot of money.

In the second place it is very hard to know what their effect is because that depends not only on legal reserves, but also on the amount of reserves that banks themselves want to hold. Under some circumstances, an increase in reserve requirements may have no effect. In other circumstances, it may have a very drastic effect, so I think this is a technically very poor tool of policy. If you eliminated discounting and changes in reserve requirements, you would leave the Federal Reserve System with the one tool which is effective and is important; namely, their ability to buy and sell on the open market.

With respect to their ability to buy and sell on the open market, I would leave them free with respect to the kind of securities they deal in.

With respect to their "bills only" doctrine, which is a recent doctrine, I see nothing particularly wrong about it, but I see no reason why it should be a legislative mandate.

Does this answer your question?

Senator BUSH. Thank you very much. It is very interesting.

Representative CURTIS. I have a question.

The CHAIRMAN. Representative Curtis.

Representative CURTIS. I have one question I wanted to ask.

I wonder if you would comment on this theory sometimes advanced, that the demand for credit is inelastic. Therefore, credit restrictions of a general rate result in discrimination against a particular type of borrower.

Mr. FRIEDMAN. Again, one must distinguish clearly between credit policy and the monetary policy, and this question has to do with credit policy. It really has much less to do with Federal Reserve policy than with the general structure of money markets.

No doubt certain categories of borrowers have an inelastic demand for credit. That means that in a free market they will be the ones who will get the credit. They will be willing to pay the price for it.

But if one takes the credit market as a whole, or the capital market as a whole, it seems to me very hard to reconcile the view that the

demand for credit is inelastic, taken as a whole, with the fact that interest rates have fluctuated over relatively moderate ranges over the last hundred years.

If for any commodity, whether it be credit or wheat, the demand is highly inelastic, one consequence is very wide fluctuations in the price of that commodity.

If people are urgently insistent on buying a particular commodity, then small changes in its supply will lead to large changes in its price, and consequently, if it were true that demand for credit as a whole is very inelastic, that would have shown up historically in very wide fluctuations in interest rates.

There are certain cases in which you have had such fluctuations, for example, in call money rates on the stock market. In times of stock market crises, the daily rate of call money has of course risen enormously, and that is a symptom of a case in which the demand for credit of that particular kind was very inelastic under those circumstances. However, if you look at credit markets in general, it is very hard to find many cases of that kind.

Consequently, my own judgment is that the demand for credit is probably elastic, although particular segments within it may of course be inelastic.

Representative CURTIS. Would that not be particularly true of consumer credit?

It would seem to me that would be even more elastic than some of the others you have described, what a person wants to buy.

Mr. FRIEDMAN. That is a very complicated issue you are raising because the demand for consumer credit is connected with the price of goods and services which are being bought on credit, and it is sometimes hard to differentiate between the effect of a change in the prices of the goods and in the terms of credit.

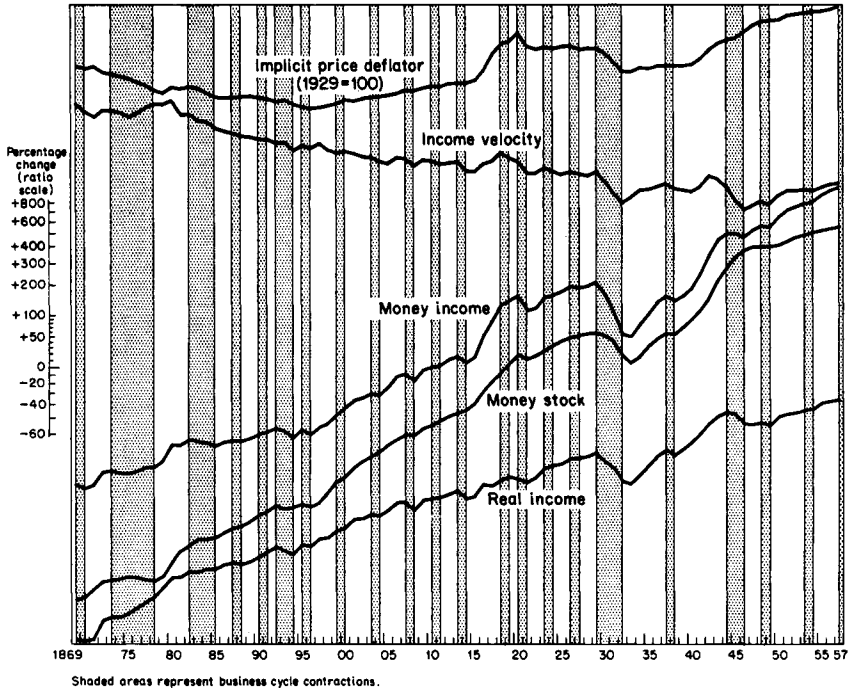
I haven't made any detailed study of the consumer credit market myself and can't express any kind of really informed opinion on it. I would be very much surprised if the demand for consumer credit were notably inelastic. I think it is probably the other way, but I really don't have any empirical evidence that I can offer, only a vague judgment.

Representative CURTIS. Thank you.

Chairman DOUGLAS. Thank you, Mr. Friedman.

(The charts referred to follow :)

Chart 1
MONEY STOCK, INCOME, AND INCOME VELOCITY, 1869-1957



6

Chart 2
MONTHLY RATE OF CHANGE IN MONEY STOCK, 1907-58

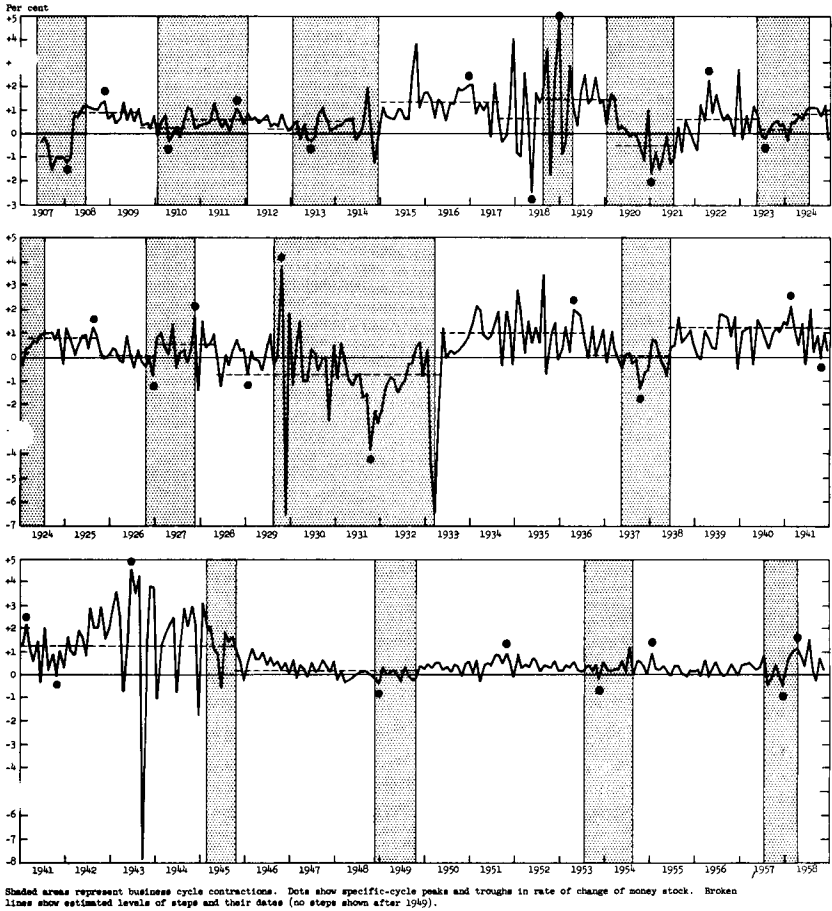


Chart 3

FOUR MEASURES OF AGGREGATE MONETARY VELOCITY

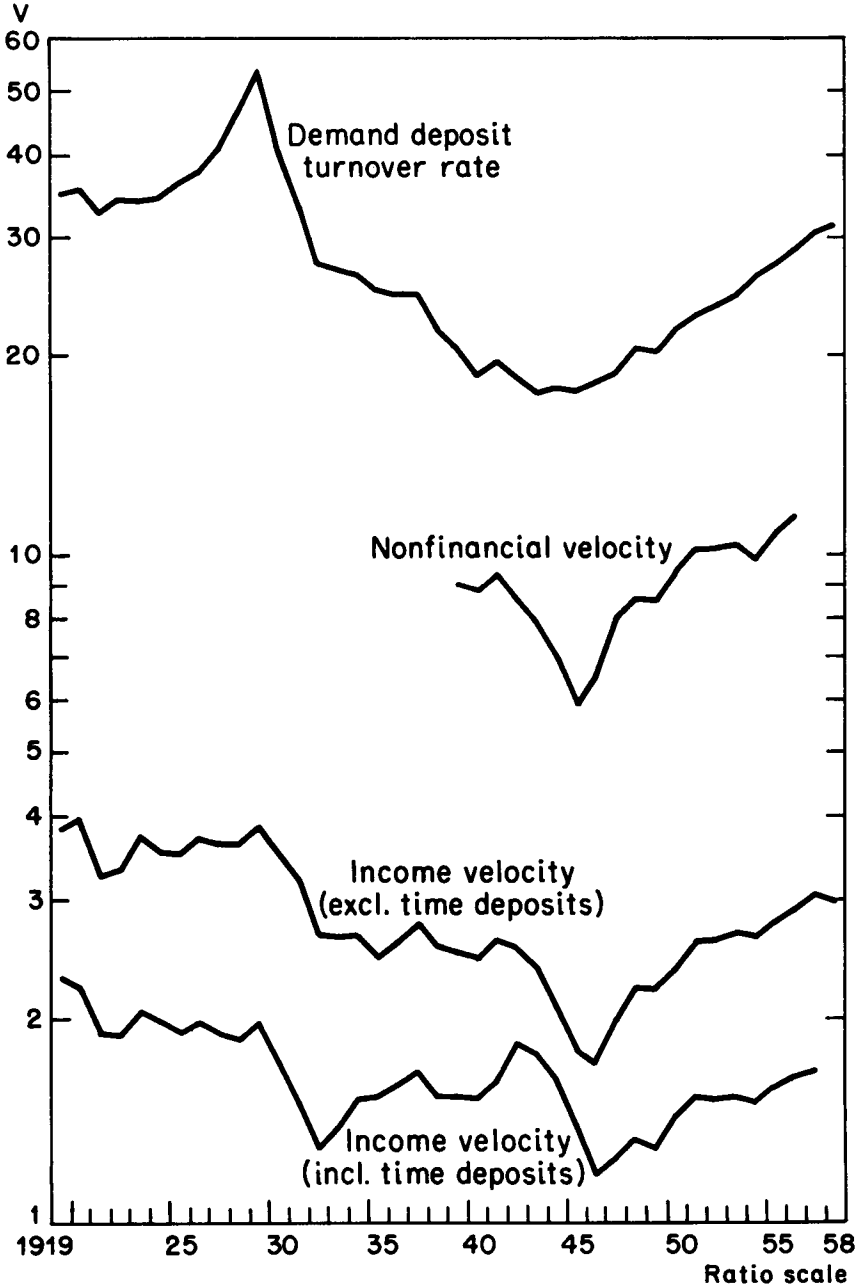
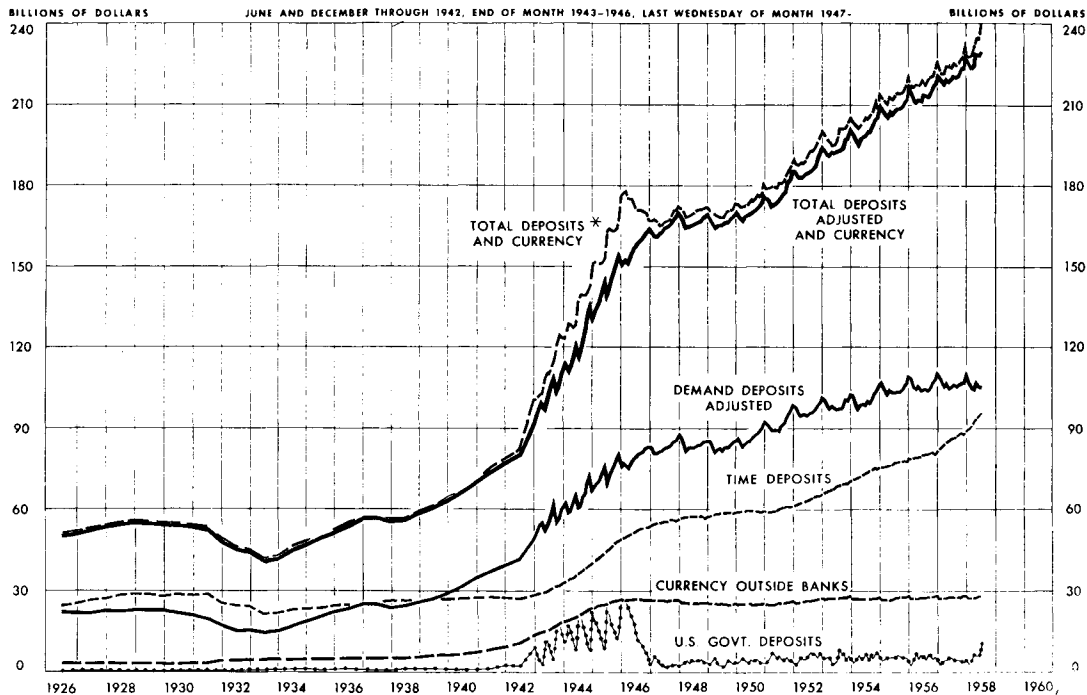


Chart 4

DEPOSITS AND CURRENCY
ALL BANKS IN THE UNITED STATES



* FOR ITEMS EXCLUDED, SEE PAGE 122.

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

Chart 5
ELEMENTS OF THE EQUATION OF EXCHANGE, QUARTERLY, 1947-58

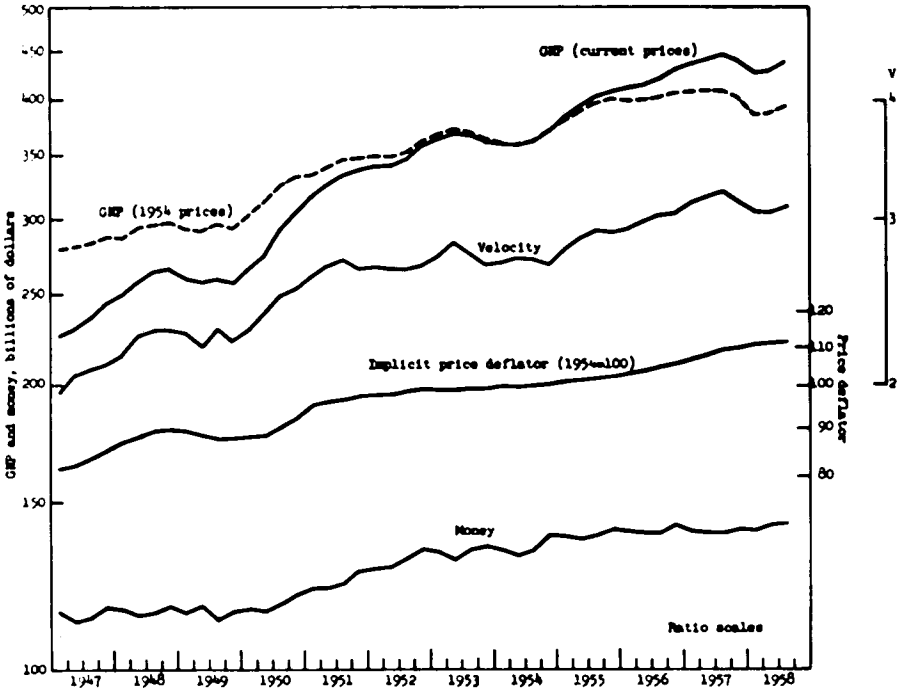


Chart 6
DEMAND DEPOSIT TURNOVER RATES, 1943-58

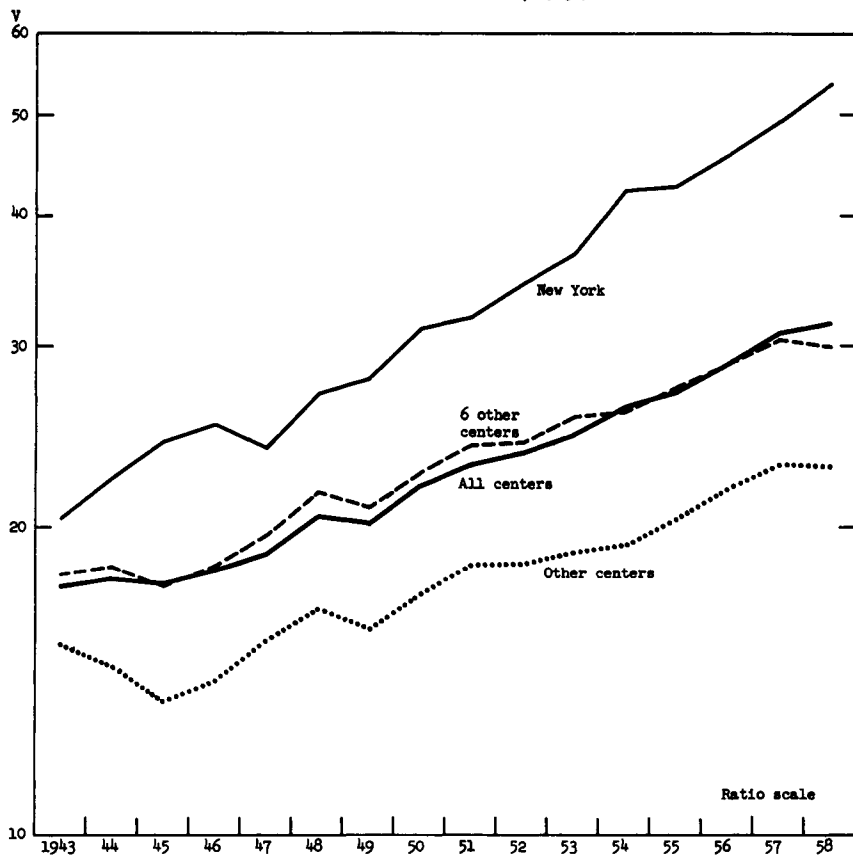


Chart 7
FLOW OF FUNDS SECTOR VELOCITIES, 1939-56

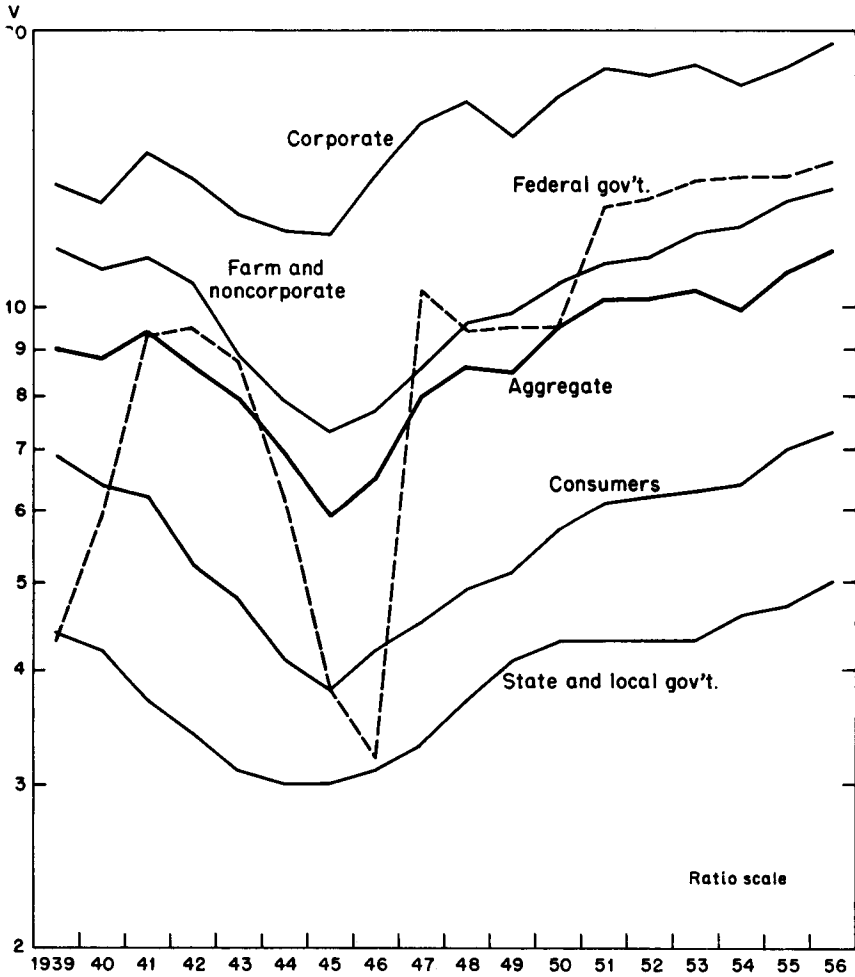


Chart 8

SECTOR VELOCITY COMPONENTS, STATISTICS OF INCOME, 1931-56

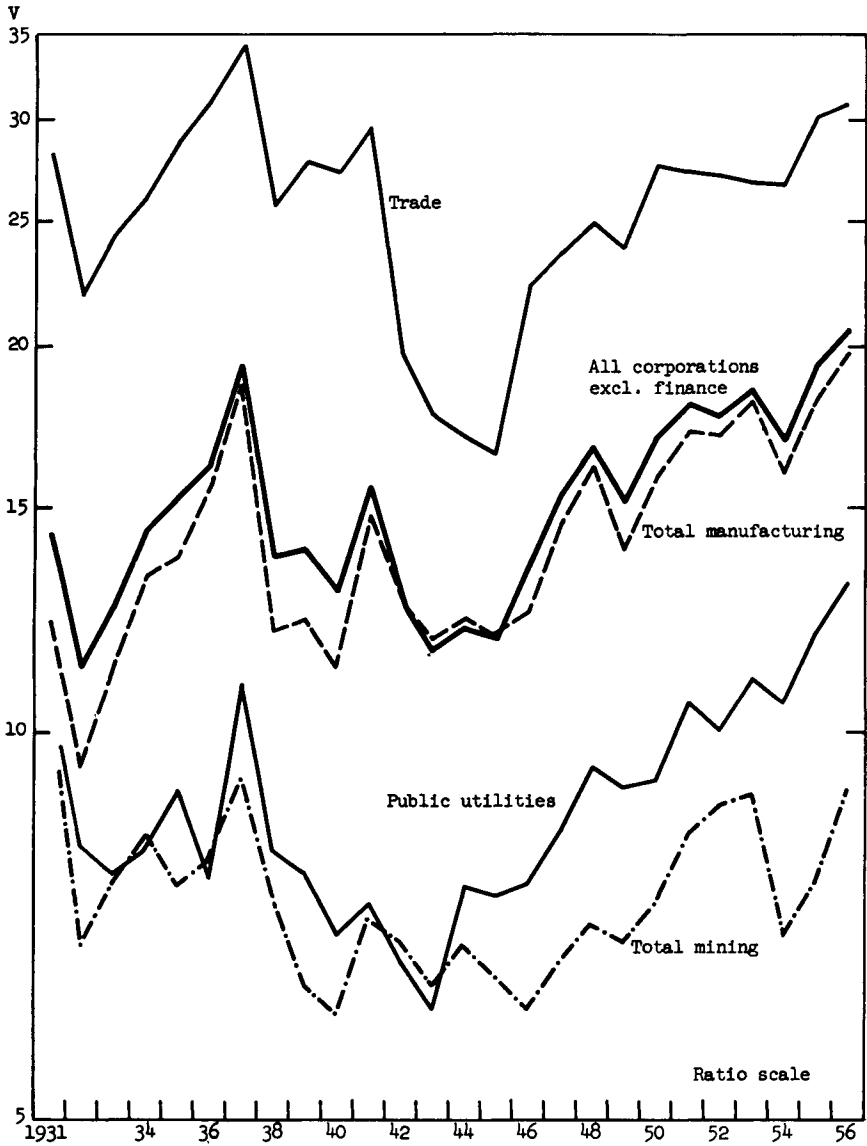


Chart 9

SELECTED SECTOR VELOCITIES BY MAJOR INDUSTRY GROUPS, STATISTICS OF INCOME, 1946-56

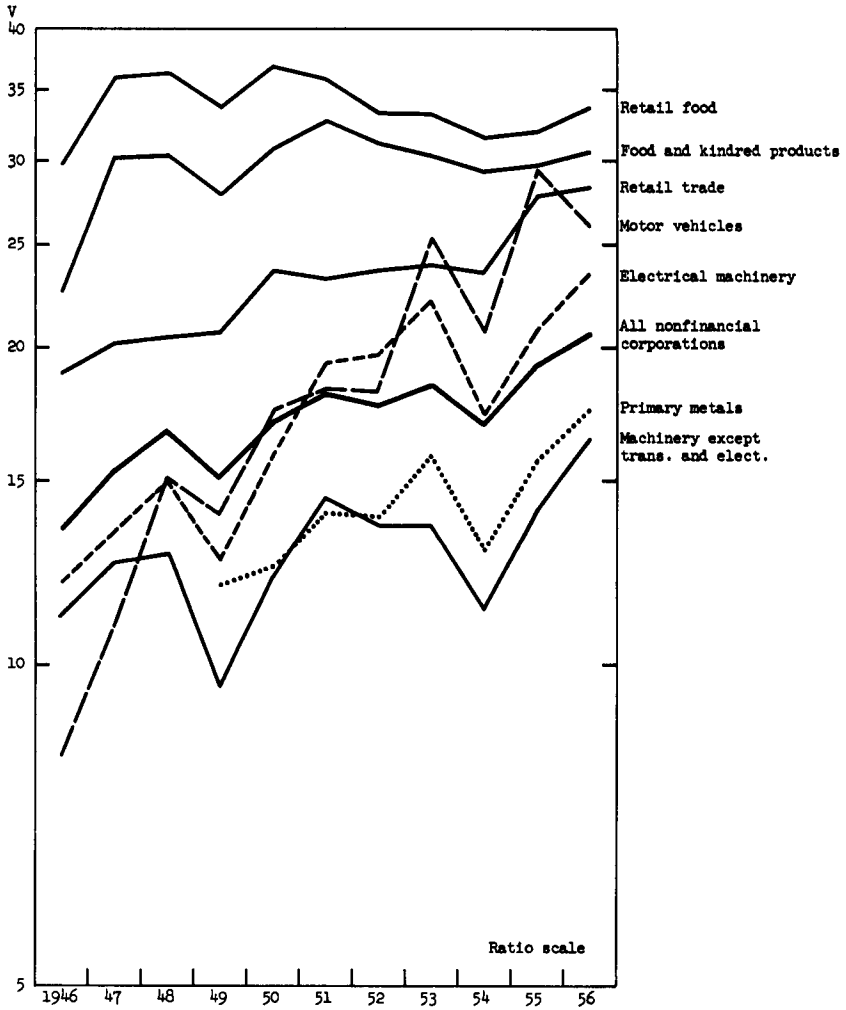


Chart 10

SELECTED SECTOR VELOCITIES BY MAJOR INDUSTRY GROUPS, STATISTICS OF INCOME, 1946-56

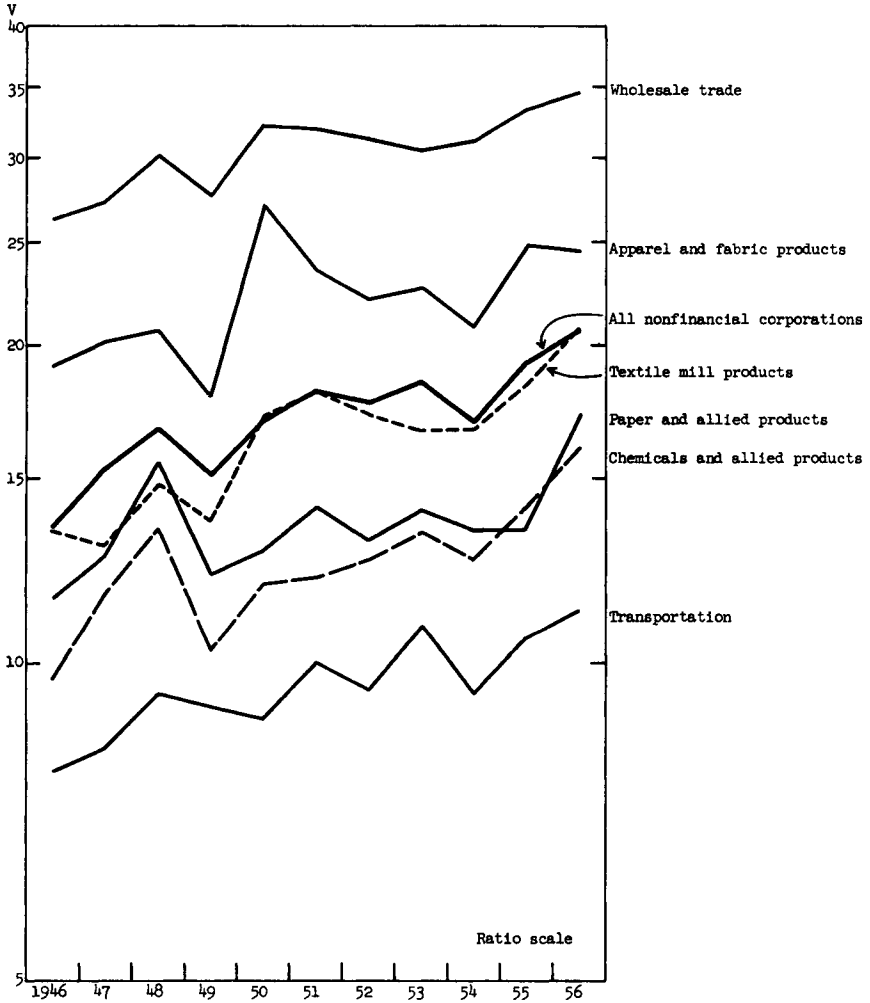
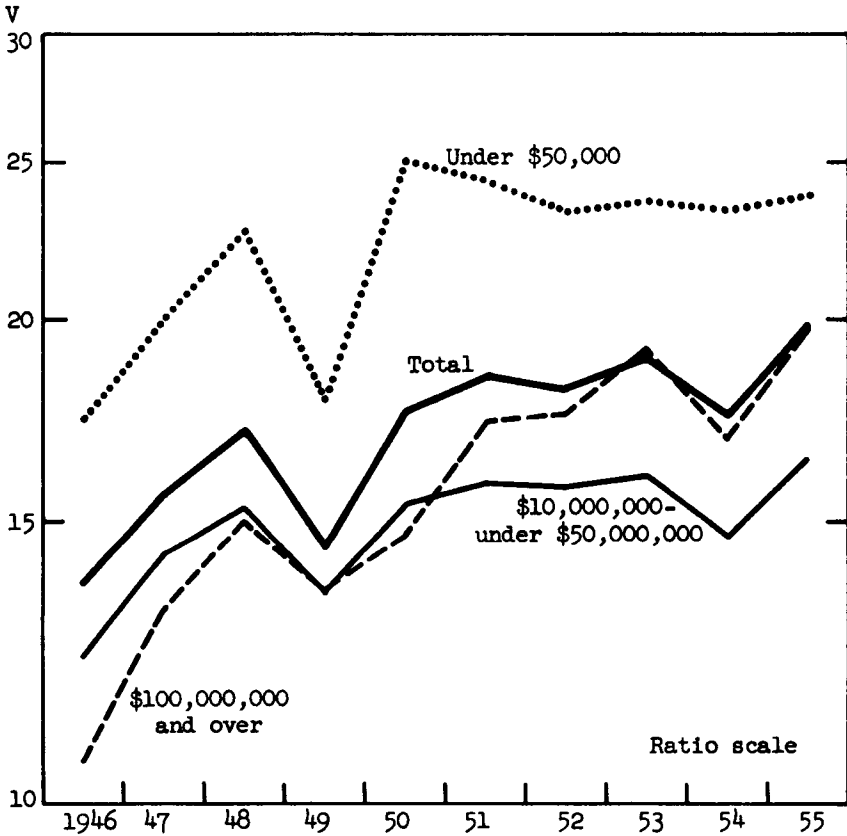


Chart 11

SELECTED ASSET SIZE VELOCITIES, NONFINANCIAL CORPORATIONS,
STATISTICS OF INCOME, 1946-55



(The statement of Mr. Friedman—"The Supply of Money and Changes in Prices and Output"—is contained in the compendium of papers submitted by panelists appearing before the Joint Economic Committee on the "Relationship of Price to Economic Stability and Growth," pp. 241-256. It is for sale by the Superintendent of Documents, Government Printing Office at \$2 per copy, and is also available at depository and university libraries.)

The statement on the quantity theory of money—a restatement by Mr. Friedman, follows:)

I

The Quantity Theory of Money—A Restatement

MILTON FRIEDMAN

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The Quantity Theory of Money—A Restatement

THE quantity theory of money is a term evocative of a general approach rather than a label for a well-defined theory. The exact content of the approach varies from a truism defining the term "velocity" to an allegedly rigid and unchanging ratio between the quantity of money—defined in one way or another—and the price level—also defined in one way or another. Whatever its precise meaning, it is clear that the general approach fell into disrepute after the crash of 1929 and the subsequent Great Depression and only recently has been slowly re-emerging into professional respectability.

The present volume is partly a symptom of this re-emergence and partly a continuance of an aberrant tradition. Chicago was one of the few academic centers at which the quantity theory continued to be a central and vigorous part of the oral tradition throughout the 1930's and 1940's, where students continued to study monetary theory and to write theses on monetary problems. The quantity theory that retained this role differed sharply from the atrophied and rigid caricature that is so frequently described by the proponents of the new income-expenditure approach—and with some justice, to judge by much of the literature on policy that was spawned by quantity theorists. At Chicago, Henry Simons and Lloyd Mints directly, Frank Knight and Jacob Viner at one remove, taught and developed a more subtle and relevant version, one in which the quantity theory was connected and integrated with general price theory and became a flexible and sensitive tool for interpreting movements in aggregate economic activity and for developing relevant policy prescriptions.

To the best of my knowledge, no systematic statement of this theory as developed at Chicago exists, though much can be read between the lines of Simons' and Mints's writings. And this is as it should be, for the Chicago tradition was not a rigid system, an unchangeable orthodoxy, but a way of looking at things. It was a theoretical approach that insisted that money does matter—that any interpretation of short-term movements in economic activity is likely to be seriously at fault if it neglects monetary changes and repercussions and if it leaves unexplained why people are willing to hold the particular nominal quantity of money in existence.

The purpose of this introduction is not to enshrine—or, should I say, inter—a definitive version of the Chicago tradition. To suppose that one

could do so would be inconsistent with that tradition itself. The purpose is rather to set down a particular "model" of a quantity theory in an attempt to convey the flavor of the oral tradition which nurtured the remaining essays in this volume. In consonance with this purpose, I shall not attempt to be exhaustive or to give a full justification for every assertion.

1. The quantity theory is in the first instance a theory of the *demand* for money. It is not a theory of output, or of money income, or of the price level. Any statement about these variables requires combining the quantity theory with some specifications about the conditions of supply of money and perhaps about other variables as well.

2. To the ultimate wealth-owning units in the economy, money is one kind of asset, one way of holding wealth. To the productive enterprise, money is a capital good, a source of productive services that are combined with other productive services to yield the products that the enterprise sells. Thus the theory of the demand for money is a special topic in the theory of capital; as such, it has the rather unusual feature of combining a piece from each side of the capital market, the supply of capital (points 3 through 8 that follow), and the demand for capital (points 9 through 12).

3. The analysis of the demand for money on the part of the ultimate wealth-owning units in the society can be made formally identical with that of the demand for a consumption service. As in the usual theory of consumer choice, the demand for money (or any other particular asset) depends on three major sets of factors: (a) the total wealth to be held in various forms—the analogue of the budget restraint; (b) the price of and return on this form of wealth and alternative forms; and (c) the tastes and preferences of the wealth-owning units. The substantive differences from the analysis of the demand for a consumption service are the necessity of taking account of intertemporal rates of substitution in (b) and (c) and of casting the budget restraint in terms of wealth.

4. From the broadest and most general point of view, total wealth includes all sources of "income" or consumable services. One such source is the productive capacity of human beings, and accordingly this is one form in which wealth can be held. From this point of view, "the" rate of interest expresses the relation between the stock which is wealth and the flow which is income, so if Y be the total flow of income, and r , "the" interest rate, total wealth is

$$W = \frac{Y}{r}. \quad (1)$$

Income in this broadest sense should not be identified with income as it is ordinarily measured. The latter is generally a "gross" stream with respect

to human beings, since no deduction is made for the expense of maintaining human productive capacity intact; in addition, it is affected by transitory elements that make it depart more or less widely from the theoretical concept of the stable level of consumption of services that could be maintained indefinitely.

5. Wealth can be held in numerous forms, and the ultimate wealth-owning unit is to be regarded as dividing his wealth among them (point [a] of 3), so as to maximize "utility" (point [c] of 3), subject to whatever restrictions affect the possibility of converting one form of wealth into another (point [b] of 3). As usual, this implies that he will seek an apportionment of his wealth such that the rate at which he *can* substitute one form of wealth for another is equal to the rate at which he is just willing to do so. But this general proposition has some special features in the present instance because of the necessity of considering flows as well as stocks. We can suppose all wealth (except wealth in the form of the productive capacity of human beings) to be expressed in terms of monetary units at the prices of the point of time in question. The rate at which one form can be substituted for another is then simply \$1.00 worth for \$1.00 worth, regardless of the forms involved. But this is clearly not a complete description, because the holding of one form of wealth instead of another involves a difference in the composition of the income stream, and it is essentially these differences that are fundamental to the "utility" of a particular structure of wealth. In consequence, to describe fully the alternative combinations of forms of wealth that are available to an individual, we must take account not only of their market prices—which except for human wealth can be done simply by expressing them in units worth \$1.00—but also of the form and size of the income streams they yield.

It will suffice to bring out the major issues that these considerations raise to consider five different forms in which wealth can be held: (i) money (*M*), interpreted as claims or commodity units that are generally accepted in payment of debts at a fixed nominal value; (ii) bonds (*B*), interpreted as claims to time streams of payments that are fixed in nominal units; (iii) equities (*E*), interpreted as claims to stated pro-rata shares of the returns of enterprises; (iv) physical non-human goods (*G*); and (v) human capital (*H*). Consider now the yield of each.

(i) Money may yield a return in the form of money, for example, interest on demand deposits. It will simplify matters, however, and entail no essential loss of generality, to suppose that money yields its return solely in kind, in the usual form of convenience, security, etc. The magnitude of this return in "real" terms per nominal unit of money clearly

depends on the volume of goods that unit corresponds to, or on the general price level, which we may designate by P . Since we have decided to take \$1.00 worth as the unit for each form of wealth, this will be equally true for other forms of wealth as well, so P is a variable affecting the "real" yield of each.

(ii) If we take the "standard" bond to be a claim to a perpetual income stream of constant nominal amount, then the return to a holder of the bond can take two forms: one, the annual sum he receives—the "coupon"; the other, any change in the price of the bond over time, a return which may of course be positive or negative. If the price is expected to remain constant, then \$1.00 worth of a bond yields r_b per year, where r_b is simply the "coupon" sum divided by the market price of the bond, so $1/r_b$ is the price of a bond promising to pay \$1.00 per year. We shall call r_b the market bond interest rate. If the price is expected to change, then the yield cannot be calculated so simply, since it must take account of the return in the form of expected appreciation or depreciation of the bond, and it cannot, like r_b , be calculated directly from market prices (so long, at least, as the "standard" bond is the only one traded in).

The nominal income stream purchased for \$1.00 at time zero then consists of

$$r_b(0) + r_b(0) d \frac{\left(\frac{1}{r_b(t)}\right)}{dt} = r_b(0) - \frac{r_b(0)}{r_b^2(t)} \cdot \frac{d r_b(t)}{dt}, \quad (2)$$

where t stands for time. For simplicity, we can approximate this functional by its value at time zero, which is

$$r_b - \frac{1}{r_b} \frac{d r_b}{dt}. \quad (3)$$

This sum, together with P already introduced, defines the real return from holding \$1.00 of wealth in the form of bonds.

(iii) Analogously to our treatment of bonds, we may take the "standard" unit of equity to be a claim to a perpetual income stream of constant "real" amount; that is, to be a standard bond with a purchasing-power escalator clause, so that it promises a perpetual income stream equal in nominal units to a constant number times a price index, which we may, for convenience, take to be the same price index P introduced in (i).¹ The nominal return to the holder of the equity can then be regarded as taking three forms: the constant nominal amount he would receive per year in

1. This is an oversimplification, because it neglects "leverage" and therefore supposes that any monetary liabilities of an enterprise are balanced by monetary assets.

the absence of any change in P ; the increment or decrement to this nominal amount to adjust for changes in P ; and any change in the nominal price of the equity over time, which may of course arise from changes either in interest rates or in price levels. Let r_e be the market interest rate on equities defined analogously to r_b , namely, as the ratio of the "coupon" sum at any time (the first two items above) to the price of the equity, so $1/r_e$ is the price of an equity promising to pay \$1.00 per year if the price level does not change, or to pay

$$\frac{P(t)}{P(0)} \cdot 1$$

if the price level varies according to $P(t)$. If $r_e(t)$ is defined analogously, the price of the bond selling for $1/r_e(0)$ at time 0 will be

$$\frac{P(t)}{P(0) r_e(t)}$$

at time t , where the ratio of prices is required to adjust for any change in the price level. The nominal stream purchased for \$1.00 at time zero then consists of

$$\begin{aligned} r_e(0) \cdot \frac{P(t)}{P(0)} + \frac{r_e(0)}{P(0)} \cdot d \left[\frac{P(t)}{r_e(t)} \right] &= r_e(0) \cdot \frac{P(t)}{P(0)} \\ &+ \frac{r_e(0)}{r_e(t)} \cdot \frac{1}{P(0)} \cdot \frac{dP(t)}{dt} - \frac{P(t)}{P(0)} \cdot \frac{r_e(0)}{r_e^2(t)} \cdot \frac{dr_e(t)}{dt}. \end{aligned} \quad (4)$$

Once again we can approximate this functional by its value at time zero, which is

$$r_e + \frac{1}{P} \frac{dP}{dt} - \frac{1}{r_e} \frac{dr_e}{dt}. \quad (5)$$

This sum, together with P already introduced, defines the "real" return from holding \$1.00 of wealth in the form of equities.

(iv) Physical goods held by ultimate wealth-owning units are similar to equities except that the annual stream they yield is in kind rather than in money. In terms of nominal units, this return, like that from equities, depends on the behavior of prices. In addition, like equities, physical goods must be regarded as yielding a nominal return in the form of appreciation or depreciation in money value. If we suppose the price level P , introduced earlier, to apply equally to the value of these physical goods, then, at time zero,

$$\frac{1}{P} \frac{dP}{dT} \quad (6)$$

is the size of this nominal return per \$1.00 of physical goods.² Together with P , it defines the "real" return from holding \$1.00 in the form of physical goods.

(v) Since there is only a limited market in human capital, at least in modern non-slave societies, we cannot very well define in market prices the terms of substitution of human capital for other forms of capital and so cannot define at any time the physical unit of capital corresponding to \$1.00 of human capital. There are some possibilities of substituting non-human capital for human capital in an individual's wealth holdings, as, for example, when he enters into a contract to render personal services for a specified period in return for a definitely specified number of periodic payments, the number not depending on his being physically capable of rendering the services. But, in the main, shifts between human capital and other forms must take place through direct investment and disinvestment in the human agent, and we may as well treat this as if it were the only way. With respect to this form of capital, therefore, the restriction or obstacles affecting the alternative compositions of wealth available to the individual cannot be expressed in terms of market prices or rates of return. At any one point in time there is some division between human and non-human wealth in his portfolio of assets; he may be able to change this over time, but we shall treat it as given at a point in time. Let w be the ratio of non-human to human wealth or, equivalently, of income from non-human wealth to income from human wealth, which means that it is closely allied to what is usually defined as the ratio of wealth to income. This is, then, the variable that needs to be taken into account so far as human wealth is concerned.

6. The tastes and preferences of wealth-owning units for the service streams arising from different forms of wealth must in general simply be taken for granted as determining the form of the demand function. In order to give the theory empirical content, it will generally have to be supposed that tastes are constant over significant stretches of space and time. However, explicit allowance can be made for some changes in tastes in so far as such changes are linked with objective circumstances. For example, it seems reasonable that, other things the same, individuals want

2. In principle, it might be better to let P refer solely to the value of the services of physical goods, which is essentially what it refers to in the preceding cases, and to allow for the fact that the prices of the capital goods themselves must vary also with the rate of capitalization, so that the prices of services and their sources vary at the same rate only if the relevant interest rate is constant. I have neglected this refinement for simplicity; the neglect can perhaps be justified by the rapid depreciation of many of the physical goods held by final wealth-owning units.

to hold a larger fraction of their wealth in the form of money when they are moving around geographically or are subject to unusual uncertainty than otherwise. This is probably one of the major factors explaining a frequent tendency for money holdings to rise relative to income during wartime. But the extent of geographic movement, and perhaps of other kinds of uncertainty, can be represented by objective indexes, such as indexes of migration, miles of railroad travel, and the like. Let u stand for any such variables that can be expected to affect tastes and preferences (for "utility" determining variables).

7. Combining 4, 5, and 6 along the lines suggested by 3 yields the following demand function for money:

$$M = f\left(P, r_b - \frac{1}{r_b} \frac{dr_b}{dt}, r_e + \frac{1}{P} \frac{dP}{dt} - \frac{1}{r_e} \frac{dr_e}{dt}, \frac{1}{P} \frac{dP}{dt}; w; \frac{Y}{r}; u\right). \quad (7)$$

A number of observations are in order about this function.

(i) Even if we suppose prices and rates of interest unchanged, the function contains three rates of interest: two for specific types of assets, r_b and r_e , and one intended to apply to all types of assets, r . This general rate, r , is to be interpreted as something of a weighted average of the two special rates plus the rates applicable to human wealth and to physical goods. Since the latter two cannot be observed directly, it is perhaps best to regard them as varying in some systematic way with r_b and r_e . On this assumption, we can drop r as an additional explicit variable, treating its influence as fully taken into account by the inclusion of r_b and r_e .

(ii) If there were no differences of opinion about price movements and interest-rate movements, and bonds and equities were equivalent except that the former are expressed in nominal units, arbitrage would of course make

$$r_b - \frac{1}{r_b} \frac{dr_b}{dt} = r_e + \frac{1}{P} \frac{dP}{dt} - \frac{1}{r_e} \frac{dr_e}{dt}, \quad (8)$$

or, if we suppose rates of interest either stable or changing at the same percentage rate,

$$r_b = r_e + \frac{1}{P} \frac{dP}{dt}, \quad (9)$$

that is, the "money" interest rate equal to the "real" rate plus the percentage rate of change of prices. In application the rate of change of prices must be interpreted as an "expected" rate of change and differences of opinion cannot be neglected, so we cannot suppose (9) to hold; indeed,

one of the most consistent features of inflation seems to be that it does not.³

(iii) If the range of assets were to be widened to include promises to pay specified sums for a finite number of time units—"short-term" securities as well as "consols"—the rates of change of r_b and r_e would be reflected in the difference between long and short rates of interest. Since at some stage it will doubtless be desirable to introduce securities of different time duration (see point 23 below), we may simplify the present exposition by restricting it to the case in which r_b and r_e are taken to be stable over time. Since the rate of change in prices is required separately in any event, this means that we can replace the cumbrous variables introduced to designate the nominal return on bonds and equities simply by r_b and r_e .

(iv) Y can be interpreted as including the return to all forms of wealth, including money and physical capital goods owned and held directly by ultimate wealth-owning units, and so Y/r can be interpreted as an estimate of total wealth, only if Y is regarded as including some imputed income from the stock of money and directly owned physical capital goods. For monetary analysis the simplest procedure is perhaps to regard Y as referring to the return to all forms of wealth other than the money held directly by ultimate wealth-owning units, and so Y/r as referring to total remaining wealth.

8. A more fundamental point is that, as in all demand analyses resting on maximization of a utility function defined in terms of "real" magnitudes, this demand equation must be considered independent in any essential way of the nominal units used to measure money variables. If the unit in which prices and money income are expressed is changed, the amount of money demanded should change proportionately. More technically, equation (7) must be regarded as homogeneous of the first degree in P and Y , so that

$$\begin{aligned} f\left(\lambda P, r_b, r_e, \frac{1}{P} \frac{dP}{dt}; w; \lambda Y; u\right) \\ = \lambda f\left(P, r_b, r_e, \frac{1}{P} \frac{dP}{dt}; w; Y; u\right). \end{aligned} \tag{10}$$

where the variables within the parentheses have been rewritten in simpler form in accordance with comments 7 (i) and 7 (iii).

3. See Reuben Kessel, "Inflation: Theory of Wealth Distribution and Application in Private Investment Policy" (unpublished doctoral dissertation, University of Chicago).

This characteristic of the function enables us to rewrite it in two alternative and more familiar ways.

(i) Let $\lambda = 1/P$. Equation (7) can then be written

$$\frac{M}{P} = f\left(r_b, r_e, \frac{1}{P} \frac{dP}{dt}; w; \frac{Y}{P}; u\right). \quad (11)$$

In this form the equation expresses the demand for real balances as a function of "real" variables independent of nominal monetary values.

(ii) Let $\lambda = 1/Y$. Equation (7) can then be written

$$\begin{aligned} \frac{M}{Y} &= f\left(r_b, r_e, \frac{1}{P} \frac{dP}{dt}, w, \frac{P}{Y}, u\right) \\ &= \frac{1}{v\left(r_b, r_e, \frac{1}{P} \frac{dP}{dt}, w, \frac{Y}{P}, u\right)}, \end{aligned} \quad (12)$$

or

$$Y = v\left(r_b, r_e, \frac{1}{P} \frac{dP}{dt}, w, \frac{Y}{P}, u\right) \cdot M. \quad (13)$$

In this form the equation is in the usual quantity theory form, where v is income velocity.

9. These equations are, to this point, solely for money held directly by ultimate wealth-owning units. As noted, money is also held by business enterprises as a productive resource. The counterpart to this business asset in the balance sheet of an ultimate wealth-owning unit is a claim other than money. For example, an individual may buy bonds from a corporation, and the corporation use the proceeds to finance the money holdings which it needs for its operations. Of course, the usual difficulties of separating the accounts of the business and its owner arise with unincorporated enterprises.

10. The amount of money that it pays business enterprises to hold depends, as for any other source of productive services, on the cost of the productive services, the cost of substitute productive services, and the value product yielded by the productive service. Per dollar of money held, the cost depends on how the corresponding capital is raised—whether by raising additional capital in the form of bonds or equities, by substituting cash for real capital goods, etc. These ways of financing money holdings are much the same as the alternative forms in which the ultimate wealth-owning unit can hold its non-human wealth, so that the variables r_b , r_e , P , and $(1/P)(dP/dt)$ introduced into (7) can be taken to represent the cost to the business enterprise of holding money. For some purposes, however, it may be desirable to distinguish between the rate of return re-

ceived by the lender and the rate paid by the borrower; in which case it would be necessary to introduce an additional set of variables.

Substitutes for money as a productive service are numerous and varied, including all ways of economizing on money holdings by using other resources to synchronize more closely payments and receipts, reduce payment periods, extend use of book credit, establish clearing arrangements, and so on in infinite variety. There seem no particularly close substitutes whose prices deserve to be singled out for inclusion in the business demand for money.

The value product yielded by the productive services of money per unit of output depends on production conditions: the production function. It is likely to be especially dependent on features of production conditions affecting the smoothness and regularity of operations as well as on those determining the size and scope of enterprises, degree of vertical integration, etc. Again there seem no variables that deserve to be singled out on the present level of abstraction for special attention; these factors can be taken into account by interpreting u as including variables affecting not only the tastes of wealth-owners but also the relevant technological conditions of production. Given the amount of money demanded per unit of output, the total amount demanded is proportional to total output, which can be represented by Y .

11. One variable that has traditionally been singled out in considering the demand for money on the part of business enterprises is the volume of transactions, or of transactions per dollar of final products; and, of course, emphasis on transactions has been carried over to the ultimate wealth-owning unit as well as to the business enterprise. The idea that renders this approach attractive is that there is a mechanical link between a dollar of payments per unit time and the average stock of money required to effect it—a fixed technical coefficient of production, as it were. It is clear that this mechanical approach is very different in spirit from the one we have been following. On our approach, the average amount of money held per dollar of transactions is itself to be regarded as a resultant of an economic equilibrating process, not as a physical datum. If, for whatever reason, it becomes more expensive to hold money, then it is worth devoting resources to effecting money transactions in less expensive ways or to reducing the volume of transactions per dollar of final output. In consequence, our ultimate demand function for money in its most general form does not contain as a variable the volume of transactions or of transactions per dollar of final output; it contains rather those more basic technical and cost conditions that affect the costs of conserving money, be it by changing the average amount of money held per dollar of transac-

tions per unit time or by changing the number of dollars of transactions per dollar of final output. This does not, of course, exclude the possibility that, for a particular problem, it may be useful to regard the transactions variables as given and not to dig beneath them and so to include the volume of transactions per dollar of final output as an explicit variable in a special variant of the demand function.

Similar remarks are relevant to various features of payment conditions, frequently described as "institutional conditions," affecting the velocity of circulation of money and taken as somehow mechanically determined—such items as whether workers are paid by the day, or week, or month; the use of book credit; and so on. On our approach these, too, are to be regarded as resultants of an economic equilibrating process, not as physical data. Lengthening the pay period, for example, may save book-keeping and other costs to the employer, who is therefore willing to pay somewhat more than in proportion for a longer than a shorter pay period; on the other hand, it imposes on employees the cost of holding larger cash balances or providing substitutes for cash, and they therefore want to be paid more than in proportion for a longer pay period. Where these will balance depends on how costs vary with length of pay period. The cost to the employee depends in considerable part on the factors entering into his demand curve for money for a fixed pay period. If he would in any event be holding relatively large average balances, the additional costs imposed by a lengthened pay period tend to be less than if he would be holding relatively small average balances, and so it will take less of an inducement to get him to accept a longer pay period. For given cost savings to the employer, therefore, the pay period can be expected to be longer in the first case than in the second. Surely, the increase in the average cash balance over the past century in this country that has occurred for other reasons has been a factor producing a lengthening of pay periods and not the other way around. Or, again, experience in hyperinflation shows how rapidly payment practices change under the impact of drastic changes in the cost of holding money.

12. The upshot of these considerations is that the demand for money on the part of business enterprises can be regarded as expressed by a function of the same kind as equation (7), with the same variables on the right-hand side. And, like (7), since the analysis is based on informed maximization of returns by enterprises, only "real" quantities matter, so it must be homogeneous of the first degree in Y and P . In consequence, we can interpret (7) and its variants (11) and (13) as describing the demand for money on the part of a business enterprise as well as on the part of an

ultimate wealth-owning unit, provided only that we broaden our interpretation of u .

13. Strictly speaking, the equations (7), (11), and (13) are for an individual wealth-owning unit or business enterprise. If we aggregate (7) for all wealth-owning units and business enterprises in the society, the result, in principle, depends on the distribution of the units by the several variables. This raises no serious problem about P , r_b , and r_e , for these can be taken as the same for all, or about u , for this is an unspecified portmanteau variable to be filled in as the occasion demands. We have been interpreting $(1/P)(dP/dt)$ as the expected rate of price rise, so there is no reason why this variable should be the same for all, and w and Y clearly differ substantially among units. An approximation is to neglect these difficulties and take (7) and the associated (11) and (13) as applying to the aggregate demand for money, with $(1/P)(dP/dt)$ interpreted as some kind of an average expected rate of change of prices, w as the ratio of total income from non-human wealth to income from human wealth, and Y as aggregate income. This is the procedure that has generally been followed, and it seems the right one until serious departures between this linear approximation and experience make it necessary to introduce measures of dispersion with respect to one or more of the variables.

14. It is perhaps worth noting explicitly that the model does not use the distinction between "active balances" and "idle balances" or the closely allied distinction between "transaction balances" and "speculative balances" that is so widely used in the literature. The distinction between money holdings of ultimate wealth-owners and of business enterprises is related to this distinction but only distantly so. Each of these categories of money-holders can be said to demand money partly from "transaction" motives, partly from "speculative" or "asset" motives, but dollars of money are not distinguished according as they are said to be held for one or the other purpose. Rather, each dollar is, as it were, regarded as rendering a variety of services, and the holder of money as altering his money holdings until the value to him of the addition to the total flow of services produced by adding a dollar to his money stock is equal to the reduction in the flow of services produced by subtracting a dollar from each of the other forms in which he holds assets.

15. Nothing has been said above about "banks" or producers of money. This is because their main role is in connection with the supply of money rather than the demand for it. Their introduction does, however, blur some of the points in the above analysis: the existence of banks enables productive enterprises to acquire money balances without raising capital from ultimate wealth-owners. Instead of selling claims (bonds or

equities) to them, it can sell its claims to banks, getting "money" in exchange: in the phrase that was once so common in textbooks on money, the bank coins specific liabilities into generally acceptable liabilities. But this possibility does not alter the preceding analysis in any essential way.

16. Suppose the supply of money in nominal units is regarded as fixed or more generally autonomously determined. Equation (13) then defines the conditions under which this nominal stock of money will be the amount demanded. Even under these conditions, equation (13) alone is not sufficient to determine money income. In order to have a complete model for the determination of money income, it would be necessary to specify the determinants of the structure of interest rates, of real income, and of the path of adjustment in the price level. Even if we suppose interest rates determined independently—by productivity, thrift, and the like—and real income as also given by other forces, equation (13) only determines a unique equilibrium level of money income if we mean by this the level at which prices are stable. More generally, it determines a time path of money income for given initial values of money income.

In order to convert equation (13) into a "complete" model of income determination, therefore, it is necessary to suppose either that the demand for money is highly inelastic with respect to the variables in v or that all these variables are to be taken as rigid and fixed.

17. Even under the most favorable conditions, for example, that the demand for money is quite inelastic with respect to the variables in v , equation (13) gives at most a theory of money income: it then says that changes in money income mirror changes in the nominal quantity of money. But it tells nothing about how much of any change in F is reflected in real output and how much in prices. To infer this requires bringing in outside information, as, for example, that real output is at its feasible maximum, in which case any increase in money would produce the same or a larger percentage increase in prices; and so on.

18. In light of the preceding exposition, the question arises what it means to say that someone is or is not a "quantity theorist." Almost every economist will accept the general lines of the preceding analysis on a purely formal and abstract level, although each would doubtless choose to express it differently in detail. Yet there clearly are deep and fundamental differences about the importance of this analysis for the understanding of short- and long-term movements in general economic activity. This difference of opinion arises with respect to three different issues: (i) the stability and importance of the demand function for money; (ii) the independence of the factors affecting demand and supply; and (iii) the form of the demand function or related functions.

(i) The quantity theorist accepts the empirical hypothesis that the demand for money is highly stable—more stable than functions such as the consumption function that are offered as alternative key relations. This hypothesis needs to be hedged on both sides. On the one side, the quantity theorist need not, and generally does not, mean that the real quantity of money demanded per unit of output, or the velocity of circulation of money, is to be regarded as numerically constant over time; he does not, for example, regard it as a contradiction to the stability of the demand for money that the velocity of circulation of money rises drastically during hyperinflations. For the stability he expects is in the functional relation between the quantity of money demanded and the variables that determine it, and the sharp rise in the velocity of circulation of money during hyperinflations is entirely consistent with a stable functional relation, as Cagan so clearly demonstrates in his essay. On the other side, the quantity theorist must sharply limit, and be prepared to specify explicitly, the variables that it is empirically important to include in the function. For to expand the number of variables regarded as significant is to empty the hypothesis of its empirical content; there is indeed little if any difference between asserting that the demand for money is highly unstable and asserting that it is a perfectly stable function of an indefinitely large number of variables.

The quantity theorist not only regards the demand function for money as stable; he also regards it as playing a vital role in determining variables that he regards as of great importance for the analysis of the economy as a whole, such as the level of money income or of prices. It is this that leads him to put greater emphasis on the demand for money than on, let us say, the demand for pins, even though the latter might be as stable as the former. It is not easy to state this point precisely, and I cannot pretend to have done so. (See item [iii] below for an example of an argument against the quantity theorist along these lines.)

The reaction against the quantity theory in the 1930's came largely, I believe, under this head. The demand for money, it was asserted, is a will-o'-the-wisp, shifting erratically and unpredictably with every rumor and expectation; one cannot, it was asserted, reliably specify a limited number of variables on which it depends. However, although the reaction came under this head, it was largely rationalized under the two succeeding heads.

(ii) The quantity theorist also holds that there are important factors affecting the supply of money that do not affect the demand for money. Under some circumstances these are technical conditions affecting the supply of specie; under others, political or psychological conditions determining the policies of monetary authorities and the banking system. A stable

demand function is useful precisely in order to trace out the effects of changes in supply, which means that it is useful only if supply is affected by at least some factors other than those regarded as affecting demand.

The classical version of the objection under this head to the quantity theory is the so-called real-bills doctrine: that changes in the demand for money call forth corresponding changes in supply and that supply cannot change otherwise, or at least cannot do so under specified institutional arrangements. The forms which this argument takes are legion and are still widespread. Another version is the argument that the "quantity theory" cannot "explain" large price rises, because the price rise produced both the increase in demand for nominal money holdings and the increase in supply of money to meet it; that is, implicitly that the same forces affect both the demand for and the supply of money, and in the same way.

(iii) The attack on the quantity theory associated with the Keynesian underemployment analysis is based primarily on an assertion about the form of (7) or (11). The demand for money, it is said, is infinitely elastic at a "small" positive interest rate. At this interest rate, which can be expected to prevail under underemployment conditions, changes in the real supply of money, whether produced by changes in prices or in the nominal stock of money, have no effect on anything. This is the famous "liquidity trap." A rather more complex version involves the shape of other functions as well: the magnitudes in (7) other than "the" interest rate, it is argued, enter into other relations in the economic system and can be regarded as determined there; the interest rate does not enter into these other functions; it can therefore be regarded as determined by this equation. So the only role of the stock of money and the demand for money is to determine the interest rate.

19. The proof of this pudding is in the eating; and the essays in this book contain much relevant food, of which I may perhaps mention three particularly juicy items.

One cannot read Lerner's description of the effects of monetary reform in the Confederacy in 1864 without recognizing that at least on occasion the supply of money can be a largely autonomous factor and the demand for money highly stable even under extraordinarily unstable circumstances. After three years of war, after widespread destruction and military reverses, in the face of impending defeat, a monetary reform that succeeded in reducing the stock of money halted and reversed for some months a rise in prices that had been going on at the rate of 10 per cent a month most of the war! It would be hard to construct a better controlled experiment to demonstrate the critical importance of the supply of money.

On the other hand, Klein's examination of German experience in World

War II is much less favorable to the stability and importance of the demand for money. Though he shows that defects in the figures account for a sizable part of the crude discrepancy between changes in the recorded stock of money and in recorded prices, correction of these defects still leaves a puzzlingly large discrepancy that it does not seem possible to account for in terms of the variables introduced into the above exposition of the theory. Klein examined German experience precisely because it seemed the most deviant on a casual examination. Both it and other war-time experience will clearly repay further examination.

Cagan's examination of hyperinflations is another important piece of evidence on the stability of the demand for money under highly unstable conditions. It is also an interesting example of the difference between a numerically stable velocity and a stable functional relation: the numerical value of the velocity varied enormously during the hyperinflations, but this was a predictable response to the changes in the expected rate of changes of prices.

20. Though the essays in this book contain evidence relevant to the issues discussed in point 18, this is a by-product rather than their main purpose, which is rather to add to our tested knowledge about the characteristics of the demand function for money. In the process of doing so, they also raise some questions about the theoretical formulation and suggest some modifications it might be desirable to introduce. I shall comment on a few of those without attempting to summarize at all fully the essays themselves.

21. Selden's material covers the longest period of time and the most "normal" conditions. This is at once a virtue and a vice—a virtue, because it means that his results may be applicable most directly to ordinary peacetime experience; a vice, because "normality" is likely to spell little variation in the fundamental variables and hence a small base from which to judge their effect. The one variable that covers a rather broad range is real income, thanks to the length of the period. The secular rise in real income has been accompanied by a rise in real cash balances per unit of output—a decline in velocity—from which Selden concludes that the income elasticity of the demand for real balances is greater than unity—cash balances are a "luxury" in the terminology generally adopted. This entirely plausible result seems to be confirmed by evidence for other countries as well.

22. Selden finds that for cyclical periods velocity rises during expansions and falls during contractions, a result that at first glance seems to contradict the secular result just cited. However, there is an alternative explanation entirely consistent with the secular result. It will be recalled

that Y was introduced into equation (7) as an index of wealth. This has important implications for the measure or concept of income that is relevant. What is required by the theoretical analysis is not usual measured income—which in the main corresponds to current receipts corrected for double counting—but a longer term concept, “expected income,” or what I have elsewhere called “permanent income.”⁴ Now suppose that the variables in the v function of (13) are unchanged for a period. The ratio of Y to M would then be unchanged, provided Y is *permanent* income. Velocity as Selden computes it is the ratio of *measured* income to the stock of money and would not be unchanged. When measured income was above permanent income, measured velocity would be relatively high, and conversely. Now measured income is presumably above permanent income at cyclical peaks and below permanent income at cyclical troughs. The observed positive conformity of measured velocity to cyclical changes of income may therefore reflect simply the difference between measured income and the concept relevant to equation (13).

23. Another point that is raised by Selden’s work is the appropriate division of wealth into forms of assets. The division suggested above is, of course, only suggestive. Selden finds more useful the distinction between “short-term” and “long-term” bonds; he treats the former as “substitutes for money” and calls the return on the latter “the cost of holding money.” He finds both to be significantly related to the quantity of money demanded. It was suggested above that this is also a way to take into account expectations about changes in interest rates.

Similarly, there is no hard-and-fast line between “money” and other assets, and for some purposes it may be desirable to distinguish between different forms of “money” (e.g., between currency and deposits). Some of these forms of money may pay interest or may involve service charges, in which case the positive or negative return will be a relevant variable in determining the division of money holdings among various forms.

24. By concentrating on hyperinflations, Cagan was able to bring into sharp relief a variable whose effect is generally hard to evaluate, namely, the rate of change of prices. The other side of this coin is the necessity of neglecting practically all the remaining variables. His device for estimating expected rates of change of prices from actual rates of change, which works so well for his data, can be carried over to other variables as well and so is likely to be important in fields other than money. I have already used it to estimate “expected income” as a determinant of consumption,⁵

4. See Milton Friedman, *A Theory of the Consumption Function*, forthcoming publication of the Princeton University Press for the National Bureau of Economic Research.

5. See *ibid.*

and Gary Becker has experimented with using this "expected income" series in a demand function for money along the lines suggested above (in point 22).

Cagan's results make it clear that changes in the rate of change of prices, or in the return to an alternative form of holding wealth, have the expected effect on the quantity of money demanded: the higher the rate of change of prices, and thus the more attractive the alternative, the less the quantity of money demanded. This result is important not only directly but also because it is indirectly relevant to the effect of changes in the returns to other alternatives, such as rates of interest on various kinds of bonds. Our evidence on these is in some way less satisfactory because they have varied over so much smaller a range; tentative findings that the effect of changes in them is in the expected direction are greatly strengthened by Cagan's results.

One point which is suggested by the inapplicability of Cagan's relations to the final stages of the hyperinflations he studies is that it may at times be undesirable to replace the whole expected pattern of price movements by the rate of change expected at the moment, as Cagan does and as is done in point 5 above. For example, a given rate of price rise, expected to continue, say, for only a day, and to be followed by price stability, will clearly mean a higher (real) demand for money than the same rate of price rise expected to continue indefinitely; it will be worth incurring greater costs to avoid paying the latter than the former price. This is the same complication as occurs in demand analysis for a consumer good when it is necessary to include not only the present price but also past prices or future expected prices. This point may help explain not only Cagan's findings for the terminal stages but also Selden's findings that the inclusion of the rate of change of prices as part of the cost of holding money worsened rather than improved his estimated relations, though it may be that this result arises from a different source, namely, that it takes substantial actual rates of price change to produce firm enough and uniform enough expectations about price behavior for this variable to play a crucial role.

Similar comments are clearly relevant for expected changes in interest rates.

25. One of the chief reproaches directed at economics as an allegedly empirical science is that it can offer so few numerical "constants," that it has isolated so few fundamental regularities. The field of money is the chief example one can offer in rebuttal: there is perhaps no other empirical relation in economics that has been observed to recur so uniformly under so wide a variety of circumstances as the relation between substantial

changes over short periods in the stock of money and in prices; the one is invariably linked with the other and is in the same direction; this uniformity is, I suspect, of the same order as many of the uniformities that form the basis of the physical sciences. And the uniformity is in more than direction. There is an extraordinary empirical stability and regularity to such magnitudes as income velocity that cannot but impress anyone who works extensively with monetary data. This very stability and regularity contributed to the downfall of the quantity theory, for it was overstated and expressed in unduly simple form; the numerical value of the velocity itself, whether income or transactions, was treated as a natural "constant." Now this it is not; and its failure to be so, first during and after World War I and then, to a lesser extent, after the crash of 1929, helped greatly to foster the reaction against the quantity theory. The studies in this volume are premised on a stability and regularity in monetary relations of a more sophisticated form than a numerically constant velocity. And they make, I believe, an important contribution toward extracting this stability and regularity, toward isolating the numerical "constants" of monetary behavior. It is by this criterion at any rate that I, and I believe also their authors, would wish them to be judged.

I began this Introduction by referring to the tradition in the field of money at Chicago and to the role of faculty members in promoting it. I think it is fitting to end the Introduction by emphasizing the part which students have played in keeping that tradition alive and vigorous. The essays that follow are one manifestation. Unpublished doctoral dissertations on money are another. In addition, I wish especially to express my own personal appreciation to the students who have participated with me in the Workshop in Money and Banking, of which this volume is the first published fruit. I owe a special debt to David I. Fand, Phillip Cagan, Gary Becker, David Meiselman, and Raymond Zelder, who have at various times helped me to conduct it.

We all of us are indebted also to the Rockefeller Foundation for financial assistance to the Workshop in Money and Banking. This assistance helped to finance some of the research reported in this book and has made possible its publication.

The CHAIRMAN. The meeting tomorrow will be in the auditorium on the ground floor of the New Senate Office Building.

Richard T. Selden, professor of economics, Columbia University, will be the witness.

I would suggest that the clerk of the committee, when he sends an invitation to the members of the Federal Reserve Board, send a copy of Mr. Friedman's paper and advise them that we are expecting an examination on this subject.

(Thereupon, at 12:15 p.m., the committee recessed, to reconvene at 10 a.m., Tuesday, May 26, 1959.)

EMPLOYMENT, GROWTH, AND PRICE LEVELS

TUESDAY, MAY 26, 1959

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The joint committee met at 10:05 a.m., pursuant to recess, in the auditorium, New Senate Office Building, Senator Paul H. Douglas presiding.

Present: Senators Douglas, Bush, and Javits; Representatives Patman, Curtis, and Widnall.

Representative PATMAN (presiding). The committee will come to order.

Senator Douglas is delayed. He will be here in a few minutes.

We have as our witness this morning Prof. Richard T. Selden, associate professor of banking, Columbia University.

We are delighted to have you, Mr. Selden, and you may proceed in your own way.

STATEMENT OF RICHARD T. SELDEN, RESEARCH ASSOCIATE, NATIONAL BUREAU OF ECONOMIC RESEARCH, AND ASSOCIATE PROFESSOR OF BANKING, COLUMBIA UNIVERSITY

Mr. SELDEN. Mr. Chairman and members of the Joint Economic Committee, I greatly appreciate the opportunity you have given me to take part in your important study of employment, growth, and price levels. My topic today is the behavior of money.

There are two aspects of money behavior; changes in quantity and changes in velocity of circulation. I shall devote most of my formal presentation to the latter, for two reasons: the general public is much less familiar with velocity as an important economic variable, and it is the aspect of money behavior on which I am most qualified to speak.

Although I shall attempt to summarize the historical record over the past 90 years, the major portion of my remarks will deal with the period since 1945.

As all of us are painfully aware, the postwar years have been years of inflation, by and large. We are now in the midst of a great debate on the nature of this inflation. Many of the participants in this debate regard the recent episodes of rising prices as fundamentally different from those of the past. Some talk of "cost push" inflation, while others point to the behavior of "administered" prices; but these groups unite in concluding that what we have been experiencing recently is a new inflation, in sharp contrast to the classic demand inflations of earlier periods.

The material I will present has a direct bearing on this debate, although it will not settle the basic issues.

Whatever the causes of postwar inflation, they are susceptible of analysis by means of the equation of exchange. This equation, which can never be false, states that any flow of payments can be regarded on the one hand as the quantity of money multiplied by its velocity, and on the other as the average price per transaction multiplied by the number of transactions. In symbols, MV equals PT .

The equation of exchange tells us that any rise in P , the price level, must be accompanied by a proportionate rise in M or V or a proportionate fall in T . When we apply this system of analysis to the postwar period, we discover that rising velocity has been an important characteristic of the recent inflation.

Later in this statement, I shall offer an explanation of the postwar tendency for velocity to rise, but it may be appropriate to state a major conclusion here. While undoubtedly it is true that no two inflations are exactly alike, I do not find strong support for the commonly held theory that recent inflations have been fundamentally different from earlier ones.

(At this point the chairman entered the hearing room.)

Senator Douglas, my formal statement is rather lengthy and my plan is to read portions and simply digest other portions.

The CHAIRMAN. We will print the whole paper.

Mr. SELDEN. The topics I plan to take up are, first, a discussion of the meaning of such terms as "inflation," "money," and "velocity"—particularly the latter, together with a consideration of the available statistical measures of these; secondly, a review of the historical record on money behavior up until the end of World War II; third, a similar review of the postwar period; and fourth, an analysis of the causal factors underlying postwar changes in the behavior of money.

Accordingly, I will begin with a discussion of the meaning of some of these concepts, particularly of the velocity of money.

By "inflation," in this discussion, I will mean simply a rise, whether large or small, in any broad index of prices such as the Wholesale Price Index or the implicit price deflators of the gross national product.

By "money" I shall mean the sum of currency plus demand deposits in commercial banks.

On some occasions I will follow Professor Friedman's example of including time deposits in commercial banks also. I will indicate whenever I shift usage.

The "velocity of money" is simply the average number of times each dollar is spent during a year, or whatever other time unit one chooses. Economists have confused matters somewhat by coining a variety of synonyms, including rapidity, frequency of use, turnover rate, and so forth.

By a simple transformation of the equation of exchange, we can see that the velocity of money is simply the ratio of PT to M ; that is, the ratio of total payments to money.

The CHAIRMAN. You do not draw any distinction between the velocity of cash on one hand and bank credit on the other?

Mr. SELDEN. I will discuss the velocity of demand deposits, the deposit turnover ratios developed by the Federal Reserve System, but aside from that I don't discuss the velocity of currency for the

very obvious reason that it's extremely difficult to get reliable estimates of currency payments.

The CHAIRMAN. Do you think that in practice there is any difference between the velocity of cash or currency and velocity of checking accounts?

Mr. SELDEN. It's very hard to answer the question since we have so little information. However, when I pass to a discussion of chart 3, I think I can present some evidence that will support the theory that we can measure velocity adequately by taking these deposit turnover rates or by following Professor Friedman's usage of taking the income velocity of money.

I don't think it makes much difference whether one distinguishes between currency and demand deposits. I feel it makes very little difference.

I have said that the velocity of money is the ratio of payments made during the year to the average stock of money during the year, but I haven't said what the payments are. What payments, then, are described by the equation of exchange?

Depending on the purpose at hand, they may consist of all purchases made during the year except barter transactions, or they may include only certain types of purchases such as purchases made by check, purchases of currently produced goods and services, purchases by consumers, and so forth.

There is an associated velocity concept, of course, for every conceivable payments flow. It is therefore misleading to talk of "the" velocity of money. There are many velocities.

Three velocity concepts are frequently mentioned in economic literature and I will define these; we will pass in a few moments to some statistical measures of these.

The first is the aggregate transactions velocity of money for the entire economy. The second is income velocity. That is Professor Friedman's concept from yesterday. Third, we have deposit turnover. I will explain each of these three very briefly.

The first, aggregate transactions velocity, is the ratio of all monetary purchases made during the year to average money existing during the year.

The second, income velocity, is the ratio of national income or gross national product to average money during the year.

The third measure, deposit turnover, is simply the ratio of purchases made by check to average demand deposits during the year.

To confuse matters a little more, I am going to mention two other concepts which I will utilize in my analysis. One of these is called the aggregate nonfinancial velocity and consists of the ratio of all purchases of goods and services to the average money outstanding.

The final velocity concept that I will mention is sector velocities, which are payments—money rations for particular groups within our economy, such as manufacturing corporations, holders of demand deposits in New York banks, and so forth. In other words, the concept of velocity may apply to the entire economy or it may be applied with equal validity to groups within the economy. The latter is what the sector velocity concept is trying to get at.

If we push the sector velocity concept to its logical limit, we may visualize every individual who holds cash as maintaining some ratio

of purchases to the cash he holds. Averaging these countless millions of individual velocities, we obtain the aggregate transactions or non-financial velocity for the entire economy.

There are good measures for each of these velocity concepts that I have mentioned, with one exception: There is no statistical measure of the aggregate transactions velocity. That corresponds to Prof. Irving Fisher's concept. There is no good measure of that particular concept.

Now let's turn to the second part of my remarks, the historical record up to the end of World War II. I am going to talk about trends and cyclical changes in the velocity of money.

Even a casual glance at chart 1, which is reproduced in this small set and which is also on the easel, reveals that the trend of total deposits plus currency was upward and that the trend of velocity was downward with only brief interruptions in both cases, over the period 1869-1945. There have been occasional downturns in the stock of money, as Professor Friedman pointed out yesterday, but all of these downturns have been associated with major depressions.

So far as velocity is concerned, we see that the trend has been almost uniformly downward up to the end of World War II. So much for the trends.

Cycles can also be studied from chart 1, although of course one can't study cycles very well using annual data. One really ought to have monthly or quarterly data for this purpose. However, we can see cycles even in these annual data. We see that particularly after the turn of the century the income velocity of money declines during the shaded areas on the chart, which represent periods of business contraction; and velocity typically rises during the succeeding prosperity or expansion phases of business cycles. There are one or two exceptions, but on the whole, we find this a very faithful kind of cyclical behavior.

The CHAIRMAN. Mr. Selden, is that not because expansion is commonly associated with the rise in prices and contraction with the fall in prices, so that in a period of contraction money is worth more as times goes on and therefore there is discouragement to spend and a premium upon hoarding?

Mr. SELDEN. The facts, as you state them, are certainly correct. What interpretation one places upon those facts, I am not entirely sure.

In other words, why we have this observed pattern is a complicated question. I can talk about that later, but the facts are perfectly correct as you stated them.

The CHAIRMAN. If you will forgive me, I will call your attention to a typing mistake in your manuscript.

It says "rises during business expansions and falls during business expansions." That is obviously a typing error and should be "contractions."

Mr. SELDEN. That is correct. Thank you for calling it to my attention.

So much for the annual income velocity series that goes back to 1869.

When we pass to chart 3, which is also on the easel, we find four different measures of the velocity of money. The one which is plotted also on chart 1 is the lower curve. This is the income velocity of not

only currency and demand deposits, but also of commercial bank time deposits.

The curve just above that is the income velocity of demand deposits plus currency. In other words, it embodies a narrower definition money. The short curve above that is the aggregate nonfinancial velocity and the top one is the demand deposit turnover rate at all reporting centers throughout the country.

What do we see from chart 3?

Of course, we find that the general movement of income velocity, whether one includes or excludes time deposits, has been downward. Also, nonfinancial velocity went downward sharply during the very short timespan that we had before 1945. From 1939 to 1945 it fell very abruptly. The demand deposit turnover rate rose very sharply until 1929 and fell even more sharply from 1929 to approximately 1943 or 1944.

We find in general a downward trend, although in the case of the demand deposit turnover rate a trend which was interrupted during the twenties by a very sharp countermovement. We have declining velocity then throughout this timespan from 1919 to 1945.

So far as the cycles are concerned, I do not have the periods of expansion and contraction indicated on this chart as on chart 1, but one can see approximately the periods of business downturn punctuating all of these series.

We find the cyclical movements quite evident in chart 3 as well as in chart 1.

Senator BUSH. Since 1945, the trend is just as clearly up as it was down before that?

Mr. SELDEN. Yes, Senator Bush, that is a point I am going to dwell on at some length. You are entirely correct in thinking that an explanation of that is needed. I will pass to that in a few moments.

Let's turn to the third part of my comments, the behavior of the velocity of money since 1945.

First of all, let's see what has been happening to the aggregate measures of velocity. In sharp contrast to the period 1869-1945, the velocity of money has moved steadily upward, except for cyclical downturns since the end of World War II. This is true whether one measures velocity by deposit turnover, aggregate nonfinancial velocity, or income velocity, and whether or not one includes time deposits in money. By 1957 the ratio of annual gross national product to demand deposits plus currency reached a level it had not experienced since 1931, and the same was true of demand deposit turnover. These relationships can be seen quite clearly on chart 3.

As Senator Bush has just pointed out, there was a turn in each of these velocities approximately at the end of the war or during the war, and we have had a rather unrelenting upward movement in each of them since that time.

It is interesting to note that the three aggregate velocity measures have displayed highly similar growth rates since the end of the war: 1.8 percent per year for income velocity and 2 percent for the other two. This is a greatly different situation from the 1920's when deposit turnover rose sharply but income velocity did not.

Income velocity and aggregate nonfinancial velocity appear to be tapering off in their rates of growth; deposit turnover, on the other

hand, has continued straight up. So much for the aggregate measures of velocity.

Let's look inside the economy at various sectors and see what has been happening to the velocity of money within particular groups.

As I indicated earlier, there are several ways of analyzing velocity by economic sectors: deposit turnovers by geographical groupings; nonfinancial velocities by flow of funds sectors, and nonfinancial velocities of corporations by industry and asset size groups. Charts 6 to 11 present selected sector velocities from these sources.

In chart 6 we see that deposit turnover has been rising persistently since 1943 in New York City and since 1946 in six other centers and other leading centers. However, New York City velocity has grown about twice as fast—3 percent per year—as velocity elsewhere.

Since 1954, New York City velocity has been about twice as high as velocity in the other centers and about two-thirds again as high as six other centers velocity.

Senator BUSH. Is that due primarily to financial transactions within New York such as the stock exchange and bond market?

Mr. SELDEN. I think that is a relevant consideration. I think there is another important consideration which will come out when we look at chart 11, and I am referring specifically to the fact that the large corporate accounts tend to be centered in New York City and there has been a decided difference between larger and smaller firms with respect to the behavior of their cash holdings.

I think you have the double effect of large corporations and their efforts to economize on cash balances and the effect of stock market transactions and so forth.

The CHAIRMAN. Mr. Selden, have you gone into the relative rates of turnover of the dealers in Government securities and the dealers in stock market securities?

Mr. SELDEN. I am familiar with the testimony of the New York Clearinghouse president recently before the Congress.

The CHAIRMAN. That testimony before the Senate Banking and Currency Committee was startling to me.

They segregated the accounts for the month of February. They found that the dealers in Government securities have balances averaging only \$34 million, but that the bank balances have grown over \$18.8 billion in 1 month. This was a monthly velocity of 557 and an annual rate of 6,683.

Since there are only about 22 trading days in a month, this means an average daily velocity of 25. The average velocity of commercial transactions in New York is approximately 32 for the year as contrasted with the 6,683.

These are the most astonishing figures I have ever seen. Do you have any explanation of them?

Mr. SELDEN. In lesser degree one can also find some very great velocity differences between wholesale traders and public utilities industries, for example. The wholesale velocity indexes are likely to run 50 or 60 per year, depending on the line of wholesale trade that you are talking about, whereas the public utilities velocity is more likely to be in the 8 to 10 range.

The CHAIRMAN. The 6,683 would seem to me to indicate hyper-blood tension.

Senator BUSH. In the type of operation that the chairman is talking about, that is the dealer in these bonds.

Representative PATMAN. You mean Government bonds?

Senator BUSH. Yes; principally.

That is where the big volume is. He has a relatively small account in the bank. He may have a capital of a very few million dollars.

The CHAIRMAN. Thirty-four million total value.

Senator BUSH. That is all of them together; is it not?

Mr. SELDEN. That is right.

Senator BUSH. But their borrowing is enormous.

The question I wanted to ask is whether the fact that they are borrowing many times their capital almost constantly does not result in this tremendous turnover?

Mr. SELDEN. I think it is related to it.

This particular type of business enterprise certainly would not be able to transact this tremendous volume of business with such small cash unless it had ready access to bank credit and other sources of funds. These businesses are in such an exposed position that it seems to me their position would be extremely hazardous operating on such small cash balances unless they had behind them assurances of credit and other resources on which they could rely.

Senator BUSH. Of course, their collateral in the case of these Government-bond dealers is triple A. There is not really any risk involved in them.

Mr. SELDEN. That is correct, Mr. Chairman. However, there is always the danger of price fluctuations.

Senator BUSH. But it is a constant daily turnover of their portfolio. They are not investors. They are traders for the most part.

Representative PATMAN. Mr. Chairman, was that 1958?

The CHAIRMAN. 1959.

Representative PATMAN. I assume the same rate of turnover probably prevailed in 1958.

The CHAIRMAN. They did not segregate the accounts.

Representative PATMAN. And they involved Government bonds; is that right, Professor, that 1959 was comparable?

Mr. SELDEN. I have no information, but I am glad you raised the point because the important question related to my discussion here is the trend of velocity and I am quite sure, if you looked at it in earlier years, you would find similar relationships between the velocity of traders on the one hand, and ordinary accounts in New York City on the other.

Whether this is true or not, one can only conjecture.

The CHAIRMAN. Mr. Selden, I have had some correspondence with the Under Secretary of the Treasury about these figures because they disconcerted me very much. I wrote Mr. Baird, Under Secretary of Treasury, that it seemed they must be dealing in Government bonds without margins.

Representative PATMAN. Senator Douglas, that is probably related to the fact that last year, in 1958, the commercial banks made a profit of \$681 million on the sale or disposition of Government bonds.

Senator BUSH. How do you measure that profit?

Representative PATMAN. It is measured by Federal Deposit Insurance Corporation figures.

(Information referred to follows:)

Insured commercial banks, 1936-58, profits on securities sold

[In millions of dollars]

1958.....	681	1945.....	267
1957.....	64	1944.....	130
1956.....	31	1943.....	103
1955.....	57	1942.....	66
1954.....	417	1941.....	145
1953.....	39	1940.....	178
1952.....	34	1939.....	215
1951.....	57	1938.....	173
1950.....	91	1937.....	117
1949.....	73	1936.....	268
1948.....	60		
1947.....	100		
1946.....	209		

Senator BUSH. Is it profit on the sale of Government bonds or the interest?

Representative PATMAN. Profit on the sale of Government bonds, on the sale of securities.

I do not say that they are all Government securities, possibly one-half of 1 percent might be some other type, but generally they are Government securities. That is the highest amount that the commercial banks had ever made in any one year.

That is comparable to 1954 when we had the dip of the depression in 1953 and bonds went down low and the banks bought lots of bonds. Then in 1954, when they went up, they sold them. That was the highest trading profit they had ever made, up to that time—\$417 million.

In 1957 when they went down and the banks evidently purchased them, in the early part of 1958 they must have sold them and they made 50 percent more than they made in 1954. They made \$681 million.

In order that you may have a comparison there, in the preceding year it was \$64 million and the year before that, 1956, it was \$31 million; in 1955, \$57 million. In 1954, which was after the low period of 1953, it went up \$417 million; 1953, \$39 million; 1952, \$34 million; 1951, \$57 million.

In other words, in the years 1954 and 1958, immediately after dips in 1953 and 1957, the banks made enormous profits. I looked into this 1954 deal and I discovered that a few banks profited enormously more than others. I hope we can look into this 1958 situation and see where those profits went.

It is possible that these transactions that Senator Douglas speaks of had something to do with it and are doubtless related to it in some way.

The CHAIRMAN. Does it not seem to you as though most of these transactions in Government bonds must be without margin in view of this high turnover? If an appreciable margin were required, the rate of turnover would be less than this, would it not?

Mr. SELDEN. Senator Douglas, I really can't claim any familiarity with the operations of the Government securities dealers that would enable me to enlighten you on this. It is something I am sure would be relatively easy to ascertain, but I don't have the answer at my fingertips.

My emphasis has been on the trends of velocity since the end of the war and I should imagine if we were to go back 10 years we would find a quite similar relationship between velocities of the securities dealers and velocities elsewhere.

I see no particular presumption in these high figures that we have quoted that it is a particularly recent development. However, it is a very worthwhile topic for investigation.

The CHAIRMAN. At the same time that the clearinghouse testified on the rate of turnover of dealers in Government securities, they testified on the turnover in dealers of stocks. That was something at the rate of over 200 to the year.

Mr. SELDEN. That is right.

The CHAIRMAN. As compared to a commercial rate of about 32?

Mr. SELDEN. There you are getting almost into the wholesaling range. Some wholesalers may go up as high as 90 or a hundred a year, so that is not completely outside the realm of credulity, but these other figures, I grant you, are quite phenomenal.

Senator BUSH. The answer to Mr. Patman's query on page 29 of the Economic Indicator is the enormous rise in Treasury bills reflected in the dip in yields from the middle of 1957 down to the middle of 1958, which is almost an unprecedented swing in such a short time.

Bankers who had bought Treasury bills during the 1957 period could not help but have made an enormous profit on them by the middle of 1958. The same would apply to most any other type of paper because of the very sudden drop in interest yields.

Representative PATMAN. I am talking about profits on securities sold.

Senator BUSH. I am, too.

Representative PATMAN. That \$681 million seems out of line. In insured banks they have between \$5 and \$6 billion of capital stock; I am not including the surplus or the undivided profits.

This amount of profit on securities sold, in the 1 year would thus come to between 10 and 15 percent on their capital stock. It just seems to be a pretty high rate of profit.

Senator BUSH. Capital stock or capital stock and surplus?

Representative PATMAN. I am talking about voting capital stock.

Senator BUSH. That is relatively a small amount to their total capital funds.

Representative PATMAN. It is, of course, smaller, but that is the part that controls the banks. Security profits of between 10 and 15 percent on their paid-in voting capital stock in 1 year. It just seems to me as though there must be some inside information or they could hardly profit so much.

They are speculating in Government bonds in a market that is not supervised, nor regulated. We control the onion market and the asparagus market and the wheat market and things like that, but we don't have any control over the Government-bond market of any type or character.

I think it is a challenge to this committee to go into that further.

Senator BUSH. It is all right with me, Mr. Chairman.

Mr. SELDEN. Shall I continue with the reading of my statement?

The CHAIRMAN. Yes.

Mr. SELDEN. Let's turn to chart 7, which I have in wall chart form as well as in the small set.

Chart 7 shows annual velocities for 1939-56 by five flow of funds sectors: Consumer, corporate business, farm and noncorporate business, Federal Government, and State and local government.

On inspection of the chart, one is struck immediately with the contrast between wartime and postwar velocity movements.

From 1939 to 1949, velocity rose in some sectors and fell in others, but after 1941, declining velocity became the order of the day. The declines were much sharper for the Federal, consumer, and farm and noncorporate sectors than for the corporate sector. State and local velocity also fell substantially, though not as much as consumer velocity.

The postwar period, on the other hand, has been characterized by a pronounced upsurge of velocity in every sector. For all sectors, the 1939-45 peak value had been exceeded by 1955, by as early as 1947 in the case of the corporate sector.

Except for the Federal Government, whose velocity has moved somewhat erratically, the rises have been remarkable steady throughout 1946-56. Even Federal velocity has not been far out of line since 1947, and its extremely low value in 1946 is largely the result of the huge sums obtained through the eighth war loan in December 1945.

In addition to the broad pattern of similarity since the end of the war, several differences among sectors are evident in chart 7.

Senator BUSH. How do you get these figures, Mr. Selden?

Mr. SELDEN. Senator Bush, these are ratios of spending by the particular sectors involved to the average cash holdings at the end of the year for these sectors. The source is the flow of funds accounts prepared by the Board of Governors of the Federal Reserve System, and there are annual estimates.

I might say, incidentally, that I am able to compute these velocities only for the period 1939-56 because the Federal Reserve System has discontinued its relevant statistical series here. Unless that particular gap is remedied, we will not be able to extend data of this kind beyond the year 1956.

The most obvious differences, perhaps, are the great differences in velocity levels. We have State and local velocity in the lower tier, consumer velocity above that somewhat, and then we have nonfarm and noncorporate velocity, Federal Government velocity, and at the top of the heap we have corporate velocity. So there are some striking differences in level.

Another difference is in the degree of cyclical variability. It is interesting to see that the decline in aggregate nonfinancial velocity during the 1949 and 1954 recessions resulted solely from falling velocity in the corporate sector. Cycles show up only in the corporate sector, using the annual data I am using here.

Still another difference is the fact that corporate velocity has been lagging since 1946. These are all plotted on ratio scale and if we notice the slopes of these particular curves, we see that corporate velocity rises somewhat more slowly than the others, meaning that it has been lagging somewhat since 1946.

Let's turn to charts 8, 9, 10, and 11. These are business velocities by various groups of business. They are computed from the annual Statistics of Income volumes of the Internal Revenue Service.

In chart 8 I have major groups such as trade, manufacturing, public utilities, and mining. These are all annual velocities from 1931.

Throughout the period 1931 to 1956 as well as for the period since the end of World War II, we find broadly similar velocity movements among these centers. Manufacturing velocity has been very close to that of all nonfinancial corporations in level, trend, and year-to-year movements. That is the broad curve on the chart.

Trade velocity, though much higher, moves in similar fashion; the same is true of mining velocity, which is considerably lower than the others.

Public utilities velocity, in contrast, has risen somewhat faster than velocity in the other industry divisions. However, we get the same impression from this chart as from charts 3, 6, and 7 of a general and pronounced postwar rise in velocity.

Passing to charts 9 and 10, we find velocities for 13 of the 54 major industry groups available in "Statistics of Income."

We have here retail food, food and kindred products, retail trade, and so forth. As one would expect when passing from the general to the more detailed, charts 9 and 10 reveal some striking dissimilarities, both in velocity levels and in trends.

The differences in level are what one would expect on the basis of the relationships shown in chart 8; hence they need not detain us. With respect to trends, however, the range of annual growth rates runs from a minus two-tenths of 1 percent for retail food trade to 4.7 percent for motor vehicles and equipment. Other rapidly growing sector velocities were those of electrical machinery and equipment (2.7 percent per year), textile-mill products (1.7 percent), and retail trade (1.6 percent). Other laggards were food and kindred products (0.2 percent), general merchandise retail trade (0.2 percent), and paper and allied products (0.7 percent).

The velocities in chart 11 are by size sectors, rather than industry sectors, as measured by total assets. Although I have computed velocities for all 10 of the size classes available back to 1946, the chart shows them only for under \$50,000, \$10 million under \$50 million, and \$100 million and over.

Two important facts emerge from analysis of chart 11 and the un-plotted size data. The first is that there is a definite tendency for small firms to maintain higher velocity ratios than large firms. The second fact, which I shall argue below and which is important for an understanding of the postwar behavior of money, is the much sharper rise in velocity for the largest firms than for any other size class; a growth rate of 2.5 percent per year compared with 1.3 percent for the smallest class and only 0.9 percent for firms of intermediate size.

Now I will turn to the final phase of my remarks, which is an interpretation of the postwar behavior of money.

The annual GNP price index has risen in each of the last 20 years (chart 1). Even on a quarterly basis there have been only a few instances of price declines since 1947, the earliest year for which the quarterly GNP price index is available; these occurred in the first three quarters of 1949, the first quarter of 1953, and the second quarter of 1954 (chart 5). The rate of inflation has been highly uneven, of

course, with periods of approximate stability in 1949 and early 1950 and in 1952-54 punctuating periods of more rapidly rising prices. Between the first quarter of 1947 and the third quarter of 1958, the GNP price index rose by almost 37 percent.

As we have already seen, we may analyze the postwar inflation by means of the equation of exchange. The variables contained in this equation are plotted in chart 5, quarterly, 1947-58. Each of them rose substantially over this period; money by 23.7 percent, velocity by 56.8 percent, and real GNP by 41.9 percent.

The rise in real GNP, of course, was a deflationary factor in the sense that the strong aggregate demand for goods and services was met in part by expanded supplies rather than by higher prices.

Since the volume of money has grown at less than its prewar long-term rate since 1947, and has fallen substantially relative to real GNP, it is clear that monetary expansion during the postwar period was not a major factor in inflation.

Velocity, on the other hand, not only expanded twice as fast as the stock of money; it has been moving counter to its long-established downward drift. For these reasons, it appears that an analysis of postwar inflation must center on velocity.

The CHAIRMAN. Mr. Selden, I do not have before me the arithmetic; but, in the simplest form of this equation, would it not be that 1.37 was equivalent to 1.237 times 1.568 divided by 1.409?

Mr. SELDEN. One would have to take the absolute levels at the base year.

The CHAIRMAN. I am speaking of relative levels.

Have you performed that?

Mr. SELDEN. I haven't performed that.

The CHAIRMAN. You can draw the conclusion that monetary expansion has not been the major factor in inflation, but, rather, the velocity?

Mr. SELDEN. Yes, sir.

The CHAIRMAN. Government deficits, therefore, have not been a major factor in inflation?

Mr. SELDEN. Except insofar as Government deficits have a relationship to the velocity of money, which quite clearly might be possible.

The CHAIRMAN. But not to the quantity of money?

Mr. SELDEN. Not in the quantity of money in any important degree; no, over the period as a whole.

Representative PATMAN. Can you suggest any way to control the velocity of money?

Mr. SELDEN. There are undoubtedly ways of controlling it, but I think most of them are antithetical to our free enterprise system and would be repugnant to all of us. If we look at what happened during the war, on chart 7, we see the great dip in velocity during the wartime years, and I think in some measure at least that was the result of the controls—or regimentation, if you wish to call it that—that we experienced during the war. I don't think any of us want to put up with that during times of peace.

Representative PATMAN. And that is the only way you know of to control velocity?

Mr. SELDEN. There are other ways of influencing velocity, I am sure, but from a policy point of view it has always seemed to me

that there are alternative policies at hand which would be superior to any attempt to work on the velocity of money.

I think one could accomplish the same aims in other ways, and therefore I have not spent a whole lot of time thinking about that particular problem.

In all probability, most of the postwar velocity rise is simply a readjustment from wartime abnormalities. Not until 1953 did the income velocity of demand deposits plus currency regain its 1941 peak and the income velocity of total deposits plus currency was still well below its 1942 and 1943 values in 1957—see chart 3.

Our study of sector velocities offers further evidence that the readjustment continued at least until 1951 and perhaps even until 1955. Although both corporate and Federal velocities snapped back quickly to their early wartime or immediate prewar peaks, there were prolonged lags in the other major sectors (chart 7). Farm and noncorporate velocity reattained its 1939 value only in 1953, State and local velocity did not do so until 1954, and consumer velocity achieved this feat as late as 1955.

Furthermore, in 1939–41 the velocity of demand deposits plus currency probably was still below its normal prosperity level because of the unusual severity of the 1929–33 and 1937–38 contractions. If this is true, then velocity in the postwar period has been influenced by two distinct readjustment processes rather than one, and there is no assurance that these processes have been completed even now.

The return to equilibrium levels is not the whole story, however. Superimposed on this fundamental factor were other forces of a velocity-increasing nature. Evidence of this can be seen in the fact that corporate velocity, after having resumed its immediate prewar level in 1947, continued to push upward during the next 10 years, and by 1956 had established a high for the entire period since 1931 (chart 8).

Among these other velocity-increasing forces, I would list the generally higher level of interest rates and particularly the increased availability and yields of money substitutes. Perhaps these were supplemented to a minor extent by a growing belief in the inevitability of inflation.

The rising trend of long-term interest rates and rates on bank loans is common knowledge and needs no documentation. Like velocity, these rates have moved up and down with succeeding phases of postwar business cycles, but rises have exceeded declines and an upward trend has resulted. However, since long-term rates were of limited significance before the war as velocity determinants, there is no reason to think they have been particularly important since 1946.

In my judgment, the principal reason why velocity has been rising, other than the simple readjustment from wartime restrictions and prewar depressions, is the increased importance of money substitutes in the economy.

I have already mentioned the fact that liquid assets have been growing persistently relative to money. Households have relied increasingly on time deposits and savings and loan shares as sources of liquidity, no doubt in response to greatly improved yields. State and local governments, as well as businesses, have learned that short-term Treasury securities are an attractive alternative to cash, and the

Treasury has obliged them by converting more and more of the public debt to short-term obligations.

But there have been other developments in the realm of money substitutes. Although it cannot be easily documented, there appears to have been a substantial growth of charge accounts, trade credit, credit lines at banks, and credit cards, along with a general improvement in credit ratings. All of these developments have facilitated purchases without cash and thus have tended to increase overall expenditure-money ratios; that is, velocity.

Another highly significant change has been the increasing importance of large nonfinancial corporations as lenders. I am referring here to the growth of repurchase agreements between such corporations and Government securities dealers whereby firms may lend to dealers essentially on a call basis, thus gaining interest income without sacrificing an appreciable amount of liquidity.

The importance of these arrangements, together with outright purchases of governments, can be seen clearly in the fact that velocity has risen much more rapidly for large corporations than for any other size class (see chart 11); in general, only large corporations participate in such transactions. It also explains part of the higher growth rate of velocity in New York City, where large corporate accounts are concentrated, than elsewhere (chart 6).

In summary, as I see it the 1946-57 velocity rise was primarily a readjustment from wartime dislocations and prewar abnormalities. However, these readjustments have been magnified by the growth of money substitutes of various sorts, together with a trend toward higher interest rates.

The CHAIRMAN. May I interrupt you now to raise two questions?

Mr. SELDEN. Yes, sir.

The CHAIRMAN. The first refers to your statement that State and local governments, as well as businesses, have learned that short-term Treasury securities are an attractive alternative to cash, and the Treasury has obliged them by converting more and more of the public debt to short-term obligations.

Would you say that in the creation of longer public debt durations that that practice has been carried out?

Mr. SELDEN. I think that can be ascertained by looking at the maturity structures of the Federal debt. I don't have them at hand, but we could develop them very quickly.

I think we could show without any doubt that there has been no lengthening of the debt.

The CHAIRMAN. There has been a shortening of the debt?

Mr. SELDEN. I believe that is correct.

Perhaps someone can do some research on that quickly.

The CHAIRMAN. What periods are you taking as a basis for comparison?

Mr. SELDEN. The postwar period in general is what I am talking about.

The CHAIRMAN. Has this continued in the last 6 years?

Mr. SELDEN. Oh, yes; despite frequent avowals to the contrary. It has been a very difficult thing to achieve any lengthening of the debt. Perhaps it has been done momentarily, but within a matter of months any lengthening that has been achieved has been more than offset.

The CHAIRMAN. So that more and more of the debt has been put in short-time obligations?

Mr. SELDEN. Yes, and I am arguing that this has a very definite impact on the economy through the velocity of circulation of money.

The CHAIRMAN. That is, it increases the velocity of circulation of money and therefore raises the price level?

Mr. SELDEN. Perhaps, yes.

Senator BUSH. On that point, you do not suppose that the Treasury would not prefer to lengthen its debt if it were feasible, do you?

Mr. SELDEN. You say feasible, Senator Bush. I firmly believe that this is feasible at some price. The price is the heart of the contract, and particularly in this case.

We get into the whole question of the limitation on interest on long-term debt which Congress has imposed, and other related problems.

Senator BUSH. I think that is right. I think there undoubtedly have been political pressures on the Treasury not to raise the interest rate and to keep the interest rate down. The Treasury has been under attack from time to time, almost constantly in recent years, about high-interest rates and tight money and so forth.

If they were going to offer bonds long enough to make any average extension of maturity of debts, undoubtedly they would have to get a new law passed which would raise the ceiling on the interest rate, and I doubt very much that up to the present time the Congress would have given them that. There has been no indication whatever from the Congress that they would so extend the ceiling on interest rates.

I am mentioning this apropos of what the chairman said.

The Treasury has been caught in a sort of vice and has not had very much choice.

Mr. SELDEN. That is true. It is like the leaky roof that we don't do anything about until it's raining and then it's too late.

In my judgment, this legislative change should have been made perhaps 2 or 3 years ago when the whole thing was more or less an academic issue. To have public hearings and deliberations on this question at this time when yields on Government securities are pushing up close to the limit creates a very real problem.

It is unfortunate that something was not done before.

The CHAIRMAN. I have here the hearings on the January 1959 Economic Report of the President. On page 4 is a chart showing the average length of the marketable debt to date.

In December of 1951 it was 6.1 years. In December of 1958 it was 4.9 years. I think this is very eloquent testimony to the fact that the Eisenhower administration has not in practice carried out its program of lengthening the Government debt.

I can remember Mr. Randolph Burgess before he became Under Secretary of the Treasury attacking the Truman administration and the Democratic Party for not lengthening out the debt. Yet here we find the debt, far from being lengthened, has been shortened.

Representative CURTIS. Mr. Chairman, are we going to have a political debate up here?

The CHAIRMAN. These matters cannot be entirely disassociated from policy.

Representative CURTIS. I might agree with that, but I think this is an inquiry. I would like to answer, because this has gotten into politics.

The CHAIRMAN. Politics is the discussion on public policy.

Representative CURTIS. I am one who is perfectly willing to engage in a political debate at anytime. I have many times tried to make the point that I thought the place for that was in the well of the Senate and the well of the House rather than in this committee. But I must say that I think the reason we have this problem is because we have had excessive expenditures under our Democratic controlled Congresses.

That is a political issue, and I do not think it is a question to be discussed here.

Representative PATMAN. May I comment on what Mr. Curtis said and Senator Bush?

Senator Bush said that the Secretary of the Treasury is caught in a vise. I do not agree to that at all.

The Federal Reserve could handle this situation. The Federal Reserve System is operating under a law. Under the Constitution of the United States, the President of the United States is obligated to take care that the laws are properly executed.

Faithful execution of the law governing the Federal Reserve—in reality owned 100 percent by the Government, lock, stock, and barrel—should be used in the Government's interest. The Treasury, with cooperation from the Federal Reserve, could fix the long-term interest rate at any rate it desired to fix it, whether at 4 percent or 2½ percent. They need only to decide bonds in the future, and keep them up at par. They would remain at par. There is no reason why they should not.

Now in connection with what Mr. Curtis, my distinguished friend and Member of the House, said about excessive expenditures, the excessive expenditures have been in large part due to high interest rates. High interest rates have been the most inflationary thing that we have had.

Representative CURTIS. Let me make a suggestion.

Why do we not take an hour on the floor of the House this week and we will engage in that debate. I have some questions I would like to ask the witness.

Representative PATMAN. I have, too, but I would just like to say—I am not expecting to take too much time on this, Mr. Curtis—that I wanted to comment on what you said. Excessive interest rates, to the point of being extortionate interest rates, have caused the excessive expenditures that threw all budgets out of balance from the Federal Government down to the housewives.

Representative CURTIS. Mr. Chairman, may I ask that the witness be permitted, if he wants to, to respond to the debate and maybe we can get some information from him.

Mr. SELDEN. I would rather complete my nearly completed statement. I would perhaps make one comment. That is that long-term debt, which is subject to price supports by the Federal Reserve System or any other agency, becomes, economically speaking, very similar to short-term debt. In other words, it becomes a money substitute and has precisely the same effects on velocity that I have been arguing

short-term debt has had. I can't help feeling that we could get into a self-defeating situation through any return to price supports of long-term Government debt.

Having said that, may I simply read the last two pages of my testimony and then we can proceed with the questions?

What I have done so far is offer an interpretation of why the velocity of money has gone up. I now wish to consider a counterinterpretation of this phenomenon which I do not find satisfying intellectually. This is the "cost push" or administered pricing kind of explanation of velocity rises.

Despite the preponderance of contrary opinion, I cannot agree that cost pushes and pricing practices have been significant factors in the recent inflation. My reasons are developed at length in the study that is appended to this statement, and therefore I shall only summarize my basic points here.

1. Inflation must operate through increases in the volume of money or its velocity or through decreases in the volume of transactions. In most cases, those who stress the importance of cost pressures and pricing practices fail to indicate how these factors influence the variables of the equation of exchange. Instead they commonly assume, implicitly or explicitly, that the money supply is elastic or that velocity is passive.

There is no basis in fact for such assumptions in the contemporary American economy; the Federal Reserve Board maintains tight control of the volume of money, and velocity studies suggest a high degree of regularity in that variable.

2. As we have just seen, the recent inflation is mainly attributable to higher velocity. The reasons for these velocity increases seem to be quite unrelated to cost pressures or pricing practices.

3. Since inflation means a rise in a general price index, one cannot usefully discuss it in terms of what has happened to the price of X or of Y ; there may very well be offsetting movements among other prices. However, when one analyzes the pattern of price change during 1955-57, one discovers that most of the important price rises occurred in industries that were characterized by high levels of production and employment, long work weeks, sizable unfilled orders, and other indicators of strong demand.

4. Comparisons of money wage rates and output per man-hour—productivity—are not useful in determining the sources of inflation since the finding that the former has outrun the latter is equally consistent with demand and cost theories of inflation.

5. The foregoing should not be interpreted to mean that cost pressures and price policies are unimportant to our economy. On the contrary, they may produce serious misallocations of resources, frictional unemployment, or other undesirable consequences. My only point is that they have been greatly exaggerated as causes of inflation.

There is an additional question of major importance on which I wish to comment in closing: Will inflation continue in the years ahead?

I do not see much likelihood of deflation in the future. Since 1896 the only significant price-level declines have occurred during the severe depressions of 1920-21 and 1929-33. Yet prices have risen in nearly every business cycle expansion.

This suggests that there is a long-established inflationary bias in our economy, certainly nothing that can be called a new inflation, as long as serious business declines are avoided.

Such a conclusion may be unduly pessimistic, however.

Inflations of the past have been characterized predominantly by rapid expansion of money but stable or declining velocity, apart from the usual cyclical variations. Obviously much will depend on the success of our monetary authorities in keeping the rate of growth of money within reasonable bounds.

In my judgment, the present powers of the Federal Reserve Board are entirely adequate for the achievement of sound monetary policy. The chief danger is not lack of appropriate tools, but, rather, lack of determination and political support in the use of existing tools. However, experience since 1951 provides a basis for optimism in this respect.

Assuming that this optimism turns out to be justified, the trend of prices will depend on the behavior of velocity. If velocity levels off and maintains a more or less horizontal trend, then the outlook for price-level stability will be good. On the other hand, if velocity continues to rise at its recent rate, inflation will probably continue.

The future trend of velocity will depend on the relative strength of the various velocity determinants discussed earlier. We can confidently anticipate continued growth of real income per capita and this should exert downward pressure on velocity.

On the other hand, we have little scientific basis for predicting the future of interest rates, money substitutes, and other velocity determinants, and a prediction of the trend of velocity is therefore not worth much.

My guess is that the upward drift in velocity will come to a halt within the next few years. Whether this turns out to be the case, only time will tell.

(Complete prepared statement of Mr. Selden follows:)

STATEMENT ON THE BEHAVIOR OF MONEY BY RICHARD T. SELDEN, RESEARCH ASSOCIATE, NATIONAL BUREAU OF ECONOMIC RESEARCH AND ASSOCIATE PROFESSOR OF BANKING, COLUMBIA UNIVERSITY

I. INTRODUCTORY REMARKS

Mr. Chairman and members of the Joint Economic Committee, I greatly appreciate the opportunity you have given me to take part in your important study of employment, growth, and price levels. My topic today is the behavior of money. There are two aspects of money behavior: Changes in quantity and changes in velocity of circulation. I shall devote most of my formal presentation to the latter, for two reasons: The general public is much less familiar with velocity as an important economic variable, and it is the aspect of money behavior on which I am most qualified to speak.

Although I shall attempt to summarize the historical record over the past 90 years, the major portion of my remarks will deal with the period since 1945. As all of us are painfully aware, the postwar years have been years of inflation, by and large. We are now in the midst of a great debate on the nature of this inflation. Many of the participants in this debate regard the recent episodes of rising prices as fundamentally different from those of the past. Some talk of "cost push" inflation, while others point to the behavior of "administered" prices; but these groups unite in concluding that what we have been experiencing recently is a "new" inflation, in sharp contrast to the "classic" demand inflations of earlier periods. The material I will present has a direct bearing on this debate, although it will not settle the basic issues.

Whatever the causes of postwar inflation, they are susceptible of analysis by means of the equation of exchange. This equation, which can never be false, states that any flow of payments can be regarded on the one hand as the quantity of money multiplied by its velocity, and on the other as the average price per transaction multiplied by the number of transactions. In symbols, $MV=PT$. The equation of exchange tells us that any rise in P , the price level, must be accompanied by a proportionate rise in M or V or a proportionate fall in T . When we apply this system of analysis to the postwar period we discover that rising velocity has been an important characteristic of the recent inflation.

Later in this statement I shall offer some explanations of the postwar tendency for velocity to rise, but it may be appropriate to state a major conclusion here. While undoubtedly it is true that no two inflations are exactly alike, I do not find strong support for the commonly held theory that recent inflations have been fundamentally different from earlier ones.

II. SOME ESSENTIAL CONCEPTS AND THEIR STATISTICAL COUNTERPARTS

It will be well worth our while to spend a few moments establishing some terminological ground rules at the outset. In addition it may be useful to consider the adequacy of statistical measures for the variables under discussion.

Inflation

Most economists use this term to denote a rise, whether large or small, in the price level as measured by a broad price index. It is important to recognize that a rise in any particular price, in and of itself, is not inflation, there may be compensating declines in other prices included in the index. Indeed, with a given total demand for goods and services one would normally expect such offsetting price movements.

In the United States there are three principal measures of the price level: the BLS Wholesale Price Index, the BLS Consumer Price Index, and the Commerce Department's implicit price deflators for gross national product. The first is available annually from 1801 and monthly from 1890; the second is available annually from 1913 and monthly from 1941; and the third is available annually from 1929 and quarterly from 1947. In addition, Dr. Simon Kuznets has estimated GNP price deflators back to 1869 (chart 1). None of these price indexes is entirely adequate for the study of inflation, but the Consumer Price Index is the least satisfactory of the three because of its narrow scope and its relative sluggishness. The Wholesale Price Index has two major shortcomings: its omission of the prices of services and its failure to pick up all departures from list prices. Where annual or (since 1947) quarterly data will suffice the implicit price deflators are probably our best measure of the price level because of their relatively broad scope.

Money and money substitutes

Money is anything that is generally accepted, and at par value, in the settlement of debts. In the United States only currency and demand deposits fit this definition exactly. However, there are many other assets which, though not used as exchange media, are very close substitutes for currency and demand deposits in the sense that they can be converted into the latter quickly and without risk of price fluctuation. What we have, essentially, is a continuum of assets with respect to their moneyness or liquidity. At one extreme there is money, the perfectly liquid asset, and at the other there are highly illiquid assets such as art objects. Most assets are between these extremes, some approximating money in their liquidity, others falling toward the less liquid end of the scale.

Prominent among the close money substitutes are commercial bank time deposits, savings accounts at mutual savings banks, series E bonds, and savings and loan shares. Because of their high liquidity it is likely that these assets influence the price level in much the same way as money proper. For this reason some economists have defined money broadly to include other highly liquid assets in addition to currency and demand deposits. Whatever the theoretical merits of this procedure may be, we have no choice but to do this in historical studies of the pre-1914 period. This is because bankers had little incentive to distinguish between time and demand deposits before passage of the Federal Reserve Act introduced much lower reserve requirements for the former than for the latter. For this early period, therefore, money must be regarded as currency plus total bank deposits.

Until recently the best money estimates have been those of the Federal Reserve System, covering the period since 1892. Up to 1922 these estimates consist of the amount outstanding at the close of business on a single date in June of each year; even as late as 1942 total money is given only for midyear and yearend dates. A major extension of monetary statistics is now nearing completion at the National Bureau of Economic Research. Under the direction of Prof. Milton Friedman and Mrs. Anna J. Schwartz monthly estimates of money have been prepared back to 1907, and annual and semiannual estimates to 1867. Chart 1 shows this series on an annual basis; its month-to-month rate of change is plotted in chart 2.

Velocity

As a broad historical generalization it is undoubtedly true that most of the world's significant inflations have resulted from excessive growth of money. Realization of this fact explains the continuing appeal of the "quantity theory of money." But it is also true that velocity sometimes influences the price level, even in the absence of changes in the quantity of money, and that is why velocity is worth discussing. Despite the long history of the concept and the large body of data relating to it, velocity remains a controversial topic. The plain truth is that we have only begun to understand why money circulates rapidly in some periods and slowly in others.

The velocity of money is simply the average number of times each dollar is spent during a year (or other time unit). Economists have confused matters somewhat by coining a variety of synonyms, including rapidity, frequency of use, turnover rate, and so forth. By a simple transformation of the equation of exchange it is obvious that velocity is the volume of payments per unit of money: $V=PT/M$.

So far I have not indicated what payments are described by the equation of exchange. Depending on the purpose at hand they may consist of all purchases made during the year, less barter transactions, or they may include only certain types of purchases (e.g., purchases made by check, purchases of currently produced goods and services, purchases by consumers, and so forth). There is an associated velocity concept, of course, for every conceivable payments flow. It is therefore misleading to talk of "the" velocity of money.

The three velocities most frequently mentioned in economic literature are aggregate transactions velocity, income velocity, and deposit turnover. The first is the ratio of all monetary purchases to average money during the year; the second is the ratio of national income or product to average money; and the third is the ratio of purchases by check to average demand deposits during the year. In addition to these three one also encounters aggregate nonfinancial velocity, which is the ratio of all purchases of goods and services to average money, and sector velocities, which are payments-money ratios for particular groups of spenders (e.g., manufacturing corporations, holders of demand deposits in New York City banks, etc.). If we push the sector velocity concept to its logical limit we may visualize every holder of cash as maintaining some ratio of purchases to cash balances. Averaging these countless millions of individual velocities we obtain aggregate transactions (or nonfinancial) velocity.

Because of the lack of information about currency payments there is no statistical measure of aggregate transactions velocity, but there are fairly good measures of each of the other velocities described above.

1. Income velocity. We have annual estimates of income velocity from 1869 using the National Bureau's money series (total deposits plus currency) as denominator and Dr. Kuznets' net national product series as numerator (chart 1). If money is defined as demand deposits plus currency we have annual income velocity estimates from 1914 (chart 3). Beginning in 1929 monthly and quarterly estimates are available embodying the Commerce Department personal income series and the National Bureau's money series. Another less-than-annual income velocity series, in my judgment superior to the series just mentioned, covers the period since 1939. This is the ratio of quarterly GNP to outstanding money. This series is particularly useful for the postwar period because we now have quarterly implicit price deflators and estimates of real output back to 1947 (chart 5).

In general we may be confident that these income velocity series are reliable. So far as the money component is concerned there can be no question of this, particularly since 1907, the initial date of the National Bureau's monthly series. Even for earlier years it is doubtful that use of 1 day's figures to represent an entire year introduces any significant error; the volume of money is a relatively

stable magnitude in the short run, as reference to chart 2 will indicate. While we cannot rely equally on the income estimates, we may nevertheless be sure that the range of error is insufficient to invalidate their use for broad historical analysis.

2. Deposit turnover. Annual deposit turnover estimates, published by the Federal Reserve System, go back to 1919 (chart 3). As noted below, deposit turnovers for New York City and other groups of reporting centers also date from that year. The Federal Reserve has published monthly deposit turnovers for a broad group of centers since 1943. In each case these series consist of the ratio of debits against checking accounts to the average amount of such accounts during the period.

These deposit turnover series have numerous statistical defects. Every time a check is drawn its amount is added to total debits, even if it is payable to cash or represents a transfer from one account to another or arises out of lending or debt repayment. None of these debits is a payment in the sense that is relevant to the equation of exchange. Furthermore, another large class of debits, checks drawn for the purchase of stocks and real estate, is of limited value in the analysis of inflation and the level of output. During the late 1920's rapid growth of these purely financial debits caused a marked disparity in the behavior of deposit turnover and income velocity (chart 3).

Because of the predominance of check payments in the American economy it is likely that these deposit turnover series are fairly good indexes of aggregate transactions velocity, statistical flaws notwithstanding.

3. Aggregate nonfinancial velocity. A statistical measure of this velocity has become available annually for the period 1939-56 as a byproduct of the Federal Reserve's flow of funds system of social accounts (chart 3). The numerator is total nonfinancial uses of funds. Stock purchases, debt transactions, and purely technical operations involving money are excluded; payments by currency are meant to be included as well as those by check. The denominator is essentially the standard Federal Reserve money series. The version of nonfinancial velocity shown in chart 3 excludes time deposits from money. The quality of this series is hard to assess. My own judgment is that it is about as reliable statistically as deposit turnover and much sounder in concept. Unfortunately, the Federal Reserve has no plans at present for extending the required data beyond 1956.

4. Sector velocities. Until recently very little attention has been paid to velocity behavior by economic sectors, except for the Federal Reserve break-downs of deposit turnover by New York City, other leading centers, and smaller centers (chart 6). By themselves these geographical deposit turnovers have little value except to isolate the effect of financial operations, which mainly affect New York City banks.

The Federal Reserve flow of funds accounts provide data for more meaningful sector velocities since they include both nonfinancial uses of funds and year-end money holdings for consumers, the Federal Government, State, and local governments, and several broad categories of business (chart 7). These are annual estimates over the period 1939-56.

Finally there are several ways of computing velocities for various parts of the business sector of our economy. Since 1931 the annual statistics of income volumes have tabulated financial statements of corporations filing tax returns in such a manner that reliable sector velocities can readily be computed for industry and size groups (charts 8 to 11). Similarly, since 1947 quarterly velocities for major manufacturing industries can be derived from the Federal Trade Commission-Securities and Exchange Commission Quarterly Financial Reports for Manufacturing Corporations. One might also compute velocities directly from published financial reports. All of these business sector velocities have flaws, but they do not seem sufficiently serious to impair their usefulness.

III. THE HISTORICAL RECORD OF 1945

Trends

Even a casual glance at chart 1 reveals that the trend of total deposits plus currency was upward and that of velocity downward, with only brief interruptions in both cases, over the period 1869-1945. As far as money is concerned this is what one would expect in a growing economy; the equation of exchange makes it clear that failure of M to expand as rapidly as T would exert downward pressure on P , unless V were to rise. But V has fallen historically, as we have just seen, and therefore M has had to expand even faster than T to

avoid long run deflation. The downward drift of prices in the last quarter of the 19th century indicates that *M* grew insufficiently during that period (chart 1); likewise, the predominance of inflation since then indicates that on the whole monetary expansion has been excessive in this century.

It will be recalled that the income velocity series shown in chart 1 utilizes a broad definition of money. Chart 3 permits us to study trends in the velocity of demand deposits plus currency for the much shorter period since 1919. Again the general movement of income velocity was downward to 1945. However, nearly all of the decline occurred during the severe business contraction of 1930-33 and the wartime restrictions of 1942-45. Except for these more or less catastrophic events it is not at all clear that the income velocity of demand deposits plus currency would have declined after 1919. This also raises the unanswerable question of whether this velocity fell during 1869-1919, as its more broadly defined counterpart did.

Demand deposit turnover had no simple trend during 1919-45 (chart 3). It rose initially and then fell sharply and almost continuously from its 1929 peak to a trough in 1944. The net effect, of course, was a substantial downward movement of velocity. Again we have no way of knowing how this velocity behaved before 1919.

Cycles

The existence of cycles in the behavior of money is well established. In general velocity rises during business expansions and falls during business contractions; this pattern has been highly regular since the turn of the century. The volume of money varies less than velocity cyclically. It usually rises during contractions as well as expansions, but its rate of increase is less during the former than the latter. Only during severe contractions does the volume of money actually decline. These behavior patterns are readily apparent in charts 1, 3, and 5 for velocity and in charts 1, 2, and 5 for money. They are also shown somewhat more rigorously in table 1, which I have taken from a forthcoming publication by Professor Friedman. Needless to say, the interpretations placed on these data are my own.

Table 1 summarizes the result of standard (though somewhat abbreviated) National Bureau business cycle analyses as applied to annual data for money, velocity, and related variables. It would prolong this discussion unduly to describe the method of analysis fully but in brief the procedure involves the following steps:

1. The dating of business cycle peaks and troughs. The National Bureau has assigned monthly and quarterly as well as annual dates, but only the latter concern us here.
2. For each trough-to-trough business cycle, computation of a cycle average for the series under analysis.
3. Computation of cycle relatives by taking trough and peak year values as a percent of the cycle average.
4. Computation of change per month in cycle relatives during expansions and contractions. This is done for expansions, for example, by subtracting the initial trough relative from the peak relative and dividing the difference by the expansion's duration in months.
5. Averaging these changes per month for a large number of cycles to obtain average business cycle patterns during expansion and contraction phases. It is these numbers that appear in table 1.

The data in table 1 cover the 18 complete peacetime business cycles between 1870 and 1954. They are arranged in two groups according to severity of the cycle. We see that on the average money grew substantially during the expansions and moderately during the contractions of the 12 mild cycles. During the six deep depression cycles, on the other hand, money increased at about the same rate in expansions but fell during contractions. The velocity of total deposits plus currency rose only slightly during expansions, whether in mild or severe cycles, but fell markedly in both types of contractions.

The other variables in table 1 also deserve our attention. Income, both real and money, rose and fell with business cycles much as one would expect. The price level also has demonstrated cyclical conformity, but the contrast between mild and deep depression cycles is notable. We see that moderate inflation has been characteristic of both types of expansions, but that deflation has been much greater during severe than mild contractions. Indeed, as reference to chart 1 indicates, prices actually continued to rise during several business contractions.

TABLE 1.—*Cyclical movements in income, money stock, income velocity, and prices: Difference in monthly rate of change between reference expansion and contraction, annual analysis, 1870–1954, excluding war cycles*

	Change per month in reference-cycle relatives during reference		Excess of expansion over contraction (3)
	Expansion	Contraction	
	(1)	(2)	
12 mild depression cycles:			
Money income.....	0.64	-0.07	0.71
Money stock.....	.55	.28	.27
Income velocity.....	.08	-.32	.40
Implicit price deflator.....	.12	-.02	.14
Real income.....	.52	-.05	.57
Real stock of money.....	.43	.30	.13
6 deep depression cycles:			
Money income.....	.64	-.07	1.61
Money stock.....	.60	-.28	.88
Income velocity.....	.02	-.69	.71
Implicit price deflator.....	.16	-.44	.60
Real income.....	.46	-.53	.99
Real stock of money.....	.42	.18	.24

NOTE.—All series have expansion period I-V.

Source: The series were analyzed as described in A. F. Burns and W. C. Mitchell, *Measuring Business Cycles* (NBER, 1947), pp. 197–202. Because of rounding, col. 3 sometimes disagrees with the difference between cols. 1 and 2. Deep depression cycles are 1870–78, 1891–94, 1904–8, 1919–21, 1927–32, and 1932–38. All others are mild depression cycles except for war cycles 1914–19 and 1938–46, which are excluded. The basis of classification is described in the NBER monograph on the money supply now in preparation. Money income is net national product; current prices, preliminary estimates by Simon Kuznets, NBER, prepared for use in the study of long-term trends in capital formation and financing in the United States: Variant III (from 1929 based on estimates of commodity flow and services prepared by the Department of Commerce). Money stock is averaged to center on June 30 from data in the monograph just mentioned. Income velocity is money income divided annually by money stock. Implicit price deflator is money income divided by real income. Real income is net national product, 1929 prices, Variant III from same source as money income. Real stock of money is money stock divided by implicit price deflator.

Informative though it is, table 1 tells us nothing of the relation between cyclical turning points in money and velocity and the peaks and troughs of business cycles. In other words, I have said nothing so far to indicate whether these are leading or lagging series. For velocity it is difficult to answer this question because of the relatively short time spans of our monthly or quarterly series; annual series do not convey much information of the type we seek. My investigations lead me to believe that velocity is more or less coincident with business cycles, and in any case does not usually lead general business downturns.

We are somewhat better off with respect to money, although here we must work with cyclical variations in the rate of change rather than in money itself. Chart 2 shows month to month rates of change in seasonally adjusted money, 1907–55. The shaded areas of this chart represent business cycle contractions and the dots indicate turning points in the series. Professor Friedman, in the paper he prepared for this committee last year, concluded that “on the average the rate of change of the money supply has reached its peak nearly 16 months before the peak in general business and has reached its trough over twelve months before the trough in general business.” Thus the rate of change in money is a leading series.

Determinants of observed behavior

It would be presumptions of me to give the impression that we fully understand the various aspects of money behavior just described. This is particularly true with regard to velocity. Nevertheless, I shall summarize what appear to me to have the main determinants of velocity during 1869–1945 before turning to the postwar behavior of money. A further discussion of these matters may be found in my study of the recent inflation (pp. 7–8), which I have appended to this testimony.

We have already seen that velocity is the ratio of a flow of payments to a stock of money. All of this money must be held by someone at all times. If an individual decides that he is holding too much money he may get rid of it

by spending it. All spending units taken together, on the other hand, cannot do this, for the money disposed of by A will be acquired by B, with the total remaining unchanged. Thus it is broadly true that the public cannot affect the quantity of money, M . But in trying to get rid of superfluous cash the public can influence the real volume of money, M/P , by bidding up the price level. It can also thereby affect velocity, PT/M . The question of what determines velocity can therefore be rephrased to "why does the public wish to hold varying quantities of money from time to time in relation to the payments it makes?"

One determinant of the public's demand for money to hold, and therefore of velocity, is probably the level of interest rates. Holders of cash are keeping a portion of their wealth in a barren form (except insofar as interest is paid on deposits). When interest rates are low this involves no great sacrifice and the public is content to maintain large balances relative to payments; accordingly, velocity is low. High interest rates cause people to consider ways of economizing on cash so that advantage may be taken of attractive opportunities to lend; the result is high velocity.

Another important factor influencing velocity is the level of yields on money substitutes, together with the availability of credit cards, trade credit, and other devices that take the place of cash. Higher yields or increased availability will cause the public to satisfy its liquidity needs by holding items other than cash. Here again the result will be a rise in velocity as the public expands the volume of payments in a futile attempt to unload money.

A third velocity determinant is the general level of well-being, as measured by real income per capita. It is common knowledge that as income expands consumption of some articles rises even faster than income while consumption of others lags (or may even decline). We may apply the same idea to money. It seems reasonable to suppose that the public will seek additional cash, relative to the payments it makes, as real income per capita rises. This, of course, implies falling velocity as an attribute of economic growth.

A fourth determinant, in a sense the fundamental one, is the extent to which the holding of money is useful. This varies from one spending unit to another and for the entire economy over time, depending on the economic environment. The pattern of receipts and payments is one element of this environment; another is the risk of unforeseen reductions in receipts or additions to payments. These factors are difficult to measure, and the degree to which variations in the utility of money cause velocity fluctuations is therefore hard to assess.

The final velocity determinant I shall mention here is the public's expectations about the future value of money. If the notion becomes widespread that prices will rise, there is likely to be an attempt to move out of cash and into other assets that are more inflationproof. As we have already seen, the public at large cannot do this; it can only augment the flow of payments, thus increasing velocity. Perhaps I should add that this is a case of a self-confirming prediction: if the public expects price rises it may behave in such a manner that prices will indeed rise.

We can now frame some tentative answers to the following questions: Why did velocity decline so persistently over the period 1869-1945? Why does velocity rise during business expansions and fall during contractions?

The most likely answer to the first question is that velocity has declined since 1869 because per capita income has risen. Apparently the public wishes to "consume" more of the services of money as income grows, and this means keeping a larger stock of cash in relation to expected payments. There is a very real question, however, whether this reasoning applies to all components of money or only to time deposits; the behavior of the velocity of demand deposits plus currency since 1919 does not conform well to this income hypothesis. Rather, the extremely severe depression of the 1930's and the period of wartime restrictions before full recovery had been reached probably account for most of the velocity decline observed between 1919 and 1945.

One might have expected a rising rather than a falling trend of velocity since 1869 on the ground that improved techniques of managing cash, particularly by businesses, have diminished the utility of money. No doubt such improvements did occur, but during 1869-1945 they were more than offset by the income factor, aided to a minor extent perhaps by a trend toward lower interest rates. The same is true of the much discussed growth of financial intermediaries and their spawning of money substitutes. Up to 1945 at least this trend was not strong enough to produce rising velocity.

Let us turn briefly to the cyclical behavior of velocity. There can be little doubt that variations in interest rates, particularly short-term rates, are respon-

sible for some of the cyclical pattern in velocity. Other relevant factors may include cyclical oscillations in price expectations and in the degree of optimism. However, perhaps the most promising clue is revealed by the sector studies described below: the fact that cycles are virtually nonexistent except in the corporate business sector. This suggests that the main factor responsible for cyclical variations in aggregate velocity may be business expectations concerning the profitability of new plant and equipment and inventories compared with the utility derived from keeping cash on hand. Probably a complete answer here will be forthcoming only when the business cycle itself is fully understood.

IV. THE POSTWAR BEHAVIOR OF MONEY: THE HISTORICAL RECORD

In some respects money has behaved much the same since 1945 as earlier in our history, and in other respects not. I shall review these aspects of behavior in the following paragraphs, taking up first the volume of money and other liquid assets, next changes in the aggregate velocity of money, and finally velocity change within particular sectors of the economy.

The volume of money and money substitutes

Chart 1 contains the salient facts about the postwar volume of money, including commercial bank time deposits. The wartime period of rapid growth ended abruptly in 1945. For 3 years, during 1947-49, the stock of money was at a complete standstill. Growth resumed in 1950 and has continued since then, but at a noticeably slower rate than in earlier peacetime years.

Chart 4 permits us to analyze the components of money in some detail. (Note that this chart, which I have taken from the Federal Reserve chart book, is plotted on an arithmetic scale in contrast to the logarithmic vertical scale of the other charts I have presented; furthermore, deposits in mutual savings banks and the postal savings system are included in chart 4 but excluded from chart 1.) Demand deposits were nearly stable during 1947-49, rose moderately during 1950-54, rose only slightly during 1955-56, fell in 1957, and rose sharply in 1958. Since currency has remained virtually unchanged since 1946, the behavior of demand deposits plus currency is nearly identical to that of demand deposits alone. Time deposits, on the other hand, have grown throughout the postwar period and with great rapidity during 1952-54 and 1957-58.

An important characteristic of the postwar period has been the sharp expansion of money substitutes. This is evident from the data in table 6 of the appended study of recent inflation. As this table shows, the ratio of money substitutes to money rose steadily during 1952-57; and the rise would have been even more striking had time deposits been counted as money substitutes rather than as money. The only major money substitute not participating in this remarkable growth has been U.S. savings bonds. The expansion of savings and loan shares has been especially dramatic.

Aggregate measures of velocity

In sharp contrast to the period 1869-1945, the velocity of money has moved steadily upward, except for cyclical downturns, since the end of World War II. This is true whether one measures velocity by deposit turnover, aggregate non-financial velocity, or income velocity, and whether or not one includes time deposits in money. By 1957 the ratio of annual gross national product to demand deposits plus currency reached a level it had not experienced since 1931, and the same was true of demand deposit turnover (chart 3).

It is interesting to note that the three aggregate velocity measures have displayed highly similar growth rates since the end of the war—1.8 percent per year for income velocity and 2 percent for the other two. This is a greatly different situation from the 1920's when deposit turnover rose sharply but income velocity did not. Income velocity and aggregate nonfinancial velocity appear to be tapering off in their rates of growth; deposit turnover, on the other hand, has continued straight up.

Sector velocities

As I indicated earlier, there are several ways of analyzing velocity by economic sectors: deposit turnovers by geographical groupings; nonfinancial velocities by flow of funds sectors; and nonfinancial velocities of corporations by industry and asset size groups. Charts 6 to 11 present selected sector velocities from these sources.

In chart 6 we see that deposit turnover has been rising persistently since 1943 in New York City and since 1946 in six other centers and other leading centers. However, New York City velocity has grown about twice as fast (3 percent per year) as velocity elsewhere. Since 1954 New York City velocity has been about twice as high as velocity in the other centers and about two-thirds again as high as six other centers' velocity. One other point is worth mentioning: New York City velocity, on an annual basis, fails to exhibit cyclical declines, while the other two sector velocities do.

Chart 7 shows annual velocities for 1939-56 by five flow of funds sectors: consumer, corporate business, farm and noncorporate business, Federal Government, and State and local government. On inspection of the chart one is struck immediately with the contrast between wartime and postwar velocity movements. From 1939 to 1941 velocity rose in some sectors and fell in others, but after 1941 declining velocity became the order of the day. The declines were much sharper for the Federal, consumer, and farm and noncorporate sectors than for the corporate sector. State and local velocity also fell substantially, though not as much as consumer velocity.

The postwar period, on the other hand, has been characterized by a pronounced upsurge of velocity in every sector. For all sectors the 1939-45 peak value had been exceeded by 1955—by as early as 1947 in the case of the corporate sector. Except for the Federal Government, whose velocity has moved somewhat erratically, the rises have been remarkably steady throughout 1946-56. Even Federal velocity has not been far out of line since 1947, and its extremely low value in 1946 is largely the result of the huge sums obtained through the eighth war loan in December 1945.

In addition to the broad pattern of similarity since the end of the war several differences among sectors are evident in chart 9. Most obvious, of course, are the great differences in velocity levels, with corporate business at the upper end of the scale and State and local governments at the bottom. Another difference is in the degree of cyclical variability. It is interesting to see that the decline in aggregate nonfinancial velocity during the 1949 and 1954 recessions resulted solely from falling velocity in the corporate sector. Still another difference is the fact that corporate velocity has been lagging since 1946, its rate of increase being only about half those of the consumer and farm and noncorporate sectors.

The business velocities shown in charts 8 to 11 were computed from statistics of income. They are ratios of annual expenditures (except capital outlays) to year-end holdings of currency and deposits (time as well as demand), as reported by corporations filing tax returns. Those in chart 8, covering the period 1931-56, are for selected major industry divisions: manufacturing, mining, public utilities, and trade. Throughout this period, as well as since the end of World War II, we find broadly similar velocity movements among these sectors. Manufacturing velocity has been very close to that of all nonfinancial corporations in level, trend, and year-to-year movements. Trade velocity, though much higher, moves in similar fashion; the same is true of mining velocity, which is considerably lower than the others. Public utilities velocity, in contrast, has risen somewhat faster than velocity in the other industry divisions. However, we get the same impression from this chart as from charts 3, 6, and 7 of a general and pronounced postwar rise in velocity.

Charts 9 and 10 show velocities for 13 of the 54 major industry groups available in statistics of income. As one would expect when passing from the general to the more detailed, charts 9 and 10 reveal some striking dissimilarities, both in velocity levels and in trends. The differences in levels are what one would expect on the basis of the relationships shown in chart 8; hence they need not detain us. With respect to trends, however, the range of annual growth rates runs from a minus two-tenths of 1 percent for retail food trade to 4.7 percent for motor vehicles and equipment. Other rapidly growing sector velocities were those of electrical machinery and equipment (2.7 percent per year), textile-mill products (1.7 percent), and retail trade (1.6 percent). Other laggards were food and kindred products (0.2 percent), general merchandise retail trade (0.2 percent), and paper and allied products (0.7 percent).

The velocities in chart 11 are by size sectors, rather than industry sectors, as measured by total assets. Although I have computed velocities for all 10 of the size classes available back to 1946, the chart shows them only for under \$50,000, \$10 million under \$50 million, and \$100 million and over. This sacrifices little information since the five smallest classes are clustered closely

together throughout the period, and the intermediate classes behaved much like the \$10 million under \$50 million class.

Two important facts emerge from analysis of chart 11 and the unplotted size data. The first is that there is a definite tendency for small firms to maintain higher velocity ratios than large firms. The second fact, which I shall argue below is important for an understanding of the postwar behavior of money, is the much sharper rise in velocity for the largest firms than for any other size class—a growth rate of 2.5 percent per year compared with 1.3 percent for the smallest class and only 0.9 percent for firms of intermediate size.

V. THE POSTWAR BEHAVIOR OF MONEY AND PRICES: AN INTERPRETATION

The extent of inflation and proximate causes

The annual GNP price index has risen in each of the last 20 years (chart 1). Even on a quarterly basis there have been only a few instances of price declines since 1947, the earliest year for which the quarterly GNP price index is available; these occurred in the first three quarters of 1949, the first quarter of 1953, and the second quarter of 1954 (chart 5). The rate of inflation has been highly uneven, of course, with periods of approximate stability in 1949 and early 1950 and in 1952-54 punctuating periods of more rapidly rising prices. Between the first quarter of 1947 and the third quarter of 1958 the GNP price index rose by almost 37 percent.

As we have already seen, we may analyze the postwar inflation by means of the equation of exchange. The variables contained in this equation are plotted in chart 5, quarterly, 1947-58. Each of them rose substantially over this period: money by 23.7 percent, velocity by 56.8 percent, and real GNP by 41.9 percent. The rise in real GNP, of course, was a deflationary factor in the sense that the strong aggregate demand for goods and services was met in part by expanded supplies rather than by higher prices. Since the volume of money has grown at less than its prewar long-term rate since 1947, and has fallen substantially relative to real GNP, it is clear that monetary expansion during the postwar period was not a major factor in inflation. Velocity, on the other hand, not only expanded twice as fast as the stock of money; it has been moving counter to its long-established downward drift. For these reasons it appears that an analysis of postwar inflation must center on velocity.

Why velocity has risen since the end of the war

It may be useful to begin an explanation of the postwar velocity rise by considering some hypotheses that seem clearly inapplicable.

1. We may reject at once one promising and simple explanation. Since velocity varies greatly among economic sectors, shifts in the relative importance of sectors can affect aggregate velocity. I have studied such realignments in considerable detail for the postwar period and have concluded that their effects on velocity have been slight. Furthermore, they have tended to reduce rather than raise velocity.

2. The fact that velocity has risen in virtually every sector suggests that the forces responsible for rising velocity are general in nature. While most of the velocity determinants discussed above (section III) do appear to be general in their effects, one of them, the level of real income per capita, does not. Although it is readily understandable that consumer velocity may depend on this variable, it is not clear why corporate, Federal, and State and local velocities should be similarly affected. This difference between consumers and other spending units may account in large part for the fact that the income velocity of total deposits plus currency has shown more of a tendency to fall over time than has the income velocity of demand deposits plus currency; consumers hold far and away the largest portion of time deposits. In any case the income effect apparently was velocity reducing in nature up to World War II. These considerations tend to cast doubt on changes in per capita real income as a significant determinant of velocity since the end of the war.

3. Finally, if the postwar velocity rise had been confined to income velocity alone or to deposit turnover or aggregate nonfinancial velocity alone it could have been attributed to the widespread mergers or to other factors that affect the alternative velocity measures differently. The fact that these measures have behaved with remarkable similarity since 1946 permits us to reject all such hypotheses with confidence.

Having considered some inadequate explanations of the postwar velocity rise, let us now turn to a positive approach to the problem. In all probability most

of the postwar velocity rise is simply a readjustment from wartime abnormalities. Not until 1953 did the income velocity of demand deposits plus currency regain its 1941 peak, and the income velocity of total deposits plus currency was still well below its 1942 and 1943 values in 1957. (See chart 3.) Our study of sector velocities offers further evidence that the readjustment continued at least until 1951 and perhaps even until 1955. Although both corporate and Federal velocities snapped back quickly to their early wartime or immediate prewar peaks, there were prolonged lags in the other major sectors (chart 7). Farm and noncorporate velocity regained its 1939 value only in 1953, State and local velocity did not do so until 1954, and consumer velocity consumer velocity achieved this feat as late as 1955. Furthermore, in 1939-41 the velocity of demand deposits plus currency probably was still below its normal prosperity level because of the unusual severity of the 1929-33 and 1937-38 contractions. If this is true then velocity in the postwar period has been influenced by two distinct readjustment processes rather than one, and there is no assurance that these processes have been completed even now.

The return to equilibrium levels is not the whole story, however. Superimposed on this fundamental factor were other forces of a velocity-increasing nature. Evidence of this can be seen in the fact that corporate velocity, after having resumed its immediate prewar level in 1947, continued to push upward during the next 10 years and by 1956 had established a high for the entire period since 1931 (chart 8). Among these other velocity-increasing forces I would list the generally higher level of interest rates and particularly the increased availability and yields of money substitutes. Perhaps these were supplemented to a minor extent by a growing belief in the inevitability of inflation.

The rising trend of long term interest rates and rates on bank loans is common knowledge and needs no documentation. Like velocity, these rates have moved up and down with succeeding phases of postwar business cycles, but rises have exceeded declines and an upward trend has resulted. However, since long term rates were of limited significance before the war as velocity determinants there is no reason to think they have been particularly important since 1946.

In my judgment the principal reason why velocity has been rising, other than the simple readjustment from wartime restrictions and prewar depressions, is the increased importance of money substitutes in the economy. I have already mentioned the fact that liquid assets have been growing persistently relative to money. Households have relied increasingly on time deposits and savings and loans shares as sources of liquidity, no doubt in response to greatly improved yields. State and local governments as well as businesses have learned that short-term Treasury securities are an attractive alternative to cash, and the Treasury has obliged them by converting more and more of the public debt to short-term obligations.

But there have been other developments in the realm of money substitutes. Although it cannot be easily documented there appears to have been a substantial growth of charge accounts, trade credit, credit lines at banks, and credit cards, along with a general improvement in credit ratings. All of these developments have facilitated purchases without cash and thus have tended to increase overall expenditure-money ratios (i.e., velocity).

Another highly significant change has been the increasing importance of large "nonfinancial" corporations as lenders. I am referring here to the growth of repurchase agreements between such corporations and Government securities dealers whereby firms may lend to dealers essentially on a call basis, thus gaining interest income without sacrificing an appreciable amount of liquidity. The importance of these arrangements, together with outright purchases of Governments, can be seen clearly in the fact that velocity has risen much more rapidly for large corporations than for any other size class (chart 11); in general only large corporations participate in such transactions. It also explains part of the higher growth rate of velocity in New York City, where large corporate accounts are concentrated, than elsewhere (chart 6).

In summary, as I see it the 1946-57 velocity rise was primarily a readjustment from wartime dislocations and prewar abnormalities. However, these readjustments have been magnified by the growth of money substitutes of various sorts, together with a trend toward higher interest rates.

Have "cost pushes" or business pricing practices contributed to postwar inflation?

Despite the preponderance of contrary opinion, I cannot agree that cost pushes and pricing practices have been significant factors in the recent inflation. My reasons are developed at length in the study that is appended to this statement, and therefore I shall only summarize my basic points here.

1. Inflation must operate through increases in the volume of money or its velocity or through decreases in the volume of transactions. In most cases those who stress the importance of cost pressures and pricing practices fail to indicate how these factors influence the variables of the equation of exchange. Instead they commonly assume, implicitly or explicitly, that the money supply is "elastic" or that velocity is "passive." There is no basis in fact for such assumptions in the contemporary American economy: the Federal Reserve Board maintains tight control of the volume of money, and velocity studies suggests a high degree of regularity in that variable.

2. As we have just seen, the recent inflation is mainly attributable to higher velocity. The reasons for these velocity increases seem to be quite unrelated to cost pressures or pricing practices.

3. Since inflation means a rise in a general price index, one cannot usefully discuss it in terms of what has happened to the price of X or of Y; there may very well be offsetting movements among other prices. However, when one analyzes the pattern of price change during 1955-57 one discovers that most of the important price rises occurred in industries that were characterized by high levels of production and employment, long work weeks, sizable unfilled orders, and other indicators of strong demand.

4. Comparisons of money wage rates and output per manhour (productivity) are not useful in determining the sources of inflation since the finding that the former has outrun the latter is equally consistent with demand and cost theories of inflation.

5. The foregoing should not be interpreted to mean that cost pressures and prices policies are unimportant to our economy. On the contrary, they may produce serious misallocations of resources, frictional unemployment, or other undesirable consequences. My only point is that they have been greatly exaggerated as causes of inflation.

Implications for the future

There is an additional question of major importance on which I wish to comment in closing: will inflation continue in the years ahead?

I do not see much likelihood of deflation in the future. Since 1896 the only significant price-level declines have occurred during the severe depressions of 1920-21 and 1929-33. Yet prices have risen in nearly every business cycle expansion. This suggests that there is a long established inflationary bias in our economy—certainly nothing that can be called a new inflation—as long as serious business declines are avoided.

Such a conclusion may be unduly pessimistic, however. Inflations of the past have been characterized predominantly by rapid expansion of money but stable or declining velocity (apart from the usual cyclical variations). Obviously much will depend on the success of our monetary authorities in keeping the rate of growth of money within reasonable bounds. In my judgment the present powers of the Federal Reserve Board are entirely adequate for the achievement of sound monetary policy. The chief danger is not lack of appropriate tools but rather lack of determination and political support in the use of existing tools. However, experience since 1951 provides a basis for optimism in this respect.

Assuming that this optimism turns out to be justified, the trend of prices will depend on the behavior of velocity. If velocity levels off and maintains a more or less horizontal trend then the outlook for price-level stability will be good. On the other hand, if velocity continues to rise at its recent rate inflation will probably continue.

The future trend of velocity will depend on the relative strength of the various velocity determinants discussed earlier. We can confidently anticipate continued growth of real income per capita and this should exert downward pressure on velocity. On the other hand, we have little scientific basis for predicting the future of interest rates, money substitutes, and other velocity determinants, and a prediction of the trend of velocity is therefore not worth much. My guess is that the upward drift in velocity will come to a halt within the next few years. Whether this turns out to be the case only time will tell.

COST-PUSH VERSUS DEMAND-PULL INFLATION, 1955-57¹

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I. INTRODUCTION

UNTIL recently, monetary theorists have approached the topic of inflation with an air of assurance. Whether employing the homely but durable equation of exchange or the newer Keynesian models, they have explained price-level changes primarily in terms of variations in aggregate demand. True enough, there have always been dissidents,² though mainly among those without thorough grounding in macroeconomics. Particularly since 1955, however, we have been told with increasing frequency, and by men of recognized competence, that there is a new kind of inflation in our land.³ In fact, judging by recent discussions there are several new kinds of inflation, including wage inflation, profit inflation, sellers' inflation, and even "tight-money" inflation.⁴ Each

¹ I wish to express my gratitude to Gary S. Becker and Milton Friedman for their many helpful suggestions.

² In 1911 Irving Fisher noted that "one of the supposed causes of high prices today, much under discussion at the present time, is that of industrial and labor combinations" (*The Purchasing Power of Money* [1st ed.; New York, 1911], p. 179).

of these supposedly new phenomena is said to operate through a cost push, rather than through the traditional demand pull, and in this respect they confront the monetary theorist with a difficult choice. Unless he can show that recent price rises do not differ importantly from those of earlier periods, he must either rationalize cost-inflation theories in terms of orthodox models or fashion new models that encompass cost as well as demand inflation.

I shall argue that the 1955-57 inflation was in fact basically similar to inflations of the past and that the role of costs in

³ The literature reflecting this point of view has become voluminous. I shall cite only a few examples: John Kenneth Galbraith, "Are Living Costs Out of Control?" *Atlantic Monthly*, February, 1957; National Association of Manufacturers, *A New Force for Inflation* (May, 1956); Abba P. Lerner, "Inflationary Depression and the Regulation of Administered Prices," in U.S. Congress, Joint Economic Committee, *The Relationship of Prices to Economic Stability and Growth* (Compendium of Papers Submitted by Panelists, March 31, 1958). I shall refer to the latter volume as *Compendium*.

⁴ See *Compendium*, p. 259, for Lerner's defense of the term "sellers' inflation." On the allegedly inflationary effects of interest-rate rises see the statements of Senators Humphrey and Sparkman, reported in the *New York Times*, January 27, 1957.

this inflationary episode has been greatly exaggerated.⁵ I shall proceed by first reviewing in Section II some general aspects of the American economy during this period. It is clear that most cost-push theories of inflation implicitly assume that higher costs can increase the velocity of money; therefore as a preliminary to the core of this study, which is contained in Section IV, I have provided in Section III a résumé of velocity theory as it has been developed in the "Chicago" monetary tradition. In Section IV, I evaluate what appear to be the more important variants of cost-push thinking. These are reformulated in terms of, and organized around, the velocity theory presented in the preceding section. Section V summarizes the argument and offers an alternative interpretation of recent price-level changes.

II. RECENT INFLATION: DIMENSIONS AND PROXIMATE CAUSES

A. GENERAL CONSIDERATIONS

One fact about 1955-57 is beyond dispute: the price level *did* rise, however measured. The Bureau of Labor Statistics' Wholesale Price Index (WPI) turned upward in mid-1955; the Consumer Price Index (CPI) early in 1956. Both indexes had been approximately stable during the two preceding years. From December, 1954, to December, 1957, the WPI rose by 8.2 per cent, the CPI by 6.4 per cent. Another measure of the price level, the implicit deflators of gross national product (GNP), also increased by 8.2 per cent over the same period. These movements were more or less continuous throughout the period, with a definite tapering-off in evidence by the middle of 1957. Unquestionably it is true, as some critics have charged, that

⁵In this study "inflation" means simply a rise, however small, in a broad index of prices.

these indexes overstate the degree of price rise.⁶ But it is equally clear that a large portion of the rises would remain even if the upward biases could somehow be removed.

Another fact merits mention at the outset. The 1955-57 inflation began about one year after the beginning of the business-cycle expansion of July, 1954—August, 1957. By the time the WPI turned upward, the economy was virtually at full employment. The historical record indicates that inflation has almost always accompanied American business expansions.⁷ The remarkable aspect of the 1955-57 inflation is not that the price level rose but rather that it did not begin to rise earlier than it did.

B. THE PATTERN OF PRICE CHANGE

The broad price movements just noted were the net result of widely varying changes among component prices. The WPI, with which the remainder of this study deals, covers about 2,000 prices, arranged in 15 major groups and 92 subgroups.⁸ Figure 1 shows the indexes for

⁶Neil H. Jacoby, "The Threat of Inflation," *Harvard Business Review*, May-June, 1957, p. 30. H. E. Riley describes the CPI and WPI, and indicates several of their limitations, in *Compendium*, pp. 107-16. On the logic of price indexes see Kenneth Arrow, "The Measurement of Price Changes," *Compendium*, pp. 77-87.

⁷Clarence H. Danhof, "The Behavior of Prices, 1890-1940," *Compendium*, p. 136. See also Wesley C. Mitchell, *What Happens during Business Cycles* (New York: National Bureau of Economic Research, 1951), p. 37, for the average peacetime reference-cycle pattern of wholesale prices, 1891-1938. For the eleven reference expansions falling within this time span, the average rise in wholesale prices from initial troughs to peaks was 9 per cent.

⁸Prices and indexes for each item and for product classes, subgroups, and major groups are presented monthly in the BLS publication *Wholesale Prices and Price Indexes*. BLS Bulletin No. 1214, *Wholesale Prices and Price Indexes, 1954-56*, provides a highly useful summary of recent price data, together with a detailed description of the WPI and the relative importance of items in the index.

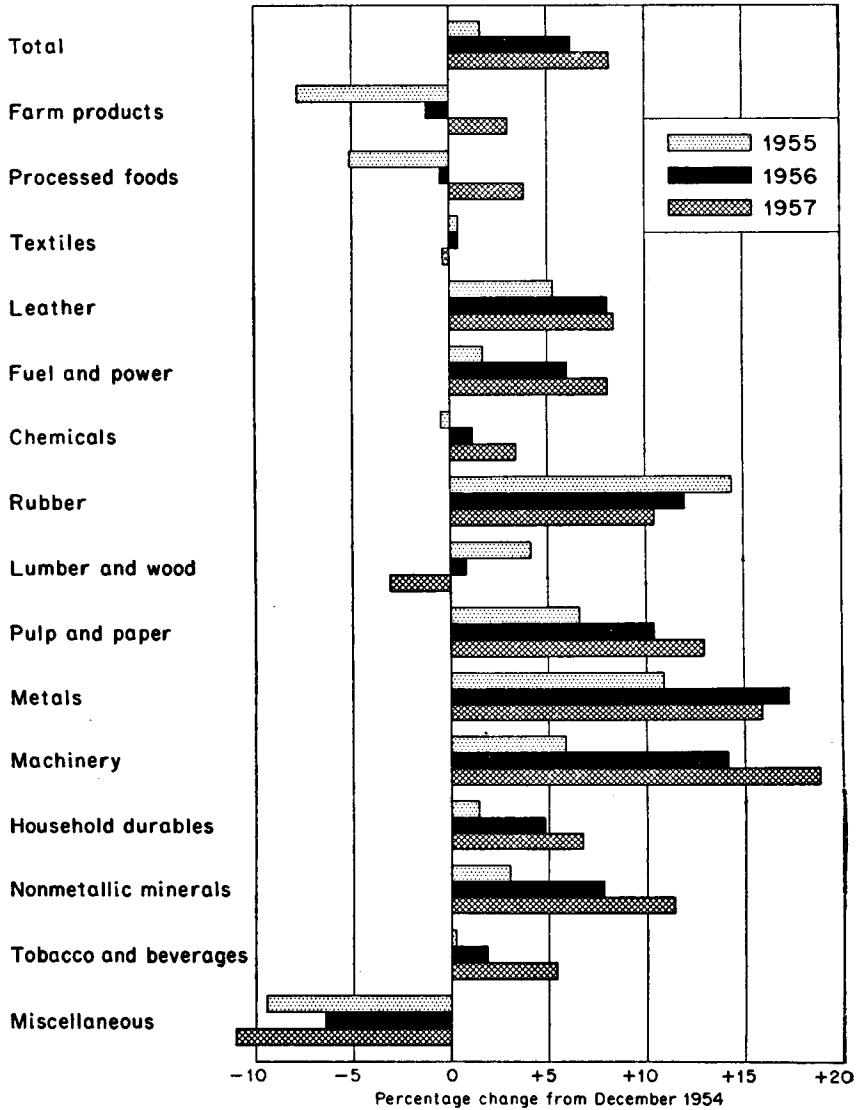


FIG. 1.—Wholesale prices for major groups and all commodities, percentage change from December, 1954, to December, 1955, 1956, and 1957.

each major group and for all commodities as of December of 1955, 1956, and 1957, using December, 1954, as base. Average prices increased sharply in machinery and motive products; metals and metal products; and pulp, paper, and allied products. In nine other major groups they rose moderately to substantially.

TABLE 1

PRICE CHANGES, DECEMBER, 1954, TO DECEMBER, 1957, WPI SUBGROUPS WITH GREATEST RISES AND DECLINES

Subgroups with Greatest Rises	Per Cent Change
Eggs.....	45.9
Metalworking machinery and equipment..	27.2
General-purpose machinery and equipment	25.4
Construction machinery and equipment..	24.7
Iron and steel.....	23.3
Coke.....	22.3
Coal.....	20.0
Commercial furniture.....	19.8
Electrical machinery and equipment.....	19.2
Other tobacco manufactures.....	18.9

Subgroups with Greatest Declines	Per Cent Change
Manufactured animal feeds.....	-28.5
Hay, hayseeds, and oilseeds.....	-16.2
Packaged beverage materials.....	-14.8
Grains.....	-13.0
Other farm products.....	-9.6
Animal fats and oils.....	-8.9
Plywood.....	-8.4
Man-made fiber textile products.....	-5.8
Fertilizer materials.....	-4.9
Electricity.....	-4.6

Source: Computed from data in Bureau of Labor Statistics Bulletin No. 1214, *Wholesale Prices and Price Indexes, 1954-56*, and the monthly BLS publication, *Wholesale Prices and Price Indexes* (December 1957 Final).

However, prices declined over the period in three groups—miscellaneous products, lumber and wood products, and textile products and apparel. Furthermore, 11 of the 45 yearly price changes shown in Figure 1, involving 8 of the 15 major groups, were negative.

The same picture of price dispersion emerges from examination of the WPI subgroups; prices for 23 of the 92 subgroups declined over the same three-year period. Table 1 shows the 10 subgroups with the greatest increases and decreases.

Eggs, with a 45.9 per cent rise, heads the list of subgroups whose indexes increased; various subgroups of machinery and industrial raw materials dominate the rest of the list. At the other extreme, various subgroups of farm products and processed foods declined the most.

Since they do not indicate the relative importance of subgroups in the WPI, the data in Table 1 are not especially meaningful. However, one can roughly determine the relative contribution of each subgroup to the over-all change in the index by multiplying the relative price change of the subgroup by its weight and expressing the product as a percentage of the sum of all such products. Table 2 pre-

TABLE 2

PERCENTAGE CONTRIBUTION, SUBGROUPS THAT CONTRIBUTED MOST TO THE RISE IN THE WHOLESALE PRICE INDEX, DECEMBER, 1954-57

	Contribution to WPI Change (Per Cent)
Iron and steel.....	16.4
Electrical machinery and equipment.....	10.9
Motor vehicles.....	9.9
Petroleum and oil products.....	6.9
General-purpose machinery and equipment	6.7
Metalworking machinery and equipment..	5.6
Meats, poultry, and fish.....	5.2
Livestock and live poultry.....	4.4
Fabricated non-structural metal products.	3.7
Converted paper and paperboard products	3.2
Sum of the above.....	72.9

Source: Same as Table 1. Computed (1) by multiplying percentage price change, December, 1954, to December, 1957, for each subgroup by its relative importance in December, 1954, and (2) by taking each product as a percentage of the sum of products.

sents such data for the ten leading subgroups for the entire period 1955-57. This table has two important features. First, these ten subgroups taken together accounted for nearly three-fourths of the total change in the index. Thus a relatively small number of subgroups dominated the WPI during the period under consideration. Second, except for the two categories of farm products and

processed foods, these subgroups have certain common characteristics. In general, they comprise sectors of our economy that are strongly unionized and oligopolistic. It is not surprising that there has been talk of wage inflation and administered pricing. As I shall argue later, however, the prominence of capital-goods industries in this list of subgroups provides a better clue to the inflation since 1954.

Before turning to other matters, let us examine one further aspect of the pat-

tern of price change. The year 1957 differed significantly from the two preceding years. Table 3 repeats for the subperiods December, 1954-56, and December, 1956-57, the operation performed in Table 2. The first subperiod had the same patterns noted for the entire period, but in exaggerated form. The main differences are that non-ferrous metals and fabricated structural metal products replace the livestock and meat subgroups and that there is a somewhat greater concentration of the over-all rise in the index among the top ten subgroups. In 1957, however, four subgroups of farm products and processed foods accounted for

C. THE PROXIMATE CAUSES OF INFLATION

60 per cent of the rise in the WPI. Furthermore, price increases in 1957 were concentrated even more heavily than in 1955-56 in the ten leading subgroups.

Economists have evolved two macro-economic frameworks, and each has its uses in the analysis of inflation. For an *ex post* study such as this, however, the equation of exchange is much the more valuable of the two.⁹ Accordingly, I shall

TABLE 3
PERCENTAGE CONTRIBUTION, SUBGROUPS THAT CONTRIBUTED MOST TO THE RISE IN THE WHOLESALE PRICE INDEX, DECEMBER, 1954-56, AND DECEMBER, 1956-57

DECEMBER, 1954-DECEMBER, 1956		DECEMBER, 1956-DECEMBER, 1957	
Subgroup	Per Cent of WPI Change	Subgroup	Per Cent of WPI Change
Iron and steel.....	19.7	Meats, poultry, and fish.....	29.2
Electrical machinery and equipment.....	11.1	Livestock and live poultry.....	22.6
Motor vehicles.....	9.6	Metalworking machinery and equipment..	12.5
Petroleum and oil products.....	7.4	Motor vehicles.....	9.8
General-purpose machinery and equipment..	7.3	Electrical machinery and equipment.....	8.3
Non-ferrous metals.....	6.6	Eggs.....	5.8
Metalworking machinery and equipment....	5.8	Iron and steel.....	5.6
Fabricated structural metal products.....	3.7	Petroleum and oil products.....	5.0
Converted paper and paperboard products..	3.6	General-purpose machinery and equipment	4.2
Fabricated non-structural metal products..	3.5	Cereal and bakery products.....	3.9
Sum of the above.....	78.3	Sum of the above.....	105.9

Source: Same as Tables 1 and 2. See note to Table 2 for method of computation.

tern of price change. The year 1957 differed significantly from the two preceding years. Table 3 repeats for the subperiods December, 1954-56, and December, 1956-57, the operation performed in Table 2. The first subperiod had the same patterns noted for the entire period, but in exaggerated form. The main differences are that non-ferrous metals and fabricated structural metal products replace the livestock and meat subgroups and that there is a somewhat greater concentration of the over-all rise in the index among the top ten subgroups. In 1957, however, four subgroups of farm products and processed foods accounted for

carry forward the discussion primarily in terms of this equation.

In a proximate sense the 1955-57 inflation was caused by one or more of the

⁹ Since, in the Keynesian system, the division of GNP among consumption, investment, government and net foreign purchases usually is not considered a function of the price level, the system provides no way of determining the source of an inflation. At a time of full employment an attempt by any sector to increase its expenditures would leave the composition of real income unchanged, as long as other sectors resolutely resisted any reduction in their shares of total output. The only result would be a rise in money income, because of higher prices, equal to the attempted addition to expenditures times the reciprocal of the *average* propensity to save. Broadly speaking, the events of 1955-57 were in harmony with this view.

following: an increase in the stock of money, an increase in monetary velocity, or a decrease in real income. Table 4 presents indexes of these variables for 1955-57, using 1954 as base. In each of the three years the stock of money rose by more than 2 per cent, and the rise for the entire period was 7.2 per cent.¹⁰ Evidently, monetary expansion played an active role in the recent inflation. However, the rate of growth of the money stock was

more than 3.5 per cent. Thus the price level would have fallen had velocity been stable.

Velocity, however, increased 10.4 per cent over the three-year period, and at its peak in the third quarter of 1957 it was 13.2 per cent above the level of the fourth quarter of 1954.¹¹ It is clear that in a proximate sense velocity was even more important than the quantity of money as a source of inflation during

TABLE 4
INDEXES OF ELEMENTS OF THE EQUATION OF EXCHANGE, 1955-57
(Fourth Quarter, 1954 = 100)

Year (and Quarter)	Money	Income Velocity of Money	Deposit Turnover, Six Large Cities*	Non- financial Turnover†	Real GNP‡
1955 (1).....	100.3	103.3	100.4	.....	.....
1955 (2).....	100.2	105.7	108.0	.....	.....
1955 (3).....	101.1	107.6	98.5	.....	.....
1955 (4).....	102.5	107.6	110.3	105.2	108.2
1956 (1).....	102.5	108.0	104.6	.....	.....
1956 (2).....	102.6	109.0	109.1	.....	.....
1956 (3).....	103.1	110.0	104.2	.....	.....
1956 (4).....	104.9	110.8	117.9	109.8	110.8
1957 (1).....	105.5	112.2	114.8	.....	.....
1957 (2).....	106.1	112.8	116.0	.....	.....
1957 (3).....	107.2	113.2	108.4	.....	.....
1957 (4).....	107.2	110.4	116.0	N.a.‡	112.1

Sources: "Money," computed from monthly data, *Federal Reserve Bulletin*; "Income Velocity of Money," computed by dividing Commerce Department seasonally adjusted estimates of GNP by money; "Deposit Turnover, Six Large Cities," unadjusted estimates, *Federal Reserve Bulletin*; "Non-financial Turnover," computed from Federal Reserve flow-of-funds tables by dividing total non-financial uses for all sectors by money; "Real GNP," *Survey of Current Business*, July, 1958.

* Monthly figures, second month in each quarter.

† Annual figures.

‡ Not available.

well below its long-term average. Furthermore, the stock of money failed to keep pace with the rising tempo of business activity: for the period as a whole real GNP rose by 12.1 per cent, and the stock of money per unit of output fell by

1955-57. This conclusion rests not only on comparison of the percentage changes in the two variables but on the further fact that the expansion in the money stock was less than normal, while the in-

¹⁰ Money is defined throughout this study as the sum of currency outside banks and all deposits (including United States government deposits at commercial and Federal Reserve banks, deposits of foreigners in United States banks, and time deposits at commercial and mutual savings banks). I have chosen this concept of money for statistical convenience; for the period since 1954 this does not involve a significant analytical sacrifice.

¹¹ The use of different measures of velocity gives slightly different percentage changes. I do not wish to defend my choice of velocity measures except to say that it shows as well as any other the general magnitude of the increase since 1954. Note that the numerator is seasonally adjusted, while the denominator is not. The distortions thus introduced are less than those resulting from the use of an unadjusted numerator.

crease in velocity was greater than normal.¹²

For 1955 and 1956 at least, one could scarcely argue that prices rose because of the failure of output to expand sufficiently. Real GNP rose sharply by 8.2 per cent in 1955 and rose by 2.4 per cent in 1956. For the two years taken together the growth rate of GNP was well above normal; to offset the recorded price rises in these years, almost unheard-of growth rates would have been needed.

Thus cost-push theorists are saying, in effect, that excessive wage or other cost rises can somehow increase the stock of money and its velocity. How this comes about they do not indicate. I shall consider, in Section IV, several of the more plausible links between costs and money and costs and velocity. First, however, a review of the fundamentals of velocity theory may be of use.

III. A DIGRESSION ON VELOCITY THEORY

The key to velocity analysis lies in the application of orthodox demand theory to money.¹³ The reciprocal of velocity, real balances per unit of output (M/Py), may be regarded as a commodity whose services are in demand. A decrease (in-

¹² "Normally," velocity rises during cyclical expansion and falls during contractions. But the trend of velocity has been downward, which means that on the average the falls during contractions have exceeded the rises during expansions. However, by the third quarter of 1956 velocity exceeded the peak it had attained in the second quarter of 1953, and it continued to rise steadily for another year.

On the trend of velocity see Clark Warburton, "The Secular Trend in Monetary Velocity," *Quarterly Journal of Economics*, February, 1949, and my "Monetary Velocity in the United States," Section III, in Milton Friedman (ed.), *Studies in the Quantity Theory of Money* (Chicago, 1956). It is possible that the trend turned upward during or soon after World War II. Warburton recognizes this possibility, contrary to the impression left in my earlier treatment of his views on velocity.

crease) in quantity demanded, of course, means a rise (fall) in velocity. Quantity demanded, in this as in all other cases, can be analyzed in terms of the usual categories: the commodity's price, prices of related commodities, incomes, tastes, and expectations.

The "price" of M/Py consists of the opportunity costs sustained by money-holders. The cost of holding money may be measured in various ways, but for our purposes it is the difference between yields on illiquid assets and on money. Since the yield on money is negligible and does not change quickly, corporate bond yields serve as a rough measure of the cost of holding money. Higher bond yields will lead to an increase in velocity.¹⁴

Money substitutes can be handled in the same fashion. Their attractiveness as sources of liquidity depends on their yields. A rise in the yields of money substitutes will reduce the demand for

¹³ For a more complete treatment of the topics discussed in this section see Selden, *op. cit.*, and Milton Friedman, "The Quantity Theory of Money: A Restatement," in *Studies in the Quantity Theory of Money*, and "The Supply of Money and Changes in Prices and Output," *Compendium*, pp. 241-56.

¹⁴ Strictly speaking, this argument should be stated in terms of equilibrium interest rates. This is because lending is not the only alternative to holding cash. Real investment is an important additional alternative; hence the expected return on investment also measures the cost of holding money. It is the essence of cyclical disturbances that the relation between returns on loans and returns on investment is out of equilibrium—a fact that complicates the cyclical relation between interest rates and velocity. Under such conditions a rise in the real rate will lead to higher velocity even though the loan rate is constant. This may be visualized as a shift to the right of the investment demand curve, accompanied by a simultaneous and causally related leftward shift in the demand curve for M/Py . The latter shift implies an increase in velocity. This is probably a major reason why studies of earlier periods have found a relatively weak relation between velocity and interest rates (Selden, *op. cit.*, pp. 195-205).

M/P_y , since households and firms will tend to satisfy their liquidity needs by holding near-moneys rather than money.

The income elasticity of demand for M/P_y appears to be well above zero in the long run; that is, a permanent rise in real income per capita leads to greater quantity demanded and thus to a lower velocity. Exactly the opposite relationship exists during cyclical income rises, probably because households adjust their holdings of cash primarily with reference to permanent rather than current income.¹⁵ As current income falls during recessions, the demand for nominal balances (M) does not fall correspondingly, since permanent income falls more slowly. The result is a reduction in velocity, as computed with current income. During business upswings the reverse effect probably occurs.

Tastes may change in the aggregate either as the result of income redistribution or because of alterations in individual desires. One of the more significant redistributive effects occurs when government's share of GNP fluctuates. Obviously, changes in tastes may be either velocity-increasing or velocity-decreasing, although cash-economizing innovations may gradually reduce the basic desire for liquidity.

The final category, expectations, is important for short-run changes in velocity. Most obvious, perhaps, are expectations about the future value of money. If the public expects the rate of inflation to increase (perhaps because of rapid monetary expansion), the demand for M/P_y will fall and velocity will rise. Probably more significant for the general run of cyclical inflations are businessmen's ex-

pectations about the productivity of capital and its relation to interest rates. A rise in the expected marginal efficiency of capital, with stable interest rates, will reduce the quantity of M/P_y demanded, and velocity will rise. There are several other expectational effects on velocity, but there is no need to elaborate them here.

IV. AN EVALUATION OF COST-PUSH THEORIES OF THE RECENT INFLATION

Hypothesis I: Cost Increases Have Caused a Rise in the Stock of Money

There are at least two variants of the hypothesis that rises in wages or other costs may result in monetary expansion. The first is based on the existence of a public "full-employment" policy. Cost increases, according to this argument, may lead to unemployment, which in turn may trigger a government program to restore full employment, with inflationary results. The second variant states that firms whose costs have risen will increase their demand for working capital. Banks will expand their loans, and the stock of money will increase.

Neither variant has much relevance for the 1955-57 inflation. As I have shown above, the role of money as a source of inflation in this period was less than that of velocity, at best this would be a partial theory of price-level changes. Moreover, the volume of money depends not on the demand for loans, as the second variant implies, but on Federal Reserve decisions about the size of bank reserves. The monetary expansion during 1955-57 was mainly the result of two factors: the failure of the Federal Reserve to gauge the strength of inflationary forces correctly and Federal Reserve preoccupation with Treasury refunding

¹⁵ See Milton Friedman's research report in National Bureau of Economic Research, *Thirty-eighth Annual Report* (May, 1958), pp. 39-41.

problems.¹⁶ Neither of these seems to be related to cost pushes.

Hypothesis II: Velocity Is Passive

The commonest version of cost-push thinking is the simple assumption, usually implicit, that velocity passively adjusts to whatever level will permit the existing stock of money to finance an independently determined volume of payments. According to this view, the price level is a mere agglomeration of loosely related items. A rise in any price is regarded as inflationary, since there is no reason to expect compensating declines among other prices.¹⁷

Pushed to the extreme, this hypothesis amounts to a denial that there is a demand function for money such as that described above. In this form we may reject it on the basis of a growing body of contrary evidence.¹⁸ Milder forms of the hypothesis, on the other hand, are essentially a reiteration of J. M. Clark's remark about the irrational pursuit of rationality:¹⁹ there may be a "zone of indeterminacy" within whose limits cost pushes can increase velocity and the price level. Needless to say, one should not expect administrators of cash balances to adjust their holdings at once in response to minute changes in the demand determinants. The problem lies in the size of such velocity variations, and

¹⁶ See the testimony of Chairman Martin before the Senate Finance Committee (85th Congress), *Investigation of the Financial Condition of the United States*, pp. 1304-7 ff.

¹⁷ Examples are legion. For instance, see the contributions of Paul A. Samuelson, E. S. Shaw, and Henry C. Wallich in "The Economics of Eisenhower: A Symposium," *Review of Economics and Statistics*, November, 1956.

¹⁸ Friedman summarizes the evidence in *Compendium*, pp. 241-56.

¹⁹ *Preface to Social Economics* (New York, 1936), p. 120.

here opinions may differ. Moreover, this argument cuts both ways. If administrators of cash balances have been getting along with less cash than desired, cost increases may result in a reassessment of cash positions and a decision to hold *more* money, relative to expenditures.

Testing the passive velocity hypothesis is not easy. An indirect approach would be to see whether or not observed variations in velocity are adequately explained in terms of changes in the conventional determinants. I shall do this in the following subsections and in Section V. But there is a more direct way of getting at the problem. According to this hypothesis, price rises occur mainly where costs have been climbing rapidly.²⁰ It should be possible, through detailed analysis of price changes, to determine whether cost or demand factors have predominated in the areas of greatest price rise.

One must interpret such a test cautiously, however. As is always the case, failure to disprove a hypothesis does not establish its validity. The mere demonstration that the price of *X* rose because of an increase in unit labor cost of *X* is equally consistent with inflation, deflation, or stability.²¹ On the other hand, if

²⁰ To facilitate discussion, I assume that "productivity" is unchanged.

²¹ Wage increases resemble tax increases in many ways and should be analyzed in the same fashion. Ordinary incidence theory, of course, focuses on cost-price relationships within the taxed sector, but this does not mean that taxes have no general effects. If the proceeds of an excise are impounded, for example, prices in general will decline—even though the taxed commodity's price will rise in relation to other prices. The degree of deflation depends largely on two factors: the tax yield and the extent to which the reduction in the privately held money stock leads to a decline in private spending.

A wage increase is analogous to a new payroll tax or an excise on raw materials, except that the pro-

it can be demonstrated that no such cost-price relationship exists, the passive velocity hypothesis can be rejected at once.

What kinds of evidence would permit one to distinguish between cost-induced and demand-induced price rises? In Figure 2 the first is illustrated by the movement from p_0 to p_1 , because of a leftward shift in supply, the second is represented by the rise from p_0 to p_2 , in response to a

procedure. In practice demand and cost factors are likely to operate simultaneously. The rise from p_0 to p_3 in Figure 2 illustrates this possibility. Obviously, an increase in output does not mean that costs have had *no* influence on price. Nevertheless, an empirical investigation of specific product markets should provide worthwhile clues to the relative strength of demand and cost influences on prices.

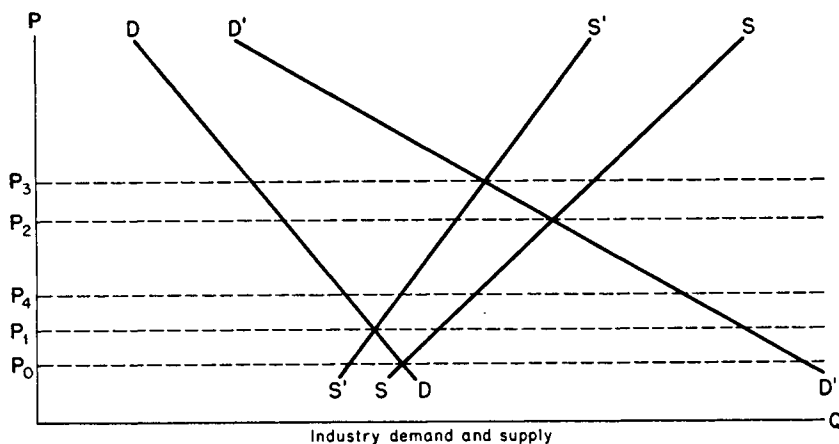


FIG. 2.—Types of relative price rise

shift of demand to the right. In the first case output declines, the quantity of labor demanded (or of other inputs whose rates of remuneration have risen) falls, and employment and hours decrease. Opposite changes characterize the second case.

Two complications, only one of which is substantial, may impede this testing

ceeds are not impounded but constitute an increase in workers' incomes. Because of this fact deflation need not occur. Indeed, depending on the demands for cash, relative to expenditures, of those who lose and gain income, inflation might well result. However, for 1955-57 this does not seem to have been a significant source of inflation. See Hypothesis V, below.

The second complication—more apparent than real—grows out of "administered pricing." Galbraith has argued that most manufacturing firms typically refrain from pricing at profit-maximizing levels in the short run.²² Price p_0 in Figure 2 illustrates this case under demand $D'D'$ and supply SS . Under these circumstances an increase in wage rates (or other input prices) will probably be covered fully by price rises (for example, to p_4), with no decline in employment unless capital is substituted for relatively

²² John Kenneth Galbraith, "Market Structure and Stabilization Policy," *Review of Economics and Statistics*, May, 1957. I do not pretend to give Galbraith's full argument here.

expensive labor. Indeed, higher wages may be the pretext for an even greater price rise, in which case output and employment will rise without any change in demand. Galbraith regards these price rises as inflationary.

In my judgment Galbraith greatly exaggerates the importance of administered pricing as a factor in inflation.²³ Almost always price is below equilibrium in these instances because demand has increased and appropriate adjustments have not yet been made. Galbraith assumes that these adjustments will not be made at all unless cost justifications can be shown. Even if this were true, such price rises would still be demand-induced initially; they *reflect* inflation rather than cause it.²⁴ But Galbraith's assumptions are doubtful for most industrial markets. It takes time for businessmen to recognize the need for price changes and to institute them. Public relations and collective-bargaining strategy may affect the timing of demand-induced price rises, but the evidence is clear that in most cases rising demand leads to higher prices fairly soon, whether costs go up or not.

It is time now for us to examine the most important price rises since December, 1954. Table 3 shows these for the two subperiods, December, 1954-56, and December, 1956-57. I shall take up these subperiods in turn.

²³ The whole topic of administered pricing is reviewed by Martin J. Bailey, "Administered Prices in the American Economy," in *Compendium*, pp. 89-106.

²⁴ Furthermore, it is far from evident that the raising of a price to its equilibrium level contributes to inflation. Insofar as firms indulge in private price control, they are redirecting upward pressure on their own prices elsewhere in the economy. If the administered price is subsequently raised, the demand for other goods will fall, and their prices will tend to fall.

A. DECEMBER, 1954, TO DECEMBER, 1956

As I have already mentioned, the subgroups included in Table 3 accounted for more than three-fourths of the total rise in the WPI during 1955-56. For all but one of these ten subgroups—motor vehicles—it is evident that strong demand was the decisive factor causing higher prices. If we add to these nine the numerous less important subgroups that were characterized by strong demand (for example, eggs, commercial furniture, and "other tobacco manufactures"), it would seem reasonable to conclude that at least 80-85 per cent of the rise in the WPI occurred in sectors dominated by changes in demand.

Several pieces of evidence support this view. First, industrial production increased over the period for the sectors corresponding to these nine subgroups, in most cases more rapidly than aggregate industrial production. In fact, the positive relation between change in industrial production and change in prices can be generalized to the WPI as a whole. Figure 3 presents the scatter for percentage changes in these two variables, 1954-56; the correlation coefficient is +0.40. Second, employment and average weekly hours were high.²⁵ Third, new orders and unfilled orders approached their Korean War peaks for primary metals and machinery and attained record levels for paper and paperboard products and fabricated metal products.²⁶ Fourth, steel operating rates neared capacity late in 1955 and remained high until early 1957.²⁷

²⁵ All references to employment, average weekly hours, and average hourly earnings are based on data contained in *Monthly Labor Review*, Tables A-2, A-3, and C-1.

²⁶ United States Department of Commerce, *Business Statistics* (1957 ed.), pp. 20-22.

²⁷ *Ibid.*, p. 157.

Of course, average and marginal costs probably rose substantially in most of these sectors during 1955-56. However, one must be careful to distinguish between cost rises that merely reflect short-run supply inelasticity and those that result from alterations in supply conditions

variable costs are dominated by employment, scrap, and fuel costs.²⁸ By early 1955 the labor market in steel was tight, and labor's bargaining position was therefore strong. Demand for scrap grew, and scrap prices soared as production expanded. Only in the case of rising fuel

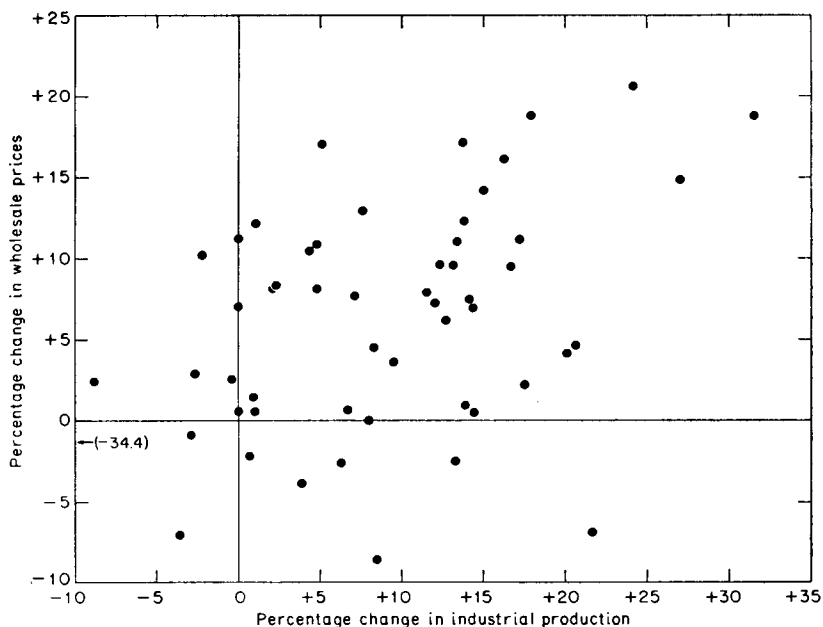


FIG. 3.—Relationship between percentage change in wholesale prices and percentage changes in industrial production, December, 1954, to December, 1956, by WPI subgroups. (It was not possible to find suitable production counterparts for the following price subgroups: 1.1-1.8, 3.4, 3.6, 4.1, 6.3, 6.7, 7.1, 9.2, 9.6, 10.5, 10.8, 13.5, 13.6, 14.3, and 15.1-15.5. Several of the remaining price categories were combined to achieve comparability with production groupings; as a result, only 54 points are plotted in the figure. For both prices and production the percentage changes are in three-month averages centered at December.)

themselves. Only the latter are relevant to cost-push hypotheses. It seems likely that a large part of the cost increases since 1954 are attributable to near-capacity production levels. This appears to be the case with steel, for instance, where

prices do we find a significant cost increase for the steel industry that did not result directly from the increased demand for steel.

Thus nearly every case of significant relative price rise in 1955-56 can be explained largely in terms of heavy demand. The glaring exception is motor vehicles. They, too, were in great demand during 1955, and it is entirely un-

²⁸ United States Senate, Committee on the Judiciary, Subcommittee on Antitrust and Monopoly, *Administered Prices—Steel* (Senate Report No. 1387 [85th Cong.]), p. 42.

derstandable that their prices rose in that year. But prices of motor vehicles also rose in 1956, a poor year for the auto industry. Employment in 1956 was below 1955 levels except in January and February, and average weekly hours were down. Profits fell by nearly \$700,000,000.²⁹ Average hourly earnings of production workers, on the other hand, rose ten cents in September, 1956, on top of smaller rises in June, July, and August; they continued to rise during the rest of the year. Undoubtedly, the 1956 price increases in motor vehicles, insofar as they were real, are the clearest example of a cost-induced price change one could hope to find. Indeed, for the period 1955-56, they are virtually the *only* such example, and we must conclude that the passive velocity hypothesis finds little support in this period.

B. DECEMBER, 1956, TO DECEMBER, 1957

The striking thing about price rises in 1957 is the extent to which they occurred in farm and processed food subgroups (see Table 3). These subgroups, which are usually not regarded as hotbeds of administered pricing or wage-induced inflation, accounted for more than 60 per cent of the rise in the WPI in 1957. However, these sectors are peculiarly subject to autonomous cost changes of the same general sort that form the basis of cost-push theories of inflation. Analytically, it makes little difference whether supply curves shift because of higher wage demands or because of a drought. Apparently, these important price increases during 1958 were supply-dominated rather than demand-dominated. For instance, the price rises in meats, poultry, and fish occurred almost entirely in meats. The major cost in meat packing is livestock. Livestock prices rose in 1957, with volume declining, as farmers experi-

enced favorable feeding conditions and withheld animals from the market.³⁰

Aside from these farm-product and food subgroups, the most important price rises in 1957 took place in subgroups where prices had risen significantly during 1955-56: metalworking machinery and equipment, motor vehicles, electrical machinery and equipment, iron and steel, petroleum and oil products, and general-purpose machinery and equipment. Since conditions differed among these sectors, I shall comment briefly on each of them.

1. *Metalworking machinery and equipment.*—Through the first six months of 1957 this sector continued to be in a state of boom. Employment was approximately stable at a high level, and the work week was longer than in 1955. During this period prices rose only moderately. A definite slackness appeared in July and persisted through the year end, as employment and hours both fell. Prices rose steadily from July to December, presumably in response to higher costs of materials and labor.

2. *Motor vehicles.*—Prices of motor vehicles, according to the Bureau of Labor Statistics, were stable until the introduction of 1958 models in October. Production and employment improved somewhat over 1956 but were still well below 1955 levels. On the whole, it appears that higher employment and materials costs were the major reasons for the higher prices.

3. *Electrical machinery and equipment.*—Prices in this subgroup rose moderately until September and then leveled off. Employment held up well, though a shorter work week was evident early in the year. Production tended to slip throughout 1957 but was higher than in 1956 for the first seven months. There were probably cost pressures on prices in

²⁹ United States Department of Commerce, *Business Statistics* (1957 ed.), p. 93.

³⁰ The volume of livestock marketing is given in *Survey of Current Business*, February, 1958, p. S-2.

this subgroup during 1957; however, it is equally clear that the state of demand exerted a definite influence on prices.

4. *Iron and steel.*—After small declines in February, March, and April, iron and steel prices again rose and reached a peak in August; they then declined for the rest of the year and increased less than 2 per cent over the year as a whole. Demand was slack after February, and it seems clear that the summertime price increases were related to the rise in employment costs which occurred at that time.

5. *Petroleum and oil products.*—Although there was a small net price rise in this subgroup during 1957, the rise took place entirely in January and February, in the wake of the Suez crisis. Prices then moved downward during the remainder of the year. This is clearly an instance of a demand-induced price rise.

6. *General-purpose machinery and equipment.*—This sector also experienced strong demand during the first half of 1957 but suffered a slump in the last half of the year. Prices rose steadily throughout the year. It does not seem reasonable to explain the price rises after midyear in terms of changes in demand.

In summary, price increases during 1957 differed substantially from those of 1955–56. While strong demand was dominant in the earlier period, it was not during 1957. However, even in 1957 there was strong demand in several important sectors early in the year; for petroleum changes in demand appear to tell nearly the whole story. Furthermore, the really important cost changes occurred in farm products and processed foods more than in the strongly unionized and oligopolized sectors that have become the favorite whipping boys.

In evaluating these findings, it is well to keep the following facts in mind. In

general, 1957 was a year of relatively stable prices. The WPI rose by less than 2 per cent, and the increases for most of the subgroups in Table 3 were small. Actually, even these moderate increases almost surely are exaggerations, since they fail to take account of secret price cutting, which must have been much more widespread at the end of the year than at the beginning. Where authentic price rises did occur, they probably were based on mistaken forecasts of expanding demand. It takes time to recognize such mistakes and to determine the appropriate adjustments.

Finally, as I pointed out at the beginning of this subsection, the existence of cases of cost-induced price rises establishes no presumption whatever in favor of the passive velocity hypothesis, even though their non-existence effectively refutes the hypothesis. It will become clear in the remainder of this section and in Section V that there are other sufficient reasons for the behavior of velocity in 1957.

All in all, it seems surprising that so much attention has been devoted recently to the hypothesis that monetary velocity passively adjusts to whatever level cost pressures may require of it. At most this hypothesis is a secondary explanation of doubtful validity for the inflation of 1955–57.

Hypothesis III: Cost Increases Have Raised Velocity via Higher Interest Rates

Of course, the passive velocity hypothesis is not the only method of linking cost changes to velocity. It is entirely possible that cost increases affect velocity by altering the basic velocity determinants outlined above in Section III. I shall examine these possibilities in this and the following three subsections.

As everyone knows, interest rates rose sharply between late 1954 and late 1957. During 1955 the rise occurred primarily in short-term rates; in 1956 and 1957 all rates tended to move up uniformly (see Table 5). Velocity undoubtedly rose as a result of these interest-rate changes. However, it seems most unlikely that cost pressures were responsible for the higher interest rates.

steadily in 1955 and 1956, as they have since 1951; this trend accelerated dramatically in 1957. Demand deposits grew only modestly in 1955, on the other hand, and were at a standstill during 1956-57. Simultaneously with the growth of time deposits, the banks unloaded a large volume of government securities. To induce holders of cash to exchange their money for governments, yields on the latter had

TABLE 5
SELECTED INTEREST RATES, MARCH, JUNE,
SEPTEMBER, AND DECEMBER, 1954-57

Year and Month	United States			
	Government Long-Term Bond Yields	Corporate Bond Yields (Aaa)	Commercial Paper Rates (4-6 Mo.)	Treasury Bill Yields (3 Mo.)
1954:				
March.....	2.51	2.86	2.00	1.03
June.....	2.54	2.90	1.56	0.64
September.....	2.51	2.89	1.31	1.01
December.....	2.57	2.90	1.31	1.14
1955:				
March.....	2.71	3.02	1.69	1.28
June.....	2.76	3.05	2.00	1.41
September.....	2.88	3.13	2.54	2.07
December.....	2.88	3.15	2.99	2.54
1956:				
March.....	2.90	3.10	3.00	2.25
June.....	2.89	3.27	3.38	2.49
September.....	3.19	3.56	3.50	2.84
December.....	3.43	3.75	3.63	3.21
1957:				
March.....	3.26	3.66	3.63	3.08
June.....	3.58	3.91	3.79	3.29
September.....	3.66	4.12	4.00	3.53
December.....	3.30	3.81	3.81	3.04

Source: *Federal Reserve Bulletin*.

Basically, interest rates rose during 1955-57 because businessmen expected high returns on additions to plant and equipment. This in turn gave rise to a strong demand for bank loans. Since the banks faced a generally stern central bank, there were only three ways of meeting the strong demand for loans: they could draw down excess reserves and vault cash, they could entice time deposits, or they could dispose of investments. Quantitatively, only the latter two were important, and the banks used them both. Time deposits expanded

to rise considerably. On the reasonable assumption that these former cash-holders did not reduce expenditures proportionately with the reduction of their cash, velocity thereby rose.

One might maintain that this process was set in motion by increases in wages or other costs. The argument might run along any of several lines: cost increases caused an increased demand for working capital; wage increases stimulated labor-saving investments; or businesses expanded in anticipation of improved markets because of higher wages. It is prob-

ably too much to hope that we will ever know exactly why the 1955-57 investment boom took place. However, until someone can produce convincing evidence to the contrary, it seems reasonable to regard the recent boom as essentially the same sort of phenomenon that has characterized business expansions of the past.

rise in the volume of money substitutes has proceeded year after year, regardless of the intensity of cost pressures.

During 1955-57 yields on money substitutes climbed significantly, while yields on demand deposits and currency did not; it is reasonable to conclude that this was an important factor in the growth of money substitutes.³¹ This con-

TABLE 6
VOLUME OF MONEY SUBSTITUTES AND RATIO OF MONEY SUBSTITUTES TO MONEY
END OF YEAR, 1952-57
(In Billions)

MONEY SUBSTITUTES	YEAR					
	1952	1953	1954	1955	1956	1957
Credit-union total assets* . . .	\$ 1.5	\$ 1.9	\$ 2.2	\$ 2.8	\$ 3.4	\$ 4.1
Life insurance policy reserves†	62.6	66.7	70.9	75.4	79.7	84.1
Savings and loan shares‡ . . .	19.2	22.8	27.3	32.2	37.1	42.0
United States government short-term debt (publicly held marketable debt maturing within one year)§ . .	25.1	31.0	27.6	31.7	33.9	38.6
Tax and savings notes‡ . . .	5.8	6.0	4.5	.....	.....	.....
Savings bonds‡	57.9	57.7	57.7	57.9	56.3	52.5
Total money substitutes . . .	\$172.1	\$186.1	\$190.2	\$200.0	\$210.6	\$221.3
Ratio: money substitutes to money . . . . .	.84	.89	.87	.89	.91	.94

* *Credit Union Yearbook.*

† *Life Insurance Fact Book.*

‡ *Federal Reserve Bulletin.*

§ Computed from *Federal Reserve Bulletin* by subtracting United States government, Federal Reserve, and commercial bank holdings from total marketable federal debt maturing within one year.

Hypothesis IV: Cost Increases Have Raised Velocity by Expanding the Volume of Money Substitutes

It is true that the volume of money substitutes grew rapidly during 1955-57 (see Table 6), both absolutely and relative to the stock of money, and that this is an important reason for the rise in velocity. But there is no basis for attributing these changes to cost pressures. One might argue that wage or other cost increases have redistributed income in favor of groups that prefer to hold their liquid assets with non-bank intermediaries. This is tenuous at best. Income distribution seems to have been stable during the last few years, and in any case the

conclusion finds support in the fact that savings bonds have not participated in this growth; the volume of such bonds actually declined sharply in 1957. Although yields on savings bonds have gone up, they remain low during the first few years after issue. For the person who wants to maintain his liquidity, the rising yields on other money substitutes and on time deposits have made these assets much more attractive.

The higher yields on money substitutes, in turn, can be traced to two factors.³² The first, of course, was the invest-

³¹ See the following subsection.

³² Various yields are compared in the *Savings and Loan Fact Book, 1958*, p. 58.

ment boom and the associated heavy demand for lendable funds and high interest rates. The second is the regulatory framework that permits non-bank intermediaries to pay higher returns on their short-term claims. To repeat, none of this has any obvious connection with costs.

Hypothesis V: Cost Increases Have Raised Velocity by Changing Tastes

There are two rather different lines of argument under this heading. One holds that cost changes may have redistributed income in favor of groups that hold little money, thus reducing the weighted average desire to hold money. The other stresses the effects of high interest rates on the evolution of credit institutions and techniques of financial management.

It is true that compensation of employees has been a rising portion of national income in recent years. It is not true, however, that the prewar trend toward reduction of inequality has continued during 1955-57. In 1955 the highest quintile of consumer units received a larger share of personal income than in 1952 and 1953.³³ The share of this group was constant in 1956 and actually rose in 1957. The share of the lowest quintile fell slightly during the recession year 1954 and was the same in 1955 and 1956 as in 1952 and 1953. In any case, I am not aware of any evidence supporting the view that wage-earners typically hold smaller balances relative to expenditures than other groups. Furthermore, analysis of sector velocities reveals that the rate of increase from 1955 to 1956 was less for consumers than for all sectors taken together.³⁴ If the hypothesis under discus-

sion were valid, one would expect precisely the opposite result.

One might argue that a different and more significant redistribution has taken place—between the public and private sectors. Since the federal government's velocity ratio is several times that for the rest of the economy, a growth of the federal sector at the expense of the private sector would lead to higher velocity. Unfortunately for this line of argument, federal government expenditures *declined* relative to GNP during 1954-57.³⁵ It is clear, nevertheless, that the growth in federal spending, even though accompanied by surpluses in the cash account, has contributed to the rise in velocity. Even if every tax dollar had been fully spent by tax-paying households, government accomplished the same volume of spending with much smaller cash balances. The released cash then was available to facilitate additional private expenditures. The total stock of money, as I have defined it, was unaffected by this process; the result was therefore an increase in velocity and, of course, the price level. There is no evidence, however, that public budgetary policy was influenced by cost pressures during this period.

The second hypothesis states that high interest rates stimulate financial innovations that reduce the need for cash.³⁶ By

³³ Of course, government expenditures declined relative to GNP only because private expenditures grew at an even faster pace. The growth in private spending, in turn, resulted partly from an increase in the quantity of privately held money, partly from an increase in private velocity. These conclusions are based on computations with the standard GNP and money series, with transfer and interest payments included in government spending.

³⁴ Warren L. Smith, "On the Effectiveness of Monetary Policy," *American Economic Review*, September, 1956, p. 601; Hyman P. Minsky, "Central Banking and Money Market Changes," *Quarterly Journal of Economics*, May, 1957.

³³ See Selma F. Goldsmith, "Size Distribution of Personal Income," *Survey of Current Business*, April, 1958.

³⁴ Sector velocities may be computed from Federal Reserve flow-of-funds data (see Table 4).

itself this hypothesis provides no link between costs and velocity, except insofar as costs are to blame for tight money. I have already rejected the latter notion in discussing Hypothesis III. While there is some plausibility to the idea that necessity is the mother of invention, this hypothesis should be tested against the broad sweep of history and not simply for a two- or three-year period. The trend of velocity has been downward, until recently, for more than a century. Apparently, the influence of improved financial techniques, whatever the cause, has been dwarfed by such velocity-reducing factors as rising real income, the falling cost of holding money, and, in the case of income velocity, vertical disintegration of the economic process. One is left with the feeling that changes in tastes have not had a major influence on velocity.

Hypothesis VI: Cost Increases Raised Velocity by Changing Expectations

As suggested in Section III, there are several dimensions to expectations as velocity determinants. One of these is the expected rate of inflation as a cost of holding money. If the public believes the editorial writers, it will interpret a general cost increase as a harbinger of inflation. In these circumstances it will be rational for households and firms to draw down their cash, relative to expenditures. This can be accomplished only through an increase in expenditures, since there is no way in which the public at large can reduce its balances. A general increase in spending will be inflationary, thus validating the editorial writers' predictions.

Undoubtedly, most people believe that cost pushes are inflationary. However, the continued rapid growth of fixed claims during 1955-57 argues against the chain of events just described. Whether

this was because the public is not highly sensitive to rising prices as a cost of holding money or because the amount of inflation was so small is unimportant for the present discussion.

Another and closely related aspect of expectations and velocity concerns the timing of expenditures. If prices are expected to rise, because of cost increases or for any other reason, consumers and businessmen may decide to buy now instead of next month. Such bunching of expenditures is likely to cause price increases. It is difficult to test this hypothesis for 1955-57 or any other period. As far as households are concerned it seems most unlikely that anticipatory buying has been a factor of any importance in recent years. In the case of businesses it appears that most investment programs are thought out well in advance of actual expenditures and that they lack the flexibility envisaged by this hypothesis. It is interesting that, of 867 firms responding to a Commerce Department survey, only 32 mentioned prices of capital goods as a reason for changes in investment plans during 1956.⁴⁷ And presumably most of these were cases in which plans were carried out despite (not in anticipation of) higher prices.

According to still another argument linking costs, expectations, and velocity, businessmen believe that cost pressures are inflationary and that inflation means continued prosperity. In these circumstances they may undertake investment programs in anticipation of rising sales. The consequences will be inflationary. That this hypothesis is valid is certainly within the realm of possibility, although I am unaware of any evidence in its support. Until such evidence is forthcoming,

⁴⁷ Murray F. Foss, and Vito Natrella, "Investment Plans and Realization," *Survey of Current Business*, June, 1957, Table 1.

it seems reasonable to interpret the 1955-57 investment boom as an ordinary cyclical phenomenon, lacking any special connection with costs.

Finally, it is possible that the pattern of expectations created by cost changes lacks symmetry. Specifically, as wage negotiations take place, wage-earners' expectations of higher incomes may not be offset entirely by stockholders' expectations of diminished incomes. The result might well be increased expenditures and upward pressure on prices. Again, it is not easy to test this hypothesis. However, the fact that prices of consumer goods have risen so much less than those of capital goods does not suggest a strong influence of this kind on velocity and the price level.

V. CONCLUDING REMARKS

The preceding discussion has been largely negative. My main concern so far has been to analyze critically a commonly held interpretation of the 1955-57 inflation rather than to offer a coherent alternative view. The position I have taken on the cost push is summarized in the following points.

1. Anything that affects the price level must do so through changes in the stock of money, its velocity, or the volume of transactions.

2. The recent inflation has resulted from a strong upsurge in velocity, together with moderate monetary expansion.

3. Cost-push theorists are therefore arguing (usually implicitly) that the stock of money and its velocity have risen because of cost increases.

4. Usually velocity is assumed by these theorists to be an arbitrary ratio between unrelated magnitudes, which passively adjusts to cost pressures. This type of cost-push hypothesis can be re-

jected for 1955-56 on the basis of specific industry analyses; for 1957, on the other hand, it is not possible to refute the hypothesis in this way.

5. It does not seem possible to establish convincing links between costs and velocity via the conventional velocity determinants or between costs and the stock of money.

Two tasks remain: to examine further evidence bearing on the passive velocity hypothesis for 1957 and to outline an alternative account of why prices have risen since 1954. Actually, the latter includes the former, since the status of the passive velocity hypothesis for 1957 will depend on whether or not velocity changes in that year can be explained adequately along conventional lines.

In the course of the preceding discussion I have mentioned five factors that were responsible for the 1955-57 inflation: an increase in the stock of money, a higher cost of holding money, expansion of substitute sources of liquidity, the growth of government expenditures, and a general rise in confidence, particularly on the part of businessmen. Several of these factors were closely interrelated, and I shall not pretend to give a full account of all the complications involved.

For one reason or another—perhaps partly because of the large expansion in the stock of money during the preceding year—households and firms faced 1955 with a feeling of optimism. This in itself goes far in explaining why velocity began to rise. However, this optimism had several further effects on velocity and on the stock of money which intensified inflationary forces. The increased consumer expenditures were debt financed to a great extent, as were business investment outlays. One result was an expanded money stock, although the board of gov-

ernors of the Federal Reserve System prevented any sizable enlargement of bank reserves. In this general climate of monetary restraint the strong demand for loans resulted in higher interest rates, at first mainly on short-term debt but eventually throughout the debt structure. The banks sold government bonds in great volume throughout 1955 and the first half of 1956. Of course, this could be accomplished only with progressively higher bond yields. The result was an increase in velocity, since the bond purchasers almost certainly did not reduce their expenditures proportionately with the reduction in their cash holdings.

Furthermore, the strong demand for loans was an important factor leading to growth in the volume of money substitutes during recent years. Savings and loan associations and credit unions offered higher returns in order to lure deposits. The flow of funds to these and other providers of liquid fixed claims had a direct impact on velocity: the funds soon returned to the banking system, so that bank reserves were not impaired; but those who borrowed from non-bank intermediaries were enabled to augment the total flow of expenditures.

Simultaneously with these developments, all levels of government increased their expenditures on goods and services. The inflationary potential of expanded public spending was not entirely nullified by an even greater expansion in tax receipts. The transfer of expenditures from private to public hands released a portion of the money stock for the financing of additional expenditures.

It is possible that wage and other cost increases aggravated these inflationary developments somewhat, though it is

clear that their role was not major. The only plausible link between costs and inflation is the possibility that, when wages rose, wage-earners may have increased their expenditures more than stockholders reduced theirs, not because of different marginal propensities to hoard for the two classes of income recipients, but because of an asymmetry in the degree of awareness of income changes. However, even this could not have been an important factor in the recent inflation, since the most intense pressure on prices was experienced in capital goods rather than consumer goods.

The developments just outlined continued through the first half of 1957. Despite the growing evidence of cost pressures on relative prices, there is no reason to regard the velocity changes in that year as being fundamentally different from those of 1955 and 1956. It is true that the optimism of the earlier years had dampened greatly by 1957. On the other hand, interest rates, the volume of money substitutes, and government expenditures continued to increase. Velocity turned downward sharply in the final quarter of 1957, presumably because of a crisis in confidence. It does not seem reasonable to ascribe more than a minor part of these velocity changes to cost pressures.

In conclusion, cost-push theories of inflation have been greatly overworked in explaining the course of the American economy during 1955-57. Their impact on the price level was of minor importance during this period. Furthermore, insofar as costs have had any such impact, the traditional tools of monetary theory seem entirely adequate for their analysis.

(See chart presentation in Mr. Friedman's statement, pp. 638-648.)
the profits on securities sold. (The material appears at page 678.)

The CHAIRMAN. I think the Chair has taken more than his share of the time in questions, so I will refer to Congressman Patman.

Representative PATMAN. I ask consent, Mr. Chairman, to place in the record at the point where I mentioned about the earnings and distribution of profits of insured commercial banks, and particularly the profits on securities sold, this statement showing by years back to 1936 the profits on securities sold. (The material appears at p. 678.)

The CHAIRMAN. And the source for this is what?

Representative PATMAN. Federal Deposit Insurance Corporation.

The CHAIRMAN. Without objection.

Representative PATMAN. Mr. Selden, you are talking about volume of money and velocity. I want to ask you about how some of this money gets into circulation.

I was impressed by your statement that our inflation in the past few years has been as a result of velocity of money and not by additional volume of money.

Mr. SELDEN. In the main, yes.

Representative PATMAN. When the Open Market Committee of the Federal Reserve System buys a billion dollars worth of bonds in the open market and issues a billion dollars worth of credit, whether it actually delivers the Federal Reserve notes or not, that money is placed in the bloodstream of business and our economy from here on out, is it not?

Mr. SELDEN. That is correct.

Representative PATMAN. It is in somebody's pocket in the form of Federal Reserve notes or, more realistically, it is in somebody's account at some bank. In any case, it is in circulation and outstanding.

Mr. SELDEN. That is correct.

Representative PATMAN. The Federal Reserve System is now holding a portfolio of about \$25 billion of interest-bearing obligations of the United States purchased in a similar manner. It has reported to the Committees on Banking and Currency that this amount is a great deal more than the System needs to hold for either income purposes or possible future needs of monetary controls.

Now the Federal Reserve authorities, in legislation now pending to reduce and adjust member bank reserve requirements (S. 1120), proposes a scheme which would make available additional reserves to member banks so that they could purchase very large amounts of these Government bonds from the Fed's portfolio. My own estimate, based on the bill and what the Fed has said as to the amount of securities it feels it should keep, is that about \$15 billion of these bonds could or would be transferred to the commercial banks substantially improving, as the Federal Reserve authorities themselves point out, the earning position of the private commercial banks.

Mr. SELDEN. From the standpoint of administration of monetary policy, it seems to me this would be essentially a neutral kind of operation.

On the one hand you are wiping out some reserves of the banks and at the same time by the proposed legislation saying that the banks don't need as much reserves as they had before.

It seems to me the quantity of money outstanding would be essentially unchanged.

Representative PATMAN. From the standpoint of the quantity of money in circulation there may be a great deal in what you say, but the point is that the Government, through its own instrumentality, the Federal Reserve System, has bought and paid for these securities once. It has bought them in the open market and by holding in one hand the pieces of paper which the other hand must pay has in effect canceled them. Of course, they have not been canceled or "retired" in fact, since the Treasury goes on owning and paying interest into the Federal Reserve. Meanwhile the Federal Reserve, as another branch of the Government, holds the bonds, collects interest, and then in effect turns the interest back into the Treasury after, of course, taking out its "cut" for operating expenses which have sometimes, it is true, included some very "plush" items.

Instead of reducing member bank reserve requirements so that they can expand their earning assets by taking over some \$15 billion of these bonds, I propose that the Federal Reserve System instead transfer \$15 billion of these obligations to the Treasury Department for immediate cancellation.

Mr. SELDEN. When the bonds were initially purchased by the Federal Reserve System, this created reserves which permitted the banks to expand the quantity of money. The second phase of this transaction is that they—the Federal Reserve—sell them. This, it seems to me, is simply reversing, negating, and washing out completely the first transaction. If they buy the same securities back again, as the third step of the transaction, then we are back where we were initially. We have created new reserves.

Representative PATMAN. The point I want to make is, in respect to this \$25 billion of Government securities that the Federal Reserve has, and they admit they do not need that much portfolio. It has now been suggested that we ought to reduce reserve requirements so that the private commercial banks can buy about \$15 billion.

My point is, and I am going to argue at least as long as I get any attention or consideration of it, that these \$15 billion in bonds, now owed on the one hand and now owned on the other by the Government itself through two different agencies, should be canceled and not given away. In other words, we should have a bond burning and burn \$15 billion more or less, in bonds and thereby reduce the national debt that much because those bonds have actually been paid for with U.S. Government money.

Senator BUSH. At that rate, if the gentleman would yield, it would not take long to get rid of the whole national debt.

Representative PATMAN. Yes, it would take a long time, Senator, because you would have terrific opposition from certain people and I do not think we would get far on getting rid of the national debt. But we can get rid of \$15 billion because we already have that in hand.

Senator BUSH. If you could do it as easily as you say in 1 year, it would not take very long to get rid of the whole thing.

Representative PATMAN. We are not creating a new situation to do it, Senator. We are merely having to take cognizance of a situation that has already been created because the pending legislation now contemplates a wholly new situation—a situation in which these bonds become earning assets of private banks instead of a branch of Government.

If you had a mortgage on your home and you gave someone the money to pay for that mortgage and the person making the payment had the mortgage transferred to himself instead and then demanded payment of interest from you, you would think that would be outrageous and naturally you would be right.

That is what the Government is doing. An instrumentality of the Government is buying these bonds, and instead of canceling them, letting the instrumentality get interest on the bonds and now they seek a way of putting them back into circulation and making the people pay for them twice.

Senator BUSH. I may be wrong, but it seems to me you are treating the Federal Reserve System and the Treasury as though they were just one. The obligation is the obligation of the Treasury. Those bonds are not the obligation of the Federal Reserve Board.

Representative PATMAN. I know, but Federal Reserve Board has paid for them with another form of Government obligation of Federal Reserve notes that is just as much a mortgage on the incomes and the property of the people as an interest-bearing obligation.

So the Federal Reserve has taken our Bureau of Engraving and Printing money and paid for these bonds. Therefore, the bonds should be canceled except where they can be used in the necessary functions of the Federal Reserve System. They say they are not needed in their functions, that they do not need those bonds. They want to turn them back over to the commercial banks, thereby making the people pay for the bonds twice.

Mr. SELDEN. I don't see that there is any great issue involved, sir, if I may say so.

The interest income paid to the Federal Reserve System reverts to the Treasury.

Representative PATMAN. Ninety percent of it flows back to the Treasury and the other 10 percent belongs to the Treasury, but is temporarily withheld. The difference is, if you let that 15 billion go back to the private commercial banks, and they will get them for nothing, instead of their interest flowing back into the Treasury, it will flow into the profits of the private commercial banks.

Mr. SELDEN. The whole thing has me somewhat mystified because if the commercial banks wished to increase their portfolios of Government securities, this can be done at a moment's notice on the open market. Securities can be purchased from private holders other than the Federal Reserve System.

I am not aware of the existence of a large volume of excess reserves in the banking system now which needs to be employed.

Representative PATMAN. That is precisely the catch. It is proposed to reduce the reserve requirements so that they do have added reserves. Of course the giveaway is clouded by some horsetrading because they cannot afford to just turn \$15 billion over to the private commercial banks. They just would not try it without some hocus-pocus.

The CHAIRMAN. Mr. Curtis?

Representative CURTIS. Dr. Selden, I was very much interested in your breakdown of the factors that affected velocity.

As I gathered from your paper, you list five. One is the level of interest rates. The second listed here is credit. Three is ratio to real

income. Four is the extent that holding is useful. Five is the expectations of future values.

There seems to have been a sixth that you list on page 18, which you say is improved techniques of managing cash.

Would you regard that as one that should be added?

Mr. SELDEN. No; I would include that under the extent to which the holding of cash is useful.

Representative CURTIS. Rather than improved techniques?

Mr. SELDEN. That will depend on the technical proficiency of people and of businesses in their management of their cash accounts.

As experience is accumulated, we begin to be more sophisticated in the management of cash. I think this is certainly true at the business level, in any case. It may be that we can make a given amount of cash go further.

Representative CURTIS. And the same would apply to some degree to the personal holdings, too?

Mr. SELDEN. Yes, sir; I believe it does.

Representative CURTIS. You list the level of interest rates as a sort of plus factor that increases velocity. I was a little curious about that.

Mr. SELDEN. This is what Professor Friedman was speaking of yesterday under the terminology of the cost of holding money. He mentioned two factors there, the level of interest rates and rate of price level change.

For simplification here, I left out that second factor. The influence of interest rates on velocity can be described in this way: Cash is a barren sort of wealth holding. There is no income from cash except where interest is paid on deposits. The extent to which people want to hold cash will depend upon the extent to which they are sacrificing monetary income by holding cash instead of something that is income-earning.

Representative CURTIS. Then turning around to the point of demand for money, you do not feel that the amount of the interest rate that is determined would slow down in the amount of debt creation, or not sufficiently so?

Mr. SELDEN. No; I agree with what Dr. Friedman said yesterday, that there is probably a fairly elastic demand for credit. I also think we have to distinguish between credit matters and monetary matters, as he did yesterday.

Representative CURTIS. You agree with his statement?

Mr. SELDEN. Yes; I subscribe to it completely.

It seems to me the level of interest rates probably has some effect on the amount of cash that people are willing to hold and therefore velocity, but I don't think it is a major or dominant factor.

Representative CURTIS. The second item, which I have listed as credit, although you described it as increased use of substitutes, is very definitely a plus item in increasing velocity, is it not?

Mr. SELDEN. Yes, sir.

Representative CURTIS. I was a little disappointed to find from your paper that you do not think we can measure that very well.

Mr. SELDEN. We can measure some aspects of it exceedingly well, but there are a great many ramifications to it.

I was referring there to the volume of lines of credit in existence. I don't know any place where I can put my hand on a figure which

would tell me what the total volume of negotiated lines of credit would be at all banks in this country, for instance. Perhaps such a figure exists, but I am not familiar with it. I am not familiar with any figure which would tell me the extent to which individuals use credit cards for the purchase of gasoline. I could perhaps find this out by doing a little research.

Representative CURTIS. It seems to me, as your paper has pointed out, that since World War II there has been a tremendous increase in the use of the substitutes for money. I think in that category the factor of consumer credit has been probably very predominant.

I am looking for whatever statistics we might have that might measure that.

Mr. SELDEN. It is certainly not impossible to measure. It would be quite a chore and one which I have not found time to get around to.

Representative CURTIS. In your conclusion, you state that for future predicting, we cannot very well predict the future of money substitutes. I wonder if we can find the underlying factors that have brought about the use of money substitutes.

Insofar as consumer credit is concerned, I think it is a very healthy thing which is enabling our people to spread their purchasing power for a lifetime more evenly over their years. In their earlier years, there is probably a need for more expenditures than they would have the cash and reserves for. If we have gotten to the point where we have met that human desire, I think we could look forward to a declining of any future expansion of money substitutes in that area.

Do you think that is an area worthy of investigation?

Mr. SELDEN. I do, and I tend to agree with you, although it is rather intuitive on my part, that the rate of increase of money substitutes will begin tapering off. No doubt we will continue to develop substitutes for cash in the future; technology is not going to stand still here. But I don't think it is going to be as important in the next decade or two as it has been.

Representative CURTIS. I think it is a result of our income tax laws. There are tremendous pressures to defer income to later years. There is this same human desire to spread their income more equally over a lifetime.

Number three, ratio to real income, you have listed as a minus factor. In other words, that would tend to slow the velocity.

Mr. SELDEN. That is right. When we look at chart 1 we see that persistent downtrend since 1869 in the income velocity of money. How do we explain that? That is a question I have spent quite a bit of time thinking about. My conclusion has been that the rise in living standards, in other words, rising income per capita, has been the major factor.

Representative CURTIS. That led me to this question.

Do we have any figures of the per capita ratio of debt to per capita assets?

I think that is as important a factor as real income. You must also consider the net assets.

Mr. SELDEN. It is an area in which I have no immediate information. I simply haven't looked at it from this point of view.

Representative CURTIS. Do you agree that that may not be as important as real income but it is a relevant consideration?

Mr. SELDEN. Yes, sir.

Representative CURTIS. Then you list the extent of the holding being useful. I put that down as a plus or a minus. That could go either way, could it not?

Mr. SELDEN. Yes, sir.

Representative CURTIS. Then the last one, expectations of future value, again could be a plus or minus, going either way?

Mr. SELDEN. That is right.

Representative CURTIS. So we come back to Nos. 1 and 2, level of interest rates and money substitutes, as the place where we have experienced that expansion in the 20th century, this increase in velocity?

Mr. SELDEN. We must remember that the velocity increase has been primarily since 1945. It is mainly a postwar phenomena.

Representative CURTIS. That would make me believe it is almost exclusively in this area of money substitutes. I have long felt that it was, and I have long felt that the phenomena has not been a bad one because it is reflecting this attempt to spread income.

If that is so, we are dealing with a different problem than many people have presented to us.

Representative PATMAN (presiding). Senator Bush.

Senator BUSH. Do you feel that the Federal Reserve Board powers are sufficient, inadequate, or too great?

Mr. SELDEN. They are certainly not inadequate.

I think I would say, if anything, they are too great.

Senator BUSH. You would what?

Mr. SELDEN. I would say that if anything, they are too great. They certainly are sufficient for sound monetary policy, it seems to me.

Senator BUSH. If you were going to suggest how they should be changed, what would you suggest?

Mr. SELDEN. I think I would follow the recommendations of the previous witness, Professor Friedman, in that regard.

As I recall, he stressed two things: One was the elimination of the power to vary reserve requirements. Second is the elimination of rediscounting.

I believe I would strike at both of those.

Senator BUSH. Do you have any legislative recommendations to make to this committee respecting the Federal Reserve System or the banking system?

Mr. SELDEN. The recommendations I would make, other than the ones I have just made, would be that we permit the Treasury to sell securities at a competitive open-market rate of interest so that some appreciable lengthening of the Federal debt can be achieved.

Aside from that, I would like to see, either by legislative mandate or as a result of discussion within the Federal Reserve System, the announcement of a monetary policy which they intend to implement. As it stands now, we are all somewhat in the dark as to what are the objectives of our central bank. They change from time to time.

I think it would be salutary if they had an announced policy of some kind which they would stick to so that all of us would live in a stable monetary environment. And we could make plans accordingly.

Senator BUSH. They have frequently referred to their monetary policy as one of leaning against the wind. That does not seem to be adequate indication of what their policy is?

Mr. SELDEN. Again, to steal Professor Friedman's words on this, it depends on which way the wind is blowing.

Senator BUSH. On the question of price stability and its relationship to maximum employment, how do you feel about that?

Legislation has been offered to make price stability an objective in the Employment Act of 1946. Do you care to comment on that?

Mr. SELDEN. When you asked me for recommendations, I neglected to mention that.

Yes, I would agree with an amendment of that sort making price level stability a coordinate goal with the maintenance of full employment.

Senator BUSH. Do you feel they are compatible and not conflicting in their interests?

Mr. SELDEN. Yes, providing one adopts a sensible definition of full employment.

Quite often in economic literature, one encounters what seems to me a rather restrictive definition of full employment. The Beveridge report, which was published by Sir William Beveridge in the early postwar period, adopted a definition of full employment which literally meant that everybody would be employed.

It seems to me that kind of situation is not compatible with price level stability. We have normally frictional unemployment, meaning by that that from time to time people change jobs. Almost invariably there is some duration of time, usually relatively short, between the quitting of one job and reemployment on another. We have found that this amounts to several hundreds of thousands of individuals in the American economy at any moment in time. I think it would be unfortunate if the idea ever became implanted in the policymakers minds that this kind of unemployment could be eliminated entirely.

Senator BUSH. I think that is right. The law does not speak of full employment anyway. It refers to maximum employment and the factor you have mentioned is taken into account in that.

I have no other questions, Mr. Chairman.

Representative PATMAN. Mr. Widnall.

Mr. WIDNALL. Professor Selden, on page 3 you said the wholesale price index has two major shortcomings, its omission of the price of services and the failures to pick up the departures from list prices.

Do you have any facts and figures indicating what would happen to the price index if you included those two items?

Mr. SELDEN. They have been working in opposite directions recently. The prices of services have been going up. We see that from the Consumer Price Index, so there is no question as to what is happening with the price of services.

On the other hand, when we come to the question of a fictitious price, it is very hard to amass any body of data which would be convincing on this. At the same time, I believe anyone who reads trade journals and keeps his ear to the ground, so to speak, has been aware during the last year or so of instances of departures from list prices.

The Bureau of Labor Statistics makes every effort to find out about these and when they do know of them, they give the actual prices rather than the listed prices, which is appropriate.

What I am saying is that they fail to pick up a lot of these instances. I know of one case in particular.

During 1957 and 1958, the wholesale price index of this particular group of commodities was rising continuously through a period of obviously slack demand. I spoke to the person in charge of marketing of these commodities for a major producer, and asked him what the explanation was. He said, "Haven't you heard of our great white sale?" It turned out that actually these items were not being sold at this price even though the Bureau of Labor Statistics was unaware of it.

How important this is, I cannot say. All I know is that I have personally become aware of a number of instances of this and I think the failure of the wholesale price index to decline during the 1957-58 recession is in part attributable to errors of this kind. I think on a realistic basis we did have some deflation which did not show up in the index.

Representative CURTIS. Would the gentleman yield?

Is that not somewhat true in the retail field.

Mr. SELDEN. Yes, sir. You have allowances of one sort or another, trading stamps and other kinds of offers which are payments made for soap and so forth. I think there are factors of this kind working in the Consumer Price Index, too. However, I think it is probably more important in the wholesale index.

Representative WIDNALL. It has interested me very much in going to retail stores recently to see at how much of a discount you can get so many items and in the food line how cheap are certain items of food compared to several years ago. Yet we hear constantly about rising prices.

I don't think food prices seem to be weighted as much as they should be in connection with the price index today. Meat is up, but many other items are way down.

Eggs are down, for instance. They are a basic commodity and used to a great extent in the average family fare.

Mr. SELDEN. I think the Consumer Price Index is a relatively inferior criterion of what is happening to the value of money in any case. I feel that it is a narrow and sluggish index.

If you want to find out what is happening to the price level, I think you would do better looking either at the wholesale index, which I like to use despite its flaws, or we now have this quarterly price deflator series that the Department of Commerce is putting out, and I think that is probably a pretty good index.

Representative WIDNALL. Do you have any recommendations as to how the Consumer Price Index could be improved?

Mr. SELDEN. It could be broadened greatly by extending the coverage of it. As it stands now, it is limited to moderate income families in the larger centers of population. I think it can be broadened in terms of the types of things that are priced, the types of markets that are surveyed geographically, and so on. However, even a greatly broadened Consumer Price Index is still just a Consumer Price Index.

Despite the fact that consumption is so important in our economy, it leaves out of account the very important area of capital equipment and many other kinds of items which households don't purchase.

I think when we measure the value of money, we should measure it broadly against the prices of all kinds of goods and services.

Mr. WIDNALL. That is all. Thank you.

Representative PATMAN. Senator Javits.

Senator JAVITS. Professor Selden, first let me welcome you as a fellow New Yorker.

Mr. SELDEN. Thank you, sir.

Senator JAVITS. I would like to call your attention specifically to the analysis contained in your statement, which I find especially interesting to me.

In the first place, I would like to have you reaffirm your statement in which you say:

I cannot agree that cost pushes and pricing changes have been significant factors in the recent inflation.

Does that mean that you do not regard cost pushes and pricing practices as having been great factors in the recent inflation, or does it mean that under no circumstances could cost pushes or pricing practices be significant factors in an inflation?

Mr. SELDEN. Taking the latter statement, of course that is a rather extreme position.

Senator JAVITS. I am just trying to get your position.

Mr. SELDEN. My position is simply based on my reading of history. I can't say what will happen in the future and I can't say what has happened in other countries. Furthermore, it is based on my reading of history primarily during this 1955-57 period, which is commonly assumed to be an example of cost push.

I will say that I don't think they have been a major factor.

Senator JAVITS. Is it fair to say that you are testifying that the cost push and pricing practices engaged in from 1953 to 1957 have not been significant factors?

Mr. SELDEN. Yes, sir.

Senator JAVITS. I think that is very important because there is a widespread feeling, as you know, that the contrary is the case.

Apparently it is your feeling that we have not, either by so-called administered prices or by wage increases, in any major way outstripped the productivity of the economy or the giving of real value, let us say, for the receipt of money?

Mr. SELDEN. That is correct.

You see, when you look at the pattern of price change during 1955 to 1957, you find that investment goods were particularly important in the rise of the wholesale price index. It is true, of course, that these investment goods industries are characterized in some instances by what is called administered pricing. It is also true that these investment goods industries are characterized in some cases by strong unions which have won large wage increases. We have three possible interpretations coinciding. We have the strong demand for capital goods and we have the pricing practices of the capital goods producers and we have the labor situation within those areas of the economy. Which of the three do you select?

It simply seems to me that during 1955 and 1956 particularly the price increases in those areas reflected strong demand. We know that the 1955 to 1957 business expansion was a period of exceptionally rapid capital goods expansion. I think that the long workweeks and the high levels of employment in general and the high levels of industrial production in those areas testifies to the strong demand for

those goods which existed in the economy and it is reasonable to attribute the largest part of these price rises to that phenomena of strong demand.

Senator JAVITS. Then, you say, if velocity levels off and attains a more or less horizontal trend, then the outlook for price level stability will be good.

You add, we can confidently anticipate continued growth of real income per capita. This should exert downward pressure on velocity.

Is it fair to say that you conclude that if we have continued growth of real income—and I emphasize the word “real”—per capita, that the outlook for price level stability is good?

Mr. SELDEN. One would have to continue reading the next sentence too, because those are coupled together.

You see, as Representative Curtis brought out, you have some factors moving velocity in a downward direction and you have other factors tending for an upward movement of velocity. There is a tug of war. It is a question of the relative strengths of these factors.

I think I would agree with the sense of your comment that rising real income per capita will be an important factor influencing velocity.

Quite apart from its influence on velocity, an increase in the flow of goods and services will in itself be a deflationary factor.

Senator JAVITS. So your theory of the behavior of money, if it is correct, would lead us to the conclusion that increased productivity and increased markets, both foreign and domestic, will give us a satisfactory rate of advance, will help us avoid excesses of inflation with the present machinery of government and present equipment that controls?

Mr. SELDEN. Yes.

I think the present machinery is adequate. The question is how it is going to be used or operated.

My own feeling is one of optimism in this respect. I think we have had good leadership on the whole. If we can continue to get it or perhaps improve it a little bit, I think the longrun prospect for the next decade or two, barring unfavorable international developments, is for only moderate inflation or perhaps even stability.

Senator JAVITS. So we are on the right track as you see it?

Mr. SELDEN. I do believe so.

Senator JAVITS. And we just have to keep at it with the greatest diligence?

Mr. SELDEN. That is right. We have to have determination and not be deflected from our purpose. I think that would be the best policy.

Senator JAVITS. Thank you, Mr. Chairman.

Representative PATMAN. The chairman desires to insert in the record (1) the American Economic Review article on “Monetary Systems and Accelerator Models,” by Hyman P. Minsky, (2) certain correspondence between Senator Douglas and the Federal Reserve Board, and (3) two brief items by Prof. Alvin Hansen on inflationary pressures and debt management thereto.

Without objection, they will be placed in the record at this point. (Information referred to follows:)

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MONETARY SYSTEMS AND ACCELERATOR MODELS

By HYMAN P. MINSKY*

A significant part of recent literature on both growth and business-cycle theory has been based upon some form of an interaction between a consumption (saving) relation and an induced investment relation. The authors who have constructed these accelerator-multiplier models have paid little, if any, attention to the monetary prerequisites and effects of the assumed processes.¹ Obviously the accelerator-multiplier process takes place in the context of some monetary system. In this paper the manner in which the time series generated depends upon the interaction of an accelerator-multiplier process and the monetary system will be investigated: the main emphasis will be on the upper turning point and the possibility of generating steady growth. In this paper the lower turning point is unexplained aside from noticing how the various monetary systems can act as a brake on disinvestment and also, by changing liquidity, set the stage for a recovery.

The procedure will be to examine the result of combining a linear accelerator-multiplier model with a number of alternative monetary systems. The terms (interest rate) and the manner (type of liability) of financing investment are affected by the behavior of the monetary system. In turn, both money-market conditions and the balance-sheet structure of firms affect the response of firms to a change in income. This can be interpreted as making the accelerator coefficient an endogenous variable related to the monetary system. Hence the material

* The author is associate professor of economics, Brown University. A large portion of the work on this paper was done while he was a visiting associate professor at the University of California, Berkeley. He wishes to acknowledge his debt to Julius Margolis, Roger Miller and Merton P. Stoltz for their helpful comments and suggestions.

¹ J. R. Hicks, *A Contribution to the Theory of the Trade Cycle* (Oxford, 1950) and S. C. Tsiang, "Accelerator, Theory of the Firm, and the Business Cycle," *Quart. Jour. Econ.*, Aug. 1951, LXV, 325-41 briefly consider monetary factors.

in this paper could be formalized as a series of nonlinear accelerator-multiplier models.²

This paper is divided into four sections. The first is a brief review of the attributes of both linear and nonlinear accelerator-multiplier models, which is followed in the second section by an analysis of the behavior of the accelerator model with the quantity of money constant. The third section is an investigation of how the system would behave with the quantity of money varying in a number of different ways. In the last section some implications of the analysis for monetary and fiscal policies are briefly explored.

I. Formal Attributes of Accelerator-Multiplier Models

The essential linear accelerator-multiplier model can be written:³

$$Y_t = C_t + I_t \quad (1)$$

$$C_t = \alpha Y_{t-1} \quad (2)$$

$$I_t = \beta(Y_{t-1} - Y_{t-2}) \quad (3)$$

where Y = income, C = consumption, I = investment, α = marginal (= average) propensity to consume, β = accelerator coefficient and t is the number of the "day." By substitution, equations (1)-(3) yield:

$$Y_t = (\alpha + \beta)Y_{t-1} - \beta Y_{t-2} \quad (4)$$

Equation (4) is a second-order difference equation; its solution in general is of the form:

$$Y_t = A_1\mu_1^t + A_2\mu_2^t \quad (5)$$

where A_1 and A_2 depend upon the initial conditions and μ_1 and μ_2 are determined by the values of α and β .

Aside from the effects of the initial conditions, the time series generated by a second-order difference equation can be any one of the following: (1) monotonic equilibrating; (2) cyclical equilibrating; (3) cyclical with constant amplitude; (4) cyclical explosive; (5) monotonic explosive.⁴ By itself, no one of these five types of time

² Obviously the interest rate and consumer debt affect consumption expenditures also; therefore the consumption coefficient also depends upon the behavior of the monetary system. The "Pigou effect" can be interpreted as a particular relation between the consumption coefficient and the monetary system. Such effects are ignored in this paper.

³ This stripped model exhibits the characteristics of a linear accelerator-multiplier model which are important for the problems discussed in this paper. The incomes should be interpreted as deviations from a "zero" level of income given by $Y_0 = \lambda/1-\alpha$ where λ could be identified with autonomous investment or "zero income" consumption.

W. J. Baumol, *Economic Dynamics, An Introduction* (New York, 1951), Ch. 10, 11, gives a very simple discussion of the solution to second-order difference equations.

⁴ The type of time series generated is determined by the values of μ_1 and μ_2 , which in turn depend upon the values of α and β . For a type-1 series, μ_1 and μ_2 are both less than 1, for a type-2, 3, or 4 series μ_1 and μ_2 are conjugated complex numbers, and for a type-5 series μ_1 and μ_2 are both greater than 1.

series is satisfactory for business-cycle analysis. Types 1 and 5 are not cyclical. If they are to be used, either floors or ceilings to income or pushes (systematic or random) from outside have to be posited. A time series of type 2 would in time result in the cycle dying away, so that some systematic or random push is required to maintain the cycle. A time series of type 4 would in time generate fluctuations greater than any preassigned value. Hence floors and ceilings have to be posited to constrain the fluctuations. A type-3 time series is a self-sustaining cycle, but its existence depends upon a particular value of β and, in addition, the time series it generates is "too" regular.

A way out of this difficulty is to have the α and β coefficients vary over the cycle, thus generating a time series which is a combination of the different types of time series. Hicks and Goodwin do this by assuming that the value of β is so great that, unless constrained, an explosive time series is generated, but that constraints, in the form of a maximum depreciation rate and full employment (or the capacity of the capital-goods-producing industries), exist. These constraints force realized investment to be different from induced investment, and, formally, they can be interpreted as changing the value of β . As the value of β is assumed to fall (rise) when income is very high (low) or increasing (decreasing) very rapidly, an acceptably irregular cyclical time series is generated. Obviously by linking explosive, cyclical and damped movements together, any type of time series which is desired can be generated.

A set of formal nonlinear models similar to those of Hicks and Goodwin can be generated by positing that the value of β , the accelerator coefficient, depends upon money-market conditions and the balance sheets of firms. These factors in turn depend upon the relation between the level and rate of change of income and the behavior of the monetary system. In this paper however the mathematical model of the accelerator process will be a simple linear form. It is hoped that what is lost in mathematical neatness may be offset by what is gained in the identifiability of the economics.

So far we have not taken up the effects of the initial conditions. The initial conditions are particularly important in determining the income generated by a type-5 (monotonic explosive) time series for small values of t . To generate a type-5 time series, μ_1 and μ_2 are both greater than 1 in the relation $Y_t = A_1\mu_1^t + A_2\mu_2^t$. To set off the recursive process two levels of income Y_0 and Y_1 (the initial conditions) are needed, which determine the values of A_1 and A_2 . If Y_1 is greater than Y_0 and the ratio of Y_1 to Y_0 is less than μ_2 , the smaller root, then A_1 , the coefficient of μ_1 , the larger root (also called the dominant root), will be negative. As the larger root will in time dominate, a negative

A_1 will in time result in a negative Y_t . Hence if the rate of increase of income given by the initial conditions is less than the smaller root, there will be a turning point in the time series even though the values of α and β are such as to generate a monotonic-explosive time series.⁵

This leads to an alternative way of interpreting the Goodwin-Hicks type of nonlinear accelerator models. When the floors and ceilings become effective, a new set of initial conditions is, in effect, imposed on the time series. If these new "initial conditions" result in the sign of the coefficient of the dominant root changing, then in time the direction of the movement of income will be changed. The effects of monetary constraint can also be interpreted in this manner.

Following Goodwin and Hicks we will assume that the value of β is so large that, unless it is constrained, the accelerator-multiplier process will generate an explosive time series. The solution of the accelerator-multiplier model will be $Y_t = A_1\mu_1^t + A_2\mu_2^t$ where $\mu_1 > \mu_2 > 1$ and the initial conditions are such ($Y_1/Y_0 > \mu_2$) that A_1 and A_2 are both positive. For the range of magnitudes of Y_1/Y_0 which it seems sensible to posit, A_2 will be much larger than A_1 . This means that at the early dates (t small) of the development the weight of μ_2 is high while at the later dates μ_1 dominates. The rate of growth of income generated by the explosive process being considered increases in time, approaching μ_1 as a limit.⁶

The increasing rate of increase of income that such an explosive accelerator process generates will in time be greater than the accepted possible rate of growth of productive capacity. In order to be able to maintain the continuity of the accelerator process, we assume that all the relations are in money terms and that the accelerator process may generate changes in the price level. We will, at a number of points, call attention to some specific effects of price level changes.

II. *The Accelerator Model with the Quantity of Money Constant*

In this and the following section we will derive several time series that result from the interaction of an accelerator-multiplier process

⁵If the two roots are equal, then the solution to the difference equation is $Y_t = A_1\mu_1^t + A_2t\mu_1^t$ (see Baumol, *op. cit.*, Ch. 10, 11). If $Y_1/Y_0 = \mu_1$, then $A_2 = 0$ and a constant-rate-of-growth series is generated. If $Y_1/Y_0 < \mu_1$, then $A_2 < 0$ and in time $Y_t < Y_{t-1}$; if $Y_1/Y_0 > \mu_1$, then $A_2 > 0$ and, at least in the early days, the rate of increase of income is significantly greater than μ_1 . In terms of a second-order difference equation, a steady rate of growth of income can be characterized as a knife edge: it requires not only that α and β be such that $\mu_1 = \mu_2 > 1$ but also that $Y_1/Y_0 = \mu_1$ (see S. S. Alexander, "The Accelerator as a Generator of Steady Growth," *Quart. Jour. Econ.*, May 1949, LXIII, 174-97).

⁶In Sections II and III a number of tables will be exhibited to illustrate the results of combining an explosive accelerator-multiplier process with a number of different monetary systems. In each case it is assumed that $\alpha = .8$, $\beta = 4$, $Y_0 = 100$ and $Y_1 = 110$. For these values $\mu_1 = 3.73$, $\mu_2 = 1.07$, $A_1 = 1.1$ and $A_2 = 98.9$ so that $Y_t = 1.1(3.73)^t + 98.9(1.07)^t$. In time Y_{t+1}/Y_t will approach 3.73.

and various types of monetary systems. The monetary systems to be considered are classified in terms of the monetary changes which can take place. Monetary changes are changes in either the velocity of circulation or the quantity of money. Therefore we will consider the following alternative monetary systems: (A) neither velocity nor quantity changes; (B) only velocity changes; (C) only quantity changes; (D) both velocity and quantity change.⁷ The first two monetary systems will be considered in this section, the last two in the next section.

Except in the first monetary system, we assume that there exists a fractional reserve banking system. The money supply is changed by either the creation of deposits in exchange for business firms' debts or the destruction of deposits by business firms' repayment of bank debt. That is, the banking system is a commercial banking system rather than one that deals in government and other securities.⁸ In all that follows the central bank's relations with the commercial banks are integrated into the "monetary system." For example, an infinitely elastic money supply can be achieved by a central bank lending to commercial banks, or by a central bank purchasing open market paper. Also in a monetary system we include the specialized financial intermediaries.

The income velocity of money and the liquidity preference relation can be characterized as mirror images of each other.⁹ When income velocity rises, the liquidity of the economy falls and vice versa. A useful construction is to assume that for each level of money income Y , there exists a minimum quantity of money M_T which is necessary to sustain the volume of payments associated with Y . If M_T is the total quantity of money in existence then there is no money available for portfolio use; we have a maximum income velocity of money V_m for

⁷ Cases A and B, where the quantity of money is constant, may be thought of as worlds of 100 per cent money. If at the "initial point" excess liquidity exists, so that velocity can increase, it is Case B, otherwise it is Case A. Case C(1), where the money supply is infinitely elastic, is a world of a paper-money authority which ignores price-level considerations (perhaps a world in which the central bank follows a "needs of business" rule). Case C(2), where the quantity of money has an exogenously determined rate of growth, is a gold-standard world where gold production is autonomous and determines the rate of growth of the money supply. Case D of course is similar to the existing monetary system.

⁸ Some of the differences between the classical quantity theory of money and the Keynesian liquidity preference theory of money can be imputed to the way in which the banking system is assumed to operate. The quantity theory approach is consistent with bank lending to business (commercial banking) whereas the liquidity preference theory follows from banks purchasing securities on the open market. In commercial banking an increase in the quantity of money enables a business firm to effect a decision to purchase goods and services. On the other hand, open-market operations substitute money for another asset in the portfolios of the public, and whether or not purchases of goods and services result depends upon the reaction of the public to this change in liquidity.

⁹ A. C. Pigou, *Keynes's General Theory* (London, 1951); H. S. Ellis, "Some Fundamentals in the Theory of Velocity," *Quart. Jour. Econ.*, May 1938, LII, 431-72.

each Y , so that $M_T \cdot V_m = Y$. If M is greater than M_T then the actual velocity, V , is less than V_m . The difference between M and M_T is M_L , the amount of money which is held as a liquid asset. If the quantity of money is constant, portfolio money M_L must fall when V rises.

If $V < V_m$ then $M_L > 0$. Abstracting from changes in the quantity of money, with $M_L > 0$, the interest rate is determined by the demand curve for investment, *ex ante* saving, and the terms upon which holders of liquidity are willing to substitute earning assets for money. Similarly, if $M_L = 0$, then the interest rate is determined by the demand for investment, the supply of saving and the terms upon which individuals are willing to hold cash as an asset. With a given money supply in excess of M_T there exists a rate of interest at which households and business firms as a whole are not willing either to increase or to decrease their holdings of money. Any other market interest rate involves either an increase in cash balances so that savings are utilized to increase liquidity, or a decrease in cash balances so that investment is financed from the reservoir of purchasing power. It is assumed that changes in the market rate of interest will affect the amount of investment induced by a given change in income.

Assume that all investment is made by business firms. On a consolidated balance sheet of all firms, investment is represented by an increase in plant, equipment or work in progress, and it will be offset by an increase in liabilities (equity or debt) or a decrease in other assets (cash or liquid assets). Business investment can be equity-financed as a result of either *ex ante* saving by households and firms or a decrease in the cash balances of households. Business investment can be debt-financed as a result of *ex ante* saving by households, a decrease in households' cash balances or by an increase in bank debt of business firms. The financing of investment by a decrease in the cash (liquid assets) balances of firms does not affect either the debt or the equity liabilities of firms: it only makes firms less liquid.

Whereas *ex ante* saving and decreases in the liquidity of households can be used for either debt or equity financing of investment, increases in the quantity of money can be used only for the debt financing of investment. Households, business firms, and banks are sensitive to the composition of the balance sheets of firms; in particular an increase in the ratio of debt to equity or a decrease in the ratio of cash to other assets in firms' balance sheets will make business firms less willing to borrow and households and banks less willing to lend. Hence if investment is financed in such a way as either to increase the ratio of debt to total liabilities or to decrease the liquidity of business firms, the amount of investment induced by a given change in income will fall. The value of the accelerator coefficient therefore depends upon

two variables, the market rate of interest and the structure of the balance sheets of firms. Changes in these variables can dampen what otherwise would be an explosive movement of income.

A. Neither Velocity nor Quantity Changes

Using the Swedish concepts,¹⁰ we define $Y_{t-1} - C_t = (1 - \alpha)Y_{t-1}$ as *ex ante* saving. Assuming, as pure accelerator-multiplier models do, that all of investment is induced, then $I_t = \beta(Y_{t-1} - Y_{t-2})$ is identified as *ex ante* investment. From equations (1)-(3), it follows that for $Y_t \geq Y_{t-1}$ it is necessary that $I_t = \beta(Y_{t-1} - Y_{t-2}) \geq (1 - \alpha)Y_{t-1}$, for $Y_t < Y_{t-1}$ it is necessary that $I_t = \beta(Y_{t-1} - Y_{t-2}) < (1 - \alpha)Y_{t-1}$.

With a monetary system in which neither the velocity of circulation nor the quantity of money changes, if *ex ante* investment is greater than *ex ante* saving, the *ex ante* saving has to be rationed among investors, and the market in which this rationing takes place is the money market. The excess of demand over supply results in a rise in interest rates, which will continue until realized investment is equal to *ex ante* saving. In Figure 1, *ex ante* investment is based upon the

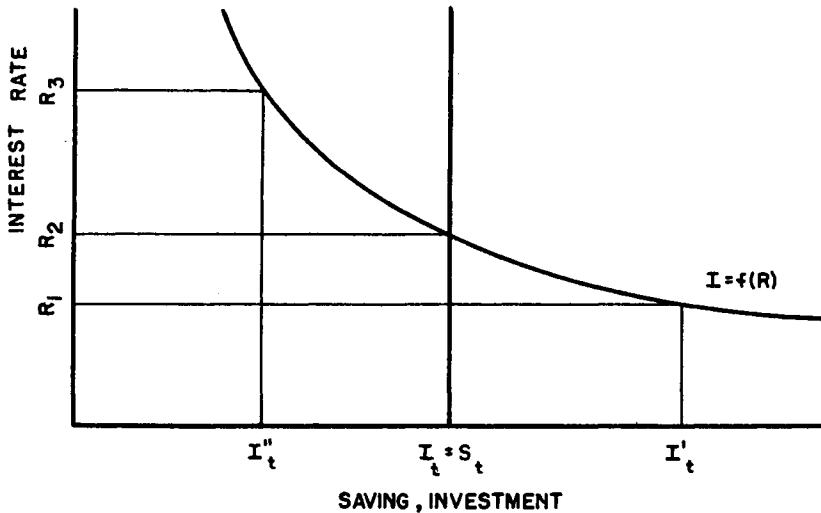


FIGURE 1. RECONCILIATION OF EX ANTE SAVING AND INVESTMENT

rate R_1 so that $\beta(Y_{t-1} - Y_{t-2}) = I'_t$. The inability to finance more than $I_t (= S_t)$ of investment results in a rise in the interest rate to R_2 . Such a monetary system leaves no room for an accelerator-multiplier cycle. A necessary condition for the functioning of an accelerator

¹⁰ B. Ohlin, "Some Notes on the Stockholm Theory of Savings and Investment," *Econ. Jour.*, Mar. and June 1937, XLVII, 53-69 and 221-40. Reprinted in American Economic Association, *Readings in Business Cycle Theory* (Philadelphia, 1951), pp. 87-130.

process during an expansion is that a source of financing of investment in addition to *ex ante* saving should exist.¹¹

Symmetrically, if *ex ante* saving is greater than *ex ante* investment then an increase in investment is forced so that all of the available financing is absorbed by real investment. If there exists no way in which savings can be utilized other than in investment, then the terms upon which firms can finance investment must change so that realized investment is greater than *ex ante* investment. This equality of *ex ante* saving and realized investment stabilizes income, thereby halting the "inducement to disinvest."

B. Only Velocity Changes

With a constant money supply, realized investment can differ from *ex ante* saving only if the velocity of circulation of money changes. We will first take up the purely mechanical implications of the existence of a floor and a ceiling to velocity. We will then consider the effects on the value of the accelerator coefficient of changes in velocity when no excess liquidity exists and when excess liquidity exists (the Keynesian liquidity trap). To the extent that a fixed money supply and a ceiling to velocity set an upper limit to the money value of income, secular growth requires a falling price level, and this has implications for the accelerator process.

We have assumed that the interest rate and the balance-sheet structure of firms (liquidity and the debt-equity ratio) affect the value of the accelerator coefficient. The financing of investment by absorbing idle cash balances does not necessarily change the debt-equity ratio of business firms, for we can assume that the debt-equity preferences of households are not strikingly different when *ex ante* saving and when idle cash balances are used to finance investment.¹² Therefore the

¹¹ A fall in the price level of investment goods may result in S_t of monetary savings being sufficient to finance I_t of real investment. Conversely a rise in the price level of investment goods will lower the amount of real investment that a given amount of money savings can finance. In Figure 1 the savings curve can be read as a supply curve and the investment curve as the demand curve (with respect to price) for investment goods at a fixed interest rate. Then reading R_2 and R_1 as price levels, the accelerator phenomenon determines the price level of investment goods. This interpretation of Figure 1 must be what a writer who uses a ceiling to investment-goods production in his models has in mind (for example, Goodwin, *op. cit.*). In the original interpretation of Figure 1, even if I_t' of investment is financed, the supply conditions of investment goods (with respect to price) may be such that spending I_t' on investment goods results in a rise in the price of investment goods; as indicated earlier the accelerator process can lead to a rising price level.

¹² J. G. Gurley and E. S. Shaw, "Financial Aspects of Economic Development," *Am. Econ. Rev.*, Sept. 1955, XLV, 515-38, discuss the effect of available assets on saving behavior. It may be true that the asset preferences of households when using cash balances are different from their preferences when using *ex ante* saving to finance firms. In this connection, the legal and traditional limitations on the portfolios of financial intermediaries no doubt tend to affect business investment.

balance sheets of investing firms do not deteriorate during an expansion financed by increasing velocity. Of course the liquidity of households and firms is reduced but, unless the liquidity trap is operative, this is reflected in the interest rate. Therefore in this section only the interest rate and, in the liquidity-trap situation, the changes in liquidity at a constant interest rate can affect the accelerator coefficient.

Assume that a cumulative rise in income is set off. This increases the quantity of money needed for transaction purposes and, therefore, as the process continues there are progressively smaller asset holdings of money which can be used to finance investment in excess of *ex ante* saving. The highest attainable level of money income is that level at which all of the available money supply is required for transactions (see Table I). At that income realized investment cannot exceed *ex*

TABLE I.—ONLY VELOCITY CHANGES
(Constant Money Supply—No Interest-Rate Effects)

Time	Accelerator Process $\alpha = .8, \beta = 4.0$ $Y_0 = 100, Y_1 = 110$					Monetary System Money Supply = 100 Maximum Velocity = 2	
	Y	C	Savings <i>Ex Ante</i>	Investment		Investment Financed by ΔV^*	Realized Velocity
				<i>Ex Ante</i>	Realized		
0	100	—	—	—	—	—	1.00
1	110	80	20	—	30	10	1.10
2	128	88	22	40	40	18	1.28
3	174	102	26	72	72	46	1.74
4	200	139	35	184	61	26	2.00
5	200	160	40	104	40	0	2.00
6	160	160	40	0	0	-40	1.60

* Investment in excess of *ex ante* saving. Obviously negative investment financed by ΔV means that *ex ante* saving is greater than investment.

ante saving. Realized investment equal to *ex ante* saving results in a constant income which, given the accelerator assumption, induces zero investment. Ignoring any effects that the interest-rate and balance-sheet changes accompanying velocity increases have upon the accelerator coefficient, a monetary system with a constant quantity of money may impose a ceiling to money income. This ceiling is not determined by full employment or by the capacity of the investment goods industries; it is determined by the limited ability of changes in velocity to finance investment.

Symmetrically if a minimum velocity exists, a floor to money income exists. However the floor is not entirely symmetrical with the ceiling, and in this paper the lower turning point is essentially unexplained.

Let us examine what would be happening in the money market

during a process such as is detailed in Table I. Ignoring the liquidity trap, a rise in transaction money as income rises means that with a constant money supply portfolio money becomes scarcer. The interest rate at which cash can be withdrawn from portfolios into the income stream rises as asset money is used to finance investment in excess of saving. With a fixed quantity of money and a rise in income, the balance sheets of households and firms show a smaller ratio of asset cash to total assets, liquidity decreases. The decrease in liquidity and the rise in the interest rate both tend to decrease the accelerator coefficient.

Alternatively, on the downswing *ex ante* investment is smaller than *ex ante* saving. With a constant money supply, this excess saving is

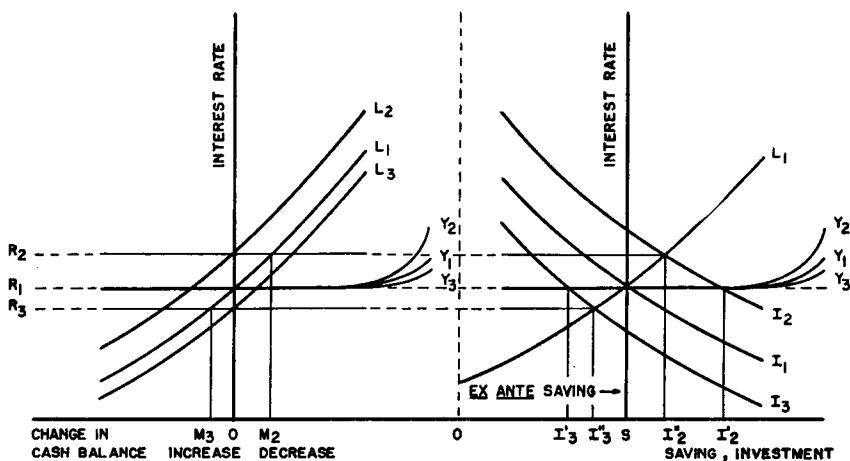


FIGURE 2. SAVING, INVESTMENT, AND CASH BALANCES

absorbed by a reduction in velocity. Money available for asset purposes increases as it is withdrawn from the income stream. The interest rate falls and the liquidity of the community rises so that the amount of disinvestment induced by the given downward shift in demand decreases. Both on the upswing and the downswing, the monetary system which is based solely upon changes in velocity acts as a stabilizer of realized induced investment unless the fall in income is so great that the money released from transaction purposes lowers the interest rate to the floor interest rate of the liquidity trap. At this interest rate the stabilizing effect upon aggregate disinvestment of the fall in financing terms will cease, although increasing liquidity can continue to act as a stabilizer.¹⁸

Figure 2 illustrates the use of cash balances to finance investment

¹⁸ Increasing liquidity raising the consumption coefficient is of course the "Pigou effect."

and to offset *ex ante* saving. At the interest rate R_1 , and income Y_0 , the velocity of circulation of money remains constant. This is illustrated by the L_1 curve intersecting the zero change in cash balances line at R_1 . At higher interest rates cash assets would be freed to finance investment; at lower interest rates saving would be absorbed by cash balances. The amount of investment which can be financed at any interest rate is equal to the sum of *ex ante* saving and the change in cash balances. Assume that income rises so that at the interest rate R_1 , I_2' of investment is induced. The I_2 curve illustrates how the value of the accelerator would be changed by a change in interest rates. The excess of demand over the supply of finance results in a rise of the interest rate to R_2 . As I_2'' is greater than *ex ante* saving, income will rise and the transaction demand for cash will increase. This will raise the schedule relating the change in cash balances to the interest rate to L_2 , so that the interest rate at which investment will be financed by a fall in liquidity will be higher.

If a fall in income shifts the investment demand curve to I_3 , *ex ante* investment is I_3' . With a constant money supply the excess of *ex ante* saving over induced investment will depress the interest rate, and realized investment will be $I_3'' > I_3'$, OM_3 being added to cash balances. As $S > I_3''$ income will fall, and this will shift the liquidity curve downward so that cash balances can be used to finance investment at an interest rate lower than R_1 .

If the cash balance-interest rate relation is as the Y_3 , Y_2 and Y_1 set of curves indicate, then excess liquidity exists; this is the Keynesian liquidity trap situation. With an investment curve I_2 , $I_2' - S$ of investment will be financed by a decrease in cash balances; and if the investment curve is I_3 , $S - I_3'$ will be added to cash balances. In both cases no change in interest rates will occur. In the Keynesian liquidity trap situation the money market damps down neither the "boom" nor the "bust." On the boom side, the liquidity trap will exist until the need of cash for transactions absorbs a sufficiently large portion of the money supply so that the Keynesian liquidity trap comes to an end. There is no endogenous limiting factor to the liquidity trap on the downswing aside from the effect that improved liquidity has upon firms' balance sheets. Therefore the Keynesian liquidity trap situation allows full scope to an explosive accelerator coefficient. And in the upswing, an explosive accelerator process will generate greater increases in money demand than the increases in productive capacity, so that a strong accelerator in combination with excess liquidity will generate large price increases.

Either the ceiling to velocity or the effect of rising interest rates and decline in liquidity upon the accelerator coefficient will break the

cumulative expansion. A fall in money income will occur. The quantity of money needed for transactions falls, and *ex ante* saving which is not realized in investment will result in the addition of money to portfolios. If the price level does not fall during a depression the ceiling real income remains fixed, while if the price level falls, even though the ceiling money income remains fixed, the ceiling real income rises.

Net investment implies an increase in productive capacity. With a constant money supply and in effect a ceiling to velocity, larger real incomes can be realized only if the price level falls. To the extent that the accelerator inducement to invest is large only when income is approximately equal to productive capacity, strong expansions can only occur if the price level falls secularly.

The effect of the expectation that in the long run the price level will fall is to increase the expected pay-off period of an investment. This is equivalent, in its effect upon investment by firms, to a rise in interest rates with a constant price level, so that a falling price level will tend to lower the value of the accelerator coefficient. Therefore the business cycle will be characterized by weaker booms than would occur with a permissive monetary system. Such a monetary system will be associated with a tendency toward relatively stable income for, unless liquidity is greatly increased during a downswing, long periods in which realized investment exceeds *ex ante* saving cannot occur.

III. *The Accelerator Model with Quantity of Money Variable*

In this section we will consider two monetary systems, those in which only the quantity of money can change and those in which both the quantity of money and its velocity can change.

We assume that commercial banks create money by lending to business firms. The maximum realized increase in the money supply is equal to the difference between *ex ante* investment and *ex ante* saving:

$$\Delta M = \text{ex ante } I - \text{ex ante } S = \Delta Y$$

Assume that $V = \frac{Y}{M} = \frac{\Delta Y}{\Delta M} = 1$. The increase in the money supply in the hands of households is the asset which makes the change in net worth equal to *ex ante* investment.¹⁴ As income velocity is 1, there will

¹⁴ Assume that *ex ante* $I > \text{ex ante } S$, realized $I = \text{ex ante } I$; also that (*ex ante* $I - \text{ex ante } S$) is financed by an increase in bank debt. The changes in the consolidated balance sheets of households, business firms and banks will be:

Households		Net Worth	+ (<i>ex ante</i> I)
Debt and Equity of Firms	+ (<i>ex ante</i> S)		
Demand Deposits	+ (<i>ex ante</i> $I - \text{ex ante } S$)		

be no net change in the quantity of money that individuals hold as assets. This is equivalent to assuming that the interest rate at which banks lend to business is the interest rate at which money and earning assets are substituted in household portfolios.¹⁵ The only relevant monetary change in these models is in the quantity of money.

When the money supply increases at an independently given rate, the autonomous increase in the money supply is not necessarily equal to the difference between *ex ante* investment and *ex ante* saving. If the increase in the money supply is greater than the difference between *ex ante* investment and *ex ante* saving we assume that this difference accumulates in the banking system (as excess reserves) and can be used to finance future investment. If the increase in the money supply is less than the difference between *ex ante* investment and *ex ante* saving, realized investment will be less than *ex ante* investment and the increase in income will be equal to the increase in the money supply.

For each monetary system we will first investigate the mechanical properties of these relations, assuming that the accelerator coefficient does not change, and then investigate the possible effects of the associated money market and financing developments upon the value of the accelerator coefficient.

A. Quantity Changes but Not Velocity

Two monetary systems in which only the quantity of money can change will be taken up. In the first, the money supply will be assumed to be infinitely elastic, and in the second the money supply will be assumed to increase at a fixed arithmetic or geometric rate.

1. *Infinitely elastic money supply.* If the quantity of money can increase without limit then no matter what the difference between *ex ante* investment and *ex ante* saving, the difference can be financed. Also we can assume that the terms upon which the banking system

Firms			
Productive Assets	+ (<i>ex ante</i> I)	Debt and Equity to Households	+ (<i>ex ante</i> S)
Demand Deposits	(no change)	Debts to Banks	+ (<i>ex ante</i> I - <i>ex ante</i> S)
Banks			
Debts of Firms	+ (<i>ex ante</i> I - <i>ex ante</i> S)	Demand Deposits	+ (<i>ex ante</i> I - <i>ex ante</i> S)

¹⁵ Alternatively if the liquidity-trap rate of interest rules, even if $V > 1$, the rise in the quantity of money in excess of transaction needs can all be absorbed by households' portfolios without lowering the interest rate. However, in this case any rise (virtual) in the interest rate would imply a substitution of earning assets for money in the portfolios of households. This then becomes a case of financing investment from cash balances. If $V > 1$ the money supply and firms' debts to banks do not increase as rapidly as income.

lends do not change. Such a monetary system is consistent with the existence of an explosive accelerator process since it permits a cumulative rise in money income. Is there anything inherent in the operations of such a monetary system which will lead to a dampening of the accelerator process? (We will ignore the political repercussions of the cumulative rise in prices which is implicit in a full-employment situation in which the rate of growth of money income is greater than that of productive capacity.)

TABLE II.—INFINITELY ELASTIC MONEY SUPPLY
(Constant Velocity—No Interest-Rate Effects)

Time	Accelerator Process $\alpha = .8 \quad \beta = 4 \quad Y_0 = 100$					Monetary System All <i>ex ante</i> S used for equity financing. All increases in money used for debt financing.	
	Y	C	Savings <i>Ex Ante</i>	Investment		Δ Money Supply	Δ Equity Financing
				<i>Ex Ante</i> $\beta(Y_{t-1} - Y_{t-2})$	Realized		Δ Total Investment
0	100.	—	—	—	—	—	—
1	110.	80.	20.	—	30.	10.	.67
2	128.	88.	22.	40.	40.	18.	.55
3	174.	102.	26.	72.	72.	46.	.36
4	323.	139.	35.	184.	184.	149.	.19

During an expansion, the increase in money supply occurs as investing firms add bank debt to their liabilities (see Table II). Assuming that the percentage distribution of *ex ante* saving between debt and equities of business firms is constant, a cumulative explosive expansion on the basis of the creation of money will (*ceteris paribus*) result in a fall in the ratio of equity to debt in the balance sheet of firms.¹⁸ Even if the terms upon which firms can borrow are unchanged by the

¹⁸ Total induced investment is $\beta(Y_t - Y_{t-1})$. *Ex ante* saving is equal to $(1 - \alpha)Y_t$. Assuming that a constant proportion of *ex ante* saving is used for equity financing, the latter is $\lambda(1 - \alpha)Y_t$. The ratio of the change in equity to total investment, therefore is:

$$\frac{\lambda(1 - \alpha)Y_t}{\beta(Y_t - Y_{t-1})} = \frac{\lambda(1 - \alpha)}{\beta \left(1 - \frac{Y_{t-1}}{Y_t}\right)}$$

The general solution to the second-order explosive accelerator process is of the form $Y_t = A_1\mu_1^t + A_2\mu_2^t$ where $\mu_1 > \mu_2 > 1$. Therefore, we can write:

$$\frac{Y_{t-1}}{Y_t} = \frac{A_1\mu_1^{t-1} + A_2\mu_2^{t-1}}{A_1\mu_1^t + A_2\mu_2^t} = \frac{1 + \frac{A_2}{A_1} \left(\frac{\mu_2}{\mu_1}\right)^{t-1}}{\mu_1 + \left(\frac{A_2}{A_1}\right) \left(\frac{\mu_2}{\mu_1}\right)^{t-1} \mu_2}$$

deterioration of their balance sheets, borrowers' risk will rise.¹⁷ This will lower the amount of investment induced by a given rise in income. Hence, even with a monetary system that permits all of *ex ante* investment to be realized, the financing of investment by bank debt can result in lowering the accelerator coefficient which in turn lowers the rate of increase of income. This continues until the accelerator coefficient falls sufficiently to replace the explosive by a cyclical time series, in which there eventually occurs a fall in income. With a fall in income, the excess of *ex ante* saving over induced investment will be utilized to reduce bank debt. Also, the failure of some firms which have relied heavily upon debt financing will result in the substitution of equity for debt in balance sheets. Both changes during the downswing raise the ratio of equity to debt in firms' balance sheets¹⁸ which acts as a

The limit of $\left(\frac{\mu_2}{\mu_1}\right)^t = 0$, therefore the limit of $\left(\frac{Y_{t-1}}{Y_t}\right)_{t \rightarrow \infty}$ is $\frac{1}{\mu_1}$.

Hence $\frac{\lambda(1-\alpha)Y_t}{\beta(Y_t - Y_{t-1})}$ approaches as a limit $\frac{\lambda(1-\alpha)}{\beta\left(1 - \frac{1}{\mu_1}\right)}$.

In the early stages of an explosive accelerator process the ratio of $\frac{Y_{t-1}}{Y_t} > \frac{1}{\mu_1}$. Therefore, the ratio of equity financing to total investment decreases as the accelerator process continues.

¹⁷ M. Kalecki, "The Principle of Increasing Risk," *Economica*, N. S., Nov. 1937, IV, 440-47.

¹⁸ On the downswing (*ex ante S* > *ex ante I*), the balance sheets of the three sectors change as follows:

Banks			
Business Debt	$-(ex\ ante\ S$ $-ex\ ante\ I) = -\Delta M$	Demand Deposits	$-(ex\ ante\ S$ $-ex\ ante\ I) = -\Delta M$
Firms			
Capital Equipment	$+ex\ ante\ I$	Debt and Equities to Households	$+ex\ ante\ S$
		Debt to Banks	$-(ex\ ante\ S$ $-ex\ ante\ I) = -\Delta M$
Households			
Demand Deposits	$-(ex\ ante\ S$ $-ex\ ante\ I) = -\Delta M$	Net Worth	$+ex\ ante\ I$
Business Assets	$+ex\ ante\ S$		

If failures occur in the account of households labeled Business Assets, equities will be substituted for debt and in the account of business firms labeled Debt and Equities to Households, equity will be substituted for debt. Also as business firms fail banks acquire titles and debts which are considered unsuitable for bank portfolios. The sale of such assets to the public results in the substitution of business assets for demand deposits in

stabilizer. The endogenous limits to an explosive accelerator process, in the absence of restrictions on the money supply, are the deterioration of firms' balance sheets due to debt-financing of investment on the upswing; and the reverse circumstances during the liquidation process on the downswing.

Two possible offsetting factors to the increasing debt-equity ratio in the financing of investment during an explosive expansion are an increase in the ratio of *ex ante* saving flowing to equities and the capital gains that accompany an increase in the price level of capital goods. As *ex ante* saving finances a decreasing proportion of total investment during an explosive expansion, a possible increase in the proportion of *ex ante* saving flowing to equities cannot for long prevent a deterioration of the balance sheets of firms. If, however, cumulative price-level inflation is politically permissible a deterioration of firms' balance sheets need not occur. Business firms are borrowers and the real burden of a debt decreases with a rise in the price level. If the assets of business firms are valued at their current replacement costs, then the rising price level raises the equity account. Such capital gains improve the balance sheets of firms and they occur generally in an inflation. The price-level rise plus the flow of *ex ante* saving to equity investment may be sufficient to keep the debt-equity ratio constant, thereby preventing any deterioration in the balance sheets of firms. However, this requires an increasing rate of change in the price level of capital goods.¹⁹ Nevertheless, if an explosive inflation is politically

the public portfolios, and in a net reduction of demand deposits. These changes obviously do not affect the net worth of households and the capital equipment accounts. However, as the value of productive capacity may be reduced during a downturn, the value of the capital equipment account of firms and the net worth account of households may be reduced; the equity liabilities of firm and equity assets of households lose a part or all of their value. This in turn can affect the "subjective" preferences of households and firms so that liquidity preference rises.

¹⁹ In the arithmetic example of Table II, in time-period 3, only .36 of the total new investment was financed by savings. If, in period 3, the price level of capital goods rose so that the value of existing capital goods rose by 2.0, then the ratio of the increase in equity to the increase in assets would be .5. In period 4 only .19 of a larger total investment was financed by savings. For the ratio of the increase in equity to the increase in the value of the assets to be .5, the value of existing capital must rise by 11.4. As total assets in period 4 are presumably only slightly larger than in period 3, this implies that the rate of increase in the price level of capital goods must rise if a constant ratio of equity to total assets is to be maintained. For example:

Period	3	4
Saving, <i>ex ante</i>	26.0	35.0
I realized	72.0	184.0
Δ money	46.0	149.0
Required Δ value of existing capital	20.0	114.0
Δ equity = $S + \Delta$ value	46.0	149.0
Δ assets = I realized + Δ value	92.0	298.0
Ratio of Δ equity to Δ assets	.5	.5

tolerable, there is no endogenous reason why an accelerator process with an infinitely elastic money supply need come to a halt.

Therefore, at least two monetary situations allow full scope to an explosive accelerator process: the Keynesian liquidity trap and an infinitely elastic money supply. It is perhaps no accident that the emphasis upon "real" floors and ceilings as causes of the nonlinearity of the accelerator coefficient occurred at a time when the high volume of government bonds outstanding and their support by central banks made the money supply in fact infinitely elastic. An era of tight money on the other hand naturally leads to an examination of the monetary prerequisites for the operation of the accelerator phenomena.

2. *Money supply increases at a fixed rate.* A monetary system in which the rate of growth of the money supply is exogenously given, for example a fractional reserve banking system based upon a gold standard, is equivalent to an infinitely elastic money supply if the difference between *ex ante* investment and *ex ante* saving does not exceed the per-period growth of the money supply. The only endogenous limitation to expansion in this case comes from the deteriorating balance sheets and liquidity of business firms, as is true with an infinitely elastic money supply. The interesting alternative exists when the difference between induced investment and *ex ante* saving is greater than the rate of growth of the lending ability of banks.

Throughout this section we will assume that at the initial period the banking system does not possess excess liquidity. Hence the available financing is equal to *ex ante* saving plus the possible increase in the money supply. If induced investment is equal to or greater than this, realized investment will be constrained to the available financing. In this case income will grow at the same rate as the money supply.²⁰

(a) *Arithmetic rate of increase in the money supply.* If the money supply increases by a fixed amount per period (constant arithmetic rate of increase), income will grow at this rate until *ex ante* saving increases sufficiently so that induced investment per period becomes less than the available financing. When this happens, the per-period increase in income will fall below what it had been, and therefore induced investment will decrease. The downturn occurs when *ex ante* saving catches up with the expansion process so that all of the investment induced by the constant arithmetic rate of growth of income can be realized without using all of the newly available credit.²¹ (This case is illustrated in Table III.)

²⁰ $\beta(Y_t - Y_{t-1}) > (1-\alpha)Y_t + \Delta M$ and $Y_t = M_t$; so that $Y_{t+1} = \alpha Y_t + (1-\alpha)Y_t + \Delta M$; $Y_{t+1} = Y_t + \Delta M$.

²¹ In an accelerator-multiplier model a necessary condition for $Y_t > Y_{t-1}$ is that $\beta(Y_{t-1} - Y_{t-2}) > (1-\alpha)Y_{t-1}$. We posit an arithmetical increase in the money supply per period of ΔM so

TABLE III.—ARITHMETICALLY INCREASING MONEY SUPPLY
(Constant Velocity—No Interest-Rate Effects)

Time	Accelerator Process $\alpha = .8$ $\beta = 4$					Monetary System +10 per time period
	Y	C	Savings <i>Ex Ante</i>	Investment		Investment Financed by In- creased Money Supply
				Induced $\beta(Y_{t-1}-Y_{t-2})$	Realized	
0	100.0	—	—	—	—	—
1	110.0	80.0	20.0	—	30.	+10.0
2	120.0	88.0	22.0	40	32.	+10.0
3	130.0	96.0	24.0	40	34.	+10.0
4	140.0	104.0	26.0	40	36.	+10.0
5	150.0	112.0	28.0	40	38.	+10.0
6	160.0	120.0	30.0	40	40.	+10.0
7	168.0	128.0	32.0	40	40.	+ 8.0
8	166.4	134.4	33.6	32	32.	- 1.6*

* In time period 7, *ex ante* $S + \Delta M > \text{ex ante } I$; therefore $Y_7 - Y_6 < \Delta M$. As a result, in time period 8 the accelerator expansion is broken.

During the expansion, the demand for financing is always greater than the available supply; the money market constrains investment. When the arithmetic increase in income becomes less than the increase in the money supply financing conditions ease. The resulting decline in the rate of interest may act to increase the inducement to invest (decrease the inducement to disinvest); this possibility is ignored in Table III. Since the banking system finances a decreasing proportion of realized investment during the expansion, the deterioration of the balance sheets of investing firms will be limited during such an expansion.

When income declines, the autonomous increases in the money supply result in an accumulation of excess reserves in the banking system, and *ex ante* saving in excess of induced investment results in a repayment of bank debt by firms. These changes should brake the decline in income.

The accumulation of excess reserves by banks and the improved balance sheets of firms during the downswing implies that if an expan-

that the available financing is $(1-\alpha)Y_{t-1} + \Delta M$: hence if $\beta(Y_{t-1} - Y_{t-2}) \geq (1-\alpha)Y_{t-1} + \Delta M$ then realized investment is $(1-\alpha)Y_{t-1} + \Delta M$. Hence $Y_t = Y_{t-1} + \Delta M$ so that $\beta(Y_t - Y_{t+1}) = \beta\Delta M$ which we once again assume $> (1-\alpha)(Y_{t-1} + \Delta M)$ so that $Y_{t+1} = Y_{t-1} + 2\Delta M$. Eventually $\beta(Y_{t+n} - Y_{t+n-1}) = \beta\Delta M < (1-\alpha)(Y_{t-1} + n\Delta M) + \Delta M$; so that $Y_{t+n+1} < Y_{t+n} + \Delta M$; therefore $\beta(Y_{t+n+1} - Y_{t+n}) < \beta(Y_{t+n} - Y_{t+n-1})$ and the accelerator process turns down.

sion begins it will not at once be constrained by the money-market and balance-sheet effects. If the arithmetic rate of growth of the money supply is small compared to the accumulation of financing ability during the decline in income, a sharp fall in investment will occur at the date that the accumulated financing ability is absorbed, thereby decreasing the per-period increase in income. The smaller increase in income will lead to a fall in induced investment, and a sharp fall in income may occur. A constant arithmetic rate of increase of the money supply in conjunction with an explosive accelerator process will tend to generate a cyclical time series.

(b) *Geometric rate of increase in the money supply.* Consider a money supply that increases at a constant geometric rate, μ_3 . As was noted earlier the solution of an explosive accelerator process can be written as $Y_t = A_1\mu_1^t + A_2\mu_2^t$ with $\mu_1 > \mu_2 > 1$ with A_1 and A_2 depending upon the initial conditions. That is, the rate of growth of income is a weighted average of the two rates of growth μ_1 and μ_2 . If μ_3 , the rate of growth of the money supply, is greater than (or equal to) μ_1 , the greatest rate of growth that income can achieve, the system behaves as if the money supply were infinitely elastic. Hence the cases that have to be examined are when $\mu_1 > \mu_2 > \mu_3 > 1$ and when $\mu_1 > \mu_3 > \mu_2 > 1$.

Take first the case in which $\mu_1 > \mu_2 > \mu_3 > 1$. With no excess liquidity, the maximum attainable rate of growth of income is the rate of growth of the money supply. To sustain this rate of growth, it is necessary that induced investment be equal to or greater than the available financing. When the rate of growth of the money supply, and therefore the rate of growth of income, is less than μ_2 induced investment will not be large enough to absorb the available financing.²² The rate of growth of income will be smaller than the rate of growth of the money supply, and this new smaller rate of growth of income also will not be sustained. These progressively smaller rates of growth of income

²² Assume $M_{t-1} = Y_{t-1}$ and $M_t = Y_t = \mu_3 M_{t-1} = \mu_3 Y_{t-1}$.

$$\beta(\mu_3 - 1)Y_{t-1} - [(1 - \alpha)\mu_3 Y_{t-1} + (\mu_3 - 1)\mu_2 M_{t-1}] \geq 0$$

is necessary for $Y_{t+1} = \mu_3 Y_t$. Therefore $\beta(\mu_3 - 1) - (1 - \alpha)\mu_3 - (\mu_3 - 1)\mu_2 - \epsilon = 0$, so that $\mu_3^2 - (\alpha + \beta)\mu_3 + \beta + \epsilon = 0$. It follows that

$$\mu_3 = \frac{\alpha + \beta \pm \sqrt{(\alpha + \beta)^2 - 4(\beta + \epsilon)}}{2}$$

The relevant root is

$$\mu_3 = \frac{\alpha + \beta - \sqrt{(\alpha + \beta)^2 - 4(\beta + \epsilon)}}{2}$$

and if $\epsilon = 0$ (induced investment is equal to *ex ante* saving plus the increase in the money supply), $\mu_3 = \mu_2$; if $\epsilon > 0$ (induced investment greater than *ex ante* saving plus the increase in the money supply) $\mu_3 > \mu_2$. Therefore a rate of growth of the money supply equal to or greater than the smaller root of the accelerator process is a necessary condition for self-sustained growth.

will in time result in insufficient induced investment to offset *ex ante* saving and at this date income will fall. Therefore, if the rate of growth of the money supply is smaller than the smallest rate of growth that the accelerator process, if unconstrained, would generate, an upper turning point in income will be produced.²³

The argument as to what happens once income turns down for a geometric rate of increase in the money supply is essentially the same as for an arithmetic increase in the money supply. Excess reserves accumulate in the banking system and firms' balance sheets improve during the downward movement. Once a sufficient upward movement again begins, an unconstrained expansion can take place until the excess liquidity is absorbed, at which time the rate of growth of the money supply will again constrain the rate of growth of income. A money supply growing at "too small" a rate will lead to a cyclical rather than a steady-growth time series.

If the rate of growth of the money supply is equal to the smaller root of the accelerator process (*i.e.*, $\mu_3 = \mu_2$), both income and the money supply will grow at this rate. Throughout this process the ratio of *ex ante* saving to bank financing of investment will be constant. If this ratio is consistent with the balance-sheet goals, there is nothing in this process which would lead to a downturn in income. Also this rate of growth of income may be consistent with a fairly stable price level. Steady growth may result from combining an explosive accelerator process and an appropriately increasing money supply.²⁴

Consider now the second case, in which $\mu_1 > \mu_3 > \mu_2 > 1$. In this case the rate of growth of income during any time period will depend upon the weight of the two roots. If the weight of μ_2 is high, then the accelerator process will generate a rate of growth of income less than the rate of growth of the money supply. However, since $\mu_1 > \mu_2$, in time μ_1 will dominate the rate of growth of income so that income will be increasing faster than the money supply. The money supply does not constrain the growth of income until the total growth of income equals

²³ This can be demonstrated by noting that $Y_0 = A_1 + A_2$ and $Y_1 = A_1\mu_1 + A_2\mu_2$ and given that $\mu_1 > \mu_2 > \mu_3 > 0$ and $Y_1 = \mu_3 Y_0$ then $A_1 = Y_0 - A_2$; $\mu_3 Y_0 = (Y_0 - A_2)\mu_1 + A_2\mu_2$ so that

$$\frac{Y_0(\mu_3 - \mu_1)}{\mu_2 - \mu_1} = A_2.$$

As $Y_0 > 0$, $\mu_3 - \mu_1 < 0$ and $\mu_2 - \mu_1 < 0$, $A_2 > 0$.

Also $A_2 = Y_0 - A_1$, $\mu_3 Y_0 = A_1\mu_1 + (Y_0 - A_1)\mu_2$ so that

$$\frac{Y_0(\mu_3 - \mu_2)}{\mu_1 - \mu_2} = A_1.$$

As $Y_0 > 0$, $\mu_3 - \mu_2 < 0$ and $\mu_1 - \mu_2 > 0$, $A_1 < 0$.

A_1 the coefficient of the dominant root μ_1 is negative. As $A_1\mu_1 + A_2\mu_2 > A_1 + A_2$ and $\mu_1 > \mu_2$ it follows that $|A_2| > |A_1|$. However in time $A_1\mu_1^t + A_2\mu_2^t$ will be < 0 , so income must turn down.

²⁴ That is, the Harrod-Domar case of steady growth can be the result of appropriate monetary conditions.

the total growth of the money supply. Whether this case results in steady growth or in a downturn of income depends upon what happens to the accelerator coefficient once the monetary constraint becomes effective.

At the beginning of such an explosive expansion the rate of growth of income is less than the rate of growth of the money supply. At the date when the total growth of income becomes equal to the total growth of the money supply the rate of growth of income will be greater than the rate of growth of the money supply. Therefore at some intermediate date, the rate of growth of income will be the same as the rate of growth of the money supply. This rate of growth of income will induce sufficient investment, at the financing terms and balance sheets ruling, for the rate of growth of income to increase. Therefore if the rate of growth of income is constrained to the rate of growth of the money supply, and the accelerator coefficient does not change, a sufficient amount of investment will be induced to generate a rate of growth of income greater than the rate of growth of the money supply.

However until the increase in income and in the money supply becomes equal, this system operates with excess liquidity. At the date that the excess liquidity is absorbed, the rate of growth of income will be greater than the rate of growth of the money supply so that when the monetary constraint becomes effective two things will occur: the rate of growth of income will fall and financing terms will rise. When financing terms were relatively easy because of excess liquidity a rate of growth of income equal to the rate of growth of the money supply induced sufficient investment to increase the rate of growth of income. However in a suddenly tight money market financing terms may so change that the accelerator coefficient will fall, and this can lead to a fall in income.

Nevertheless, if the money supply is growing at a geometric rate greater than the smaller root of the accelerator process, a constant rate of growth of income may be generated. In this case money income will grow at a faster rate than if the money supply grew at the rate given by the smaller root. Hence such a steady rate of growth of income can be associated with a substantial rate of increase in the price level. In addition, the ratio of bank financing to *ex ante* saving increases as the rate of growth of the money supply increases.

If the accelerator falls as a result of the tightening of the money market, income can turn down. The behavior of the economy with this monetary system on the downturn and on subsequent expansions would be essentially the same as in the previous case where the rate of growth of the money supply was smaller than the smaller root of the accelerator process.

B. Both Velocity and Quantity Change

The earlier consideration of the interaction of an otherwise explosive accelerator-multiplier process with monetary systems in which only changes in velocity and changes in the quantity of money can occur enables us to consider monetary systems in which both quantity and velocity of money can change. We first assume that the quantity of money is changing but that velocity is greater than 1, we then consider the effects of changing velocity. Finally we take up changes in liquidity preference.

1. In the cases where investment in excess of *ex ante* saving is financed by an increase in the quantity of money, we assumed that the income velocity of money was 1. We can now drop this assumption. If income velocity is greater than 1, and if an excess of *ex ante* investment over *ex ante* saving is financed by an increase in the quantity of money, then excess liquidity results. This excess liquidity can be utilized to finance investment.

Assume that the excess liquidity resulting from an investment initially financed by the banks is used to substitute business debt or equities to the public for business debt to banks. If $\Delta M = Y_t - Y_{t-1}$ and $V > 1$, then new transaction cash is

$$\frac{\Delta M}{V}, \text{ and asset cash is } \Delta M - \frac{\Delta M}{V} = \left(1 - \frac{1}{V}\right) \Delta M.$$

After the public purchases business debts or equities, the net increase in debt to banks is

$$\frac{1}{V} (Y_t - Y_{t-1})$$

and investment is $Y_t - \alpha Y_{t-1}$, therefore:

$$\frac{\Delta \text{Bank Debt}}{\Delta \text{Total Assets}} = \frac{\frac{Y_t - Y_{t-1}}{V}}{Y_t - \alpha Y_{t-1}} = \frac{1}{V} \frac{Y_t - Y_{t-1}}{Y_t - \alpha Y_{t-1}}$$

As an explosive accelerator process takes hold, the ratio $\frac{Y_t - Y_{t-1}}{Y_t - \alpha Y_{t-1}}$ rises and the ratio of the change in bank debt to the change in total assets approaches $\frac{1}{V}$. If the public's distribution of *ex ante* saving and

excess liquidity between debt and equity assets is constant during an expansion, the balance sheets of business firms deteriorate. As the weight of bank financing is smaller than in the case of unit velocity,

the deterioration will not be so rapid as in the case in which bank creation of money is the sole technique by which investment in excess of *ex ante* saving can be financed. Therefore, the possibility that the deterioration of firms' balance sheets will lower the accelerator coefficient is smaller.

2. Note that in $\frac{1}{V} \frac{Y_t - Y_{t-1}}{Y_t - \alpha Y_{t-1}}$ a rise in velocity decreases the ratio

of bank financing to the total change in assets and that a rise in the propensity to consume increases the dependence upon bank financing of investment. Therefore, autonomous or cyclically induced changes in these parameters can change the ratio of debt to equity financing, which can change the accelerator coefficient. In particular a rise in velocity tends to counteract the deterioration of firms' balance sheets in a business-cycle expansion financed by bank creation of money.

3. Autonomous or cyclically induced changes in the liquidity preference relation can change the dependence of an expansion upon changes in the money supply and therefore affect the ratio of bank debt to total assets of firms. If liquidity preference decreases, the excess of investment over *ex ante* saving can be financed by withdrawals from cash balances at lower interest rates than were previously ruling. Such an "autonomous" decrease in liquidity preference can, both by improving financing terms and by decreasing the dependence of business firms upon bank financing, raise the accelerator coefficient. A great stock-market boom, such as in the late 1920's, may be interpreted as reflecting a lowering of liquidity preferences; as a result business expansion could be financed with less reliance upon the banking system than otherwise.

Alternatively, an autonomous rise in liquidity preference may lead to the result that business borrowing from banks will increase the liquidity of households rather than finance investment. That is, a portion of business borrowing from banks ends up as "liquid hoards" of households. Such borrowing by business firms in excess of the difference between *ex ante* saving and realized investment will increase the rapidity with which firms' balance sheets deteriorate. An explosive accelerator process may be broken by such changes in liquidity preference.

Such changes in liquidity preference have been labeled autonomous. There exist plausible mechanisms by which the upward movement of an explosive accelerator process would lead to a fall in liquidity preference. However, there do not exist equally plausible mechanisms by which a rise in liquidity preference can be considered as endoge-

nous during an expansion. During a downswing there exists a plausible mechanism which can raise the liquidity preference of households. This can force a deterioration of firms' balance sheets, and thereby, through its effect upon the accelerator coefficient, a further fall in investment. There does not seem to be any endogenous factor which would lead to a fall in liquidity preference on a downswing. Changes in liquidity preference seem to be destabilizing.

IV. *Policy Implications*

Let us assume that the policy goal is steady growth at a stable price level. The policy measures to be used are monetary policy, which in the language of this paper means to choose a monetary system, and fiscal policy. It has been shown that steady growth requires a money supply that increases at a geometric rate: but that a too rapidly growing money supply results in rapid price inflation and that a too slowly growing money supply results in a downturn of income.

The smallest self-sustaining rate of growth of income is equal to the smaller root of the accelerator process, μ_2 . If productive capacity can also grow at this rate, then the policy goal of growth without inflation is attainable. If the rate of growth of income is greater than the maximum possible rate of growth of productive capacity, the policy goal is not attainable. In the latter case, we assume that steady growth accompanied by secular inflation will be chosen in preference to a constant price level and intermittent growth. The policy goal therefore becomes steady growth with a minimum rate of secular inflation.

If the policy-makers prize steady growth and abhor falling income, and if secular inflation is accepted as the price that has to be paid for growth, then the policy-makers would be able to "play it safe" by allowing the actual rate of growth of the money supply to be greater than the minimum self-sustainable rate of growth of income. That is, the policy-makers would accept some unnecessary inflation in order to be on the safe side in maintaining full employment.

For a given consumption coefficient, the greater the rate of growth of the money supply, the greater the ratio of bank debt to debt and equities to households in the balance sheets of firms. Therefore the greater the rate of increase in the money supply, the greater the chance that induced investment will decrease because of the unsatisfactory nature of firms' balance sheets. Two policy measures which can counteract this effect are: (1) an interest rate policy designed to keep velocity greater than one; (2) a fiscal policy designed to increase the money supply without increasing business debt to banks.

It was shown that if income velocity is greater than one and if the money supply is being increased by business borrowing from banks,

the net increase in business borrowing from banks will be smaller than the difference between realized investment and *ex ante* saving. In order to achieve this result bank financing of business must be at a high enough interest rate to keep income velocity greater than one. But the accelerator coefficient also depends upon the interest rate. Thus if the monetary policy designed to keep income velocity greater than one is carried too far the accelerator coefficient will fall and the self-sustained growth will be interrupted.

To keep interest rates at a given level, the central bank must be willing to supply reserves to commercial banks, in response to commercial banks' demands, without limit at a fixed rediscount rate. Therefore the rediscount rate seems the appropriate tool of central bank policy.

Nevertheless if the money supply can increase only by business borrowing from banks, a ratio of debt to equities in business balance sheets can result which will lead to a decline in induced investment. Government deficits financed by borrowing from banks result in an increase in the money supply without any corresponding increase in business debt. If interest rates are such that velocity is greater than one, debts and equities to households will be substituted for debts to banks in the business firms' balance sheets. This is more conducive to steady growth than the situation in which all of the increase in the money supply required for steady growth is created in exchange for business debt. Therefore government deficit financing, even during a period of sustained growth and secularly rising prices, may be desirable in order to maintain the conditions for further growth.

BOARD OF GOVERNORS
OF THE FEDERAL RESERVE SYSTEM,
Washington, D.C., March 20, 1959.

Hon. PAUL H. DOUGLAS,
*Chairman, Joint Economic Committee, Congress of the United States,
Washington, D.C.*

DEAR MR. CHAIRMAN: Attached is a memorandum of reply to questions asked of Chairman Martin by you and by Congressman Patman at the hearings before your committee on February 6, 1959.

I trust you will find these replies responsive and of interest to the committee.
Sincerely yours,

C. CANBY BALDERSTON, *Vice Chairman.*

REPLIES TO QUESTIONS BY SENATOR DOUGLAS AND CONGRESSMAN PATMAN AT JOINT
ECONOMIC COMMITTEE HEARINGS FEBRUARY 6, 1959

Question by Senator Douglas: Would it not be preferable, in implementing monetary and credit policy, for the Federal Reserve to rely on open-market operations to achieve restraint or ease, but refrain from changing discount rates? In these circumstances interest rates generally would not rise, or not rise as much, in periods of credit restraint. When there is considerable unemployment and excess capacity, would you agree that this result would be desirable, since higher interest rates would tend to "hold back full recovery?"

Answer: As an instrument of credit policy the discount rate is one aspect of the discount operation as a whole, which functions as a complement to the open market instrument. In a period of rising business activity, demands for bank credit may rise to such an extent that banks are unable to meet these demands on the basis of their existing reserves. There are essentially two ways in which banks can obtain additional reserves; the Federal Reserve System can, on its own initiative, supply reserves by purchase of Government securities in the open market; alternatively, banks can on their own initiative increase their reserves by borrowing at Federal Reserve banks.

When credit demands are in such strength as would promote growth in credit and money in excess of the expansion of goods and services available for purchase, the Federal Reserve, in the interest of economic stability, tempers the amount of reserves available to meet such demands. When the Federal Reserve does not furnish on its initiative all of the reserves sought by banks in circumstances of very active credit demands from private sources credit conditions in the economy as a whole tend to tighten. Individual banks, finding that their available reserve funds are not adequate to permit them to meet all credit demands, may react to the situation either by selling or running off liquid assets, or by borrowing from their Federal Reserve bank. In either event, one effect is likely to be a rise in market interest rates.

Which method a particular bank uses to adjust its position will depend on a number of factors, including the kinds and amounts of securities or other openmarket paper in its portfolio, its earning rate on these securities, and the rate it must pay on borrowings at the discount window. Banks are generally reluctant to become indebted to the Federal Reserve except for very short periods, and when in debt feel constrained to liquidate assets. The deterrents to borrowing are greatly weakened if market yields on securities owned become and remain substantially higher than the discount rate. In these conditions, banks may even be induced to borrow for profit, a development which renders difficult effective administration of the discount window.

Federal Reserve banks, in acting on member bank requests for credit, must therefore weigh each request in the light of the needs of the individual bank, the uses to which reserves are being put, and the general character and rate of credit expansion in the economy. While banks may expect that requests based on temporary needs resulting from reserve shifts beyond their individual control will be met, it is recognized that borrowing at the Federal Reserve is a privilege, not a right. Continued borrowing under circumstances pointing to unhealthy or unsound expansion of credit will be discouraged.

Federal Reserve Regulation A, revised in February 1955, sets forth the following guiding principles applicable to member bank borrowing:

"Federal Reserve credit is generally extended on a short-term basis to a member bank in order to enable it to adjust its asset position when necessary because of developments such as a sudden withdrawal of deposits or seasonal requirements for credit beyond those which can reasonably be met by use of the

bank's own resources. Federal Reserve credit is also available for longer periods when necessary in order to assist member banks in meeting unusual situations, such as may result from national, regional, or local difficulties or from exceptional circumstances involving only particular member banks. Under ordinary conditions the continuous use of Federal Reserve credit by a member bank over a considerable period of time is not regarded as appropriate."

In applying these principles it is of prime importance that the general reluctance of banks to borrow at the Federal Reserve be reinforced by a discount rate with real deterrent power at times when a tempering of bank credit growth is in the public interest. In other words, in order to make the discount mechanism an effective supplement to open market operations the Federal Reserve is obliged to maintain discount rates not markedly lower than market yields on the most readily available alternative source of bank reserves, Treasury bills. If the Federal Reserve in these circumstances did not adjust its discount rates to keep them "in touch" with market rates, the task of administering the discount window to prevent excessive credit expansion would become very difficult. In the absence of a rate deterrent to borrowing, Federal Reserve bank officers would be without workable guidelines in acting on a great number of borrowing requests from banks, many of whom would be in the position of profiting directly from the relatively low rate on borrowings.

The need for frequent reappraisal of the discount rate in order to maintain the effectiveness of the discount operation as a credit instrument is recognized in the Federal Reserve Act itself. Section 14(d) of the act empowers each Federal Reserve bank

"To establish from time to time, subject to review and determination of the Board of Governors of the Federal Reserve System, rates of discount to be charged by the Federal Reserve bank for each class of paper, which shall be fixed with a view of accommodating commerce and business; *but each such bank shall establish such rates every 14 days, or oftener if deemed necessary by the Board.*" [Italic added.]

At times conditions are such that market rates and discount rates vary from each other for extended periods. When credit demands are relatively light and banks have abundant reserves with negligible borrowings, short-term market rates are likely to fall well below the discount rate. This occurred in 1954 and also in 1958.

There have been other times when market rates have remained above the discount rate for a considerable period and have been little affected by changes in the discount rate. For example, last year the market yield on 90-day Treasury bills rose sharply from below 1 percent in July to around 2¼ percent by early October, while discount rates were raised from 1¾ percent to 2 percent in August and September, as shown on the attached chart. Since early October the yield on 90-day Treasury bills has fluctuated generally within a narrow range—between 2% and 3 percent, while discount rates were raised in late October to 2½ percent and in early March to 3 percent—a total increase of 1 percentage point. Rates on longer term securities likewise rose sharply in the summer and early fall and have shown little further change since early October. In this period member bank borrowings have averaged close to \$500 million, a much smaller amount than prevailed in other recent years when market interest rates were around present levels. The recent period provides an excellent illustration of the fact that market rates are strongly influenced by other factors than Federal Reserve policies.

Rising market rates of interest almost inevitably follow along with rising business activity because expansion of credit demands are an essential accompaniment of such a rise. The discount rate is essentially a technical rate, relating to the availability of borrowed reserve funds for banks. It is not a rate at which public and private borrowers in the market can avail themselves of funds.

In periods of active credit demands, market rates will generally array themselves in closer relationship to the discount rate, because banks are always in a position to supplement their lending capacity by borrowing at the Federal Reserve. It is to keep this source of supplementary lending power under continuous and effective regulation that the Federal Reserve must rely on flexible adjustment of the discount rate to changing market and economic conditions. In any case, if the discount rate were not used for this purpose but access to the discount window were limited by instruction, a similar impact on market

rates of interest would occur, as individual banks sold Treasury bills or other securities to acquire the reserves denied through the discount window. Conceivably, the shortrun impact on market rates would be greater.

Question by Mr. Patman: What is the effect of the Federal funds market on the Federal Reserve discount operation? Are not banks using this market really bypassing the Federal Reserve?

Answer: The existence of the Federal funds market, a loosely organized market in which banks having excess reserves lend these balances to other banks, usually for 1 day, enables many banks to manage their reserve positions to a closer degree of tolerance than would otherwise be possible. The net result may be that the banking system has fewer pockets of excess reserves, and perhaps also a smaller total volume of reserves. Another way of saying the same thing is that shortrun reserve shifts through the Federal funds market result in more nearly optimum use by the banking system of the existing reserve base, with less use of Reserve Bank credit.

From the standpoint of the individual bank, borrowing reserves in the Federal funds market as a way to adjust to a reserve deficiency adds a liability to its balance sheet. In this respect Federal funds borrowing is similar to borrowing from the Federal Reserve. In either case, adjustment by borrowing is a temporary expedient; if the need for reserves continues, the bank will be obliged to reduce its holdings of securities or curtail its lending activities to bring its reserve position into balance.

While an individual bank which borrows Federal funds may thus avoid borrowing at a Federal Reserve bank, it does not necessarily follow that the existence of the Federal funds market materially impedes Federal Reserve discount policy. In the first place, participation in the Federal funds market is confined to a relatively small number of banks, most of them the larger banks in financial centers. In the second place, transactions through the Federal funds market do not alter the total supply of reserves available to the banking system, which can be influenced by Federal Reserve policy actions. The supply of funds in the market is closely related to the general state of reserve availability for the banking system. When reserve availability is tight, interest rates in the Federal funds markets will tend to rise to, or close to, the discount rate. With the supply of reserve funds limited at such times, the discount mechanism, including the discount rate, can perform effectively its function of supplementing the open market instrument in regulating the volume of money and credit so that it is kept in alinement with the needs of the economy at a stable level of prices.

Question by Mr. Patman: Have not interbank deposits increased rapidly, approaching the same level that existed prior to the passage of the Federal Reserve Act when too much money was concentrated in too few banks?

Answer: Prior to the establishment of the Federal Reserve System, banks kept substantial portions of their cash liquidity reserves in the form of deposits at other banks. Under today's conditions, however, the first line of reserves of member banks is maintained in the form of legal reserves on deposit at Federal Reserve banks. Under these circumstances, banks now maintain balances at other banks primarily as a part of correspondent relationships—for liquidity purposes, to facilitate check clearance, and to obtain a variety of services and advice.

The total of interbank balances increased substantially between 1939 and 1945, as the table shows. There has again been some growth in the last year or so, but total interbank balances held at member banks were only \$600 million higher in 1958 than in 1945. New York banks actually held fewer deposits due to domestic banks in 1958 than in 1945, although they continued to hold substantial deposits for foreign banks. Moreover, as would be expected, a substantial portion of total interbank balances held by member banks represented the approximately \$4 billion which nonmember banks keep on deposit—an amount which in large part represents the legal and working reserves of nonmember banks.

The growth of member bank interbank deposits for the period shown is of diminished significance when compared to the large growth in the total of demand deposits of all banks. Interbank deposits at member banks, which represented 27 percent of total demand deposits of all banks in 1939, declined by 1945 to 16 percent, and in recent years have remained at about 11 percent.

Selected data on interbank demand deposits and total demand deposits, 1939-58

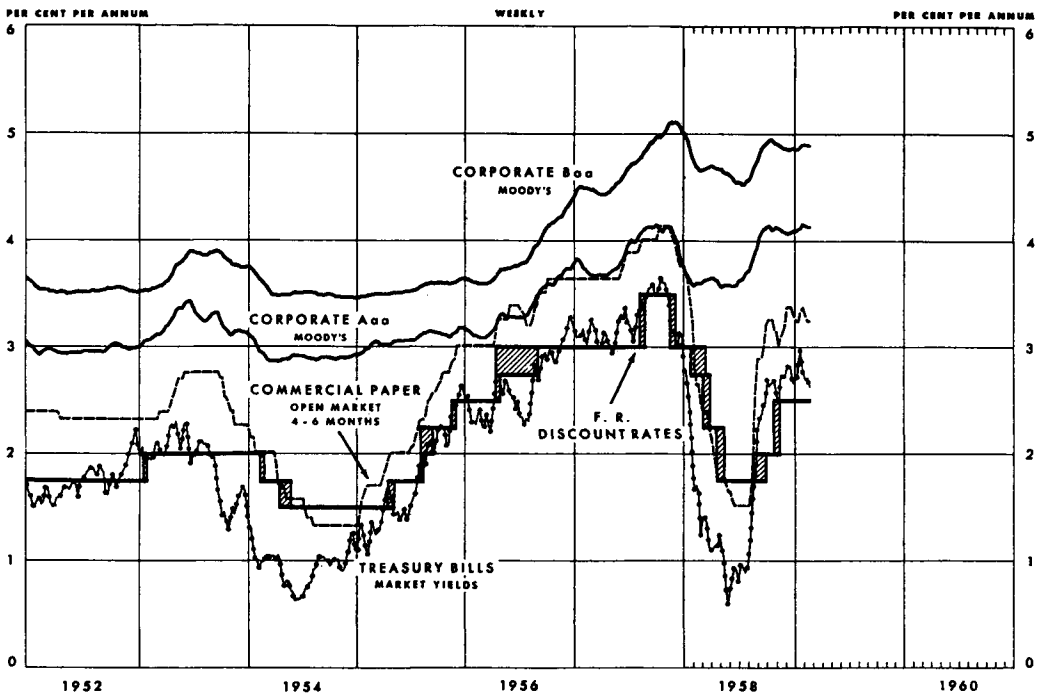
[Millions of dollars]

Year (June call date)	Demand deposits of domestic banks held by member banks					Nonmember banks—balances due from domestic banks	All commercial banks—demand deposits adjusted ¹	Percent of member bank interbank deposits to total demand deposits
	New York	Chicago	Reserve city	Country	All member banks			
1939.....	2,992	746	2,920	439	7,097	(²)	27,355	25.9
1945.....	3,271	1,174	5,510	1,108	11,064	(²)	69,053	16.0
1946.....	3,127	1,047	5,220	997	10,391	(²)	79,476	13.1
1947.....	2,898	1,056	4,773	885	9,612	(²)	82,186	11.7
1948.....	2,830	1,055	4,751	798	9,433	3,163	82,697	11.4
1949.....	2,680	962	4,460	762	8,864	3,037	81,877	10.8
1950.....	2,692	977	4,848	850	9,368	3,214	85,040	11.0
1951.....	2,744	1,006	4,996	913	9,659	3,394	88,960	10.9
1952.....	3,193	1,136	5,624	1,060	11,013	3,833	94,754	11.6
1953.....	2,979	1,175	5,744	1,049	10,947	3,843	96,898	11.3
1954.....	3,237	1,287	6,220	1,212	11,956	3,958	98,132	12.2
1955.....	3,129	1,125	5,979	1,249	11,482	3,811	103,234	11.1
1956.....	3,080	1,149	6,078	1,321	11,627	4,000	104,744	11.1
1957.....	2,775	1,133	5,648	1,243	10,799	3,816	105,706	10.2
1958.....	3,084	1,211	6,115	1,267	11,676	3,964	106,169	11.0

¹ Excludes interbank and U.S. Government deposits and collection items; data are partly estimated prior to 1947.

² Beginning with Dec. 31, 1947, the all-bank series was revised; previous data not strictly comparable.

MONEY RATES



Latest Figures Plotted: FEBRUARY 20

IMAGE BY KINDNESS OF THE FEDERAL RESERVE SYSTEM

HARVARD UNIVERSITY

GRADUATE SCHOOL OF PUBLIC ADMINISTRATION

Cambridge, Mass.

INFLATIONARY PRESSURES, 1955-57; A NEGLECTED FACTOR

What was the primary cause of the fairly sharp rise in prices from 1954 to 1957?

As always, there were of course many interrelated factors, but the primary cause has, I feel, been overlooked by almost everybody, and especially by the administration and the officials of the Federal Reserve.

The evidence seems to me overwhelmingly clear that the inflationary pressures were caused mainly by an excessive splurge of investment in plant and equipment. This indeed has been the main cause of inflationary pressures in boom periods throughout our history. Yet there is no case in history, I believe, in which the increase from an already high base was so large as from 1954 to 1957. The increase was 39.3 percent (p. 149, President's report, January 1959). And the outlays in plant and equipment were already in 1954 at the near record high of \$29.5 billion, which was \$1.4 billion above 1952 and only \$0.7 billion below 1953, the two previous peak years.

Now what was the result? As shown in the charts on pages 11 and 19 in the President's January 1959 report, the prices of producers' finished goods (p. 11) rose 22 percent, and the prices of producers' equipment (p. 19) by a similar amount. In the same period the prices of metals and metal products (p. 181) rose 18.1 percent, the prices of machinery and motive products (p. 181) 17.3 percent, while construction and factory building costs (p. 11) rose 15 percent. In the meantime general wholesale prices rose only 7 percent. It appears to be quite clear that the heavy inflationary pressures struck in the area of plant and equipment in consequence of the extraordinary increase in investment.

For further evidence note the table on page 97 of the President's 1959 report, where a comparison is made between price increases from 1953 to 1957 in the United States and selected European countries. In the United States prices rose less than in Western Europe except in the case of producers' durable equipment. In this country the price increase for producers' equipment was 17 percent; in the European countries the average figure was only 8 percent. On the other hand, the Consumer Price Index increased only 5 percent in the United States, while the average increase for the European countries was 12 percent.

The effect of this burst of investment in the United States was a rapidly developing excess of manufacturing capacity. This is strikingly disclosed in the President's 1959 Economic Report (p. 11). Yet all through this period Secretary Humphrey was calling for more and more investment and urging tax measures to stimulate it. That we in fact borrowed from the future is now clear. Secretary Humphrey had never learned the lesson that investment in excess of the requirements of growth and technological progress will drive the marginal productivity of capital down to a point where investment outlays dry up, as indeed was the case in 1958.

The recovery of 1955-57 was far too narrowly based, and this spelled its own doom. A more balanced recovery would have given us a sustainable relation of manufacturing capacity to the demand for consumers goods and services.

We do indeed urgently need to accelerate the growth of our economy. But this cannot be achieved simply by piling up excess capacity. What is needed is to step up technological research, thereby opening up new investment opportunities. Excess capacity spells stagnation (such as we are just now witnessing); new investment opportunities, on the other hand, open the doors to growth and expansion.

To be sure, if an authoritarian government had held wages rigidly constant in the face of the excessive burst of investment, the inflationary pressure would rapidly have evaporated. Wage increases in 1955-57 reenforced the rising price trend. Yet it is to be noted that hourly earnings in durable manufacturing increased only 15 percent while hourly earnings in building construction increased 14 percent (p. 167, President's 1959 report). This is less than the increase in prices in the capital goods industries disclosed above.

It should also be noted that in the entire calendar years 1955-57, the Federal budget had a surplus averaging \$4.5 billion per year (p. 220, President's January

1959 report). It was the spurt in outlays on plant and equipment, not the Federal budget, that was feeding the inflationary pressures.

With respect to consumer prices, which rose only 5 percent from 1954 to 1957, it is quite obvious (as indeed is correctly noted in p. 18 in the President's 1959 report) that this increase was "not closely related to the immediate business situation." The prices of services including rent were making a "delayed adjustment to earlier increases in prices and costs." Note especially the chart on page 17 in the President's 1959 report.

These I think are matters of the greatest importance. So long as we continue incorrectly to appraise the forces causing the price increases of 1955-57 we shall continue to pursue erroneous policies. This applies, of course, particularly to the current debate on the budget.

ALVIN H. HANSEN.

DEBT MANAGEMENT, 1959

Last week the Treasury undertook a major financing operation involving \$14,900 million of maturing certificates and notes. Holders of the maturing securities refused to accept the new securities offered to the tune of over \$2 billion.

It is, I believe, generally agreed that this unfortunate result was mainly due to the failure of the Treasury to tailor its issues to the needs of the market. Holders of the maturing issues, notably corporations, wanted shorter-term securities than those offered by the Treasury. Yet this event was seized upon by both Treasury officials and Mr. Martin as further evidence supporting the alleged urgency of a balanced budget.

This raises a very fundamental issue with respect to Treasury and Federal Reserve policy.

In the first instance, the Treasury should pay much closer attention to the requirements of the market. Instead, the Treasury is inclined to push long-term issues regardless of market needs. Still at best it is likely to make mistakes. What then?

The Federal Reserve should stand ready to underwrite Treasury offerings, taking up whatever the market refuses to absorb. This ought to be accepted without argument as one of the primary functions of a central bank. Yet our Federal Reserve System, under Mr. Martin's leadership, has backed away from this obligation.

During the peculiarly difficult period through which we are passing, it might indeed prove to be a very good thing for the Federal Reserve to take over a much larger proportion of the public debt than it now holds. Any undue expansionist effect from such purchases of U.S. Government securities could easily be offset by raising reserve requirements. Larger holdings by the Federal Reserve would: (a) reduce the net interest charges (since excess profits of the Reserve banks flow back to the Treasury), (b) strengthen the position of the Treasury and greatly ease the task of debt management.

These are times when conventional methods are quite inadequate. It is shocking to hear high administration officials declare that we cannot afford adequate defense, education, housing, urban renewal, etc. And now we have the added argument that retrenchment is necessary because the Treasury is unable to manage the public debt. It is unable to manage only because the Treasury and the Federal Reserve, under present leadership, have reverted to obsolete thinking and policies. Instead of giving us a vigorous, positive leadership, they are spreading a fear psychology throughout the country by alarmist talk about inflation. We need a Marriner Eccles back on the job.

ALVIN H. HANSEN.

Representative PATMAN. I would like to ask you, Professor, about your statement advocating the elimination of reserve requirements?

Mr. SELDEN. No, variations in reserve requirements.

Representative PATMAN. You mean to make it all the same, just like time deposits, a 5 percent reserve, and make it across the board?

Mr. SELDEN. I am referring to existing legislation.

The Federal Reserve Act permits the Board of Governors to set the level of reserve requirements, depending upon the class of bank.

In the case of the larger size, the central reserve city banks of New York and Chicago, the Federal Reserve Board can set it between 13 and 26 percent. I advocate elimination of that discretionary power to vary reserve requirements.

Representative PATMAN. Do you consider inflation a threat now?

Mr. SELDEN. Yes. I have not studied it in great detail, but I think the statistics which have been becoming available in the last month or two are a little bit disquieting with respect to the rate of increase of the stock of money. It seems to me it has been unusually rapid. I think this is a worry.

However, I must add that I do not think we are under threat of any rapid or sudden increase in prices.

Representative PATMAN. How do you reconcile the position of the Federal Reserve current recommendation that their powers to deal with inflation be, in effect, weakened?

They are recommending that the central reserve city banks that now have a minimum reserve requirement of 13 and a maximum of 26 have a reduction from 26 to 20. How can anyone who believes that inflation is a threat believe also that we should weaken the power of the Federal Reserve to cope with inflation in that manner?

Mr. SELDEN. I would simply state that I feel that the Board of Governors has very strong powers through its Federal Open Market Committee, via open market purchases of Government securities. It seems to me that is the most sensible method.

Representative PATMAN. That would make more inflation.

I am talking about dealing with inflation, fighting the inflation.

Mr. SELDEN. Representative Patman, I am talking about sales of such securities as well as purchases. These work in either direction.

Representative PATMAN. I am talking about fighting inflation. You cannot fight inflation by buying Government bonds.

Mr. SELDEN. No, but by selling them you can.

Representative PATMAN. They claim that inflation is a great threat. If it is a great threat, why should they seek to weaken their powers to fight it, by reducing the maximum reserve requirement from 26 to 20?

It has been higher than 20 percent, I believe, most of the time since 1937 when the Federal Reserve Board doubled the reserve requirements of the banks. It was raised to 26 percent in 1937; again in 1941; and again in 1948. It was above 20 percent from 1936 until 1954. Only in the past 2 years has it been below 20 percent, now proposed as a maximum.

Over that long period of time, they needed the power to have more reserve requirements than 20 percent. Yet they come in now and ask that their weapon be weakened to fight inflation to where they cannot possibly impose reserves exceeding 20 percent.

Mr. SELDEN. I believe at the moment there is no difference in the required reserve ratio between central reserve and reserve of city banks.

Representative PATMAN. Yes; there is.

Mr. SELDEN. There is in the law, but is there in fact? Could someone check that?

Representative PATMAN. I can check it for you. It is 18 percent in the central Reserve cities and 16½ in the Reserve city banks.

Mr. SELDEN. The reduction of the statutory power to vary reserve requirements from a maximum of 26 percent to a maximum of only 20 percent would leave unaffected the actual reserve position of the central reserve city banks as they now stand since they are below the 20 percent maximum they are requesting.

Representative PATMAN. The reserve requirement is now 16½ percent, and central reserve city banks 18 percent, and the country banks are 11 percent, and all commercial banks 5 percent on time deposits.

Mr. SELDEN. Yes, sir.

Representative PATMAN. You made a statement awhile ago about liquidity, indicating that you were not concerned about that.

Do you believe that if Federal Deposit Insurance Corporation were to fail to have sufficient assets to meet the demands upon it, that it would be a moral obligation of Government to support it?

Mr. SELDEN. I think the first line of defense that the Government could take in any future crisis which might lead to the circumstances you are suggesting is to pursue central banking policy, Federal Reserve policies, of a sort which would obviate need for that.

Representative PATMAN. That is off on a somewhat different subject. I say that respectfully. I am just asking you a simple question: Do you consider it a moral obligation?

Mr. SELDEN. Yes, sir.

Representative PATMAN. If you want to qualify that, will you do it in the record? Time is of the essence now and I want to get through here.

Mr. SELDEN. Yes, sir.

Representative PATMAN. On the value of our dollar going down, I want to invite your attention to the fact, Professor, that the dollar that bought interest at short-term on Government securities in 1945, 1946, and 1947, we will say, is worth 10 cents today because the rate of interest for that purpose has gone up 10 times. So we have a 10-cent dollar for the purpose of paying interest on short-term obligations compared to 1945.

Do you see any evils occurring in our economy by reason of the continuing increase in interest rates over the years?

Mr. SELDEN. It is hard to say yes or no. In general, I am not greatly concerned about it.

Representative PATMAN. It enters into the cost of production and everything else, though.

Mr. SELDEN. When we look at the present level of interest rates compared to the levels that prevailed in the 1920's, we still have some distance to go. I feel that the low rates that we experienced earlier in the postwar years and during the war were essentially abnormal in the sense that they were depression-bred.

Representative PATMAN. I am sorry but we just have word of a quorum call in the House and we will have to leave, and I want Mr. Curtis to ask any questions he desires to ask.

Representative CURTIS. In order to save time, I will give the questions and Mr. Selden may supply the answers.

One was the question raised in answer to your question on the inflationary threat. I pose the question:

What would happen, in your judgment, if we have to market another \$3 or \$4 billion of Federal debt, for deficit financing, on top of the \$13 billion deficit financing in the fiscal year just ending?

I would like to get your judgment as to what impact you think that would have.

The other question reverts back to the line of questioning I pursued previously.

(The following was subsequently received for the record:)

RESPONSES BY PROF. RICHARD T. SELDEN TO QUESTIONS BY REPRESENTATIVE CURTIS
ASKED DURING HEARING, MAY 26, 1959

1. The marketing of another \$3 or \$4 billion of Federal debt at this time in my judgment would have no major effects on the economy. In this regard one must distinguish between the effects of additional Government expenditures, which at the time of expanding business activity such as the present would clearly be inflationary, and the effects of the related bond sales. If as a result of the additional debt the Federal Reserve System permits the volume of bank reserves to expand, this will mean an expansion in the stock of money with further inflationary implications. However, I see no reason why the Treasury would not be able to sell another 3 or 4 billions of debt without monetary expansion, provided it were willing and legally able to compete for long-term funds against private borrowers. The difficulty here is the statutory limitation on interest rates which the Treasury may offer on new debt. In my opinion this limitation should be abolished by Congress.

2. With respect to the effect on velocity of the increasing reliance on debt financing in preference to equity financing, one would have to consider two possible effects. On the one hand there is the effect on the velocities of the firms that engage in debt financing, and on the other there is the effect on the purchasers of securities. The influence of debt on business velocity has probably been to depress it somewhat. As compared with equity financing debt creates a contractual obligation by the firm to make certain payments at particular points in time, and these payments will lead to periodic cash accumulations in the firm. How important this effect on business velocity is I cannot say.

The influence of debt on lenders is just the reverse, however. Debt instruments, particularly those with short maturities, are closer substitutes for money than equities are. It seems likely, therefore, that creditors maintain higher velocity ratios than shareholders, other things being equal.

Taking both effects into account, in my judgment the increased reliance on debt financing has contributed, on net, to the postwar velocity rise.

Representative CURTIS. You mentioned the fact that the velocity has risen much more rapidly for large corporations than any other size class. I was wondering what you thought the effect of the amount of corporate financing that has been done through debt as opposed to equity financing might have on increased velocity. I am premising that on the assumption that the ratio of equity financing to debt financing of corporations has declined, particularly since World War II.

If it has, in my judgment it is largely as a result of our tax structure. If that premise is true, I would like to know whether you think that has had an increase on velocity.

I noted also your remarks in reply to Senator Javits' question. You may give a yes or no answer to this. You do feel, do you not, that there is relatively greater upward flexibility of wages and prices as compared with downward flexibility?

Mr. SELDEN. Yes, sir.

Representative CURTIS. But you do not feel that has been a major factor, as I understand it.

Mr. SELDEN. That is right.

Representative CURTIS. Do you feel that evidence seems to be now available indicating unions have added much to the downward price rigidities, or is that out of your field?

Mr. SELDEN. It is somewhat out of my field, but in talking to others I gather that the increase in unionization has not had any great effect in this regard. Wage rates are typically rigid in a downward direction in all economies that we know anything about, whether unionized or not.

Representative CURTIS. Thank you very much.

Representative PATMAN. Tomorrow, May 27, in the old Court Chamber of the Senate wing of the Capitol, we will have our hearing at 10 o'clock. Prof. Robert Eisener will be our witness. He is from Northwestern University.

We want to thank you very kindly, Professor, for your appearance. I know you have been very helpful to us. We will carefully consider everything you have said and everything you have written which we have inserted in the record.

The committee will stand in recess until tomorrow morning at 10 o'clock.

(Thereupon, at 12:15 p.m., the committee recessed, to reconvene at 10 a.m., Wednesday, May 27, 1959.)

EMPLOYMENT, GROWTH, AND PRICE LEVELS

WEDNESDAY, MAY 27, 1959

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Joint Economic Committee met at 10 a.m., pursuant to recess, in the Old Supreme Court Room, the Capitol, Senator Paul H. Douglas, chairman, presiding.

Present: Senators Douglas, Bush, and Javits; Representatives Patman and Curtis.

The CHAIRMAN. The committee will come to order.

We are very happy indeed to welcome Professor Eisner of Northwestern University, who is going to read a paper on the Income-Expenditure Approach to the Analysis of Money Relationships.

Mr. Eisner.

STATEMENT OF ROBERT EISNER, PROFESSOR, NORTHWESTERN UNIVERSITY

Mr. EISNER. I am very happy to be here, Mr. Chairman.

I have a lengthy paper, and some associated documents for the record. I do not think it would be appropriate to try to read all of that here this morning. I should like, therefore, to read parts and summarize parts and make use of some material I have put on the blackboard, which perhaps we can find a way eventually to get into the record.

The CHAIRMAN. I will have this copied and put in the record.

(The material referred to follows:)

CHARTS

Chart A

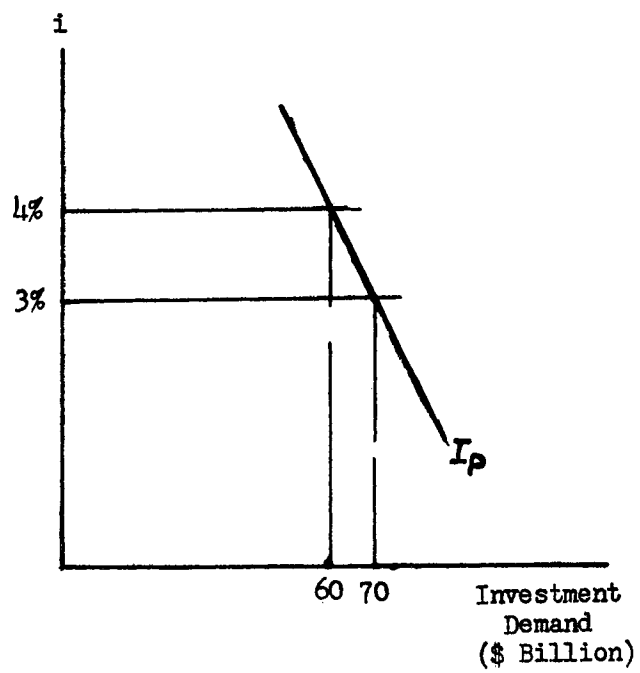


Chart B

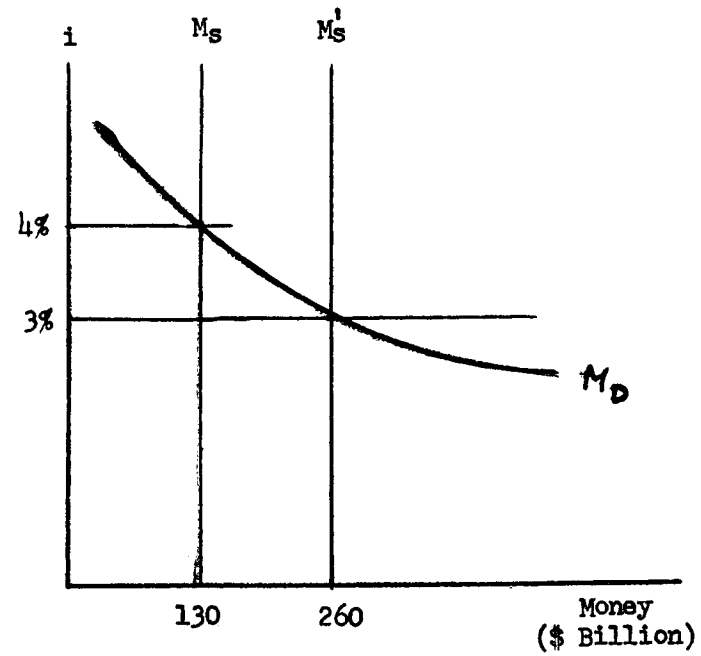


CHART C

Year	Y (output)	K (capital)	Id (investment demand)
0.....	400	1, 200	-----
1.....	420	1, 260	60
0.....	400	1, 200	-----
1.....	406%	1, 220	20
0.....	460	1, 350	-----
1.....	475%	1, 426	46

CHART D

	Full em- ployment	90 percent employ- ment
Productive capacity (P).....	100	100
Output (Y).....	100	90
Saving ÷ output ($\frac{S}{Y}$).....	.10	.05
Investments (equals saving) (I, which equals S).....	10	4.5
Change in productive capacity ($0.4 \times I$).....	4	1.8

Mr. EISNER. In some economies production is undertaken according to plan or governmental directive. In a profit oriented, market economy, production is for sales. If businessmen or other producers expect to be able to sell what they produce at a price which warrants production, they produce; otherwise they do not.

Thus in our economic system there are two relations which can be said to determine jointly the rate and prices of output. One of these relations we call the supply function. This in turn is based upon the production function and the terms under which the owners of productive factors are willing to sell the services of these factors. The other we call the demand function, what businessmen may expect to be spent on what they might produce. The income expenditure approach suggests nothing more nor less than that, once we specify the technological conditions of production and the terms under which people wish to work, the amount that is actually produced, the number of people employed in production, and the prices at which goods are sold depend upon what people are willing to spend.

This simple, intuitively plausible notion, that production and prices are determined in the short run (when technological conditions are fixed) by demand, by what people spend, is the framework of the economic analysis that has oriented leading economists for the past quarter century. Within this framework economists have by and large challenged older views and have developed policy implications suggesting the advisability, if not the necessity, of an increased role for government in an otherwise free economy. I shall attempt, in the pages which follow, both to present this framework in some detail and to indicate certain implications of its use.

1. The historical setting and the clash of ideas.

We should observe that throughout history man has known varying degrees of economic misery.

In the past, this misery has been associated with how much people could produce. When nature did evil work, when there were droughts or pestilences, production was down. The rather unique characteristic

of the modern world is that, with tremendous industrial progress, we have developed a situation where, no matter what we can produce, we frequently find ourselves lacking, because we do not use all of our capacity to produce.

Now, classical economists in large part ignored this problem. They argued that in general supply creates its own demand, and there is nothing to concern oneself about demand. The only reason for depressions or unemployment is some kind of a temporary disequilibrium, perhaps some mistake of governmental monetary policy, which presumably could be cured in time.

With chronic unemployment in England after World War I and with the long, deep, almost worldwide depression of the 1930's, traditional economics fairly cried for revision. This revision, while ultimately the work of many minds, was inspired and laid out in its essential form by the late John Maynard Keynes in *The General Theory of Employment, Interest and Money*.

The essential classical proposition challenged by Keynes was the tenet that full employment was necessarily the natural state of a competitive economy. Unemployment, Keynes argued, might for long periods of time be endemic to the system and there would then be nothing that any individuals, whether workers or businessmen, could do by themselves to eliminate it. Further, Keynes declared, the mass unemployment of his time could in no reasonable sense be considered voluntary, as some economists argued on the alleged ground that workers could not get work only because they demanded wages higher than employers could afford to pay. While not denying that workers tended to resist money wage cuts in time of unemployment (although indeed such resistance was only partially successful), Keynes insisted that a fall in money wages was entirely unlikely to increase employment. The error in the classical reasoning might indeed be explained as an illustration of the logical fallacy of composition: the invalid inference that something true of the individual or the part is necessarily true of the aggregate or the whole. It might well be true that an individual employer would find himself able to hire more workers if he could pay lower wages. For then he might be able to charge lower prices for his product and sell more. However, if all wages were to be lower, throughout the economy, all prices would be lower and each individual businessman would lose the competitive advantage he expects to have when he thinks of cutting his prices with everything else, the income of his buyers as well as the prices of other sellers, remaining the same.

To analyze the effects of a wage change, or any other aspect of the problems of employment and income, a new set of analytical tools was necessary, a set appropriate for explaining the economy as a whole. This set of tools, fashioned in large part by Keynes but explained and sharpened by a whole generation of economists since, I shall now attempt to present in fairly elementary form. I shall supplement this presentation with a somewhat more technical note bearing particularly on the role of money, and with two previously published professional papers relating these tools to economic growth.

We might now turn in the paper to table 1 (see p. 796). And we have here in schematic form the essential elements or outline of the income-expenditure approach. What we indicate is that any hypo-

thetical or possible level of employment, in order for the producers or businessmen of the economy to undertake it, must involve an expectation of proceeds, of receipts, if you wish, which would be such as to justify this employment.

By looking at the first two columns, we can quickly get a notion of what they mean. If 70 million people were to be employed—I might add that these figures are hypothetical, but, as you can see, they are reasonably close to the figures that would apply to the economy as we know it in the country today—if employment were to be 70 million, it might be argued that the supply of goods forthcoming in a year would be about \$460 billion. That means that in order for producers to employ 70 million people, they would have to expect receipts or proceeds of \$460 billion. If they did not, there would be no point to their hiring 70 million people, because they would find that they could not sell all of the goods that they could produce.

On the other hand, if they were to employ 65 million people, they would have to expect receipts of \$430 billion. Of course, the more people that are employed, the more that is produced, the more businessmen would have to expect and demand in expenditures for their goods to warrant the employment, and hence the production.

Now, the paradox and irony of this is that unlike what classical economists might have suggested, there is no guarantee that, whatever the production, there will be a demand. The notion that we have is that demand, aggregate demand or total demand, can best be viewed as made up of some four components, one of them the demand of consumers, which we call consumption; second, the demand of businessmen for inventories and producers' goods, capital goods, which we call investment; third, the demand of foreigners, which we like to treat as a net demand, the difference between what foreigners demand from us and what we demand from them; and fourth, Government demand. The total supply or production of goods has to be demanded by some one of these four groups indicated by these four headings.

If the total demand of these four groups is less than the total supply, then businessmen will find that they are supplying goods for which there is no demand, and in a free economy, when nobody is forcing them to produce, if they find there is no demand for their goods, the only reasonable thing to do is to cut back production.

Now, what we have assumed here as a first simple approximation is that, regardless of the level of output, we have certain amounts of investment demand, foreign demand, and Government demand. In table 1, this is assumed to be \$60 billion for investment demand, \$5 billion for net foreign demand, \$85 billion for Government demand.

The curiosity of this is that while it is not entirely unreasonable to suggest these figures for those three components, it is very clearly unreasonable to say that consumption demand would remain the same, regardless of the level of output or employment, because clearly the amount that we as individuals consume must depend pretty much upon our income. In the short run we can use up past savings or borrow, but sooner or later we are caught up by the fact that if we are not earning income we do not have the wherewithal to consume.

But the second element in this consumption function or relation which is particularly important is the fact that as income increases, our consumption tends to increase by less than our income. Because

all of us have a propensity to save, we have the notion that consumption is generally less than income, and particularly that as income changes consumption changes by less, or what economists call the margin of propensity to consume, the proportion of additional income that would be consumed, is less than one. This we have embodied in table 1, where we note that as income or output—because whatever the supply or output would be, the income would have to correspond to that—goes up, from 340 to 370, consumption goes up from 220 to 235, a ratio of 15 to 30, or one-half.

Looking at table 1, if these relations were to obtain, we can conclude that there is only one level that the economy could sustain. That would be a level of employment of 60 million, because at that level of employment, \$400 billion worth of goods would be supplied, and the total demand for goods would be \$400 billion. If businessmen were for some reason to increase their production to \$430 billion, for that purpose hiring 65 million, they would find that the total demand would go up by only \$15 billion. Because businessmen produce for profit, if they cannot sell their goods, they will not produce. Therefore, if we find that this level of employment is not satisfactory—and with the illustrative figures I have it is clear that it is not—and that an employment of 60 million would represent a substantial amount of unemployment in our present economy, the question arises: is there anything that would change these relations automatically, or is there anything that we can do to bring about an increase in either the consumption column, the investment column, the foreign column, or the government column? If we cannot, we are stuck. To analyze this, we have to go a bit behind the scenes and consider further now what influences the amount, for example, the businessmen invest.

The notion we have here is that businessmen invest, that is, accumulate inventories willingly or buy capital goods, plant, and equipment, because they think that the profit that they will earn on these goods that they are acquiring is more than the cost of money. If it is not, it is a foolish thing to do. If money is worth 5 percent to you, there is no point to acquiring a new plant or new equipment that will only pay you 4 percent. And of course a fortiori, as the economists like to say, if the expected profit on investment is negative, then there is really no conceivable cost of money which would induce businessmen to acquire more capital goods.

Now, the cost of money is a rather peculiar animal, and it is this peculiar characteristic of the cost of money, together with the kind of profits that people might reasonably expect on investment, which accounts for the particular results that economists usually get when they use the income-expenditure approach. And I might add that an approach does not change the nature of the real world, but of course it can facilitate bringing out certain relationships which are sometimes obscured in other approaches, and that I believe most economists feel have been obscured in the old quantity theory approaches.

I can now perhaps turn to the blackboard, where I have a number of diagrams and charts, I have labeled them A, B, C, and D. And we might first look at A, in which we relate the investment demand and the rate of interest or the cost of money, or what people might earn on money.

We have on the vertical axis "i" for interest, on the horizontal axis investment demand, and what we say is that the lower the rate of interest, the lower down we go on the vertical axis, the higher the investment demand, that is, the greater the abscissa, the more to the right that investment-demand line appears. In other words, if the rate of interest were 4 percent, the businessmen of the economy all put together might find that there was \$60 billion worth of capital goods and inventories that they could acquire that would give them a profit of 4 percent or more. Therefore, they would do so.

On the other hand, if the rate of interest were as low as 3 percent, there would be an additional \$10 billion of goods, which they would find it profitable to acquire. This \$10 billion would be additional plant and equipment and perhaps inventories, on which their estimated rate of profit is somewhere between 3 and 4 percent, not sufficient to acquire if the alternative profit we did not buy were at 4 percent, but sufficient to warrant acquisition if the alternative profit were 3 percent.

Looking at that, one is to remember that in this analysis the only way we can effect anything is to affect some one of these four components of demand—this with the parenthetical remark; except to the extent we can affect supply, which, in the short run, we presume we are not able to do.

One way to increase investment demand, in looking at this, is to get that rate of interest, the opportunity cost of money, the amount the businessmen would have to pay to get the money to buy capital goods, down below, let us say, 4 percent. We might presume that table 1, where investment demand is \$60 billion, corresponds to a rate of interest of 4 percent.

Well, to figure out how we might do that, we should look at chart B, in which we relate the supply and demand for money to the rate of interest, and we note initially that if we have a money supply of \$130 billion, which we might say is the amount of money that the monetary authorities have put in existence for us, then our situation of equilibrium, which would indicate that the money supply is equal to the money demand, would be one of the 4 percent. At 4 percent, people would be content to hold just the amount of money which is supplied, \$130 billion.

Now, it should be remembered that when people hold money, they are sacrificing the return they could receive on interest, they are sacrificing the use of consumer goods that they might buy. The lower the rate of interest, the less the sacrifice, and therefore the more money they might want to hold.

One way, then, to get the rate of interest down is to increase the supply of money. And in this analysis, it becomes clear that a prime way in which the amount of money can affect demand or expenditures is by affecting the rate of interest, particularly if we restrict ourselves to the notion that the effect upon the quantity of money is gotten only by conventional monetary policy, not by budget deficits. Therefore, we have a situation where the Federal Reserve, for example, simply goes out and buys bonds from the public. If it does this, it increases the quantity of money. But it has no particular effect upon the quantity of assets that people hold, because people are giving up bonds and getting in return money.

The effect of this operation, then, is to lower the rate of interest.

Now, here comes the real sticker. As we have drawn this money-demand curve, we see that even if you double the quantity of money from \$130 billion to \$260 billion, you lower the rate of interest only from about 4 to 3 percent. For that matter, if you were to increase the quantity of money still further, you would get even a more negligible lowering of the rate of interest.

The reason for this is that whenever people decide to hold money or give up money, they have to consider what they are losing. As the rate of interest gets down, people have to recognize that if they were to buy bonds they face a very substantial risk of loss if the rate of interest were to go up.

I might perhaps try to squeeze on the board a numerical explanation of that. If the rate of interest were, for example, 3 percent, we would have a situation where a bond paying \$3 a year, maturing in 20 years, would sell for let us say \$100. That is what a rate of interest of 3 percent would mean.

Now, if the rate of interest were, however, to rise to 4 percent, what would happen to the price of this bond? Clearly, anybody familiar with the money markets would realize that the price of a 20-year bond paying \$3 a year with a rate of interest in the market of 4 percent would have to drop from \$100 to about \$85, just roughly.

What this means is that when the rate of interest is 3 percent, people may think that, "You know, that rate of interest is perhaps not very certain to remain there. That is unusually low. It is likely to go up again the next time the administration decides we had better tighten up on money. I had better not buy a bond paying 3 percent. I had better not pay \$100 for a \$3 bond, because if I do, I may take quite a loss."

Now, it is this essential notion, which Keynes called "the speculative motive," which results in the situation where it is very difficult to get the rate of interest down below a certain point because as it goes down, people begin to hold on to money rather than buy bonds, with the fear that if they do buy bonds they will lose.

This has some rather interesting implications for monetary policy. If our objective is to get the rate of interest down, to raise investment demand, then we are going to find that every time the monetary authority operates in such a way as to raise interest rates, it implants in people the notion that any low rate of interest would sometime or other rise again in the future, which will make it all the more difficult to get the rate of interest down if in a period of depression or unemployment you want to do that.

But now, back to the main track of our analysis, we can see that we can increase investment demand by increasing the money supply, and for example, we might double the money supply from \$130 billion to \$260 billion. In so doing, we would lower the rate of interest from 4 percent to 3 percent, but the effect on investment demand would not be major. It would be an increase of investment demand from \$60 billion to \$70 billion.

The CHAIRMAN. You have assumed a rather inelastic investment curve?

Mr. EISNER. That is correct.

The CHAIRMAN. Do you think that is true?

Mr. EISNER. I am not quite sure it is true, but of course this is an empirical question to argue about. I might add that all of us have some notion of what the real world is like. If we see unemployment about, we look for explanations of it. Our economy has known unemployment periodically. If the investment-demand curve were very elastic, not drawn nearly as vertical as I would have it, then you would have a situation where this analysis would suggest that we would never really have any danger of unemployment. But in fact we do have the unemployment. That would be one basis for inferring this. However, there have been a lot of empirical investigations. I cannot say that we always have things entirely conclusive. The analysis is tricky. But I think on the short run that curve should not be drawn in too elastic a fashion.

We can now use this approach to analyze very directly the role of money, and we can see for example that if the monetary authority or the Federal Reserve were, for example, to double the quantity of money, we would have some effect. But the effect has to be analyzed through the effect on demand. It is not the quantity of money per se that has anything to do with the economy. It is how people use this money. If they put it under the mattress, it has no effect. If they take the money to buy goods, this increases demand, and this will tend to increase output, and this will tend, I must suggest, very likely to increase prices as well.

So this analysis indicates, then, that one way to raise output would be to increase the quantity of money. But this effect would be shown through a reduction in the rate of interest, a consequent increase in investment demand. I might add perhaps an increase in the demand of State and local governments for public capital projects, because they, too, are considerably influenced by the cost of capital and the rate of interest.

I think it might be best to move on rather quickly, leaving a number of things perhaps for closer examination in the text of the paper that I am presenting for the record, and consider now the role of prices in this. Suppose we were to increase the quantity of money in a period of considerable unemployment. The argument there would be that in the first place we would get likely a small reduction in the rate of interest, because in a period of unemployment, when there is little demand for money on the part of businessmen, who do not want to expand and do not want much investment goods, the rate of interest is already low.

It would be argued that where the level of employment is low and there is much excess capacity, while increases in demand are likely to bring about some increase in price, the increase in price should be relatively little.

It seems clear that whenever businessmen experience an increase in demand, this is signaled in part by increased prices, as income firms up and markets seem surer, but that where there is a lot of excess capacity, the forces of competition, imperfect as they may be, are likely to prevent any substantial increase in prices.

I have illustrated the general relation that I think economists might agree upon in figure 1. (See p. 803.) And there you can see that if we find some way in increasing effective demand, the demand for goods in money terms, by perhaps increasing the quantity of

money or by increasing Government expenditures or by cutting taxes—any of these things might conceivably affect some one of the four components of demand—as we do this the effect upon employment, if we start from a very low level of employment, for example, 20 million employment, at the left hand side of the diagram, is quite substantial. Employment initially rises almost proportionately to the increase in demand. And at this point there is very little increase in prices.

As, however, we get closer and closer to full employment, the increases in demand—and I must emphasize from whatever source, from an increase in the quantity of money, from increased Government expenditures, from increased consumer expenditures, from increased consumer expenditures having nothing to do with Government—from whatever sources of increase in demand as you approach full employment, you find that the increases in employment are proportionately small and the increases in prices tend to be somewhat larger.

The CHAIRMAN. Dr. EISNER, have you any idea as to where this critical point is?

Mr. EISNER. I am afraid I do not have any very precise idea. But I have some general observations on the subject, in terms of implications for policy, implications as to which I think neither I nor anybody else has a very precise idea. Perhaps I could come back to that, if you would like.

So much for our quick sketch of the role of prices. I would like to emphasize at this point, however, that economists insist that, after all, the wealth of nations, going back to Adam Smith, the welfare of the economy, in the last analysis, has nothing to do with prices in itself. Our welfare is determined by what we have in the way of goods, factories, schools, of defense, whatever we feel we need. Our welfare is measured in these real terms. If prices are high, but we have more of all of these things in real terms, we are better off than if prices are low, and we have less of these things.

Figure 1 suggests that you may run into the difficulty that as you try to keep the price level low you find that you tend to keep employment low, and if you keep employment low in real terms, we are clearly worse off, because we have less in the way of goods.

Now, finally, I would like to tie this in to what has become very much the center of public discussion, the question of economic growth. But here I would like to emphasize something of a paradox. It is usually suggested that growth is desirable for its own sake, and growth certainly is desirable. But the income-expenditure approach enables us to see that the growth is not merely desirable for its own sake. It becomes something of an essential in order to preserve prosperity and any reasonably high level of employment.

The reason for that is that an essential component of this aggregate demand, we have noticed, is investment demand, the demand on the part of businessmen for additional inventories, for additional capital equipment. And this demand of businessmen we find is intimately related with growth.

Suppose you have an economy which is fixed in its rate of output. Suppose, taking a look at chart C on the lower left hand corner of the board, we find that in the year zero we have an economy with an output of \$400 billion worth of goods and services.

Well, for that output, there is just a certain amount of capital goods that businessmen find it desirable to have. Perhaps to produce \$400 billion worth of goods in a year, they need \$1,200 billion worth of plant, equipment, and inventories. As long as they are producing only at \$400 billion, that is all the plant and equipment and inventories they need. True, they have to replace things as they wear out. What is more, they may want to acquire a certain amount of new inventories or new plant and equipment, to make use of technological advance. But in large part, their demand for additional capital goods is limited.

As a matter of fact, if we presume that the technological advances are all embodied in the replacement, there is no net investment demand as long as the output remains at \$400 billion. The only way in which businessmen would require to invest, to buy more plant and equipment, is if they find that what they have is not enough. And they will not find that what they have is not enough until output is increased.

We can illustrate that in just very simple figures by noting what might happen if in the year 1 output had increased from \$400 to \$420 billion. Then we might find fairly reasonably that businessmen would figure that they need \$1,260 billion of capital, thus maintaining the same 3 to 1 ratio.

But if in the year zero they had \$1,200 billion, in order to get to \$1,260 billion they would have to acquire, order, have produced, \$60 billion more of plant and equipment. So you see the amount of investment demand is intimately related with how much the economy is growing.

Now we have a few more reasonably illustrative figures below. Suppose the economy were growing at a—well, look at the very bottom. Suppose the economy were growing at a 5 percent rate. If the economy were growing at a 5 percent rate, you would find that an economy that started initially with \$460 billion worth of goods and services being produced, which we had noted back in table 1, corresponds to 70 million employment, which would be roughly full employment, such an economy would need \$1,380 billion of capital. If it were to grow at 5 percent, it would increase to \$475 $\frac{1}{3}$ billion in the year 1, and the amount of capital required for that would be \$1,426 billion, an increase of \$46 billion, about 10 percent of the \$460 billion of output being produced in the year zero.

Now, suppose we assumed that the 10 percent of output goes to simply investment for purposes of replacement or for purposes of embodying technological change, and therefore we had \$46 billion roughly being demanded there. Or maybe we should say about \$40 billion. If we add on the \$46 billion being required because of an increase in output of 5 percent, we find that we get a total investment demand which would be in the area of \$92 billion, actually. And I do not know if this is entirely clear on table 1 or on table 3, but the illustration can easily be developed to indicate that this would be sufficient investment demand so that the total aggregate demand would equal the aggregate supply.

On the other hand, if employment were growing at only a 1 $\frac{2}{3}$ percent rate, as indicated in the middle two lines on chart C, we would find that the amount of capital needed initially, \$1,200 billion, would

increase to \$1,220 billion, and there would be an investment demand of \$20 billion, for purposes of expansion.

Senator BUSH. May I ask a question, Mr. Chairman?

The CHAIRMAN. Certainly.

Senator BUSH. It is not quite clear to me how these figures develop. The basic figure, I take it, there, is the left hand column. That is output. And if that goes up 20 billion, the assumption then is that the capital investment would have to be increased to take care of that?

Mr. EISNER. The assumption is that the capital stock, the total amount dollar value of factories, equipment, inventories, would have to go up.

The paradox is that investment, the acquisition of capital goods, involves a change in the capital stock.

Senator BUSH. And the assumption is that it would have to go up at the same percentage of growth as the output. Is that right?

Mr. EISNER. Well, this is a simplifying assumption. But it is quite unessential for the analysis. That is, we could assume that the capital stock would have to go up less than in proportion. Or you could make an extreme assumption and assume it goes up more than proportionately. But aside from technological change, which does account for a good amount of investment but far from all of it, unless there is a need for more capacity, because output is going up, the demand for output is going up, there is no need for additional factories.

If General Motors is going to produce a million cars, then it needs a certain size plant, and it is not going to need more plant until it decides that the demand justifies a capacity of a million and a half cars, for example. And this applies right through the economy.

The major element in investment demand, a major element, probably the largest single one, is the demand for additional plant and equipment in order to produce additional goods. If the economy is stationary, if production is remaining at the same rate, the factories we have are enough.

This indicates, you see, that at a low rate of growth investment demand would be less. But if investment demand is less, we are going to find that aggregate demand, which is the sum of the four components of consumption, investment, foreign demand, and Government demand, would be less. And, indeed, in terms of the illustration I have here, which is really not unreasonable, although clearly I am not going to want to stand on the exact figures involved—in terms of this illustration, it can quickly be shown that a 1 $\frac{2}{3}$ -percent rate of growth would leave us with such an investment demand that our aggregate demand would equal aggregate supply only at an employment of 60 million.

Well, finally turning to the other side of the coin, this is intended to indicate that a rapid rate of growth may be necessary to give us enough investment demand so that total demand is equal to what we can produce at full employment. But you may ask yourself: Suppose we are not at full employment. What might the growth be? Now, that is indicated in table 4. I illustrate it in this fashion. We have two columns there, one called full employment, one 90 percent employment. And I try to keep the figures very simple for illustrative pur-

poses. Let us assume that under full employment we have a productive capacity of 100 and under full employment that means, using all of that capacity, our output is 100.

Now, let us assume that saving as a ratio of output, S over Y — Y is the symbol economists frequently use for output—saving as a ratio of the output is 10 percent. And investment we find must be equal to saving. Saving in real terms will equal investment. So investment, we can say, 10 percent of output, is 10.

Now, let us assume that each dollar of capital goods additional enables us to produce about 40 cents more per year. It increases our capacity by 40 cents. That is not an unreasonable assumption. It is pretty close to the 3 to 1 ratio. It actually implies a $2\frac{1}{2}$ to 1 ratio. Well, that would mean that if we did invest \$10 or \$10 billion, whatever the magnitudes we are talking about, the change in capacity of the year would be four-tenths for every dollar of four-tenths of a billion for every billion. So the change in capacity would be \$4 billion. Now, we had an output of 100, a capacity of 100, the change in capacity is four, and with full employment, then, we have a 4-percent increase in capacity.

Suppose, however, we did not have full employment, but had 90 percent of full employment. Output, therefore, would be not 100, but 90.

Now, we might at this point ask ourselves: When output goes down, what do all of the empirical data suggest happens to the amount that we save and invest? It is very clear that as output goes down, the amount that we save and invest goes down more proportionately, certainly more in the short run. That is, people, as we witnessed recently, try to maintain their consumption as well as they can, and the drop in output is largely a drop in the output of capital goods. It would be quite reasonable to assume that at 90 percent of employment saving would drop to 5 percent of output instead of 10 percent of output, and this saving would be 5 percent of a reduced output. This saving then, 5 percent of 90, would be 4.5.

Now, if we still maintain that each dollar of additional capital provides an increase in capacity of four-tenths of a dollar, then we find, multiplying 4.5 by four-tenths, that the increase in capacity is only 1.8. But if capacity was initially 100, an increase in capacity of 1.8 represents only a 1.8 percent increase in capacity.

Now, these, of course, are crude numerical illustrations. I have in several professional articles tried to indicate this in more rigorous forms. I think the broad outlines really should be unchallengeable to all those who think through them. The notion simply is that our capacity increases in large part because of the addition to our plant and equipment. When we have unemployment, we add to our plant and equipment less. We save and invest less. And as we save and invest less, there are fewer additional factories, less additional equipment, and then capacity will be growing at a lesser rate.

Well, I have taken really much more time than I had meant to. Let me conclude perhaps by reading from my conclusion in the paper, as I have presented it.

I might just before that read perhaps a paragraph from my manuscript, in which I say:

In the last analysis we find ourselves in an Alice-in-Wonderland world in which we have to run to keep in the same place and in which to get anywhere

we have to run twice as fast. The reason for this is that aggregate demand depends in significant part on its own rate of growth. If the growth in aggregate demand slows or ceases, investment demand (which is largely induced by the need for new capital to provide for growth) shows an absolute decline. For investment demand to remain merely a constant percent of total output, effective demand must be growing at an increasing absolute rate—a constant compound interest rate if the saving ratio and other relations remain unchanged.

The implications of this for Government policy are such that while rising prices may or may not be an aid in maintaining demand—I rather believe that they are an aid, for reasons suggested in part above—the measures necessary to keep demand growing at a constant compound interest rate and to keep demand and output always at or close to the full employment level are such as to make rising prices a likely byproduct. Growing demand, particularly where it is pushed unrelentingly by Government monetary and fiscal policy, is likely to raise prices. Recall that in our economy higher prices are precisely the signal and lure which induce producers to increase output. What is more, unemployment and excess capacity are the chief downward pressures upon prices. If the economy is kept at or close to full employment (as I believe it should be) we are denied these downward pressures and we may well find the increasing rate of demand, however much desired and necessary, tending to pull up prices as well as output.

6. Conclusion:

The income-expenditure approach requires that any presumed effects of economic variables and actions upon the levels of employment, output and prices be shown to operate through aggregate supply and demand functions of the sort here presented. This approach proves particularly useful in analyzing the role of present or proposed governmental policies. Will a cut in personal income taxes raise the consumption function? What kind of a tax cut will have the greatest or most rapid impact? Will permitting faster depreciation for tax purposes raise investment demand? What will the effect of tariff cuts be upon consumption and upon foreign demand? Will a general wage increase in a large industry influence any of the aggregate demand functions? For each of these questions economists employing the income expenditure approach have at least been shown where to look for answers. Indeed the questions themselves have frequently only been perceived within the framework here presented. And in many cases we are able to give clear and useful answers.

In evaluating the role of money, we apply the same test as we would with any other variable. If the quantity of money influences the levels of employment, output and prices this influence must be demonstrable in its effects upon the aggregate supply and aggregate demand functions. When the role of money is analyzed in this fashion we find that its likely effect on supply in real terms is virtually nil. Its effects upon demand can be significant, but these effects are likely to be much more limited than has been suggested by application of older, crude "quantity theories of money", a matter which I shall discuss in more technical terms in "A Note on Money and Prices," which follows this paper.

In this note, I might add, I explore the likely eventuality or likely results of a situation where the Government and the Federal Reserve keep the quantity of money rigidly constant, but go ahead and increase Government expenditures.

Starting from a situation of full employment, it is inevitable that prices will rise. And this I do not take as any revolutionary discovery, but simply as something of an answer to those who would argue that the all-important determinant of prices is the quantity of money. One can hold the quantity of money constant, increase Government expenditures, and clearly increase prices.

The CHAIRMAN. Thank you very much, Mr. Eisner, for your very suggestive paper.

If you will turn back to your hypothetical table which shows a disparity between the sum total of price tags on goods and the sum total of purchasing power in the pockets of the people, with the exception of one condition, what would you say to what I suppose would be the reply of the modern classicist, namely, that every item which:

goes into the cost of pricing a commodity is also income for somebody, and that therefore you cannot have a disparity between the two? Do I make myself clear?

Mr. EISNER. Yes, surely, Mr. Chairman. The answer to that is that it certainly is true that the items that go into the price of the commodity are income. But that does not mean that the people that receive the income will necessarily want to spend it in the period under consideration.

The essential fact of our economy is that when we produce goods we want income. But that does not mean, as the earlier classicists suggested, that therefore we immediately want to buy. And we need only go around the room and ask ourselves how many of us make it a practice of spending all of our income to buy goods. Almost all of us, until we get to the point of retirement—I hear some laughs, and I should quickly concede that many of us are constrained to spend all of our income, because we do not find it enough; but as a rule, most of us try to reserve some of our income. The Government forces us to do so in large part, by contribution to social security funds, and employees have pension funds, in which part of the value is not even given to us but goes into an insurance fund. We add to savings accounts. In all of these cases we are not spending all of our income.

The CHAIRMAN. What happens to the income which is not spent?

Mr. EISNER. What happens to the income that is not spent by consumers is that either it is spent by others or it represents goods which pile up in stores, in business inventories, which are not sold. That is, in the given period, of course, the income must equal the output. But if people do not want to buy the output, businessmen quickly learn the lesson.

And, being stuck with it, they therefore reduce their orders in the subsequent period, which means that output goes down. And it goes down until it gets to such a point that everyone is willing to buy it willingly.

Of course, the output does go somewhere. That is to be recognized. But if it goes to businessmen in the form of undesired inventories, that is not going to be a desirable situation that we would expect to continue.

Representative PATMAN. I have enjoyed your statement very much, Mr. Eisner.

Do you not think that the demand for money and credit is being restricted now because local people less frequently operate local businesses, like the grocery store, drugstore, picture show, and things like that. In other words, do you not think that, as absentee ownership enters into the picture in the local community, that necessarily restricts the demand for money and credit?

Mr. EISNER. This may be a partial answer to your question. It is my impression that the effect of monetary policy is to restrict the availability of money in a rather uneven fashion. That is, if the Federal Reserve follows the policy of selling Government securities, keeping rediscount rates high, or making reserve requirements high, this tends to make it difficult to borrow from banks, raises the rate of interest, and those people that have to rely upon borrowing from banks are very seriously handicapped, and I would think this would

be in larger part smaller businessmen, people who are interested in borrowing for purposes of purchasing houses. And the general effect is not an even one through the economy. In large part, with the development of the corporate sector of the economy, my impression is that the kind of monetary controls that we have have relatively little impact upon business expenditures.

Representative PATMAN. Do you consider that the trend that I have just mentioned, in the direction of absentee ownership of local businesses, is a bad trend in our country? Do you think it should be reversed, that something should be done about it, or should we let it go?

Mr. EISNER. I have no considered opinion on that, and I think it would be better if I refrained from answering it.

Representative PATMAN. You mentioned the rate of interest a while ago as though you considered it something that the competitive free market determined. You do not consider that we have a competitive free market in this country in interest rates, do you, Professor?

Mr. EISNER. No, it is certainly imperfectly competitive. But the question that I think properly arises in issues of this kind is whether the imperfections are sufficient to alter the conclusions of a particular analysis. In the context in which I was speaking, I do not know that this is critical. It may well suggest an amplification of what I indicated a moment ago, that because of the imperfections, the effect of tight money can well be quite discriminatory. And thus tight money does not mean that all find equal difficulty in getting money. Those that are in the habit of going to capital markets and a booming stock market may find it the easiest thing in the world to raise funds by floating a new issue, while the small businessman, who wants to go to the bank, just finds he is quite up against it.

Representative PATMAN. In a recent period of tight money, there was considerable talk about restricting consumer financing and things like that. But there was no talk about restricting the money market in a way that the big fellow would be unable to get money. I think that is bad for our country. If we are going to have restrictions, let it apply clear across the board. In these efforts to have tight money to restrict credit something should be done to make sure that every person and corporation who is deserving, would have a fair opportunity of getting a part if they deserve it.

Mr. EISNER. I might just add that in interviewing businessmen quite intensively, a number of years ago, I gained the distinct impression that the cost of money, the cost of capital, was a relatively minor consideration. If you would interview a financial vice president, he would certainly tell you, "Oh, the cost of capital is very important." But on more than one occasion, when I was able to get the president and chairman of the board in with the financial vice president, he would say, "Oh, sure. We want to get money as cheaply as possible. But if there is any worthwhile investment project, we will find the money one way or the other."

And I think this can be made clear in theoretical terms by recognizing that money is, after all, just one of a number of things that people can use. It has substitutes. And what I become rather fond of suggesting is that we ask ourselves what would happen to the economy if the monetary authority began reducing the quantity of nickels; suppose the monetary authority said, "We are going to

make nickels really tight, so that you can't get nickels," and they would keep selling bonds for nickels and keep withdrawing nickels from circulation. What would that do to the economy, to the rate of interest? I would suggest it would do very little, because nobody would pay a premium for nickels when he could get pennies and dimes. This seems rather obvious and perhaps ludicrous.

If money is made tighter, businessmen can make the existing money go around more rapidly. They can begin to use more and more fully charge accounts. Individuals can use charge accounts; business can use credit. There is really no reason ultimately why business need be hamstrung by a lack of money. Money is a debt of banks.

We might ask ourselves: What would happen to the economy if the Government said, "We are sick and tired of this money. We are tired of furnishing a medium of exchange for the public. Let them furnish their own." We withdraw all money from circulation; as in 1945 the old German marks became illegal. Would the economy really have to burn down? Or could not General Motors say, "Well, we have no money to pay United States Steel for the steel we need for our cars. Here is a note on our cars. And for so many tons of steel, here is a note for so many cars. You can use this note to pay your suppliers and your workers, and this note can then be used to buy General Motors cars."

And ultimately, you see, even at that extreme, you would find new debt instruments, new forms of money, replacing the old.

Because there are all of these substitutes, the monetary authority's control over the state of the economy, I would insist, is very imperfect and very loose. And I frankly am one of those who while well aware of the increasing attention being given to monetary policy, considers that increasing attention quite unwarranted. I think the lessons of the 1930's remain uncontradicted, that the quantity of money does not, certainly in the short run, have any very intimate relation with the level of economic activity. And there are good theoretical reasons which can justify and explain this empirical observation that we have.

The CHAIRMAN. Mr. Curtis?

Representative CURTIS. Thank you, Mr. Chairman.

I would like to comment that this note on money and prices is a rather technical and complicated thing and very interesting.

Now you say:

To some extent the choice of stable prices over high employment and output is one that should be made or rejected by the people, regardless of the views of economists.

Dr. Eisner, I have been of the impression that this is not a choice; that we actually need stable prices if we are going to attain high employment. Do you regard those as conflicting values?

Mr. EISNER. Yes. I think in considerable part they may be conflicting values. And I welcome the question, because I recall a question of the chairman which I can at this point answer along with yours.

At this point I think economists should be modest and recognize that we cannot indicate exactly that level of employment at which demand tends to be so great that prices tend to go up. We cannot

pinpoint that. Nor can we pinpoint precisely what the effects of any of our actions are. We do know that clearly when the money demand becomes greater than the supply, that can be produced at full employment, prices must go up. When the money demand gets less than the output that can be produced at full employment, output goes down.

Now, suppose we are faced with the kind of problem that is simply this: We have, let us say, 4 million unemployed, or 3 million unemployed now. We say to ourselves, "If we were to increase the quantity of money or cut taxes, and everything else remained the same, if we were to cut taxes by X amount, we could eliminate this unemployment in 6 months, if everything else remained the same." And then you would say, "Fine. Let's do it."

But then the economist has to say—he is not sure that everything will remain the same. Maybe in this 6 months business will begin to boom all the more, and we will find that this cut in taxes or increase in the quantity of money, sufficient to raise employment by 3 million to full employment, would in fact, with the other increase that might occur, give us too much demand and send prices up.

Now, no economist can guarantee to you that that may not happen. The safe thing to do if you want to be sure that prices do not go up is not to give any impetus to demand. On the other hand, you cannot be sure that perhaps demand aside from Government action will not go down.

We never can predict exactly where we will be 6 months from now, and we have to make a decision of political policy as to which way we want to take our chances on erring. If demand is too high, we will tend to have price inflation. If demand is too low, we will have unemployment.

Representative CURTIS. But you hinge everything on consumer demand. And yet on the next page you do pay attention to investment demand, and you recognize that high employment comes from economic growth. Economic growth, in turn, depends very materially upon investment demand, and also the supply of investment funds. Now, do you not believe that stability of prices has a great effect upon this investment side of the problem?

Mr. EISNER. Well, on this point, if anything, sir, I think I would go in the other direction, though I do not want to emphasize this too strongly. My impression is that rising prices tend, if anything, to stimulate investment demand.

Representative CURTIS. But how about the supply of investment capital to take care of that?

Mr. EISNER. I think this also stimulates the supply of investment capital.

I might add, just by way of example: this was perhaps not a good time to do it—I do not know—but I found myself with a few thousand dollars, and I put it into the stock market just a week or two ago. And my notion is that if prices are tending to go up, I do not think they are going to be going up drastically, but if they continue to go up, I am much better putting my money in a share of a corporation which will benefit from the increase in prices, than holding my money under the mattress, so to speak.

Representative CURTIS. Yes, but the problem there is that you get into a very basic situation—and I might say the reason I believe that

the stock market is acting the way it is is a traditional type of inflation, where there is too much demand going after too small an amount of commodity, which is the stock, because of the deemphasis on equity financing and the encouragement of debt investment.

Now, you get to this situation, where I think to a large degree the recent recession, in my judgment at any rate, came from a lack of capital in the areas where we were going to experience the economic growth. In other words, the companies cut back on their capital expansion.

Now, the effect of previous inflation upon the investment plan—you pay attention in your paper to the replacement problem of equipment, and yet our tax laws are such that replacement is based on original cost, not replacement cost; and when we devalued the dollar from \$1 to 50 cents, we in effect had a capital levy on all plant investment of about 50 percent.

In other words, in order to just replace, in order to take care of obsolescence and these other things but just to replace, we had to have twice the amount of investment capital that was originally put in there.

Now, where is that capital going to come from? In your paper, you talk about taking care of the victims of inflation. But nowhere do you mention what effect it has on creditors and what effect it has on savers, not only from the standpoint of the psychological effect on savers, but also the actual effect on the amount that is being saved, which has been cut by the very increase in prices.

It seems to me those are all economic factors that make stable prices important if we are going to get economic growth. Would you care to comment on those observations?

Mr. EISNER. Yes. Thank you.

On the question of the replacement cost of capital as a result of price inflation, I think that this argument is only partially valid, in that if we look at the aggregate amount of depreciation charges we find that these depreciation charges, being based in large part on assets originally acquired at higher prices by an expanded economy, turn out in fact, in the aggregate, to be at least equal to the replacement cost of the assets that have to be replaced.

Representative CURTIS. Where did you get the premise that they were acquired at high cost? The general turnover on plant and machinery in this country, for example—the acquisitions were around 1940.

Mr. EISNER. Yes. Well, I actually, it so happens, have done a good bit of work on depreciation, and have a number of articles I would be happy to suggest on the subject. But the essential relation is simply this: Capital tends to last a long time. In 1959, on the average, businesses are replacing plant and equipment that was acquired perhaps in the 1930's. They did not require much plant and equipment in the 1930's. In the first place, the economy was smaller, to begin with, and in the second place, of course, the 1930's were a time when we were not acquiring a lot. So that even if you doubled or tripled the prices which would have to be paid to replace that equipment, there is not very much.

On the other hand, depreciation charges, which the firms write up, that the accountants write, are based only in very small part upon the

assets acquired in the 1930's. Even on a straight-line basis, they are a fixed proportion—if assets were to last 25 years, for example, it would be one twenty-fifth of the dollar value at original cost of all of the assets acquired from 1934 to 1958. And in a growing economy, and certainly in an economy where prices are rising, it can be shown in algebra, and it can also be observed by simply looking at the depreciation accounts, that the amount actually charged as a whole is more than the replacement requirements, or at least equal thereto. And I know that looks strange to many people, because what they tend to think of is simply one individual item of equipment. They say, "Well, look at this \$100 piece of machinery that I acquired in 1933. I have to pay \$300 to replace that."

But in fact, one cannot look properly at one item of equipment. One has to look at the total depreciation charges of the firm.

In my interview studies some years ago, since I was interested in depreciation, I questioned a good number of comptrollers and top company executives about this, and while initially they gave me exactly the argument you have—"You know, this is terrible. Replacement costs are very high"—then I questioned them closely whether, with their depreciation allowances, reckoning the increased serviceability and advance in new methods, new equipment, depreciation charges would not be sufficient to at least maintain existing capacity. And I certainly got no clear answer that it would not. I think when I got through to them it became clear in many cases and some of them would volunteer the information, that actually their depreciation charges were sufficient to replace expiring capacity.

Representative CURTIS. I can see we are in rather fundamental disagreement on this subject. I have been interested in it, too, as a member of the Ways and Means Committee, trying to figure out depreciation charges. But I will certainly be very happy to read some of your papers on this and see if I can determine where we might be in error or where we might actually be in agreement.

But the point essentially I was trying to get across—and that was only one of the illustrations that I used in that rather lengthy statement I made—was my concern that you felt that it was a question of choice between stable prices and high employment; that the two were not two goals that we have to seek, and each was dependent upon the other.

Senator BUSH. Dr. Eisner, I have been very interested, too, in your statement this morning, one of the most interesting ones we have had.

We have serious problems that confront us down here from time to time, and last year and the year before, 1957, we experienced a rather sharp recession in business, which you know all about, as to the figures on it, anyway. And it was a matter of great concern politically as to what should be done about that situation, if anything, by the Government.

I am trying to relate your philosophy here, as you have expressed it, to practical considerations, and I am not asking this question to embarrass you, but in an earnest effort to try to appraise your thinking as an economist, as against a practical situation which we faced. And therefore I would like to ask you two questions.

In that period from the autumn of 1957, the late autumn, through, let us say, April or May of 1958, a year ago, did you favor the U.S. Government making a cut in taxes?

Mr. EISNER. Yes, I did.

Senator BUSH. Did you favor a step-up in Government spending at that time? Did you support mentally or otherwise the recommendations that were made on many hands to step up the possibility of Government spending very substantially?

Mr. EISNER. Yes, I did support that mentally. I think I was on record only for a cut in taxes.

The CHAIRMAN. May I say I want to congratulate the witness in having the good sense to favor tax reduction at that time.

Senator BUSH. I will say he had a lot of excellent company. I am not sure I want to congratulate him on the decision, but I must say he was in awfully good company.

The CHAIRMAN. Thank you.

Senator BUSH. Now, have you any recommendations respecting the Federal Reserve Act and the powers of the Federal Reserve Board? Do you think that the Congress should change the powers that they have, or restrict them or enlarge them?

Mr. EISNER. No. I have no considered recommendation on that.

Senator BUSH. You are familiar with the statement that is frequently made that their policy, insofar as monetary policy is concerned, is to lean against the wind? When the demand is very high, they are supposed to use somewhat restrictive measures, and vice versa. Do you think that is a sound policy, or not?

Mr. EISNER. I have reservations with regard to that policy, which are implicit really in the paper I presented, or reasonably explicit in the paper I presented this morning.

I think in the interests of longrun growth the policy of the Federal Reserve should be directed to keeping money as plentiful as possible, keeping the rate of interest as low as possible. I think that every time it leans against the wind in a period of inflation, it, of course, in that period raises the rate of interest and makes money tighter, and it makes it more difficult to get the rate of interest down to a reasonable minimum in periods when there are not inflationary pressures.

So I would rather have the Federal Reserve follow generally a policy of keeping money plentiful, getting the rate of interest as low as possible, and if we do find a very clear and compelling need for action to stop an increase in prices, I would much rather see this done by fiscal power, that is, by raising taxes or cutting expenditures or cutting payments to people.

Senator BUSH. Do you think that is very practical, though? You know how hard it is to get a tax bill through the Congress. That is a serious question. Theoretically, that might be right, but my chairman will support me, I think, in stating that it is a very difficult thing to raise taxes. You go back to 1956-57, if you want to take the same period that I raised earlier, there. And I doubt very much that the Congress would have entertained a recommendation for a tax increase at that time, despite the fact that we were at the peak of a boom, the biggest that we had ever seen in history up to that time, with full employment. Many people referred to it as overemployment, and so forth. Do you think it would have been practical, politically, to suggest a tax cut at that time, as a restrictive measure?

Mr. EISNER. You mean a tax increase?

Senator BUSH. A tax increase. I beg your pardon.

Mr. EISNER. Well, I claim no expert knowledge of the political process.

Senator BUSH. Well, you are a political economist, I think.

The CHAIRMAN. I would like to support what he says, namely, that even at the height of a business boom it is almost impossible to increase taxes. In fact, the tendency then is for decreased taxes, on the ground that receipts are plentiful and this is the time to aid business.

Senator BUSH. And my conclusion from that, very respectfully, is that your suggestion that you use fiscal practice is not really a very good answer. It is not a practical answer to the problem of: What are you going to do about a boom?

Mr. EISNER. I might just point, though, to the qualification that I indicated. I said that I would use fiscal policy to fight an inflation where there was a clear and compelling need. My impression is that there has not been any clear and compelling need for action against inflation for at least the past 10 years. As a matter of fact, I am quite mystified, except as a political scientist, at the great concern and hullabaloo about price increases.

Since the first 6 months of the Korean war, certainly our price increases have been very modest, probably less on the average than they have been through most of our history. And I certainly see nothing in the past 8½ years, since the Korean war inflation—and that was just in the initial period of the Korean war—that would justify action against prices.

I think that generally the action that would be called for would be tax cuts against recession, and while again I disclaim expertese as a political scientist, my impression is that the Congress would have much less trouble getting through tax cuts than tax increases.

Senator BUSH. Well, you have got a good point there, I think, about the relative price stability over that period.

The purpose of Federal Reserve action in 1957, I believe, was not wholly anti-inflationary, but it was an attempt, I believe, to avoid the possibilities of a big bust due to the overaccumulation of goods and services, particularly goods, through a very large overextension of credit.

In other words, the classic illustration that is used there is the automobile industry. They got up to 7½ million cars, which was way above the average growth trend or any other figure, and what they were doing there was borrowing against another year's production. It turned out that that is what happened, I think.

Now, Federal Reserve used some of its powers at that time to temper this exaggerated buying spree, so to speak, by restricting credit to some extent.

So it was not wholly anti-inflationary, you see. At least, that is my observation.

Now, do you disapprove of the Federal Reserve using those powers in that way at such times?

Mr. EISNER. I think that I do. I can go back at this point to the general theory of John Maynard Keynes back in the 1930's, when he argued that there is much talk about the necessity of trying to stabilize things, reduce the booms, and raise the troughs, and it seems to me, as he argued then, that this is rather pointless. We do not

want to cut off the booms. We like the booms. We want to fill in the troughs. And I am not convinced that action to cut off the booms does any particular good in eliminating the next recession. It may just bring it on somewhat more rapidly. I think in real terms, welfare is measured by the amount that we produce. We should try to keep that production as close as we can to a maximum at all times.

I think the cost of doing this is likely to be a more rapid increase in prices than we would have otherwise, but I think that in spite of all the concern expressed for this, the increase in prices does not hurt the economy as a whole. It hurts, perhaps, some individuals, and I think far fewer individuals than we generally admit, and to the extent it does hurt these individuals it certainly is within the power of the Congress to take measures to help them out.

It is, you know, generally argued, "Look how badly off we are. A dollar now is equivalent in value to 46 cents 25 years ago," or some such figure. But people sort of want to have their cake and eat it, too. They want to go on having the much larger number of dollars that they have now, and would also like to have dollars of the same value.

It is argued, for example, that people on pensions are much worse off, because the pensions are not worth as much. But I might raise the question as to what these pensions might likely be or have been if over the past 25 years the Government had not followed an expansionary policy, if we had continued with the large amount of unemployment of the 1930's. I would then suggest that these pensions would be far less in dollar amount, and people would really be worse off.

My notion is that this has been a very prosperous economy on the whole in the past decade, and the price increases have not prevented probably 95 percent of us from being much better off than we were ourselves 25 years ago, or than our fathers or the people who were comparable to us in the social scale were 25 years ago.

Senator BUSH. Well, I think that makes a pretty good case for that broad statement. In regard to the last 10 years, I think they have been on the whole very prosperous years. But on this boom business, you say Mr. Keynes does not want to cut off booms, and you do not either. I do not either, provided they will last. But the history of these things is that they bust somewhere along the line. I have lived through one of these, myself, much to my regret and expense. And I wonder whether you think—I know you have studied the history of this 1929–30 period there; I am sure you have—that the Federal Reserve at that time was unwise to attempt to restrict the use of credit, which had already expanded to such an extent that, as I remember, brokers' loans were 9 billions of 1929 dollars, which is more than twice as much as they are today, despite the devaluation of the dollar. I mean: Was the Federal wrong in trying to restrain that use of credit at that time, in 1929?

Mr. EISNER. I would probably want to avoid a judgment on 1929, but I do have the impression that the Federal Reserve was overly restrictive in its policy in subsequent years, and that a freer and easier monetary policy in the several years following 1929 might have mitigated some of the disaster.

Senator BUSH. You mean in the 1930's?

Mr. EISNER. In the 1930's. In the early 1930's.

Senator BUSH. Well, I do not recall those figures. I believe it was 1932 or after that, that long term rates got down below 4 percent. Is that what you have in mind?

Mr. EISNER. I am not fresh on the details, but I believe it has been charged, probably correctly, that the Federal Reserve was all too tight in several occasions on money. I believe as early as 1930 and 1931. But it might be better to check the record and not use my recollection.

Senator BUSH. The year 1930 was a big year, in business and industrially, too.

Mr. EISNER. But it was the beginning of a downturn. One of the difficulties is that these things tend to gain momentum. And unless you are prompt in easing up as you swing into a downturn, it becomes all the harder to do very much about it, so that 1930 probably should have been a time when the Federal Reserve should have been easing up very substantially, certainly in hindsight.

Senator BUSH. But you do not have any comment to make about their behavior or activities in 1929?

Mr. EISNER. No; not of my personal knowledge, so I should avoid it.

The CHAIRMAN. Mr. Eisner, I think you have presented a very able paper. We have heard two papers on the quantity theory of money in the preceding days, and your paper seems to be concerned with a different world, almost, from those that were discussed.

I know you have not had the advantage of reading the precise papers, though you may have seen their articles.

Would you give any place, and if so how much, to the quantity of bank credit and the velocity of bank credit and their effect on prices?

Mr. EISNER. The difficulty is that the way the chairman has phrased the question, I expect intentionally, the answer has to be yes, that the velocity and the quantity certainly affect the level of prices and output, because as we usually define velocity, the velocity times the quantity is exactly the amount that is spent. So all that we are saying is that the amount spent affects prices and output.

I think the fatal defect in the quantity approach is that it is usually presumed that there is something reasonably stable about velocity, so that as we alter the quantity of money, which is certainly what the monetary authority has the power to do, we will not have compensating changes in the velocity. And my impression of the empirical evidence—and I believe a good bit of that advanced by Mr. Selden himself—is that velocity does vary all over the map; that when you get into a depression velocity goes way down. And I think there is little evidence that an increase in the quantity of money or credit or potential credit would do anything other than involve a corresponding drop in velocity.

I might point out that velocity is simply defined, usually, as something like the total expenditures divided by the quantity of money. And if one therefore increases the quantity of money, unless we can say that that will increase the quantity of expenditures, then increasing the quantity of money by raising the denominator of the fraction, must decrease the velocity.

It is interesting to me to note that Professor Friedman, certainly a very able economist indeed, is now modifying and modernizing the

quantity theory of money, is in effect taking into account in part the kind of factors that we traditionally discuss in the income-expenditure approach. And the question then becomes one of whether changing the money quantity by influencing the costs of money will influence expenditures and in that way prevent a corresponding drop in velocity. For my part, I continue to find it much more convenient to look at things in the way I have indicated here, so that we can then see very clearly that there is no necessary reason why changing the quantity of money will change expenditures. It may simply lead to a change in the other direction in velocity.

The CHAIRMAN. Is this what lies behind the statement you made in your paper, that there can be a disparity between the total income distributed and the total demand for products expressed in money terms? That the velocity may change?

Mr. EISNER. Yes; I believe that could be translatable in this fashion. That is, one could argue, for example, that with a given quantity of money, if employment were 65 million rather than 60 million, and \$430 billion of goods were produced, rather than \$400 billion, the velocity would be more than if \$400 billion were produced.

The way we would usually indicate this is simply the identity, which I can put on the board, MV equals PT , or sometimes MV equals PY , with T for total transactions, or you can alternatively use Y as total income. The difficulty with that is that it is unquestionably true as a matter of definition. But if we were to change M , there is utterly no reason, just looking at that, to presume the V will not go down. The question whether V goes down correspondingly or not is precisely the question of what changing the cost of money does to demand, to expenditures. And unless one goes behind the scenes and examines this, that kind of an equation strikes most of us as rather useless tautology.

I should not say useless tautology. It is a tautology which may or may not be useful, depending on how we marshal our knowledge within it.

Senator JAVITS. I would like to say that you could say as well that Y equals C plus I plus G is a useless tautology, as something that is mechanically correct. The question is whether the behavior relations subsumed under these terms are predictable to a greater or lesser extent, and whether they are reliable, and to what extent they are reliable.

In other words, this is not quantity theory, nor is Y equal to C plus I Keynesian theory. The question, for instance, is: How predictable is velocity of circulation under various circumstances? Can we really depend on the consumption function?

I think all of us on all sides have a lot to learn yet. I do not think economics has even begun to answer the substantive questions. But you would grant, would you not, that logically one or the other formulations of the problem might turn out to be the better? And it might well be that for certain kinds of problems one approach is preferable to the other? Would you agree with that statement?

Mr. EISNER. Well, I would agree that one can formulate the problem in either terms in logically consistent fashion. My concern is that formulating the problem in the terms of the quantity theory, even though made more sophisticated and subtle, tends to obscure some of the particular problems into which we have run.

For one thing, it obscures the fact—it can be brought out, but it has tended to obscure the fact—it seems to me that it tends to be somewhat obscured in the presentations of the best of the modern quantity theorists—it tends to obscure the fact that the direct cost of holding money is nil, except for price changes, and that if we are trying to analyze what happens in an economy where prices do not change, we can never get the cost of holding money, or the opportunity cost of holding money, below a certain point. And not being able to get it below that certain point, we find that the chances of increasing expenditures by this means are quite limited.

Now, this can be spelled out in the quantity theory. You can say that the demand for money depends upon income, the rate of interest, the rate of change of prices, the amount of wealth we have, and none of us, no economist, should have any objection in getting over some of the work done by the people that contributed to the Friedman edited volume on the quantity theory. I know there was some tendency to argue, there, that the amount of money that people wanted to hold did not seem to be very clearly related to the cost of holding money.

Now, that, it seems to me, is not reasonable. I think I could indicate places where the empirical data have been misinterpreted. But I have the feeling that that is just the kind of pitfall, perhaps, that the quantity theory encourages. If one were willing to openly recognize the effect of the cost of money upon the amount that people would want to hold, one would ultimately get the same results as one does with the income-expenditure approach.

But perhaps it is a matter of historical tradition. There seems to be a reluctance to make that move, even when it is explicitly recognized in the theoretical function or relations, as Professor Friedman has explicitly related.

I recall quite distinctly a passage, I think in one of his essays, in which he argues that, in fact, the evidence does not seem clear that the quantity of money has fluctuated substantially with the cost of money, of holding money.

One of the difficulties there, I think, is that they measure the cost of holding money in terms of the rate of interest and past changes in prices; when, after all, one is concerned with the expected future change in prices. This is perhaps a narrow technical point, and I will concede that if the two theoretical formulations are handled carefully and adequately, and the empirical data are properly fed into them, there is no reason why one should get different results with one framework than with another.

The CHAIRMAN. Thank you very much, Dr. Eisner. We are greatly indebted to you.

Mr. EISNER. Thank you, sir.

The CHAIRMAN. Your full statement will appear in the record. (The statement referred to is as follows:)

THE INCOME-EXPENDITURE APPROACH TO THE ANALYSIS OF MONEY RELATIONS

(By Robert Eisner)

In some economies production is undertaken according to plan or governmental directive. In a profit oriented, market economy production is for sales. If businessmen or other producers expect to be able to sell what they produce at a price which warrants production, they produce; otherwise they do not.

Thus in our economic system there are two relations which can be said to determine jointly the rate and prices of output. One of these relations we call the supply function. This in turn is based upon the production function and the terms under which the owners of productive factors are willing to sell the services of these factors. The other we call the demand function, what businessmen may expect to be spent on what they might produce. The income expenditure approach suggests nothing more nor less than that, once we specify the technological conditions of production and the terms under which people wish to work, the amount that is actually produced, the number of people employed in production, and the prices at which goods are sold depend upon what people are willing to spend.

This simple, intuitively plausible notion, that production and prices are determined in the short run (when technological conditions are fixed) by demand, by what people spend, is the framework of the economic analysis that has oriented leading economists for the past quarter century. Within this framework economists have by and large challenged older views and have developed policy implications suggesting the advisability, if not the necessity, of an increased role for government in an otherwise free economy. I shall attempt, in the pages which follow, both to present this framework in some detail and to indicate certain implications of its use.

1. The historical setting and the clash of ideas

Throughout history man has known varying degrees of economic misery. Until the development of modern capitalism, however, this misery seemed related directly to vicissitudes in the struggle with nature. When there were floods or droughts, fire, or pestilence, production dropped, and frequently men starved. In these periods men, with the meager tools at their command, were simply not able to produce enough.

With modern capitalism came enormous material progress. Man became increasingly able to provide for himself first the necessities of life and then more and more "luxuries," including the luxury of voluntary leisure in which he could enjoy the growing fruits of his labor. But still there remained variations in the levels of relative prosperity. Man continued to enjoy good times and bad times, but with one essential difference. Bad times were no longer periods when man was physically unable to produce. Rather they were times when productive capacity was as great or greater than ever, but factories with all their new technology were idle, workers were unemployed, and farmers could not sell their bountiful harvests at prices which enabled them to pay their debts, let alone buy the goods they needed for adequate living. How explain such poverty amidst potential plenty?

To most classical economic theorists such phenomena represented transient "disequilibrium" or the results of interference with the free workings of the economic system or a combination of the two. Adam Smith's "invisible hand" was expected to bring about an optimum allocation of resources and this implied a full utilization of resources. What became known as "Say's law" stated that there could be no general problems of overproduction or excess supply because those that produced or supplied commodities did so only in order to obtain other commodities in return. Since for every supply there was a corresponding demand for some other good (or the same good), total quantities supplied must equal total quantities demanded. There could, of course, be temporary oversupplies of some goods and corresponding excess demands for other goods at existing prices. But then prices would adjust, in a free market, so that quantities supplied and demanded of each commodity were made equal. This might take some time but it was not usually considered that this time might be very long unless monopolistic imperfections (or trade-union restrictions) prevented the free adjustment of prices (or wages). If such imperfections were permitted to become important, or if governments were to act capriciously to interfere with the free workings of the system, difficulties might indeed develop and persist. But for a freely competitive system full employment was the normal or equilibrium order of things. Departures from this desired state were to be ascribed to temporary phenomena incidental to not undesired change or to interferences with that freely competitive system. Among the main body of orthodox economic thinkers, as opposed to the "heretics" and soapbox orators, the problem of aggregate demand had no place.

With chronic unemployment in England after World War I and with the long, deep, almost worldwide depression of the thirties, traditional economics fairly

cried for revision. This revision, while ultimately the work of many minds, was inspired and laid out in its essential form by the late John Maynard Keynes in "The General Theory of Employment, Interest, and Money."

The essential classical proposition challenged by Keynes was the tenet that full employment was necessarily the natural state of a competitive economy. Unemployment, Keynes argued, might for long periods of time be endemic to the system and there would then be nothing that any individuals, whether workers or businessmen, could do by themselves to eliminate it. Further, Keynes declared, the mass unemployment of his time could in no reasonable sense be considered "voluntary," as some economists argued on the alleged ground that workers could not get work only because they demanded wages higher than employers could afford to pay. While not denying that workers tended to resist money-wage cuts in time of unemployment (although indeed such resistance was only partially successful), Keynes insisted that a fall in money wages was entirely unlikely to increase employment. The error in the classical reasoning might indeed be explained as an illustration of the logical fallacy of composition: the invalid inference that something true of the individual or the part is necessarily true of the aggregate or the whole. It might well be true that an individual employer would find himself able to hire more workers if he could pay lower wages. For then he might be able to charge lower prices for his product and sell more. However, if all wages were to be lower, throughout the economy, all prices would be lower and each individual businessman would lose the competitive advantage he expects to have when he thinks of cutting his prices with everything else, the income of his buyers as well as the prices of other sellers, remaining the same.

To analyze the effects of a wage change, or any other aspect of the problems of employment and income, a new set of analytical tools was necessary, a set appropriate for explaining the economy as a whole. This set of tools, fashioned in large part by Keynes but expanded and sharpened by a whole generation of economists since, I shall now attempt to present in fairly elementary form. I shall supplement this presentation with a somewhat more technical note bearing particularly on the role of money, and with two previously published professional papers relating these tools to economic growth.

2. *Aggregate supply and aggregate demand*

The core of modern aggregative economics, the economics of the economy as a whole, is that production is determined not merely by what we are able and willing to produce but also by the demand for production, or what we are willing to buy. Indeed what we are willing and able to produce is at any time merely an upper limit to what we can produce. What we do produce may be less, and frequently if not generally is less, than what we can produce. How much of what we do produce is less than what we can produce depends upon how much effective demand, what people pay, measured in real terms, is less than what with the existing stock of capital and existing techniques and the labor of all those wanting to work, we can produce.

In technical language we may say that production is a function of the capital stock (and perhaps the intensity with which it is used) and the quantity of labor employed. But the actual level of employment, and hence the actual level of output, will depend upon the aggregate supply function and the aggregate demand function. The aggregate supply function relates each possible level of employment to the expectation of proceeds or sales which producers would have to have, in the light of the production function or costs, to justify it. The aggregate demand function relates each possible level of employment to the demand that producers would actually expect (on the basis of the income that they would find such employment would generate). The "equilibrium" level of employment is then the level of employment for which aggregate demand equals aggregate supply. • The demand corresponding to this amount of employment is known as the effective demand. The resulting output, which is what is produced with this level of employment, not necessarily full employment, is then equal in value to the effective demand.

A major task of classical economists was to analyze the determinants of what we can produce, the conditions of supply. But once we reject the old idea that supply creates its own demand, we see it much more immediately relevant to explain what determines demand, which more often than not will be sufficient to tell us what we actually produce. And since what we actually produce now, in the way of plant and equipment and new skills and techniques (the "production" of schools and research laboratories), determines

what we can produce tomorrow, the conditions of demand are responsible for the supply functions of the future. What then is the nature of the aggregate demand function?

Aggregate demand may most usefully be broken into the following components: (a) consumption, (b) investment, (c) foreign, (d) government.

Let us examine each of these in turn.

(a) In a free economy consumption demand in any period of time may be taken as the actual consumer expenditures for goods and services in that period, what is frequently called consumption. The single factor most responsible for determining the amount of our consumption is our income. In the short run we may borrow or draw on past savings but sooner or later we are caught up by limitation of our income and our need to provide for a period of retirement in which we do not expect income. Because of this consideration of provision for old age, plus perhaps a desire to grow richer and leave an estate, it is generally argued that as income rises, consumption rises but not by as much. Thus, the more we earn the more we consume, but also the more we save, that is, the more we abstain from current consumption in order to provide for future consumption or merely in order to get richer.

This last hypothesis, that what economists call the marginal propensity to consume, or the ratio of changes in consumption to changes in income, has a value less than one, turns out to be of critical significance. For it means that as output and, consequently, income grow, we cannot expect consumers to purchase all of the increased goods and services available. But if they do not purchase the additional products that stem from growth, others must be willing to purchase them. If not, in a free economy producers will not produce additional products—recall that production is for sales, or demand—and output cannot grow. We find, in fact, that except at very low outputs, consumption is considerably less than total supply. Therefore, unless the consumption function as we know it is drastically changed (perhaps by governmental action), there remains a gap between consumption and the output of a prosperous economy, a gap which must be filled by one or several of the other components of demand.

(b) Investment demand is simply the demand for current output by producers. This takes the form of demand for additional inventories or demand for additional or new plant and equipment. It may be best to consider these separately.

One key to understanding investment demand must be the realization that a firm in a stationary situation needs only to replace the plant and equipment wearing out. It is not a source of net investment demand. All net investment demand, and a major part of gross capital expenditures, must stem from change. One form of change which is perhaps basic is growth. If a firm is producing any given output to meet any given demand, it may have no need to add to its capital equipment. However, if demand for its products and, consequently, its output grows, it needs additional plant and equipment in order to produce, at least to produce efficiently, the additional output.

A second kind of change which may induce investment is a change in relative prices of capital and other factors of production. Particularly, if the cost of capital as measured by the cost of obtaining or using funds to buy capital goods (generally and loosely speaking, the rate of interest) declines, producers may find it economical to substitute capital for other factors of production.

Third, there may be changes in the production function, that is, in our technology, which may induce investment in order to permit utilization of more advanced and more efficient capital goods. Such new capital goods may be used, of course, both to replace old capital goods and to replace other factors of production.

Fourth, there may be changes in product demand which will necessitate investment because the capital goods utilized for products previously demanded may not be usable, or fully usable, for the new products. Changes in product demand may stem from changes in tastes or from changes in product prices, which might come from changing techniques of production, changing relative prices of factors of production, and changing patterns of international trade.

Finally, it should be realized that these factors and others are likely to interact, in manners which will be discussed in part below, in their ultimate determination of the amount and pattern of investment demand.

Investment in inventories is frequently the balancing item between output and demand. As demand falls output is not usually cut promptly and business finds itself more or less involuntarily investing in inventories. This generates a negative investment demand as firms attempt to disinvest in inventories in

subsequent periods. On the other hand, if demand rises, after an initial "undemanded" disinvestment in inventories as stocks are depleted before producers increase output, a positive demand for investment in inventories is generated in future periods. While investment and investment demand in inventories may be on the average fairly small, the large movements between negative and positive figures are an important element of cyclical instability.

If investment demand for inventories is to be on the average positive there must be growth in output. For again, whatever the various purposes of inventories, whether raw materials, goods in process, or finished products, a given output will in general require a given stock of inventories. One will not require more inventories and hence not wish, in the long run, to invest in inventories, unless production is growing.

Since business acquires goods not for individual satisfaction but for profit, it makes sense to view the investment decision as relating the expected profit on each dollar of investment to the return for alternate uses of the funds. This rate of profit, technically that rate of discount which would equate the sum of expected future returns from a contemplated investment to its supply price, is affected by the relation between current and expected prices of products as well as the current price of investment goods themselves. Thus, if one can buy new plant and equipment now at current prices but reckon that the additional product provided by this new plant and equipment in the future will sell at much higher prices, the profitability of investment, as compared, for example, with keeping cash, is enhanced. It is in this sense that rising prices are considered to be a spur to demand.

(c) Foreign demand for a nation's production must ultimately be conveyed in the currency of that nation. Thus foreign demand for American goods must be expressed in dollars. It then becomes clear that foreign demand for American goods must depend upon (be a function of) the dollars foreigners have, the rate at which they are "earning dollars" (by selling goods to those who use dollars as a source of payment, chiefly Americans), the rate at which they are being given dollars (in private or public "charity"), or the terms at which they can borrow dollars, and the attractiveness (in terms of both prices and other qualities) of American goods. It also becomes clear that in the long run foreigners' demand for American goods must depend upon the dollars they receive from our purchases, our loans, and our gifts.

(d) Government demand for goods and services in the American economy includes the demand of State, local and Federal governments. State and local governments are perforce influenced considerably in their expenditures by receipts from taxes, which in turn depend upon the income of the community. In part, however, they are concerned with the cost of borrowing. For many of their expenditures are capital in nature and the current cost which must be met out of tax receipts is largely the interest cost of the financing.

The Federal Government is not, and should not consider itself, in the opinion of most economists, bound to limit its demand to the amount of its receipts from taxes. For the Federal Government, with its control over the monetary system, can actually create money or can determine the costs to itself of borrowing. The final determinants of Federal demand, however, are in large part political in that the political authority is ultimately free to determine the amount of goods and services that the Federal Government will seek to purchase.

The essential notion of the income expenditure approach is that with a fixed supply function in real terms, which in the short run is a reasonable assumption, one can affect the level of expenditures, and hence the level of prices and/or employment and output, only by affecting one of these components of demand. We may illustrate this with the following table:

TABLE 1.—*Hypothetical aggregate supply and demand functions*

Employment (millions)	Aggregate supply (billions)	Demand (billions)				
		Consumption	Investment	Foreign (net)	Government	Aggregate
70.....	\$460	\$280	\$60	\$5	\$85	\$430
65.....	430	265	60	5	85	415
60.....	400	250	60	5	85	400
55.....	370	235	60	5	85	385
50.....	340	220	60	5	85	370

It is to be noted that in table 1 we have assumed that the levels or rates of investment demand, foreign demand, and government demand are constant and do not differ for different possible levels of employment and supply. This is not entirely consistent with the discussion above but is a useful simplification to facilitate understanding the basic relations. Consumption is however made to depend upon employment and output. Thus, if employment were to be 50 million, output or supply would be \$340 billion and consumers would buy \$220 billion of this output. But if employment were 55 million, output would be \$30 billion more, or \$370 billion, and consumption would be only \$15 billion more, or \$235 billion. In effect we have assumed the consumption function,

$$\text{Consumption} = \$50b + 0.5 (\text{Output}).$$

The consequences of the assumptions of this illustration are that only at an employment of 60 million and a consequent output of \$400 billion would aggregate demand be equal to aggregate supply (in this case at \$400 billion). If employment were 70 million, supply would be \$460 billion and the total of consumption (280), investment (60), foreign (5), and government demand (85) would be only \$430 billion. This aggregate demand of \$430 billion would be \$30 billion less than aggregate supply. Thus businessmen would find that they had produced output for which there was no demand. Since goods acquired by business constitute investment we would have actual investment in excess of investment demand. There would be excess inventories or an excess stock of plant and equipment or both. Consequently producers would reduce their output, business would generally reduce its orders, until excess inventories could be worked off or excess plant and equipment could wear out or become obsolete.

But by this reasoning, it can be shown similarly that if employment were 65 million there would again be an excess of aggregate supply over aggregate demand, and in a free economy producers would react by cutting output and employment. On the other hand, if employment were below 60 million, aggregate demand would be in excess of supply and producers would increase output in order to make up for depleted inventories and/or to make available wanted capital goods. Only at a level of employment of 60 million and an output of \$400 billion would there be no tendency for output to rise or fall. This level of employment might, to be sure, be much below "full" employment. There might be many millions unemployed. There might be much idle capacity in the economy. But given these assumed demand relations, 60 million would be the level of employment that would be sustained and \$400 billion would be the output that would be produced.

It should be noted that we have been careful to base our results on certain specific assumptions. It is now time to examine these assumed relations to ascertain the extent to which they might respond, themselves, to forces in the economy and to what extent they may be made to respond to certain outside influences of government. Among these outside influences will be manipulations of the supply of money and credit. However, throughout it should be recalled that this approach requires that any effect upon the level of employment and the rate of output or, as we shall see later, upon the level of prices, must be shown to operate through one or several of these components of demand, or through a change in the supply function.

3. *The role of money*

Money has an implicit role in the system of relations described above but it becomes easy to see that its relation is not as simple and obvious as some economists have believed in the past. To understand its role we must analyze its effect on each of the components of demand. Before turning to this analysis we should define money and indicate a few of its essential characteristics.

For our purposes a number of definitions of "money" might serve. We shall use the one which is probably most common, although consistent use of most of the others which are also employed would not affect our analysis. We shall define money as currency in circulation and demand deposits of commercial banks. We thus do not count as money time deposits or other assets which can readily be converted to money. An essential characteristic of this money, it should be noted, is that except for price changes, it can be held without cost or gain. A second characteristic to be noted is that money is a stock, not a rate or flow per unit of time. Thus it is not of the same dimension as the supply and demand quantities discussed above. We may have, say, \$130 billion of money in the economy and a national income or output of \$400 billion per year (or \$33 billion per month or \$8 billion per week).

Further, it should be noted that while money has no cost or gain attached directly to its holding, aside from price changes, it does have what is called an opportunity cost, which is the value of the opportunity the holder of money for any given unit of time foregoes, as a result of not using his money during this period. Thus a person that holds \$100 from January 1 to February 1 may be thought of as foregoing the interest he would have received on a bond or loan, the yield (or capital appreciation) on an equity (or the profit on a capital good he might have owned directly), or the extra satisfaction from consumption that he might have enjoyed in January instead of in February. He will not hold the money unless the value to him of having the money in January (minus the inconvenience or cost, if any, of making a transaction) is greater than the value of the foregone alternatives. On the other hand, if additional money is worth more to him (again after considering the cost or inconvenience of transactions) than the alternatives indicated, the individual will borrow (or lend less), sell stock (or buy less stock) or reduce consumption in order to obtain more money.

Let us now suppose a situation of unemployment and less than full output, say employment of 60 million and output of \$400 billion when 70 million people want to work and could produce \$460 billion of goods and services if they were working, as indicated in table 1. Our stock of money may be \$130 billion and the price level may be stable at an index which we will call 100. What will be the effect of an increase in the quantity of money to say \$260 billion, or twice its former amount?

To answer this question properly we must first determine the manner in which the quantity of money is increased. If this is done by the monetary authority alone, that is by Federal Reserve open market purchases or other actions that bring about or make possible an increase in the quantity of demand deposits, we can expect some reduction in the rate of interest and general easing of the terms at which money can be borrowed. The result of this lowering of the cost of money is that the community will be ready to hold some of the additional money because its opportunity cost will be lower. But more important, those contemplating investment, particularly the acquisition of capital goods, will find at least some investment that was not relatively profitable at the previous, higher cost of money is relatively profitable now. Investment demand will thus increase. Suppose investment demand increases by as much as \$10 billion. Suppose further that State and local governments, considering the cost of borrowing in deciding upon school construction and other public capital expenditures, now see fit to increase their demand for goods and services. It would then be appropriate to reconstruct table 1, as follows:

TABLE 2.—*Hypothetical aggregate supply and demand functions after reduction in cost of capital stemming from increase in quantity of money*

Employment (millions)	Aggregate supply (billions)	Demand (billions)				
		Consumption	Investment	Foreign (net)	Government	Aggregate
70.....	\$460	\$280	\$70	\$5	\$90	\$445
65.....	430	265	70	5	90	430
60.....	400	250	70	5	90	415
55.....	370	235	70	5	90	400
50.....	340	220	70	5	90	385

Inspection of table 2 reveals that at the old level of employment of 60 million, aggregate demand will now be more than supply or output. Thus producers will increase output to meet the demand. When output is at \$430 billion, requiring an employment of 65 million, aggregate demand will be found equal to supply and we will be at "equilibrium".¹ Thus the effect of our increase in the quantity of money by 100 percent was to raise income and output by some \$30 billion, a substantial increase, but one of less than 10 percent.

¹ This equilibrium would involve the "money market" as well, for the increased income would have also generated exactly enough increase in the demand for money so that, at the lower rate of interest or opportunity cost, the community will now be content to hold the increased supply of money.

While the exact magnitudes of effect are arbitrary at this level of analysis, the chain of relations can be sketched in detail. The Federal Reserve action increasing the quantity of money, and consequently easing the terms at which money can be obtained, lowers the rate of interest or the "cost of capital". This in turn stimulates investment demand, both public and private. (To the extent consumers borrow to "invest" in durable goods consumption may also be raised. Or it may be preferable to subsume this in "investment" as is generally done with residential housing construction.) As the increase in investment and Government demand eventuates in increased capital expenditures, those producing the increased amounts of capital goods are earning additional income. As they spend part of this additional income, consumption rises. Thus the increase in the quantity of money and easing of credit may be said to have induced an increase in capital expenditures (public and private) of \$15 billion, and by the operation of the "multiplier" this in turn brought about a further increase in consumption demand, and hence of output, of \$15 billion.

Had the quantity of money been increased in such a fashion that there were a net gain in the assets of the private sector of the economy one might have expected some further increases in demand. It should be realized that by open market operations the Federal Reserve is giving the community more money but taking from it bonds or other securities of equal value. Thus, aside from some possible increase in the value of bonds and other securities outstanding, the community is no better off, having merely exchanged assets in the form of bonds or notes for assets in the form of money. However, suppose the money supply is increased by means of a Federal budget deficit. In this case it is simple for appropriate Treasury and Federal Reserve policy to bring about an increase in the quantity of money held by the public with no corresponding decrease in other assets. The typical consumer might then find himself in a position where with increased wealth in the form of cash balances in his possession he feels less need for additional savings. He would thus save less out of his current income. This would imply that aggregate consumption for any level of total output or income (aggregate supply) would be higher. It is conceivable that this increase in assets would bring about the situation depicted in table 3.

TABLE 3.—*Hypothetical aggregate supply and demand functions after reduction in cost of capital and increase in assets stemming from increase in quantity of money*

Employment (millions)	Aggregate supply (billions)	Demand (billions)				
		Consumption	Investment	Foreign (net)	Government	Aggregate
70.....	\$460	\$295	\$70	\$5	\$90	\$460
65.....	430	280	70	5	90	445
60.....	400	265	70	5	90	430
55.....	370	250	70	5	90	415
50.....	340	235	70	5	90	400

Table 3 reveals that as a result of increased consumption demand stemming from increased assets held by the private sector of the economy, the equilibrium level of output is raised by another \$30 billion, to a total of \$460 billion. By the coincidence of our assumptions this happens to be the output which would be produced if all 70 million wishing to work were in fact employed. However, there is no necessary reason why the asset effect of a doubling of the money supply should prove just sufficient in its additional contribution to demand to bring us to the point of full employment. What our analysis should make clear is that conventional monetary policy, as practiced by the Federal Reserve and the banking system, will not have as great an effect on demand as manipulations of the money supply which make use of fiscal policy and involve a change in the net worth of the private sector of the economy.

It may be well at this point to make clear what is lurking within the system to bring about various possible effects of changing quantities of money. Economists usually write that consumption, while relatively uninfluenced by the rate of interest may be somewhat affected by the real value of private assets in the form of money and Government bonds—assets in other words, which do not have corresponding private liabilities. Investment is considered to be affected par-

ticularly by the rate of interest, but to a limited extent. It is frequently argued that investment demand is not very interest "elastic." What this means is that producers are much concerned with expected profits on investment. If this is high they will invest; if it is low they will not invest. But the variations in the rate of interest or cost of capital are relatively small compared to the variations in the rate of expected profit on investment. Thus, in a time of recession no possible reduction in the cost of capital may induce any major increase in investment, in the face of very low, probably negative, expected profits on investment. On the other hand in times of prosperity it may prove very difficult to raise the relevant cost of capital sufficiently to choke off much investment, as expected profits on investment will generally appear very high.

But the rate of interest itself must be equal to the amount necessary to induce holders of money to hold no more than the amount of money actually in existence. If the amount of money in existence is small relative to the price level, holders of money will find it relatively valuable and will require a high rate of interest to induce them to refrain from accumulating more money rather than lending it out. As the quantity of money is increased, the community finds that the marginal value of holding money is decreased and money can be had at a lower rate of interest.

The critical question in all this is how much the rate of interest will be reduced by increasing the quantity of money. In answering this question we must realize that the relevant rate of interest is something that measures the cost of capital to the firm and this would be related essentially to the yield on long-term securities. But one cannot expect an unlimited fall in this rate or yield in response to increases in the real quantity of money. For one thing, the rate of interest clearly cannot fall below zero. Since there is no cost to holding money there can be no point to lending money which we know will be returned only in lesser amount after a period of time. But even further, it is reasoned, as the rate of interest becomes lower than it has usually been in the past and hence lower than many people expect it to be in the future there is an increasing demand for money for what has been called speculative purposes. This involves simply the tendency of people to hold money rather than long-term bonds if they expect that the rate of interest may rise. For if the rate of interest rises, existing bonds, paying a fixed amount, will fall in value and their holders will suffer substantial loss, one likely to be much greater in amount than the interest forgone by holding cash until the rate of interest does raise.

These two factors, the relatively high elasticity of the demand for money with respect to the interest rate, which limits the amount that the rate of interest on long-term bonds can vary, and the relatively low elasticity of investment demand with respect to the rate of interest, which narrowly limits the amount that investment demand can be expected to change with respect to any given change in the rate of interest, combine to reduce the role of monetary policy in affecting the level of demand. Thus use of the income-expenditure approach, together with our estimates of how the interest rate responds with respect to changes in the quantity of money and how investment demand responds to changes in the interest rate, lead economists to the notion that monetary policy can be useful in influencing the level of demand, but that it is not likely to be sufficient if major effects are required.

The problem is indeed compounded when we consider these relations in time of depression. At this point the lack of investment demand and the general low in economic activity may be expected to make available large amounts of "idle" cash. But to the extent the rate of interest has consequently fallen it is clear from our analysis above that increases in the quantity of money are likely to add more to "idle" cash than anything else. For the already relatively low rate of interest (as well, probably, as the scarcity of high quality investment opportunities) would make the recipients of the increased cash reluctant to give it up. There would be little or no further fall in the rate of interest or cost of capital and hence little or no increase in investment or output. Any increase in the quantity of money under these circumstances would be absorbed in a further decline in the "velocity" of circulation of money, a depression phenomenon recognized by economists of all schools and persuasions.

While these difficulties of conventional monetary policy in times of depression are fairly well recognized, two corresponding problems in time of inflationary booms are not as generally perceived. In time of inflation one would expect a monetary authority to attempt to reduce demand by reducing the quantity of money. It would be successful to the extent that it raised the

rate of interest and this rise in the rate of interest reduced investment demand. But to the extent it raises the rate of interest does it not strengthen the general view that low rates of interest cannot be considered normal? And have we not observed above that it is precisely this view on the part of the public that limits the possibility of lowering the rate of interest in order to increase demand during a depression? Hence action of the monetary authority to raise interest rates during a period it judges "inflationary" reduces its ability to raise demand by reducing interest rates in a depression.

But a second difficulty which is only recently receiving substantial attention is that the monetary authority controls essentially the quantity of money that we have defined, currency, and demand deposits. In a time of boom, it may well be argued that reductions in the quantity of money so defined can have only a limited effect in raising the rate of interest or the cost of capital. For modern business corporations are in a good position to accelerate the "velocity" of money by borrowing from insurance companies or other nonbanking financial institutions. Further, they may simply create their own credit. Rather than pay an exorbitant rate of interest for money most of us may be happy to use I O U's of General Motors or A.T. & T. to pay our debts. After all, money is only an I O U, usually of a bank. Large American corporations are as reliable debtors as most banks.

This existence of money substitutes which reduce the monetary authority's ability to alter the effective cost of money may perhaps be seen in extreme form by considering what might happen to economic activity in a period of inflation if the monetary authority were to reduce indefinitely the supply of nickels. Surely none of us would be willing to pay any premium in order to possess nickels (except perhaps as a collector's item). For, simply enough, dimes and pennies would be available as substitutes at such trivial extra inconvenience that it would be most uneconomical to pay any higher rate for nickels than the cost of obtaining dimes and pennies. Now essentially the same thing applies with respect to money generally. Money is certainly a convenience to have around but rather than pay any great amount for the privilege of having money, as we have defined it, we should certainly keep our wealth in the form of savings deposits, government bonds, and other monetary and nonmonetary assets. With money expensive to hold for transactions purposes it would pay all of us to resort more and more to charge accounts. Trade credit would grow and eventually, if the monetary authority continued to make money unavailable, we might expect United States Steel to pay its workers and suppliers with claims on automobiles which it had received from General Motors in payment for steel. Ultimately therefore, the rate of interest could not be raised beyond the price at which we were willing to make resources available for investment, plus the modest added cost to firms of having to utilize money substitutes instead of money.

4. The role of prices

Thus far our analysis has been conducted almost exclusively in real terms. We must now recognize that while real effects are our ultimate concern, in a monetary economy such as ours demand is expressed in money terms and how much any money demand is in goods and services depends upon prices. Thus, for example, a doubling of the quantity of money by the monetary authority may increase aggregate demand in money terms by \$30 billion but the important question remains: How much of that \$30 billion will result in an increase in output and how much will be spent merely in an increase in prices?

This depends on what happens to costs as demand and possibly output change. In regard to decreases in money demand when we start from a position of stable prices there is considerable evidence that many costs, and particularly wage costs, are inflexible in a downward direction. This has been taken by some to be in fact the explanation for the development of unemployment in the face of a decline in money demand. The argument of most of those using the income-expenditure approach, however, is that a fall in wages and money costs in the face of a fall in money demand would not prevent the development of unemployment. For as wages fell generally, and hence costs fell, all prices would fall. Consequently incomes would fall, including both wage and profit income and there would then be a further fall in money demand. The only conceivable gains from this general fall in wages and prices would be: (1) those that might develop from the change in the distribution of real income

and wealth in favor of those with income and wealth more or less fixed in money terms; (2) the increase in demand occasioned by any drop in the rate of interest resulting from an increase in the real quantity of money (nominal quantity of money deflated by the price level) if the nominal quantity of money were kept from declining as fast as prices; and (3) the increase in the real value of net assets of the private sector (Treasury currency and Government bonds) resulting from the failure of these net assets to decline in money terms as fast as the price level. It seems reasonable to argue that the first of these gains is entirely uncertain and might well be negative, in that the gainers from any change in the real distribution of income and wealth may in fact have a lesser propensity to spend (demand) than the loser. The second gain may be limited for reasons discussed above but to the extent it does occur it may just as well be accomplished by an increase in the nominal quantity of money as by a decrease in wages and the price level. A similar argument applies to the third possible gain and here, even more so than with the interest rate effect just discussed, it is doubted that the magnitude of gain could amount to much for any reasonably conceivable drops in the price level.

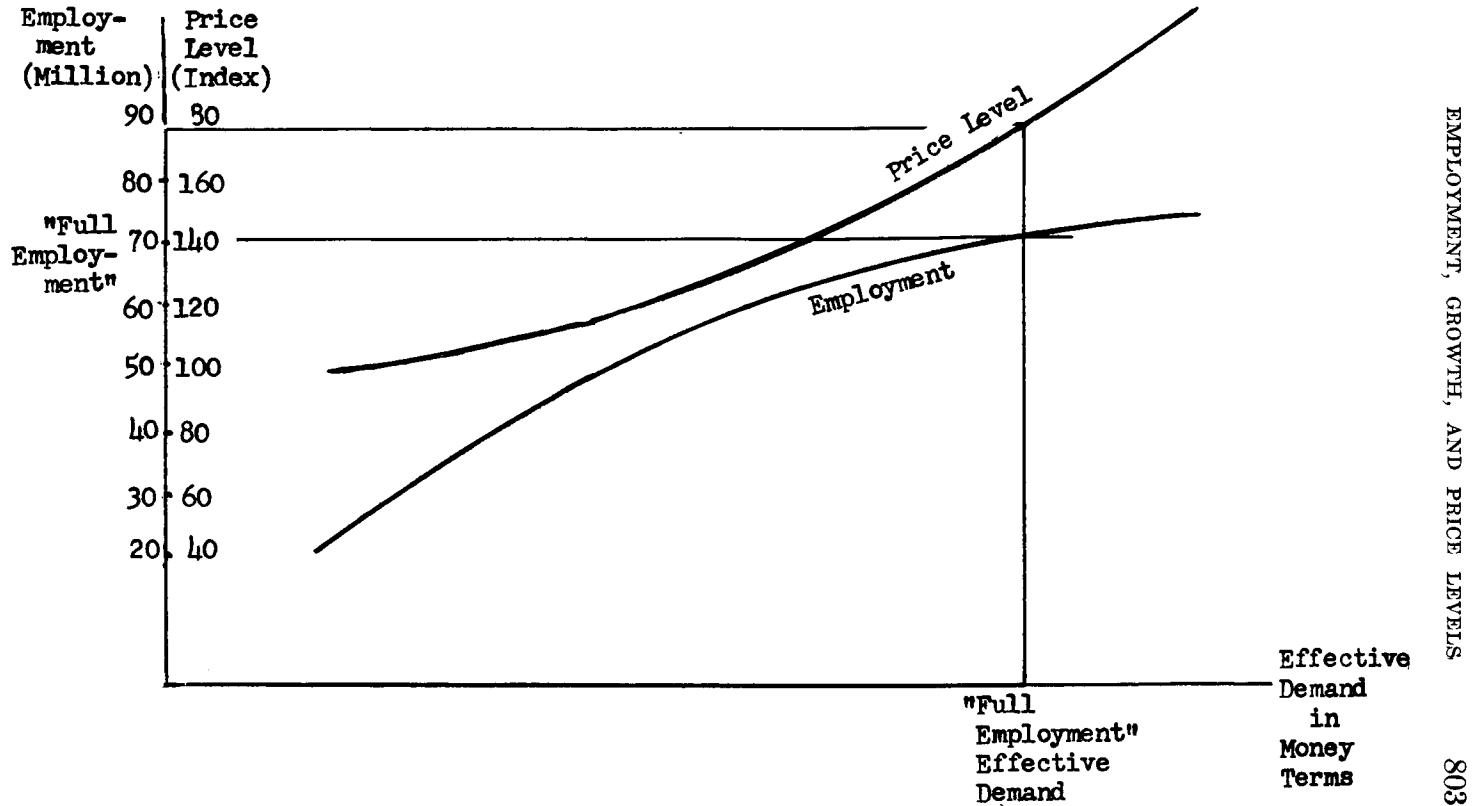
While it is felt that these possible gains are doubtful or small at best it would appear that the losses from any free fall in wages and prices in response to a fall in money demand might well prove disastrous. In the first place, a substantial fall in prices would give debtors and others with obligations fixed in money terms a greatly increased burden. This might bring about bankruptcies and general, consequent dislocations of production. And second, falling prices are likely to generate expectations of a continuing fall in prices. Then there would be a tendency to postpone purchases (and speed up sales), which would further reduce demand.

Thus it is fairly generally agreed among economists that although in fact wages and prices are not flexible in a downward direction, if they did fall freely in a depression matters would be likely to be worse rather than better. What, however, about their tendency to move in an upward direction, a matter which has received a great deal of publicity in recent times?

Let us at this stage consider again the situation depicted in table 1, above. We have an equilibrium level of output and demand of \$400 billion, which entails employment of only 60 million and unemployment of 10 million. Suppose we now increase the money supply as suggested earlier. To the extent that this succeeds in increasing aggregate demand in money terms, and it should be recalled that this effect may well be seriously limited, will prices rise? The answer would be, "Probably yes, but not by much." The point here is simply that any increase in demand, whether brought on by an increase in the money supply or by any other means, public or private may cause some increase in prices. This is one proposition that is true for the individual firm, the industry, and the economy as a whole. An increase in demand tends to increase prices. The increase in prices, along with a decline in inventories is indeed what "signals" producers to increase output. But it is also true for the individual firm, the industry and the economy that when there is much excess capacity it is likely that output will expand considerably with a relatively small increase in prices. Only when capacity is pretty well utilized will further increases in demand generate substantial increases in prices.

Thus there may be no level of unemployment or excess capacity such that economists can say that any increase in demand at this point will have no effect on prices. Similarly, there may be no level of prosperity such that economists can say that at this point an increase in demand will influence only prices and will bring about no increase in output. Rather, there is a more or less continuous function relating demand, the level of employment, and prices. Starting from a low level of employment, increases in demand are associated with substantial increases in employment and relatively small increases in prices. As the level of demand rises, further increases in demand bring about larger increases in prices and smaller increases in employment (and consequently output). This may be presented graphically in figure 1, below.

FIGURE 1



EMPLOYMENT, GROWTH, AND PRICE LEVELS

In figure 1, I have suggested this possibility that increases in effective demand beyond the point of full employment may continue to increase the level of employment (and probably consequently the rate of output). I base this on the notion that there are many—particularly women, members of minority groups, and those in the retirement ages—who are not generally in the labor force and would not be working under conditions of full employment but who would be working if effective demand were such as to continue to bid up money wages after the full employment point had been passed. However, aside from this particular issue which I personally would consider of some importance, it would be argued by most economists that once full employment is reached further increases in money demand can bring about only an increase in prices and no further increase in output.

It is important to remember throughout that it is not the increase in the quantity of money per se that brings about an increase in prices. If all recipients of additional money were to put it under their mattresses or in some other manner prevent it from influencing their spending or demand it would have no effect upon prices. It is rather the increase in demand that brings about a varying degree of price increase. But this price increase would occur with an increase in demand however induced, with or without an increase in the quantity of money. Thus, if taxes were cut or Government expenditures increased or business got optimistic and decided to spend more, or consumers went on a buying spree, even if money did not increase in quantity, prices would rise because of the increase in demand. In any of these instances, prices would rise more the less the excess capacity and unemployment.

There are here an anomaly and problem for policy that go well beyond the matter of money. It is that in order to increase employment and output we must have an increase in demand, but increases in demand tend, increasingly, as we near full employment, to increase prices. On the other hand, in order to reduce prices, or perhaps even to halt a rise in prices, we have to restrict or check demand. But a restriction of demand will not only hold down prices; it will also hold down output and employment.

While there are various measures, such as the removal of tariff barriers and other impediments to international trade and efficient specialization, the elimination of agricultural price supports, excise taxes and sales taxes and the refusal or reduction of legislative support of monopolistic restrictions and price fixing, which tend to reduce prices or prevent their rise, it cannot be blinked that the essential cause of high or rising prices is high or rising demand. And no economist can honestly guarantee that measures to choke off demand will not affect adversely both employment and output. To some extent the choice of stable prices over high employment and output is one that should be made or rejected by the people, regardless of the views of economists. But the choice should be made by the people with the benefit of the best information that economists can make available as to the nature of their choice. One point in particular looms very large and must be borne in mind. That is that general price changes are essentially problems of distribution, in which some people may be better off and some people may be worse off but the economy as a whole is substantially unaffected. Thus if 70 million people are working, their total output will be pretty much the same regardless of whether prices have been stable or have been rising at a rate of 2 percent or 5 percent per year. But if employment is only 60 million, output will be very much less, no matter what the trend in prices. Thus economists are constrained to remind the people, while still leaving the choice to them, that rather than cut employment to 60 million with its general loss in output, it should be possible to set up appropriate institutional arrangements so that those (perhaps fewer than we realize) who are really suffering from inflation can be reimbursed out of the extra output of the 10 million extra people working when demand is high enough to bring about rising prices. The particular form of these arrangements—for example, government bonds and social security payments geared to the price index, private insurance and pensions based upon investment in equities which could rise in value with the stock market—need not be specified in detail here. But it certainly is possible to have all of the people better off with the output of 70 million than the output of 60 million, regardless of the movement of prices.

5. The role of growth

In much recent discussion, economic growth has been held up as the end of economic activity. Paradoxically, whether desirable or not in itself, growth

is inextricably interwoven with the problems of employment, output and prices with which we have been concerned.

Indeed, our analysis thus far has, in its abstraction from growth, been essentially inconsistent. Without the existence of economic growth much of our demand, particularly investment demand, turns out to be without foundation. Yet once growth is admitted into the analysis it becomes improper to assert, for example, that a rate of output of \$460 billion is produced under conditions of full employment. If this is so for one moment of time it cannot, under conditions of growth, be true for the next. For in the next moment, 70 million people will be able to produce at a faster rate than \$460 billion per year and, what is more, more than 70 million people will be wanting to work.

The paradox of our economy is that growth is not only desirable, by most standards; it is necessary if we are to prevent serious unemployment. The reason for this can be seen fairly readily within the framework of the income expenditure approach. Examining the issue in the context of table 1, we note that under conditions of full employment we would require an aggregate demand at the rate of \$460 billion per year. If consumption, foreign, and government demand were as indicated in table 1, we should then require an investment demand of \$90 billion. But the investment that would be demanded to replace plant and equipment wearing out would hardly be more than \$40 billion. This "replacement" it should be remembered, would embody all of the latest technological advances and it would not be proper to attribute any major additional investment demand to technological change. But where then might the additional \$40 or \$50 billion of investment demand, some 10 percent of output, come from? The answer is that if the demand is to be forthcoming it must come from producers who need additional plants and equipment and goods in process in order to increase capacity to meet an expanding demand for their products. A major part of the investment demand necessary to sustain a high level of output must be based on actual or anticipated increases in output.

We may even get some crude notion of the amount of growth necessary to sustain full employment. It is probably not a bad estimate, for purposes of illustration, that it takes about \$3 of capital goods, on the average, to produce \$1 of output in a year. This would mean that an additional output of some \$15½ billion would require additional capital goods to the amount of \$46 billion. Additional output of \$15½ would constitute an increase of some 3½ percent. Generalizing, if net saving at full employment constituted 10 percent of output—and this is probably a conservative figure—we would require a 3½ percent annual rate of growth of output to sustain full employment.

What if output grew less rapidly? The results can be presented in rigorous mathematical fashion but they may be seen readily with just a bit more of arithmetic. Suppose output grew at only 1½ percent per year. Then we find that that investment demand to provide the required additional capital amounts to only 5 percent of output (\$3 of additional capital for every dollar of additional output). But now if we continue to assume that about 10 percent of output is necessary for replacement of wornout and obsolete capital goods we find that, at an output of \$400 billion, investment demand would total some \$40 billion for replacement and \$20 billion for expansion or the total of \$60 billion which would just be sufficient to give an aggregate demand of \$400 billion. Thus the lesser rate of growth would be sufficient to sustain only a lesser investment demand and hence a lesser level of employment. The relationship between growth and employment, one can begin to see, runs two ways. More rapid growth causes a higher level of employment at any moment of time. But it is certainly true, and this kind of analysis should make this all the more clear, that higher levels of employment imply a higher rate of growth. For the higher the level of employment the higher the level of output. And the higher the level of output the more, other things being equal, will be saved, that is, will go into additional capital goods. These capital goods will expand capacity. The faster the rate of addition of capital goods the faster the rate of growth of capacity.

For example, if with full employment and full utilization of capacity an economy devotes 10 percent of its output to capital accumulation or investment in human skills and if each dollar of such output is accompanied by an increase in productive capacity of 40 cents per year it is a matter of simple arithmetic to demonstrate that, as long as that economy maintains full employment and full utilization of capacity, it will grow at a 4 percent rate. But now suppose that this same economy, operating at only 90 percent of full employment and 90 percent of capacity, concentrates on using its diminished output

largely to attempt to maintain its standard of living. Then it might devote only, say, 5 percent of its reduced output to capital accumulation and investment in human skills. If each dollar of such output is still accompanied by an increase in annual capacity of 40 cents, our arithmetic reveals that the economy will now limp along at a rate of growth of 1.8 percent, less than half the 4 percent full employment rate.

I explore some of the possible relations between the level of employment and the rate of growth in more general, somewhat mathematical terms in "Under-employment Equilibrium Rates of Growth," *American Economic Review*, March 1952, pages 43-58, which I should like to make available for the record. Much remains to be done to estimate in reasonably precise fashion the relation between the rate of growth and employment. But there can be no question that the two are positively related. I have every reason to reiterate my conclusion in that article: "The attainment and maintenance of full-employment equilibrium in growing economies is * * * the problem of raising the rate of growth of income and/or reducing the rate of growth of productive capacity at levels of full employment" (p. 57). If for reasons of public policy we reject the latter possibility (which might be realized by increasing consumption at the expense of capital accumulation, research, and education), then full employment becomes all the more dependent upon adequate growth.

A critical issue that has exercised economists is whether we can be sure that the economy can grow at a rate sufficient to generate an investment demand equal to all the saving that will be forthcoming at full employment. If it cannot, we will find full employment beyond our reach, except perhaps for sporadic booms, unless the Government takes some measures to reduce saving or change the growth-employment relation. I have discussed this issue in fairly rigorous mathematical terms in *On Growth Models and the Neoclassical Resurgence*, *Economic Journal*, pp. 707-721, and should like to offer this too for the record. I may, however, indicate here some of the implications of that discussion.

First, it is possible that for a particular consumption function and rate of growth of the labor force there is no attainable growth in output in a free economy that would, with a stable price level, generate sufficient investment demand to absorb full employment saving. However, the very nature of the underlying relations suggests a number of measures, both of fiscal and monetary policy, that could ease or eliminate this problem where it exists. The Government might, by appropriately redistributing income, reduce saving. It might rather operate, however, to maintain saving, while raising public or private investment demand.

Public investment can be undertaken, whether in human skills (education) or roads or other public projects without regard to the profit motive. Private investment demand can be increased by bringing about more capital intensive methods of production. This might be achieved either through research-induced changes in the production function or by changing the tax structure or lowering the cost of capital (rate of interest). If, as a consequence, longer lived capital is employed in production we may find, for example, that an increase in annual output or capacity of \$1 requires an increase in capital, or investment, of say \$3 instead of \$2.50, as was implied in our examples above. This would mean that an economy with net saving equal to 10 percent of output might require a rate of growth of 3½ percent instead of 4 percent to maintain full utilization of capacity and full employment.

Conversely, if the monetary authority keeps money relatively tight and the rate of interest is consequently higher and the cost of capital more, one would expect production to be carried on in less capital intensive fashion. One would then require a higher rate of growth to maintain full employment, but this also implies that, other things being equal, a more rapid rate of growth could be obtained with a given rate of saving and given techniques, if measures were also taken to keep demand sufficiently high in the face of the high interest costs.

Economic growth has a number of other implications for the issues of money and prices with which we have been concerned. It is apparent, for example, that if output is to grow from year to year and we are to recognize the institutional factors that prevent and probably make undesirable a fall in prices, the quantity of money should grow at at least the same rate as output. For if the quantity of money grows less rapidly, we may expect a rise in the rate of interest and a downward pressure on demand which will inhibit growth.

In the last analysis we find ourselves in an Alice-in-Wonderland world in which we have to run to keep in the same place and in which to get anywhere we have to run twice as fast. The reason for this is that aggregate demand

depends in significant part on its own rate of growth. If the growth in aggregate demand slows or ceases, investment demand (which is largely induced by the need for new capital to provide for growth) shows an absolute decline. For investment demand to remain merely a constant percent of total output, effective demand must be growing at an increasing obsolete rate—a constant compound interest rate if the saving ratio and other relations remain unchanged.

The implications of this for Government policy are such that while rising prices may or may not be an aid in maintaining demand—I rather believe that they are an aid, for reasons suggested in part above—the measures necessary to keep demand growing at a constant compound interest rate and to keep demand and output always at or close to the full employment level are such as to make rising prices a likely byproduct. Growing demand, particularly where it is pushed unrelentingly by Government monetary and fiscal policy, is likely to raise prices. Recall that in our economy higher prices are precisely the signal and lure which induce producers to increase output. What is more, unemployment and excess capacity are the chief downward pressures upon prices. If the economy is kept at or close to full employment (as I believe it should be) we are denied these downward pressures and we may well find the increasing rate of demand, however much desired and necessary, tending to pull up prices as well as output.

6. Conclusion

The income-expenditure approach requires that any presumed effects of economic variables and actions upon the levels of employment, output and prices be shown to operate through aggregate supply and demand functions of the sort here presented. This approach proves particularly useful in analyzing the role of present or proposed governmental policies. Will a cut in personal income taxes raise the consumption function? What kind of a tax cut will have the greatest or most rapid impact? Will permitting faster depreciation for tax purposes raise investment demand? What will the effect of tariff cuts be upon consumption and upon foreign demand? Will a general wage increase in a large industry influence any of the aggregate demand functions? For each of these questions economists employing the income expenditure approach have at least been shown where to look for answers. Indeed, the questions themselves have frequently only been perceived within the framework here presented. And in many cases we are able to give clear and useful answers.

In evaluating the role of money we apply the same test as we would with any other variable. If the quantity of money influences the levels of employment, output and prices this influence must be demonstrable in its effects upon the aggregate supply and aggregate demand functions. When the role of money is analyzed in this fashion we find that its likely effect on supply in real terms is virtually nil. Its effects upon demand can be significant, but these effects are likely to be much more limited than has been suggested by application of older, crude "quantity theories of money," a matter which I shall discuss in more technical terms in "A Note on Money and Prices," which follows this paper.

A NOTE ON MONEY AND PRICES

Old ideas die hard, perhaps, as has been written provocatively, because "in the field of economic and political philosophy there are not many who are influenced by new theories after they are 25 or 30 years of age."² But what is more, old ideas not quite dead are sometimes revived to lead inappropriately influential lives.

I have the impression that the notion is gaining ground that, after all, a fairly simple quantity theory of money does explain or predict adequately the level of prices. Allegedly impressive statistical data are presented indicating that in various periods in various countries time series indicate high correlations between the nominal quantity of money and prices or money income. (Sometimes correlations are noted between money and real output or consumption, as well, but this is outside the scope of the current note.) I have no desire to question the accuracy of such statistical calculations. Indeed these results are certainly what one would expect from a general theory of money, prices, income, and employment. But somehow these results seem to be interpreted, explicitly or im-

² J. M. Keynes, "The General Theory of Employment, Interest and Money" (New York, Harcourt, Brace & Co., 1936), pp. 383-384.

plicitly, in accordance with the boldness and degree of sophistication of the author, as "evidence" that the "income-expenditure" approach and its associated fiscal policies are useless, misguided and bad while the "quantity theory of money" is an appropriate guide to explanation and policy. I should like to clear the air by presenting a simple if extreme problem which gets to the heart of the real controversy. I shall also present a solution to this problem which should be unquestionable to any unprepared to make extreme (unreasonable) assumptions about the world.

Let us assume an economy whose operations can be described in the following familiar set of functional relations and identities.

Consumption function

$$C=C(Y, i, M) \quad (1)$$

Investment demand function

$$I^D=I^D(Y, i) \quad (2)$$

Liquidity preference function

$$M^D=M^D(Y, i) \quad (3)$$

Saving-investment demand equilibrium

$$I^D=I \quad (4)$$

Money market equilibrium

$$M^D=M \quad (5)$$

Output identity

$$Y=C+I+G \quad (6)$$

Money-price identity

$$M=\frac{Q}{P} \quad (7)$$

We assume further that G , the level of real government expenditures on goods and services, and Q , the nominal quantity of money, are exogenously determined. This leaves us eight unknowns with only seven equations. But our neoclassical heritage comes to the rescue; we assume that employment is determined by the supply and demand functions for labor which are respectively related to the real wage and the marginal product of labor. Output, Y , is then determined by the production function, the given stock of capital and (full employment) equilibrium utilization of labor. We further assume that our seven equations are consistent. Thus it is now possible for the price level, P , to adjust so that we get a real quantity of money,³ M , equal to a demand for real cash balances, M^D , consistent with a rate of interest, i , which will generate a rate of consumption, C , and investment demand, I^D , which with the equilibrium condition that investment demand equals investment, I which is identically equal to saving), will give us a total output, Y , equal to the full employment level of output.

We have thus ruled out as nonexistent or irrelevant the Keynesian liquidity trap, asserting in effect that if there is such a floor to the rate of interest, the full-employment rate of interest, at the moment of time described by our functional equations, is above this floor. The only parametric assumptions we make

³ In order that we may consistently use the same " M " in relation to liquidity preference (3) and the cash balance effect (1), we can assume that all money is Treasury currency and that there are no Government bonds held by the private sector of the economy.

are those indicated by the following signs of partial derivatives, assumptions with which I believe few will wish to quarrel:

$$C_Y > 0 \quad (1.1)$$

$$C_i \leq 0 \quad (1.2)$$

$$C_M \geq 0 \quad (1.3)$$

$$I_Y \geq 0 \quad (2.1)$$

$$I_i < 0 \quad (2.2)$$

$$M > 0 \quad (3.1)$$

$$M_i < 0. \quad (3.2)$$

We have thus assumed practically that the elasticities with respect to real income of consumption, investment demand and the demand for money are positive, and the corresponding elasticities with respect to the rate of interest are negative, with the consumption-interest and investment-demand-income elasticities even permitted to be zero. We might actually make somewhat less sweeping assumptions, but those above should be generally acceptable and simplify the argument. There is one crucial assumption, however, to which the rigid (but not the sophisticated) quantity theorist may object, that is, that $M_i < 0$. He would presumably insist that M equals zero, that is that the demand for money is a unique function of income (even a linear function, at that). But as we shall see, it is only on the basis of such insistence (or some arbitrary assumptions about movements of our functions) that he will be able to reject our results.

Armed with this system, let us ask what consequences may be expected from an increase in the Government's real expenditures on goods and services, with no increase in taxes but open market operations which will keep the nominal quantity of money constant in the face of the resultant budget deficit. Imagine, if you will, that the Government decides to arm, develop, or educate to the amount of, say, \$50 billion per year and that the Federal Reserve banks execute appropriate open market operations or reserve requirement policies to keep the relevant quantity of money constant.⁴ What will happen to the price level, P ? The strict (or "crude") quantity theorist would argue that since the quantity of money is unchanged, prices will not change. Let us see.

First we note that since Y cannot rise above its full employment value, an increase in G must mean a decrease in C and/or I , which at equilibrium must mean a decrease in C and/or I^p . But if Y cannot rise, leaving aside the "Pigou effect" (1.3), C and/or I^p can be decreased only by an increase in i . So far we are really quite classical. Considering G as a form of investment, we are merely saying that an increase in one form of investment is balanced by a decrease in other investment and increase in saving, both of which are induced by a rise in the rate of interest.

However, now we note equations (3) and (3.2). A rise in the rate of interest must reduce the demand for real cash balances. Without invoking any peculiar Keynesian speculative motives, we may rest this aspect of the argument merely on the idea that the opportunity cost of holding resources in the form of cash is the interest foregone. The higher this cost the less idle cash balances we shall wish to hold. But the demand for real cash balances depends only upon income and the rate of interest.⁴ Since income cannot go up, the change in the demand for real cash balances can reflect only the rise in the rate of interest and must be negative. Then equilibrium in the money market can be maintained only if the real quantity of money in existence goes down. With the nominal quantity of money held constant it is clear that the real quantity can be reduced only by a rise in the price level.

⁴ Ignoring, in this context, the role of assets, including assets of cash balances.

Now if we consider (1.3) we find something of an inverse of the "Pigou effect" in that a rise in prices can be the means of reducing real consumption directly, without relying upon an indirect effect via the rate of interest. For with the nominal quantity of money, Q , fixed, a rise in prices means a fall in M , the real value of cash balances, and a consequent decline in real consumption. To the extent this cash balance effect is operative the interest rate will not have to move as much. Also, for any specified increase in G and given values of C_t , I_t , and M_t , the greater is C_t the less will P have to rise to preserve equilibrium. But P will still have to rise.

If the reader is a quantity theorist and wonders where his theory has gone astray, the answer is quite clear. He should have been stubborn and refused to concede equation (3.2), making the demand for money vary inversely with the rate of interest. And yet does this not indicate convincingly the weakness of his position. Who can seriously argue that people will be totally impervious to the rate of interest in deciding how much of their money to keep in non-interest-bearing cash? After all, holding cash in any form is a matter of convenience (which of course in the limiting case becomes virtual necessity) and should not the quantity demanded of this convenience, like all other conveniences, vary inversely with its price? Or is money to be the one great exception to that great classical contribution—the law of demand?

But once we concede that the demand for money varies inversely with its cost—the rate of interest—we can reject the conclusion of this analysis only by objecting to the stability of functions (1), (2), and (3). We could, for example, argue that consumption, investment demand, and the demand for money are not the given, specified functions of income and interest we indicate but depend as well on some other factor, say expectations, which are affected by variations of G . That in fact these variables are not unique functions of income and the rate of interest and are rather affected by expectations—and many other factors—nobody would deny. But can we assert that it is likely that an increase in Government expenditures financed in such a way as to keep the quantity of money constant would generate changes in expectations or other factors of such a nature as to lower consumption and investment demand by as much as or more than the increase in Government expenditures? Or can we assert that the rise in the rate of interest would generate such a change in the liquidity preference function that the same quantity of money or more is demanded at the higher rate of interest as was previously demanded at the lower rate?

I suppose these possibilities cannot absolutely be ruled out. People did argue that Government expenditures in the thirties were discouraging private investment, perhaps in the view of some by more than the amount of the Government expenditures. It is conceivable that a rise in the rate of interest would generate expectations of a further rise in the rate of interest or might be accompanied by expectations of price declines brought on by tight money in some sectors; either of these factors could increase the demand for liquidity.

But I should think that not many would consider these possibilities generally likely. Hence we are left with the conclusion that a constant quantity of money is not a sufficient condition for the maintenance of constant prices. And of course, to the extent we depart from our full employment assumption, an increase in output may be substituted for part or all of the increase in prices. In any event, this brief note should help make clear or remind us of some of the special assumptions or conditions necessary to validate statements that (1) the quantity of money uniquely determines prices and money income or (2) changes in the quantity of money are sufficient to explain changes in money income.

UNDEREMPLOYMENT EQUILIBRIUM RATES OF GROWTH

BY
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UNDEREMPLOYMENT EQUILIBRIUM RATES OF GROWTH

By ROBERT EISNER*

I.—Introduction: *Aggregative Theory Tackles the Problem of Growth*

There is evidence that the Keynesian revolution is moving into a new phase. After over a decade of discussion, the aggregative concepts of the determination of the levels of income and employment have become well-intrenched in the core of economic theory. "Saving and investment curves" and the approach which they symbolize have become the common property of the professional economic theorist and the college sophomore. But at this point an advance guard has plunged on. Harrod, Domar, Hicks and others have left behind the stationary equilibria of saving, investment and employment to lead us into a turbulent new world of growing economies.¹

In this new world a first casualty of the older Keynesian system is the wage unit. Measurement is now undertaken in terms of real output. Next, a new dimension is added to the aggregate supply function; productive capacity increases over time—that is, the zero elasticity portion of the curve of aggregate supply moves to the right as the economy grows. With these and other changes which will become apparent in the course of this article, it is possible to make secure certain gains of the first phase of the revolution and to afford new insights into the long-run determinants of employment. In furtherance of this latter objective, we shall offer new sets of schedules or curves of aggregate *growth* which may in some measure expose and clarify fundamental relationships of growing economies in the manner that our older schedules of aggregate *flows* of investment and saving revealed essential relationships of econ-

* The author is assistant professor of economics at the University of Illinois. He is indebted to Professors Evsey D. Domar and Fritz Machlup of The Johns Hopkins University for discussion of some of the concepts of this article when it was still in a formative stage. He has profited as well from helpful criticisms of a later draft by William M. Capron of the RAND Corporation and Professor C. Addison Hickman of the University of Illinois.

¹ Pertinent works by R. F. Harrod include: "An Essay in Dynamic Theory," *Econ. Jour.*, Vol. XLIX (Mar., 1939), and *Towards a Dynamic Economics* (London, 1948). Evsey D. Domar's works on growth include: "Capital Expansion, Rate of Growth, and Employment," *Econometrica*, Vol. 14, no. 2 (Apr., 1946), pp. 137-47; "Expansion and Employment," *Am. Econ. Rev.*, Vol. XXXVII, No. 1 (Mar., 1947), pp. 34-55; and "The Problem of Capital Accumulation," *Am. Econ. Rev.*, Vol. XXXVIII, no. 5 (Sept., 1948), pp. 777-94. J. R. Hicks has made Harrod's concepts an important foundation of his *A Contribution to the Theory of the Trade Cycle* (Oxford, 1950). These names, of course, while they represent early or prominent arrivals, far from exhaust the growing group of explorers in this field.

omies in stationary equilibrium. Development of these new curves of growth will, however, involve us in consideration (and perhaps some reconsideration) of the traditional functions of saving and investment upon which certain of the new curves will be found to depend.

We shall take as a starting point, and as a framework for much of this analysis, the intriguing algebraic models of Professor Domar on the relationship between rates of growth and levels of employment. Professor Domar has devoted much of his work to an examination of the rate of growth necessary for the maintenance of full employment. I shall, after presenting the Domar tools, essay to apply those tools and some others to a further demonstration of the underemployment implications of rates of growth less than the full-employment rate.

II.—Domar and the Full Employment Equilibrium Rate of Growth

Domar defines σ as the ratio of the change in productive capacity which takes place in an economy in any period to the change in capital stock (investment) which occurs during the same period.² He uses the symbol α for the proportion of income saved (invested). Thus, denoting investment by I , income by Y , and productive capacity by P ,

$$\sigma I = \Delta P, \quad (1)$$

$$I = \alpha Y, \quad (2)$$

and

$$\Delta P = \alpha \sigma Y. \quad (3)$$

Now if the maintenance of equilibrium requires either that excess capacity remain at zero (full employment: $Y = P$) or that the amount of excess capacity does not change ($Y = P - \text{constant}$), the equilibrium growth in income must equal the growth in productive capacity. Operating under the assumption, for purposes of simplification, that equilibrium involves full employment ($Y = P$), Domar finds that to maintain equilibrium, income (Y) must grow by the amount $\alpha \sigma Y$ in every period. Quoting Domar directly:

$\alpha \sigma$ is the equilibrium rate of growth. So long as it remains constant, the maintenance of full employment requires investment to grow at a constant compound-interest rate.³

² "Expansion and Employment," *op. cit.*, p. 40. The wording of this definition, it should be noted, is such that σ may well be a function of other variables than investment. In particular, increases in population which involved increases in the supply of labor would raise the value of σ .

³ "Capital Expansion, Rate of Growth, and Employment," *op. cit.* p. 141. Cf. "The Problem of Capital Accumulation," *op. cit.*, p. 781. The constancy of $\alpha \sigma$ will depend, of course, on the constancy of α , the proportion of income saved, and of σ , the productivity of investment, or on mutually counterbalancing changes in these variables. We shall abandon Domar's assumption that α is constant, in the course of our analysis. We shall, however, retain the assumption of a

If α remains constant as income changes, it must represent both the average and marginal propensities to save. For since

$$I = \alpha Y \quad (2)$$

differentiation reveals that

$$\frac{dI}{dY} = \alpha. \quad (2a)$$

However, according to the multiplier theorem, the change in income equals the change in investment divided by the marginal propensity to save. Thus,

$$\Delta Y = \frac{\Delta I}{\alpha} \quad (4)$$

and, dividing by (2) above,

$$\frac{\Delta Y}{\alpha Y} = \frac{\Delta I}{\alpha I} \quad (5)$$

or

$$\frac{\Delta Y}{Y} = \frac{\Delta I}{I}. \quad (6)$$

In words, the proportionate rate of growth of income equals the proportionate rate of growth of investment. In order to maintain an equilibrium rate of growth of income the economy must also, if α is constant, maintain the same rate of growth of investment. Under the assumption of Domar's model that equilibrium involves full employment, therefore, $\alpha\sigma$ is the equilibrium rate of growth of investment.

III.—*Underemployment Rates of Growth*

We must at this point modify Domar's formulation by declaring explicitly that $\alpha\sigma$ can be considered the equilibrium rate of growth only as long as full employment is considered a condition of equilibrium. In this connection, it must be pointed out that a wide range of economists have denied that full employment is an equilibrium condition. Marx argued that capitalism could not exist without a "reserve army of the unemployed." Keynes is perhaps most famed for his theory of under-

constant value of σ . It may be noted that among elements contributing to stability in the value of σ would be a constant rate of growth of the supply of labor. The maintenance of a constant value of σ in the face of irregular variations in the supply of labor would require counterbalancing changes in other determinants of σ such as technology and the marginal productivity of capital.

employment equilibrium. And most contemporary economists, one would suspect, feel that relatively "full" employment can be approximated in a private capitalistic economy only in exceedingly unstable periods of boom which would not be thought of as conditions of "equilibrium."

Developing further the underemployment element of the Domar system, we may state that if equilibrium involves a constant proportion of idle capacity, equilibrium demands that

$$Y = \theta P, \quad (7)$$

where θ is the "coefficient of utilization" or the per cent of productive capacity which is utilized.

Then, if we start from a position of equilibrium such that

$$Y_0 = \theta P_0, \quad (7a)$$

maintenance of equilibrium requires that

$$\Delta Y = \theta \Delta P \quad (8)$$

or

$$\Delta P = \frac{\Delta Y}{\theta}. \quad (8a)$$

But

$$\Delta P = \alpha \sigma Y. \quad (3)$$

Hence, substituting (3) in (8a), and rearranging terms,

$$\frac{\Delta Y}{Y} = \alpha \sigma \theta. \quad (9)$$

The equilibrium rate of growth, if equilibrium involves less than full employment, is thus $\alpha \sigma \theta$, where θ is the proportion of productive capacity utilized at equilibrium.

It is interesting to present these relationships in terms of Harrod's system of "dynamic economics" which considers expressly a concept of underemployment equilibrium in economies with rising levels of output. Harrod's G_w or "warranted rate of growth" is "that over-all rate of advance which, if executed, will leave entrepreneurs in a state of mind in which they are prepared to carry on a similar advance."⁴ Further, Harrod adds, G_w "in Keynesian fashion contemplates the possibility of growing 'involuntary' unemployment." Now, in Harrod's system a condition of equilibrium obtains when the actual rate of growth (G) equals G_w . Since to maintain full employment, on Domar's terms, the rate of growth must equal $\alpha \sigma$, a requirement for full-employment equilibrium

⁴ *Towards a Dynamic Economics*, p. 82.

for Harrod must be that $G = G_w = \alpha\sigma$. If a certain proportion of unemployment (slack resources) is the condition for putting "entrepreneurs in a state of mind in which they are prepared to carry on a similar advance," then G_w must equal $\alpha\sigma\theta$, where θ is again the utilized proportion of productive capacity, *i.e.*,

$$G = G_w = \alpha\sigma\theta. \quad (10)$$

This extension and application of Domar's concepts to Harrod's system reveals, then, that where the equilibrium level of employment is a constant proportion of full employment, the equilibrium or "warranted" rate of growth decreases as this ratio of the equilibrium level of employment to the level of full employment decreases. *The maintenance of full employment equilibrium demands a higher rate of growth than the maintenance of underemployment equilibrium.*

While Domar's mathematical demonstration of the outcome of any constant rate of growth, r , should be convincing to those who prefer such rigorous reasoning,⁵ arithmetic exploration may make the matter clearer to the general reader. Assume, therefore, that $\alpha = 0.1$, $\sigma = 0.4$, and $r = 0.03$. Then, $\theta = 0.75$; equilibrium will be approached with only 75 per cent of productive capacity utilized. Roughly speaking (assuming that the proportion of existent human resources utilized is equal to the proportion of capital resources utilized),⁶ we may say that 25 per cent

⁵ See, particularly, "Capital Expansion, Rate of Growth, and Employment," *op. cit.*, pp. 140-44. The essence of this may be reproduced as follows:

"Since

$$I = I_0 e^{rt}, \quad (11)$$

capital $[K]$, being the sum of all net investment, equals

$$K = K_0 + I_0 \int_0^t e^{rt} dt = K_0 + \frac{I_0}{r} (e^{rt} - 1). \quad (12)$$

As t becomes large, K will approach the expression $(I_0/r)e^{rt}$, so that capital will also grow at a rate approaching r . As $Y = (1/\alpha)I_0 e^{rt}$, the ratio of income to capital is

$$\frac{Y}{K} = \frac{\frac{1}{\alpha} I_0 e^{rt}}{K_0 + \frac{I_0}{r} (e^{rt} - 1)} \quad (13)$$

and

$$\lim_{t \rightarrow \infty} \frac{Y}{K} = \frac{r}{\alpha}. \quad (14)$$

Then, substituting $K = P/\sigma$ into (14), above, we obtain

$$\lim_{t \rightarrow \infty} \frac{Y}{P} = \frac{r}{\alpha\sigma} = \theta. \quad (15)$$

⁶ The relative magnitudes of unemployment of capital and of labor resulting from redundant capacity is, of course, actually, a function of price, wage and interest flexibilities, capital and labor mobilities and various other institutional factors. However, it seems reasonable to assume a fairly high correlation between the utilization of capital and labor.

of the labor force will be unemployed. The reader may demonstrate for himself, with self-constructed period analysis based on the assumed parameters, that this will be so whether the economy starts from a position of full employment, 25 per cent unemployment, or more than 25 per cent unemployment. However, it is important to keep in mind that the actual rate of growth, r , is assumed to be constant.

When we allow r to vary and, further, to become largely a function of the proportion of productive capacity which is utilized, we move from Domar's system to Harrod's system, from Domar's r to Harrod's actual rate of growth, G . We then get results frequently much different from the convergence to a given coefficient of utilization suggested by Domar.

Domar, in effect, has shown the relationship between what Harrod might designate as the maintenance of various possible "warranted" or equilibrium rates of growth, the productivity of investment and the employment ratio (the ratio of actual to "full" employment). He has not considered the effects of departures of the actual rate of growth from the equilibrium rate of growth. Domar's system thus enables us to present underemployment (or full employment) equilibrium. Harrod emphasizes this equilibrium's essential instability—an instability which leads to the underemployment *disequilibria* which form a major element of the system of Hicks.

IV.—Underemployment "Equilibrium" or Disequilibrium

Many economists objected strenuously to Keynes' concept of underemployment equilibrium. Would-be objectors to the theoretical concept of underemployment equilibrium rates of growth considered in this article may, however, find little tangible to attack. For our "equilibrium" is a formal mathematical condition defined merely as stability over time of the variables which enter our system. In most of this analysis we do not consider the requirements which such stability must impose upon variables outside of our system such as wages, interest rates, price levels and expectations. Thus, when we indicate that a certain *constant* rate of growth of income, *if maintained*, must involve a certain constant proportion of unemployment, we are reasoning in a quite formal manner and do not consider what factors would have to be operative for such a constant rate of growth actually to be maintained. In this respect we are, after all, conforming to the usual theoretical exercises with saving and investment schedules, in which we assert that *if* a certain investment schedule is operative, a certain equilibrium level of income must follow. We abstract here from the underlying determinants of the actual and "equilibrium" rates of growth of income as we abstract, temporarily, in the saving and investment schedule analysis, from the problem of the underlying determinants of the saving and investment schedules.

As Harrod points out, however, the "equilibrium" of growing economies is essentially unstable. If the actual rate of growth exceeds the "warranted" or equilibrium rate of growth, a shortage of capital goods (raw materials, finished products, machinery, etc.) develops; new orders and increases in output to make up this shortage accelerate the growth of income. Conversely, if the actual rate of growth falls short of the warranted rate, a relative surplus of goods must manifest itself; entrepreneurs, in an effort to work off this surplus, cut orders and output. The rate of growth, already too low, declines and, indeed, becomes negative.

Readers familiar with Harrod's model may ask now what an equilibrium condition involving underemployment signifies for C_r , the *equilibrium* value of C (which is the ratio of aggregate *ex post* investment to changes in income, $I/\Delta Y$). Before answering this question it is well to point out that C_r does not actually have any particular subjective meaning to the individual entrepreneur. Rather it is merely the *self-consistent* value of C . Thus, C_r is that value of C for a given period which will lead entrepreneurs to undertake actions which will, in the aggregate, give rise to the same value of C in the ensuing period. Other things, including s , the proportion of income saved, remaining equal, this constant value (C_e) of C will then involve a constant value (G_w) for G , the rate of growth of income. A value of C in excess of C_r means, however, that entrepreneurs on balance find more investment has taken place (more inventories have accumulated, more machinery has been constructed, etc.) than the actual growth in aggregate demand (income) warrants. Hence orders and output are reduced.

Our concept of underemployment equilibrium includes, in effect, a greater value for C_r than would be the case if the equilibrium condition involved full employment. When we suggest that a rate of growth involving underemployment *can* be self-perpetuating, we are suggesting as well, therefore, that the accumulation of capital at a rate which, because of its relation to the rate of growth, involves the creation of a constant proportion of excess capacity, will lead entrepreneurs to actions which, in the aggregate, continue this rate of growth.

Understanding of these relationships may be enhanced by the reflection that this increase in the value of C_r and decrease in the value of G_w from the values which could be compatible with full employment are *not* what present the system with underemployment. A high, full-employment value for G_w would, as Harrod points out, merely make more difficult the maintenance of full employment by setting a requirement for G (which would have to equal or exceed G_w) which would be more difficult to fulfill. The consequence, in Harrod's model, would be chronic periods of underemployment *disequilibrium*. During these periods, because the actual rate of growth, G , would be less than the

warranted or equilibrium rate of growth, G_w , and consequently, C would have to exceed C_r , unwanted or excess capital would accumulate and cause the levels of production and income to drop precipitously. It would then only be in periods of mass unemployment, with an abundance of slack resources, that it would be possible for the economy to grow at such a rate that G would be in excess of G_w , with C consequently less than C_r , and the downward pressures could be briefly dispelled.

The lowering of G_w and the raising of C_r from their full employment values, in this system, reduce the danger of chronic underemployment *disequilibrium* and substitute the possibility of an (unstable) equilibrium growth, involving underemployment. The admitted instability of this equilibrium invites consideration of restraining mechanisms which must be added to our model to prevent its "exploding" to infinite heights or impossible depths at the first departure from the line of stable growth. Restraining mechanisms, such as capacity "ceilings" in booms and real limits to the rate of disinvestment in periods of decline, prove quite useful in developing "Hicksian" models of the business cycle within the framework of growing economies. The present writer has worked extensively with those models and the failure to consider them in this paper implies no unfavorable judgment as to their significance.

V.—*Growth Curves: A Diagrammatic Presentation of Underemployment Equilibrium*

The Keynesian revolution may, perhaps, make secure its conquest of the new world of growth by recourse to diagrammatic presentation of the sort that was so significant in its earlier triumphs. For in a fashion strikingly analogous to creation of the familiar "saving-investment" curves of current textbooks it is possible to devise curves connecting rates of growth and the relative level of employment.

In the following pages we shall demonstrate growth curves appropriate for various saving functions. The relationship between saving and growth and employment thus revealed will suggest interesting hypotheses as to the hitherto frequently baffling nature of the aggregate saving function.

Figure 1 illustrates this relationship when all of Domar's simplifying assumptions, including the assumption that saving is a constant proportion of income, are accepted. On the horizontal axis, instead of income or employment, as in the traditional Keynesian analysis, we plot (in percentage figures) Y/P , the ratio of output to productive capacity. "Full employment" is indicated by output equal to productive capacity, or the abscissa, Y/P , equal to 100%. We shall boldly refer to the value Y/P as the "employment ratio," thereby assuming that the proportion of labor which is unemployed is always equal to the pro-

portions of other resources which are idle.⁷ On the vertical axis we plot, instead of saving and investment, percentage rate of growth of productive capacity (which is a function of real saving and the productivity of investment) and percentage rate of growth of income (which is a function of the rate of growth of investment; in Figure 1 the percentage rates of growth of income and investment are equal because investment has been assumed to be a fixed proportion of income, that is, $I = \alpha Y$). We may refer to the percentage rate of growth of productive capacity per unit of time as $(dP/dt)/P$ or as $(dP/P)/dt$. Similarly, we may refer to the percentage rates of growth of income and investment, per unit of time as, respectively, $(dY/Y)/dt$ and $(dI/I)/dt$. But inasmuch as the time dimension, implicitly thought of as a year, will in any event be the same for the various magnitudes, and since time symbols are conventionally omitted in referring to "stationary" variables such as income and investment, we shall omit the " dt " from our rate of growth symbols. The percentage rates of growth of productive capacity, income and investment per unit of time are thus denoted in Figure 1, and in the rest of this paper, as respectively dP/P , dY/Y , and dI/I .

Now, since σ is defined as the change in productive capacity accompanying each unit of investment,⁸

$$\frac{dP}{P} = \frac{I\sigma}{P} \quad (16)$$

where I is the volume of investment.

However,

$$S = I = \alpha Y. \quad (2b)$$

Hence,

$$\frac{dP}{P} = \alpha\sigma \frac{Y}{P}. \quad (17)$$

In common sense terms, the growth of productive capacity depends (at least in part) upon investment, which equals saving. But saving, in turn, is a positive function of income. Thus with any given level of productive capacity, the rate of growth of productive capacity will vary directly with income, that is, with the proportion of productive capacity which is utilized.

⁷ See footnote 6.

⁸ In order for σ to have enough stability to be meaningful it must be associated with a unit of intended or desired investment which entrepreneurs find useful in the productive process. It cannot refer to the unwanted inventories or other excess investment which help confirm the Keynesian saving-investment identity. Thus, though not necessarily rejecting this identity, we must restrict the application of this analysis to "equilibrium" conditions, in which investment will be so constituted as to have a meaningful and reasonably consistent relation to productivity.

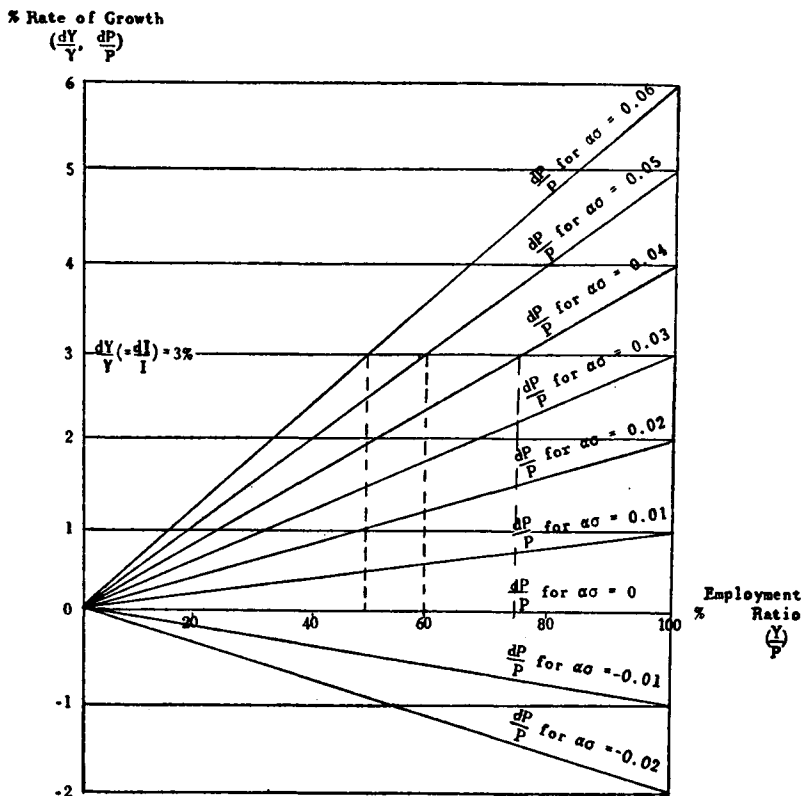


FIGURE 1. INVESTMENT A CONSTANT PROPORTION OF INCOME;

$$I = \alpha Y$$

$$\frac{dP}{P} = \alpha \sigma \frac{Y}{P}$$

It is therefore possible to construct a family of dP/P curves (rate of growth of productive capacity curves) which slope upward from left to right. The magnitude of slope of these curves depends upon the values of α and σ . In Figure 1, curves are shown for each of the values of $\alpha\sigma$ from -0.02 to 0.06 . Then, on the same graph we may let a horizontal line indicate the rate of growth of income (dY/Y). The equilibrium ratio of income to productive capacity (or "employment ratio") is now indicated by the intersection of the growth of income curve with the appropriate growth of productive capacity curve. For example, if $\alpha = 0.2$ and $\sigma = 0.2$, the appropriate dP/P curve is the one designated " $\alpha\sigma = 0.04$." Then, if income were to grow at a three per cent rate (an-

nally—an assumption which would approximate historical data and which consequently will be applied for illustrative purposes also in Figures 2, 3, and 5), the equilibrium Y/P ratio would be 75%, the abscissa of the intersection of the curves, $dY/Y=3\%$ and $dP/P=\alpha\sigma(Y/P)$, where $\alpha\sigma=0.04$.

In the traditional “saving-investment” analysis, either raising the investment curve or lowering the saving curve would raise the equilibrium level of employment. In our diagram, either raising the “growth of income curve” or lowering the “growth of productive capacity curve” will raise the equilibrium *ratio* of employment. To extend the analogy further, in our diagram, lowering α , the average propensity to save, will lower the dP/P curve (rotating it clockwise, with the origin as a fulcrum) and thus raise the employment ratio. And increasing dI/I , the rate of growth of investment, will raise the dY/Y curve, via the multiplier effect, thus raising the employment ratio.

In Figure 2 we drop the assumption that investment is a constant proportion of income but we retain a constant *marginal* propensity to save. As a further modification, we replace the traditional saving function,

$$S = \alpha Y - b \quad (18)$$

by a function in which our second parameter makes saving depend, in part, upon productive capacity, *i.e.*,

$$S = \alpha Y - \beta P. \quad (19)$$

This new function, we may suggest, may solve some of the persistent difficulties encountered in attempts to derive a long-run saving function from time series data.⁹ It also points to a negative partial correlation

⁹ It may be noted that if we accept the traditional saving function,

$$S = \alpha Y - b, \quad (18)$$

then

$$\frac{S}{P} = \frac{\alpha Y - b}{P}. \quad (18a)$$

Since

$$\begin{aligned} \frac{dP}{P} &= \frac{I\sigma}{P} \quad \text{and} \quad I = S, \\ \frac{dP}{P} &= \alpha\sigma \frac{Y}{P} - \frac{b\sigma}{P}. \end{aligned} \quad (20)$$

Thus in a growing economy, with P rising, at any given employment ratio (Y/P) the value of dP/P will be increasing. However, this is merely a corollary of the fact that in a growing economy, with Y rising while b remains constant, saving would be a rising proportion of income, approaching the proportion α . The saving function actually used in Figure 2, on the other hand, is based on the hypothesis that there is no long-run change in the proportion of income saved.

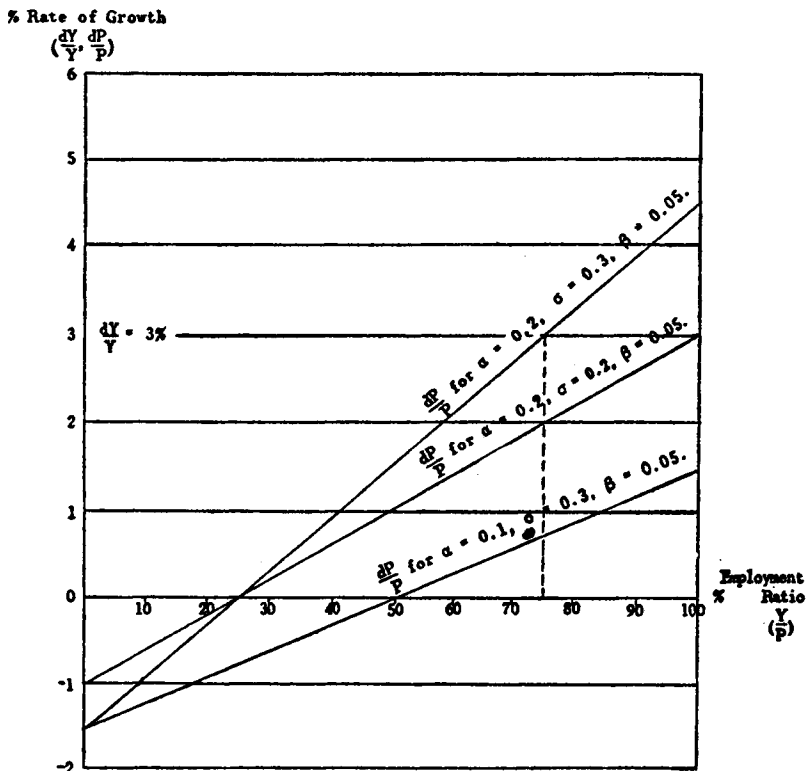


FIGURE 2. INVESTMENT A FUNCTION OF INCOME AND PRODUCTIVE CAPACITY;

$$I = \alpha Y - \beta P$$

$$\frac{dP}{P} = \left(\alpha \frac{Y}{P} - \beta \right) \sigma.$$

between productive capacity and investment, which would appear to conform to both statistical data (low levels of investment during periods of unemployment), and economic theory.¹⁰

The “growth of productive capacity (dP/P) curves” of Figure 2 may be derived quickly. Since $S = I$,

$$I = \alpha Y - \beta P. \tag{19a}$$

¹⁰ Since investment is frequently designed to increase productive capacity, as productive capacity increases, with income remaining constant, the demand for investment goods and the amount of investment may be expected to drop.

But

$$\frac{dP}{P} = \frac{I\sigma}{P} \quad (16)$$

and hence

$$\frac{dP}{P} = \left(\alpha \frac{Y}{P} - \beta \right) \sigma. \quad (21)$$

Thus, as in Figure 1, the dP/P curves are positively sloped straight lines. For any given values of α , β and σ , the rate of growth of productive capacity varies directly with the employment ratio. However, in Figure 2 extremely high rates of unemployment (low employment ratios) are associated with absolute declines in productive capacity. And in Figure 2, the dP/P curves, in order to attain a moderate positive value at a high (but not 100%) employment ratio, must be more sharply sloped than the dP/P curves of Figure 1, which begin from the origin.

This last characteristic of our curves assumes considerable interest when translated into ordinary language. So expressed, it states: our saving and productivity of investment functions may be such that the maintenance of full employment demands a high rate of growth; a stationary economy can exist, with dP/P curves such as those illustrated, but only with large proportions of unemployment.

Figure 3 introduces a savings function which adds realism and also sharpens the suggestive relationships which we have just been considering. Now saving (investment) is made a function of both income and the employment ratio (Y/P). This may be explained, at least in part, by the dis-saving necessary to care for the unemployed. As income increases, there is a rise in the volume of saving as well as in the living standards of those who are earning. However, where productive capacity (P) grows faster than income (Y), thus reducing the value of Y/P , unemployment rises and a greater proportion of income is used in providing for consumption of the unemployed. We may also point out that this function, suggesting relatively high levels of investment in periods of full employment, squares well with statistical data on cyclical fluctuations of income and investment.

The specific function exhibited in Figure 3 (though not statistically derived) expresses in a reasonably simple fashion the general relationships just cited. Thus:

$$S = I = \alpha Y \left(\frac{Y}{P} \right) - \beta P \quad (22)$$

$$\frac{I}{P} = \alpha \left(\frac{Y}{P} \right)^2 - \beta \quad (22a)$$

$$\frac{dP}{P} = \left[\alpha \left(\frac{Y}{P} \right)^2 - \beta \right] \sigma. \tag{23}$$

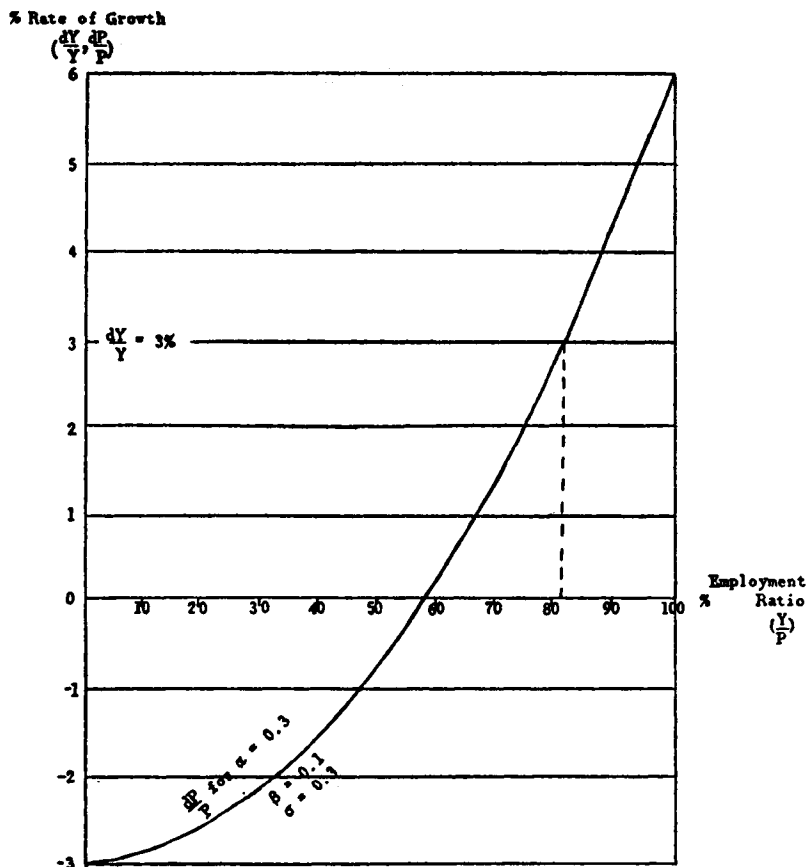


FIGURE 3. INVESTMENT A FUNCTION OF INCOME, PRODUCTIVE CAPACITY AND THE EMPLOYMENT RATIO;

$$I = \alpha Y \left(\frac{Y}{P} \right) - \beta P$$

$$\frac{dP}{P} = \left[\alpha \left(\frac{Y}{P} \right)^2 - \beta \right] \sigma.$$

Examination of Figure 3 reveals that as full employment is approached, the employment ratio becomes less and less responsive to increases in the rate of growth of income. Put another way, it appears possible that the investment and productivity functions are such that

it is impossible to secure full-employment equilibrium without rates of growth which, on the basis of past performance, our economy cannot be expected to maintain.

The attainment and maintenance of full-employment equilibrium in growing economies is then the problem of raising the rate of growth of income and/or reducing the rate of growth of productive capacity at

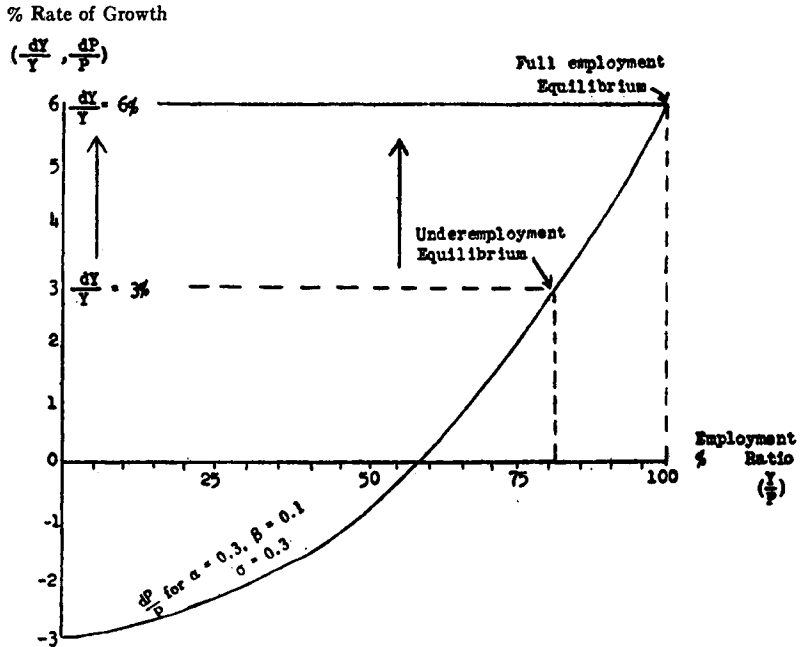


FIGURE 4. ATTAINING FULL EMPLOYMENT BY RAISING RATE OF GROWTH OF INCOME CURVE;

$$\frac{dP}{P} = \left[\alpha \left(\frac{Y}{P} \right)^{\beta} - \beta \right] \sigma.$$

levels of full employment. These complementary approaches are exhibited diagrammatically in Figure 4 and in Figure 5. In Figure 4, raising the income growth curve from 3% to 6% brings a movement of the equilibrium employment ratio, as indicated by the intersection of the curves for growth of productive capacity and of income, from just over 80% to 100%, or full employment. In Figure 5, a similar movement to full employment is accomplished by lowering the value of α from 0.3 to 0.2, thus moving to the right and lowering the growth of productive capacity curve sufficiently to make it intersect the income growth curve at a 100% employment ratio.

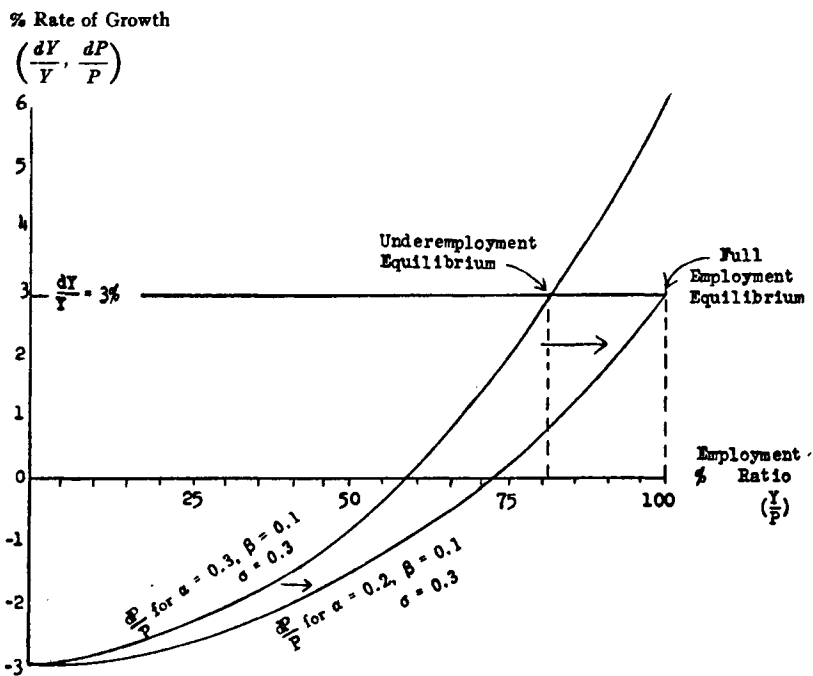


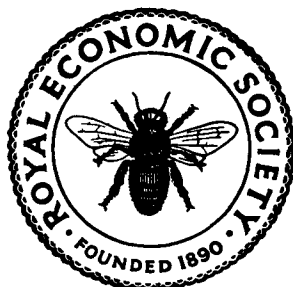
FIGURE 5. ATTAINING FULL EMPLOYMENT BY REDUCING SAVING, THUS LOWERING RATE OF GROWTH OF PRODUCTIVE CAPACITY CURVE;

$$\frac{dP}{P} = \left[\alpha \left(\frac{Y}{P} \right)^2 - \beta \right] \sigma.$$

The diagrams presented in this section, as well as the general concepts of this article which they portray, have weaknesses similar to those of the aggregative, "Keynesian" diagrams and concepts of stationary economies. Specifically, these diagrams and concepts abstract from the micro-economic functions and relations from which, ultimately, they must derive their content. In addition, it should be pointed out that these diagrams and concepts, in their present development, have not been applied to the essential process of transition from one equilibrium to another. However, they may be of some value both in assisting the forward march of the advance guard of "revolutionizing" economic theorists and in helping to consolidate for the rest of the profession some of the newly won ground. In substance, they may facilitate analysis of the modern capitalistic economic system without abstracting out the element of growth which has seemed to so many—private profit enthusiasts as well as the system's critics—to be of its essence.

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ON GROWTH MODELS AND THE NEO-CLASSICAL RESURGENCE¹

I. THE ATTACK ON THE GROWTH MODELS

THE relatively prosperous decade of the fifties has been replete with retreats from the economics of the thirties. It is good that economists are ready to meet the social issues of their own day; the problem of under-employment in a developed capitalist economy has hardly the urgency of yesteryear. But ills rooted deep in the structural relations of an economic system have a way of recurring, unless those structural relations are adequately and permanently changed. There is hence purpose in clarifying and preserving from distortion in later lights some of the now older diagnoses.²

In recent journals several respected economists have joined the attack on growth-cyclical models of the Harrod-Domar-Hicks variety. I submit that these models are such, in their inspiration and assumptions, that the attacks can be successful only with the inclusion of an apparently unintended target—Keynes. I propose to make clear the Keynesian content of the growth models and to redress somewhat the current balance by defending and building upon the Keynesian heritage.

The banners of the attackers are strikingly similar. James Tobin rebels against the concept of “straight and narrow paths from which the slightest deviation spells disaster.”³ Kenneth Boulding ridicules the “H-D-H” or “Hiccup” dynamic with its “dismal,” “gloomy,” “masochistic” prophecies.⁴ Robert Solow rejects “the characteristic and powerful conclusion of the Harrod-Domar line of thought . . . that even for the long run the economic system is at best balanced on a knife-edge of equilibrium growth.”⁵ All three see the basic problem raised by the Harrod-Domar-Hicks growth model enthusiasts as the unique result of (arbitrary and unwarranted) assumptions of fixed proportions of the factors of production. More completely, in the words of Tobin, “Contemporary theoretical models of the business cycle and of economic growth typically possess two related

¹ The writer is indebted to Norman F. Byers, Alfred H. Conrad, F. H. Hahn, Harry G. Johnson, Alvin L. Marty, Tibor Scitovsky, Robert Solow, James Tobin and Fred M. Westfield for helpful reactions and suggestions. He wishes to acknowledge, in particular, the valuable and detailed comments of Robert H. Strotz. The paper was prepared in part during the tenure of a Social Science Research Council Faculty Research Fellowship.

² This paragraph was written, with perhaps pardonable truculence, in the pre-recession summer of 1957.

³ “A Dynamic Aggregative Model,” *Journal of Political Economy*, Vol. LXIII (April 1955), 103-15.

⁴ “In Defense of Statics,” *Quarterly Journal of Economics*, Vol. LXIX (November 1955), especially pp. 492-5.

⁵ “A Contribution to the Theory of Economic Growth,” *Quarterly Journal of Economics*, Vol. LXX (February 1956), 65-94.

characteristics: (1) they assume production functions that allow for no substitution between factors and (2) the variables are all real magnitudes; monetary and price phenomena have no significance" (p. 103).¹ Generally, the attackers argue that with consideration of variable-factor proportions and flexible prices, *unlike* in the Harrod-Domar-Hicks models, not one but a variety of warranted rates of growth become possible and the economy will be free to adjust to whatever rate is appropriate for full employment.

II. WHAT HARROD, DOMAR AND HICKS REALLY SAID

It can be shown quickly that the growth models *did* encompass variable factor proportions and reasonable operation of the money-price mechanism. First, in Harrod's formulation, G_w , the warranted or self-sustaining rate of growth, depends upon s , the proportion of income saved (or that proportion remaining after saving is utilised in "autonomous" investment and export balances), C_r , the "required" or equilibrium, current capital-output ratio which leaves entrepreneurs satisfied, and d^* (for "deepening"),² the proportion of output absorbed in lengthening the production process or increasing the capital-output ratio. Algebraically,

$$G_w = \frac{s - d^*}{C_r} \dots \dots \dots (1)$$

or $G_w C_r + d^* = s \dots \dots \dots (1.1)$

In this latter form the above equation expressed directly the condition of equality between the proportion of output for which there is investment demand ($G_w C_r + d$) and the proportion of output saved (s).³ If the actual

¹ In "Complementarity and Long-range Projections," *Econometrica*, October 1956, pp. 429-50, which came to the writer's attention when this paper was in penultimate draft, P. J. Verdoorn also relates the Harrod-Domar models to an assumption of complete lack of substitutability of factors. The implication of Verdoorn's work is that this complementarity assumption may prove not unreasonable for purposes of prediction or as a description of the medium-long-run adjustment powers of the economy. But Verdoorn's thesis is also consistent with the argument we shall develop, that there is substitutability but that *economic* constraints limit crucially the range of admissible factor ratios.

² Harrod used the symbol d to denote deepening; we have changed this to d^* in order to avoid confusion with the differential and derivative symbol, d .

³ If we write capital as

$$K = Y \cdot \frac{K}{Y} \dots \dots \dots (1.2)$$

investment can be written

$$I = \frac{dK}{dt} = \frac{K}{Y} \frac{dY}{dt} + Y \frac{d(K/Y)}{dt} \dots \dots \dots (1.3)$$

and the ratio of investment to income is

$$\frac{I}{Y} = \frac{d \log Y}{dt} \cdot \frac{K}{Y} + \frac{d(K/Y)}{dt} \dots \dots \dots (1.4)$$

For the equilibrium condition described by the warranted rate of growth it is presumed that K/Y ,

rate of growth is less than the warranted rate, investment demand must then be less than saving, and the rate of growth of output and (eventually) the rate of output must turn down. But if G_n , the "natural" rate of growth or maximum rate of growth of which the economy is capable under conditions of full employment, is less than G_w , then the *actual* rate at full employment would have to be less than G_w . It follows that investment demand would have to be less than saving at full employment. Thus full employment could at best represent a momentary position of disequilibrium. A critical aspect of the problem, then, can be formulated as how to prevent G_w from exceeding G_n . One way to do this is to have deepening—a positive value of d^* . Harrod states explicitly, " d may have a positive value because of the nature of the inventions occurring. It may also have a positive value because the rate of interest is falling. Our aim should be to get such a progressive reduction in the rate of interest that

$$G_w C_r = s - d = G_n C_r."$$

Harrods adds, "If d is positive, C_r will increase through time, and may eventually become so great as to enable us to dispense with d ."¹

Now, increasing capital intensity stemming from lower interest rates implies changing factor proportions and indeed, with linear, homogenous production functions (as assumed by Solow and Tobin), changes in the capital-output ratio must mean changes in factor proportions. Thus Harrod is saying that factor proportions *may* change so much—the economy *may* get so capital intensive—that the rate of growth necessary to absorb saving (the "warranted" rate, G_w) will be reduced to an acceptable level. But, Harrod continues, "The question we now have to ask is whether there will be any natural tendency for the rate of interest to come down sufficiently. *This is the crux of the matter* [emphasis added, R. E.], the crux, perhaps, of that modern economic situation to which we shall revert, when the post-war shortages cease." I submit that there can be no doubt that in Harrod's model factor proportions are quite variable and the money-price mechanism is free to operate as it will; there is no uneconomic, arbitrary, technological

the actual, current capital-output ratio, is the ratio currently *demanded*, and therefore equals C_r . Then if $\frac{d(K/Y)}{dt}$, or "deepening," is taken as the time rate at which entrepreneurs *demand* (*desire*) that the capital-output ratio change, $\frac{I}{Y}$ is the ratio of investment *demand* to output. The warranted rate of growth is that value of $\frac{d \log Y}{dt}$ (Harrod's G) for which

$$\frac{d \log Y}{dt} \cdot \frac{K}{Y} + \frac{d(K/Y)}{dt} = \frac{I}{Y} = s = \frac{S}{Y}, \dots \dots \dots (1.5)$$

or that value which makes investment demand equal saving.

¹ *Towards a Dynamic Economics* (London, 1948), p. 96. This corresponds precisely, as should become clear below, to Solow's positive value for the rate of change of the capital-labour ratio ($\dot{r} > 0$), leading eventually to an equilibrium ratio, r^* (*loc. cit.*, p. 70).

constraint.¹ However, as more capital is used, other things remaining equal, the return on capital must fall. The difficulty is that this fall may conflict with the Keynesian floor to the rate of interest or, more generally, with the rate of return on capital which entrepreneurs will find acceptable.

Domar, similarly, is clear in pointing out that the crucial issue is not whether capital-output ratios are fixed but rather whether they are free to adjust in such a manner as to eliminate "The Problem of Capital Accumulation."² Raising the question of the American economy's ability to continue indefinitely absorbing new capital at its rapid post-war rate, Domar writes:—

"Implicit in this worry is the belief that the possibilities of the so-called deepening of capital (in the sense of an increasing ratio of capital to output) are limited. Therefore the amount of capital that the economy can absorb, at a given income level and over a given period of time, is limited as well. . . . We have thus assumed, at least for the purpose of this discussion, that there exists a fairly stable ratio between annual output (or national income) and the capital stock needed for its production, this ratio to be indicated by the letter s . While, strictly speaking, we shall treat s as a given constant, it need not be so. It is certainly not the same among various firms and industries. The national average (if such exists) can be made a function of time, interest rate, or of something else. *But it must have some stability, because if s can be anything, our argument falls through and we are back at the Knight-Simons Position*" [that "investment opportunities are practically unlimited"].³

Finally, Hicks would have cyclical fluctuations about a growth trend develop with any of a wide variety of capital-output ratios (as well as saving ratios and lags).⁴ Hicks argues that any values of the accelerator above the "Upper Point" will generate a "strong" cycle when equilibrium is disturbed, values merely above the "Middle Point" will lead the system into strong cycles, and even values merely above the "Lower Point" will contribute to some (damped) cyclical fluctuations. And Hicks devotes much space in his "inspection of the ceiling" and his analysis of "the monetary factor" to a consideration of whether the forces that transform the accelerator or the desired capital-output ratios are likely to eliminate the troublesome instability and departures from full employment which the H-D-H models all suggest. Hicks' answer, of course, is not encouraging. But again, the difficulty is due to incapacities of adjustment of the monetary framework and of the economic system generally and not an arbitrary assumption of (technologically determined) corners in the production isoquants.

¹ Cf. Harrod's amplification of this point in his "Comment" on Harold Pilvin's "Full Capacity vs. Full Employment Growth," *The Quarterly Journal of Economics*, Vol. LXVII (November 1953), pp. 553-9.

² *American Economic Review*, Vol. XXXVIII (December 1948), pp. 777-94.

³ *Ibid.*, pp. 777-9, emphasis added.

⁴ J. R. Hicks, *A Contribution to the Theory of the Trade Cycle* (Oxford, 1950).

III. "A DYNAMIC AGGREGATIVE MODEL" WITH SOME KEYNESIAN PARAMETERS

The issues may be fairly joined by constructing a model which draws heavily upon the elegant presentations of two of the critics, Solow and Tobin, and utilises such a model to consider conditions or assumptions sufficient to give the peculiar or particular Harrod-Domar-Hicks results. We shall consider first the factor-proportion question, assuming initially that private saving equals the change in physical capital and is some constant ratio of output. Later we shall enlarge the area of debate by introducing a more general saving function, complete with a "Pigou effect" and a new "dynamic Pigou theorem."

The Production Function, Factor Proportions and the Rate of Profit

Let us assume, with Solow and Tobin, that net output is a linear, homogeneous function of capital and labour:

$$Y = F(K, L) \quad . \quad . \quad . \quad . \quad . \quad (2)$$

and that output consists of only one good, which may be consumed or retained as capital (invested). Writing $r = K/L$ for the capital-labour ratio, we may, on the basis of the homogeneity assumption, factor out L and rewrite the production function:

$$Y = L \cdot F(r, 1) \quad . \quad . \quad . \quad . \quad . \quad (3)$$

We may further assume diminishing marginal returns to each factor of production, throughout the economically relevant range of factor proportions, so that, in particular,

$$\frac{d^2 F}{dr^2} < 0 \quad . \quad . \quad . \quad . \quad . \quad (4)$$

But since in equilibrium the rate of profit, i , is presumed to equal the net marginal product of capital, we may write

$$i = F_K \equiv F_r \quad . \quad . \quad . \quad . \quad . \quad (5)$$

and, consequently, substituting in (4),

$$\frac{di}{dr} < 0 \quad . \quad . \quad . \quad . \quad . \quad (6)$$

In words, i must be a monotonic, decreasing function of r ; an increase in the capital-labour ratio must mean a decrease in the rate of profit.

Taking Harrod's system as representative for our purposes, we may express his symbols as

$$C_r = \frac{K}{Y} = r \frac{L}{Y} = \frac{r}{F(r, 1)} \quad . \quad . \quad . \quad . \quad . \quad (7)$$

and

$$d^* = \frac{d(K/Y)}{dt} = \frac{dC_r}{dr} \cdot \frac{dr}{dt} \quad . \quad . \quad . \quad . \quad . \quad (8)$$

where r is the capital-labour ratio corresponding to the equilibrium capital-output ratio, C_r , and

$$\frac{dC_r}{dr} = \frac{F(r,1) - rF_r}{[F(r,1)]^2} \dots \dots \dots (9)$$

Hence, substituting in (1) and simplifying terms, and denoting $F(r,1)$ by F ,

$$G_w = \left(\frac{d \log Y}{dt} \right)_w = \frac{s}{r} \cdot F - \frac{d \log r}{dt} + \frac{d \log F}{dt} \dots (10)^1$$

But since $F(r,1)$ is total output per unit of labour and rF_r is the return to capital per unit of labour, for all economically relevant values of r (where the share of capital is less than unity) we obtain from (9) the condition that

$$\frac{dC_r}{dr} > 0 \dots \dots \dots (11)$$

or that Harrod's C_r , the capital-output ratio, varies in the same direction as the capital-labour ratio. From (8) and (11),

$$d^* \geq 0 \text{ as } \frac{dr}{dt} \geq 0 \dots \dots \dots (12)$$

or deepening depends upon an increase in the capital-labour ratio: moreover,

$$\frac{dd^*}{d\left(\frac{dr}{dt}\right)} > 0 \dots \dots \dots (13)$$

i.e., deepening is a monotonically increasing function of the rate of change of the capital-labour ratio. Now, dismissing negative values of C_r , as

¹ Noting that

$$\frac{d \log F}{dt} = \frac{d \log Y/L}{dt} = \frac{d \log Y}{dt} - \frac{d \log L}{dt} \dots \dots \dots (10.1)$$

we may write the actual rate of growth of output

$$\frac{d \log Y}{dt} = \frac{d \log K}{dt} - \left(\frac{d \log K}{dt} - \frac{d \log L}{dt} \right) + \frac{d \log F}{dt} \dots \dots \dots (10.2)$$

Since saving is presumed to be realised (whether consistent with entrepreneurial equilibrium or not),

$$\frac{s}{r} \cdot F = \frac{sL \cdot F}{K} = \frac{1}{K} \cdot \frac{dK}{dt} = \frac{d \log K}{dt} \dots \dots \dots (10.3)$$

so that, substituting in (10.2),

$$\frac{d \log Y}{dt} = \frac{s}{r} \cdot F - \left(\frac{d \log K}{dt} - \frac{d \log L}{dt} \right) + \frac{d \log F}{dt} \dots \dots \dots (10.4)$$

But then, where

$$\frac{d \log K}{dt} - \frac{d \log L}{dt} = \frac{d \log r}{dt} \dots \dots \dots (10.5)$$

(10.4) becomes identical with (10): the actual rate of growth of output equals the warranted rate when the capital-labour ratio is actually changing at the rate $\frac{d \log r}{dt}$ consistent with entrepreneurial equilibrium.

economically irrelevant, and negative values of $s - d^*$ as unlikely and uninteresting in the present context, we see from (1) that

$$\frac{\partial G_w}{\partial C_r} < 0 \quad (14)$$

and

$$\frac{\partial G_w}{\partial d^*} < 0 \quad (15)$$

Then, combining (14) and (11),

$$\frac{\partial G_w}{\partial r} = \frac{\partial G_w}{\partial C_r} \cdot \frac{dC_r}{dr} < 0 \quad (16)$$

and combining (15) and (13),

$$\frac{\partial G_w}{\partial \left(\frac{dr}{dt}\right)} = \frac{\partial G_w}{\partial d} \cdot \frac{dd^*}{d\left(\frac{dr}{dt}\right)} < 0 \quad (17)^1$$

In words again, Harrod's warranted rate of growth may be reduced by an increase in the capital-labour ratio (16) as well as by an increase in the rate of change of the capital-labour ratio (17).

But now we shall introduce some reasonable parameters into our production function. Critics of the growth models deal with functions which implicitly or explicitly (like the Cobb-Douglas illustration Solow employs) imply the assumption that the marginal net product of capital is always positive, regardless of how high the capital-labour ratio rises; barring demand problems it must always pay to invest. This, indeed, is one of the "crucial" assumptions² on which the growth model *critiques* rest. It embodies again

¹ These results may also be obtained directly in terms of r . Again denoting $\frac{Y}{L} = F(r, 1)$ by F , we may write

$$C_r = \frac{K}{L} \cdot \frac{L}{Y} = \frac{r}{F} \quad (16.1)$$

Then, substituting in (1),

$$G_w = (s - d^*) \frac{F}{r} \quad (16.2)$$

The partial derivative of G_w with respect to r , assuming s and d^* constant, is then

$$\frac{\partial G_w}{\partial r} = - (s - d^*) \frac{(F - rF_r)}{r^2} \quad (16.3)$$

As explained above in regard to (11), we may take $F - rF_r$, the relative share of labour, as positive. Hence, where

$$s - d^* = \text{constant} > 0, \quad \frac{\partial G_w}{\partial r} < 0 \quad (16.4)$$

And the partial derivative of G_w with respect to d^* , with s and r assumed unchanged, is

$$\frac{\partial G_w}{\partial d^*} = - \frac{F}{r} < 0 \quad (17.1)$$

² Solow warns that: "A 'crucial' assumption is one on which the conclusions do depend sensitively, and it is important that crucial assumptions be reasonably realistic. When the results of a theory seem to flow specifically from a special crucial assumption, then if the assumption is dubious, the results are suspect" (*loc. cit.*, p. 65). But he charges this to the Harrod-Domar model.

the optimistic notion of unlimited investment opportunities; it should not be surprising that it yields optimistic conclusions. Let us, however, in curiously more classical vein,¹ recognise that in any given period, or with a given production function, there is a limit to the extent to which greater round-aboutness of production will pay for itself. All we are arguing is that with a given quantity of labour there is some finite amount of capital at which the diminishing *net* marginal return to capital will reach zero. With more than that amount of capital the marginal net product of capital will be negative; additional capital will not realise, and hence should not be expected to realise, sufficient returns during its life-time to pay for itself. We thus add the further description of our production function,

$$F_K \underset{\wedge}{\approx} 0 \text{ as } K \underset{\vee}{\nearrow} K_0, L = L_0 \quad . \quad . \quad . \quad (18)$$

or utilising the homogeneity assumption and defining $r_0 = \frac{K_0}{L_0}$,

$$i = F_K \equiv F_r \underset{\wedge}{\approx} 0 \text{ as } r \underset{\vee}{\nearrow} r_0 \quad . \quad . \quad . \quad (19)$$

Now the existence of r_0 , a limit to the profitable extensibility of the capital-labour ratio, will prove sufficient to admit the possibility of the "H-D-H" difficulties,² but, if we wish to get more Keynesian, we can add a liquidity trap at say i_1 , where $i_1 > 0$ and is the rate of return equal to the floor to the rate of interest. To i_1 will correspond some capital-labor ratio, say r_1 , where $r_1 < r_0$ and

$$i = F_K \equiv F_r \underset{\wedge}{\approx} i_1 \text{ as } r \underset{\vee}{\nearrow} r_1 \quad . \quad . \quad . \quad (20)$$

Hence there is an upper limit to the value of r , which may be denoted by r_0 or r_1 , depending upon whether we wish to assume that the rate of (net) profit can fall to zero or only to some value above zero. Since from (16) it can be seen that G_w is a monotonically decreasing function of r , for any given values of s and d^* (e.g., $d^* = 0 = \frac{dr}{dt}$), there is then a lower limit to G_w . If this lower limit is still higher than the actual or maintainable rate of growth the economy is in for the H-D-H maladies.

But what if there is deepening, that is, d^* and $\frac{dr}{dt}$ are positive? Here we

¹ Consistently, for example, with the formulation by John M. Cassels, "On the Law of Variable Proportions," reprinted from *Explorations in Economics in Readings in the Theory of Income Distribution*, pp. 103-18.

² The simplifying assumption of linear homogeneity of the production function enables us to meet the Solow-Tobin type *critiques* on their own ground, but it is a stronger assumption than we require. The Harrod-Domar-Hicks problem may be exhibited by any production function in which, with the given (presumably exogenous) growth of labour supply and the rate of capital accumulation consistent with the saving function, the marginal net product of capital is declining, and has no non-negative lower bound.

are referring not to a *higher* but to an *increasing* capital-labour ratio. As we noted in (17), the greater the rate of increase of the capital-labour ratio, other things equal, the less the warranted rate of growth. Thus we may concede that if the warranted rate of growth is too high there is always some rate of change of factor proportions which will be sufficient to make the warranted rate of growth any necessary lower figure. We are not, however, out of the woods. For, in accordance with (6), an increasing value of r must mean a decreasing rate of profit. But since $i \geq 0$ or $i \geq i_1$, eventually (with $\frac{dr}{dt} > \epsilon; \epsilon > 0$),

$$\text{as } r \Rightarrow r_0 \text{ or as } r \Rightarrow r_1, \frac{di}{dt} \Rightarrow 0 \quad \quad (21)$$

Then, writing

$$\frac{dr}{dt} = \frac{dr}{dF_r} \cdot \frac{dF_r}{dt} \quad \quad (22)$$

we can see that since, as stated in (5), in equilibrium, the rate of profit equals the marginal product of capital or $i = F_r$, as

$$\frac{di}{dt} \left(= \frac{dF_r}{dt} \right) \Rightarrow 0, \frac{dr}{dt} \Rightarrow 0 \quad \text{unless } \frac{dr}{dF_r} \Rightarrow -\infty \quad . . \quad (23)$$

and, substituting $di = dF_r$ in (22) and (22) in (8), we derive,

$$d^* = \frac{dC_r}{dr} \cdot \frac{dr}{di} \cdot \frac{di}{dt} \quad \quad (24)$$

To paraphrase our equations once more, where the capital-labour ratio is increasing ($\frac{dr}{dt} > 0$), deepening is taking place ($d^* > 0$), and then, as Harrod (among others) points out, the warranted rate of growth is reduced and thereby relief is found. But deepening ($d^* > 0$) requires a falling marginal net product of capital, and hence a falling rate of profit ($\frac{dF_r}{dt} = \frac{di}{dt} < 0$). There is a limit to how far the rate of profit can fall, and hence, unless the marginal net product of capital falls asymptotically to this limit (so that $\frac{dr}{dF_r} \rightarrow -\infty$, the unlimited investment opportunities argument again), there is a limit to how long any given rate of deepening (any given positive value of d^*) can be maintained. Thus we should observe that the rate of deepening is curbed not only by price and money rigidities and direct institutional constraints on the rate of fall of the equilibrium rate of return on investment ($\frac{di}{dt}$); whatever the freedom from constraints, as long as there is a lower limit to i (even if only at $i = 0$), i cannot fall fast for long without hitting bottom.

The Saving Function, Asset Preferences and "Pigou Effects"

We shall now abandon the assumption that saving equals the change in physical capital and is a constant proportion of output. We shall instead introduce the saving function,

$$\frac{dW}{dt} \equiv S = S\left(\gamma, i, K, \frac{M}{P}\right) \dots \dots \dots (25)$$

where W stands for wealth or total accumulated savings and is defined as

$$W \equiv K + \frac{M}{P} \dots \dots \dots (26)$$

the total of physical capital and the real value of cash balances, so that saving is defined as

$$\frac{dW}{dt} \equiv S \equiv \frac{dK}{dt} + \frac{M}{P} \left(\frac{d \log M}{dt} - \frac{d \log P}{dt} \right) \dots \dots (26.1)^1$$

We may therefore, substituting in (10), rewrite the formulation of the warranted rate of growth as

$$G_w = \left(\frac{d \log \gamma}{dt} \right)_w = \frac{1}{K} \cdot S \left[L \cdot F, i, K, \frac{M}{P} \right] - \frac{M/P}{K} \left(\frac{d \log M}{dt} - \frac{d \log P}{dt} \right) - \frac{d \log r}{dt} + \frac{d \log F}{dt} \dots (27)$$

We shall assume that saving is positive (at least initially) and linear, homogeneous in income and wealth. Thus with a constant rate of profit and a constant ratio of wealth to income the saving-income ratio will likewise remain constant.² To the extent that the converse is true and, in particular, that the desire to save is dissipated with increasing income and wealth, our whole problem would, of course, at least ultimately, disappear. But that converse assumption has not to my knowledge been argued to be

¹ Saving is thus identically equal not to investment but to the sum of investment and the change in the Government's real, net obligation to the private sector of the economy. The definition is analogous to that used in national-income accounts, where saving is made equal to the sum of investment and the government deficit. It should be realised that, consistent with this definition, private saving equals income (after taxes) plus government transfer payments and capital gains, including the increase in the real value of cash balances, minus consumption. This formulation, in view of our concern with price flexibility, would seem superior to that usually offered (and accepted by Tobin), where saving is identified only with the change in capital stock. That formulation is, of course, identical with ours if the real value of cash balances is assumed to be fixed. But in a model including variable prices and ruling out money illusion, it seems preferable to identify the behavioural saving function as that describing the aggregate of individual additions to net worth, whatever the form in which these additions are embodied. We join Tobin in adopting the simplifying assumption that there are no bonds and that the only stores of value are physical capital and government-issued money.

² This would appear consistent with the statistical and theoretical work by Kuznets, Modigliani, Duesenberry, Friedman and others. Tobin's assumption that saving is zero for some positive income (*loc. cit.*, p. 104) is not appropriate for the long-run saving function which is relevant.

currently relevant, and will not be entertained. Our saving function may be further described by the following partial derivatives:

$$S_Y > 0 \dots\dots\dots (25.1)$$

$$S_i \geq 0 \text{ but } \cong 0 \dots\dots\dots (25.2)$$

$$S_K < 0 \dots\dots\dots (25.3)$$

and

$$S_{M/P} < 0 \dots\dots\dots (25.4)$$

With the possible exception of (25.2), in which it is assumed that the interest elasticity of saving is not sufficient to make any difference, these would not appear, in the present context at least, to be controversial. And in this context (25.2) need be disturbing only to those who stand on the original neo-classical position that the rate of interest can be expected to vary sufficiently to ensure the equality of investment demand and saving under conditions of full employment.

The form in which savings are held will be described by an asset preference function,

$$\frac{M}{P} = M(K, i, Y) \dots\dots\dots (28)$$

the satisfaction of which defines a condition of portfolio balance. This function has the general specifications,

$$M_K > 0 \dots\dots\dots (28.1)$$

$$M_i < 0 \dots\dots\dots (28.2)$$

and

$$M_Y > 0 \dots\dots\dots (28.3)$$

But we shall also endow it with the Keynesian characteristic that the demand for liquidity becomes absolute as the rate of return on investment approaches some lower limit. Thus we add,

$$M_i \rightleftharpoons -\infty \text{ as } i \rightleftharpoons i_1, \text{ or merely, as } i \rightleftharpoons 0 \dots\dots (28.4)$$

since money is presumed to be a non-depreciating store of wealth, and hence

$$i \geq i_1 \text{ or } i \geq 0 \dots\dots\dots (28.5)$$

Our system is now complete, and the issue can be specified as follows. Is an actual rate of growth of output equal to the solution for the warranted rate in (27) necessarily consistent (or attainable) with the full-employment conditions,

$$\begin{cases} L = L_s, \text{ the labor supply,} & (29) \\ \frac{d \log L}{dt} = \frac{d \log L_s}{dt} & \dots\dots\dots (29.1) \end{cases}$$

and the profit maximisation or "economic" relationship

$$F_r = i \geq i_1 \text{ or } \geq 0 \dots\dots\dots (30)$$

along with the related constraints upon r and $\frac{dr}{dt}$ expressed in (19), (20) and (23)? Or we may pose the issue in perhaps more familiar guise: can we be sure of equality between the rate of change in the capital-labour ratio determined by saving and changes in labour supply and the rate of change in this ratio acceptable to entrepreneurs under the constraints of the production function and market-determined asset preferences, *i.e.*, can

$$\frac{S}{K} - \frac{M/P}{K} \left(\frac{d \log M}{dt} - \frac{d \log P}{dt} \right) - \frac{d \log L_s}{dt} = \frac{d \log r}{dt} ? \quad (31)$$

Within the framework of an analogous set of relationships,¹ it has been argued (by Tobin), "In this model, unlike those of Harrod, Hicks and others, failure of the labor supply to grow at the rate necessary for balanced growth [constant capital-labor ratio] does not mean that growth at a slower rate is impossible."² The rate of profit must fall, it is conceded, as the capital-labour ratio grows, and "Portfolio balance requires, therefore, that a given increment of capital be accompanied by a greater price decline than in the case of balanced growth. But there is some rate of price decline that will preserve portfolio balance, even in the extreme case of completely inelastic labor supply."

This argument, however, is clearly invalid if the "given increment of capital" would bring the marginal net product of capital below i_1 (or below zero), thus violating condition (30). Portfolio balance can then be preserved only if the price decline reduces the increment of capital (saving) sufficiently so that $F_r \geq i_1$ (or 0).

But can the static "Pigou effect" rescue us? Must there always be *some level* of prices (above zero) for which real cash balances will be so large that the supply of saving will be reduced to whatever amount is consistent with the exogenous growth of the labour force and an *economic* capital-labour ratio? For this to be true it must be made clear that our assumption that $S_{M/P} < 0$ is not sufficient.³ As indicated by Patinkin,⁴ the reduced rate

¹ In which, however, functional saving is defined as the change in capital stock (cf., footnote 1, p. 716, above) and is dependent only upon income, thus excluding the Pigou effect, but is assumed ("crucially") to be zero for some positive income producible under conditions of full employment (cf., footnote 2, p. 716, above).

² Tobin, *loc. cit.*, p. 107. The word "possible" in the text seems clearly to have been a misprint, and I have taken the liberty of changing it to "impossible" in my quotation.

³ It is interesting to note that the Pigou effect, which we are here admitting, implies a curious type of money illusion to which illusion-hostile neo-classicists might wish to take exception. For an increase in the real value of cash balances makes society no wealthier in "real" terms, that is in goods. The illusion of greater wealth is accepted by private individuals in so far as they consider the balance sheet of only the private sector of the economy, and do not reckon that society is in some sense the debtor as well as the creditor of each dollar of government obligation.

⁴ Don Patinkin, "Price Flexibility and Full Employment," as reprinted in American Economic Association, *Readings in Monetary Theory*, especially pp. 267-9, and *Money, Interest, and Prices* (Evanston, Illinois, 1956) p. 236.

of saving resulting from increased cash balances may involve an asymptotic relation in which the total possible effect is finite:

$$\frac{\partial^2 S}{\partial (M/P)^2} > 0 \text{ so that } S_{M/P} \rightarrow 0 \text{ as } M/P \rightarrow \infty \quad . \quad (25.5)$$

The economic plausibility of this argument is suggested by the observation that the acquisitive motive, as well as the desire to better oneself, to pass more on when one leaves this world than one had when one entered, are fundamental parts of the capitalist ethic. Who really finds that he is rich enough and ceases trying to get richer? But if society, no matter how great its wealth, will always strive to accumulate more, we can have no assurance that, even aside from expectational and other dynamic considerations,¹ the saving ratio can be made sufficiently low.²

But there is still a way out for the growth model critics. Under the restrictive conditions we have assumed, there must be a consistent solution for the warranted rate of growth as defined in (27)—if we do not require price stability. For with a constant nominal quantity of money, M , we can, from (25) and (26.1), write the increment of capital

$$\frac{dK}{dt} = S\left(r, i, K, \frac{M}{P}\right) + \frac{M}{P} \cdot \frac{d \log P}{dt} \quad . \quad . \quad . \quad (32)$$

With falling prices $\frac{M}{P} \cdot \frac{d \log P}{dt}$ is, of course, negative and (at least mathematically) there is nothing to prevent this negative value from being indefinitely great, reducing $\frac{dK}{dt}$ to any necessary level, regardless of the supply of saving.

"Equilibrium" can thus be maintained by a perpetual fall in prices, in which the community "saves" by increasing the real value of cash balances. Paraphrasing somewhat Patinkin, we have a "dynamic Pigou theorem,"³ which suggests that there is some *rate of fall* of prices sufficient to satisfy the excess of the full employment desire to save over whatever investment demand may be forthcoming. The reader may estimate for himself the probability of finding expectations functions, let alone institutional flexibilities, which would make such a solution economically plausible.

¹ Of course, few to-day, in any event, would argue that the Pigou effect could be expected to maintain generally full employment in a dynamic system with the substantial fluctuations in demand which have characterised Western economies.

² It has been argued that underlying the portfolio balance equation is the desire of individuals (and the community) to split increments of wealth as between physical and monetary assets in order to minimise risk (Tobin, pp. 106-7). This would suggest that increments of wealth in the form of cash balances would increase the demand for physical capital, although its expected return were not thereby improved. But it can also be argued that as wealth increases, in line with the saving motives discussed above, its marginal utility approaches a positive asymptote and the hedging incentive would disappear as marginal utility became constant.

³ Cf., Patinkin's *static* "Pigou theorem" in "Price Flexibility and Full Employment," p. 271.

Our system has been endowed explicitly with the neo-classical complements of variable factor proportions, flexible prices, cash-balance effects and a *fixed* linear, homogeneous production function (thus ruling out the employment of capital-using innovations like a *Deus ex machina* to set the plot straight). By way of summary, we shall describe the operation of this system when confronted with a rate of growth in the labour supply (ultimately Harrod's "natural rate of growth") less than the "proper" full-employment rate warranted by the supply of saving. And by way of simplification of exposition we shall consider the case (suggested by Tobin) where the supply of labour is "completely inelastic . . . with respect to the real wage and with respect to time."

Since the rate of saving is (by hypothesis) positive, the ratio of capital to labour must increase continuously and the rate of profit must fall continuously. As the rate of profit falls the community becomes disposed to take larger and larger proportions of increments of wealth in the form of money. With a fixed stock of money, successive increments of wealth will then require successive declines in the level of prices. But as the rate of profit approaches the value of i at which M_i approaches minus infinity we find the community approaching a situation where no further increase in the stock of capital and decline in the rate of profit is consistent with portfolio balance, regardless of the decline in the price level (or alternately, increase in the quantity of money). The rate of profit cannot (in equilibrium) fall below the point of infinite elasticity of the demand for money because the community stops accepting further increases in capital (which is what lowers the value of i) as i reaches that lower limit. But this means that positive saving can take place only in the form of the increased cash balances stemming from falling prices. And it is only thus that the relatively too large (positive) warranted rate of growth is reducible to equality with the natural rate.

There is no assurance that such a solution, of perpetually falling prices, would prove dynamically stable when we admit the role of expectations. For price declines generating expectations of further price declines would increase the relative attractiveness of money as compared to physical capital, and might leave no point of equilibrium as long as there were physical capital of which individuals might dispose. I shall not attempt to explore further the difficulties along these lines, but, in any event, it is on this solution of perpetually *falling* prices—a "dynamic Pigou theorem"—that a rejection of the *possibility* of the growth model problems would have to rest.

IV. CONCLUSION

The implications of recent models of economic growth and fluctuation of the Harrod-Domar-Hicks variety have been challenged as the consequence of arbitrary assumptions of rigid technological relationships and/or rigid price relationships. This challenge is unfounded.

For the Harrod-Domar-Hicks models require no more in the way of a production function than most of us would be willing to grant as reasonable. Specifically, they do require a schedule of *net* marginal productivity of capital declining in such a way that there is a limit to the capital-labour (or capital-output) ratio which is economically feasible. This limit may be reached at the point where the marginal efficiency of investment equals the rate of interest set by the Keynesian liquidity trap. It may even be reached only at the point where the marginal net product of capital is zero (and the marginal efficiency of investment also zero if expectations are founded on reality). But limit there must be.

And if there must be an *upper* limit to the capital-output ratio, there must, for any saving ratio, be a *lower* limit to the rate of growth of output (or labour) which will be consistent with the saving forthcoming. This minimum "required" rate of growth can then be reduced only to the extent the saving ratio can be reduced. If the saving ratio will not adjust automatically, via interest-rate changes or "Pigou effects," to whatever value is consistent with whatever rate of growth of output obtains, then there remains some minimum "warranted," "equilibrium" or "full-employment" rate of growth. This rate of growth is thus determined jointly by the upper limit to the automatic, free adjustment of the capital-output ratio and the lower limit to the automatic free adjustment of the saving ratio. If we do not obtain this rate of growth we are in some kind of trouble—an underemployment trouble which the models merely seek to explain, not create.

We are not always in this kind of trouble. We may not always face a problem of capital-output ratios and saving ratios determined by free economic forces being inconsistent with underlying determinants of economic growth such as population and the development of additional natural resources. The problem may become remote for substantial periods of time because of various social or governmental pressures (intended or unintended) upon these ratios. But whether or not the problem is at any moment of time crying for solution, it does exist. And in view of the historical record of cyclical instability, uneven growth and recurring periods of unemployment in the (private-profit-motivated) capitalistic economies we have known, the problem seems important. It is perhaps a mark of the technological backwardness of economic theory that the "H-D-H dynamic" arrived so late. It will certainly (in the view of this observer) be a mistake to hasten to discard it.

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The CHAIRMAN. We will meet tomorrow in this same room.

(Whereupon, the committee adjourned, to reconvene on Thursday,

May 28, 1959.)

EMPLOYMENT, GROWTH, AND PRICE LEVELS

THURSDAY, MAY 28, 1959

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Joint Economic Committee met at 10 a.m., pursuant to recess, in room P-63, the Capitol, Senator Paul H. Douglas (chairman), presiding.

Present: Senators Douglas, Bush, and Representatives Widnall, Patman, and Reuss.

Representative PATMAN. The committee will please come to order.

We have with us Professor Gurley this morning of the Brookings Institution. We are delighted to have you, Professor. You have a very interesting subject: "Institutional Frictions in Money and Credit Markets."

You may proceed in your own way, sir. Senator Douglas is delayed temporarily, but he will be here shortly.

STATEMENT OF JOHN G. GURLEY, SENIOR STAFF MEMBER, BROOKINGS INSTITUTION

Mr. GURLEY. Thank you, Mr. Patman.

I very much appreciate the opportunity that you have given me to appear before this committee. I shall proceed by reading a few parts of my paper and talking about some of the other parts of it.

The monetary authorities attempt to regulate the market for loanable funds in such a way as to bring about interest rates and other terms of lending that are compatible with full employment and reasonably stable prices.

This market which I propose to examine may be described by a demand function, a supply function, and equilibrium condition. There are demand conditions, supply conditions, and equilibrium conditions to this market.

The demand for loanable funds during any period is the planned issues of primary securities coming from consumers, from governments, from business firms. These primary securities are composed of corporate bonds, mortgages, consumer debt, Federal Government securities, State and local securities and claims of this sort; all claims and equities emanating from the nonfinancial sectors of the economy.

Chart I illustrates that the three channels through which the primary securities may be sold. First, they may be sold directly to ultimate lenders.

Second, they may be sold to the monetary system. In this case, the ultimate lenders acquire not the primary securities but additional money balances.

Third, the primary securities may be sold to nonmonetary intermediaries. These intermediaries are mutual savings banks, savings and loan associations, life insurance companies, credit unions, pension funds, and similar institutions. I am also including the time deposits of commercial banks in the category of nonmonetary intermediaries. That is, the monetary system is composed of the monetary accounts of the Treasury, the Federal Reserve banks, and the demand deposit departments, so to speak, of the commercial banks.

So the ultimate lenders end up either with the primary securities themselves, if they are sold directly, or they end up with more money if they are sold through the monetary system, or they end up with nonmonetary indirect assets of various types if they are sold through nonmonetary intermediaries.

The nonmonetary indirect assets take the form of mutual savings deposits, savings and loan shares, shares in credit unions, policy holders' equities in life insurance companies, and similar claims.

That is the demand side of the market for loanable funds. The supply side is this: the supply of loanable funds during any period is the demand for primary securities by the ultimate lenders themselves, by the monetary system, and by the nonmonetary intermediaries.

There is equilibrium in this market whenever the demand for loanable funds is equal to the supply of loanable funds. But that is the same thing as saying there is equilibrium when the issues of primary securities are equal to the demand for these issues.

Whenever the demand for loanable funds exceeds the supply of loanable funds, interest rates rise on these securities and other terms of lending tighten. In the reverse case, interest rates fall and other terms of lending are eased.

That is a bird's eye view of the loanable funds market. What I would propose to do in the next few minutes is to look at each one of these aspects of the market a bit more carefully than I have up to this point.

Representative PATMAN. Do you discuss Federal funds in connection with your statement?

Mr. GURLEY. No, I do not. We will start with the demand for loanable funds.

As I said, the ultimate borrowers' demand loanable funds by issuing primary securities. These securities are issued to finance excesses of expenditures over income, that is, deficits, and to finance the acquisition of financial assets and existing tangible assets such as land.

Actual gross national expenditures for output by the economy as a whole (including the foreign sector) are always equal to its gross national income earned in producing the output. It follows, therefore, that if some economic units have excess expenditures, or deficits, others will have an equivalent amount of excess incomes, or surpluses. Deficits and surpluses are simply two sides of the same coin; like love and marriage in the popular song, you can't have one without the other.

There are several other factors that affect the growth of primary securities; that is, the demand for loanable funds during any period of time. But I can neglect these now and perhaps come back to them later.

I would now like to look at chart II on page 9, which shows the issues of primary securities as a ratio of gross national product by short business cycles since 1897.

You can see from that chart that except for the two world wars and the great depression, primary security issues were around 9 or 10 percent of gross national product in each one of these cycles. That is to say, if gross national product in some period was on an average \$200 billion a year we would find primary security issues of around 10 percent of that, or \$20 billion. That is, there would be \$20 billion of new corporate issues plus Government issues plus mortgages plus short-term debt and so forth.

The ratio of primary security issues to gross national product was quite high in the two World Wars because deficits and surpluses were quite high. Budget imbalances were high, that is, relative to gross national product. Also, during those two periods, deficits and surpluses were permanently located in sectors. They did not rotate from one sector to another.

When deficits and surpluses are permanently located in sectors, the deficits lead to primary security issues in large volume and the surpluses lead to accumulations of financial assets in large volume.

In the depression, on the other hand, the ratio of primary security issues to gross national product was quite low because deficits and surpluses themselves were quite low relative to gross national product and because deficits and surpluses rotated among sectors of the economy.

Now, I will move to the supply side of the loanable funds market. On the supply side we have the demand for primary securities by ultimate lenders, by the monetary system, and by nonmonetary intermediaries. I want to discuss each in turn.

During any year ultimate borrowers issue a certain mixture and amount of primary securities. In most circumstances, ultimate lenders demand only a portion of these security issues, since they also desire to accumulate money and nonmonetary indirect assets (claims on nonmonetary intermediaries). Ultimate lenders ordinarily want diversification of their financial assets—some corporate bonds, some money, some time deposits, and so on.

The portion of primary security issues rejected by ultimate lenders is sold to the monetary system and to nonmonetary intermediaries. When the issues are sold to these intermediaries, ultimate lenders acquire money and nonmonetary indirect assets rather than primary securities.

What determines the portion of primary security issues wanted by ultimate lenders? This portion depends, for one thing, on the interest rates on primary securities. Ultimate lenders will want a large portion of primary security issues at high interest rates, a small portion at low interest rates.

Further, given these interest rates, they will want more or less primary securities depending on the composition of these securities. They will increase their purchases if the issues are mostly short-term and riskless; they will reduce their purchases if the issues are dominantly long-term and risky. Moreover, the portion of primary security issues demanded by ultimate lenders depends on the types of claims offered by financial intermediaries, and on the interest rates paid by these intermediaries.

Ultimate lenders will reduce their demand for primary securities if these other claims are especially attractive and if intermediaries pay high deposit rates on them. They will also reduce their demand for primary securities as national income rises, for this increases their need for money balances.

Finally, the portion of primary security issues wanted by ultimate lenders depends on the stage of development of techniques for distributing these securities from borrowers to lenders, a subject which deserves a few more words.

While distributive techniques get primary securities distributed efficiently from borrower to lender, intermediative techniques take primary securities off the market and substitute in their place indirect securities—money and nonmonetary indirect assets. The principal function of financial intermediaries is to purchase primary securities from ultimate borrowers and to issue indirect securities for the portfolios of ultimate lenders.

Part of the total supply of loanable funds comes from commercial banks. This section explains how the money-creating powers of commercial banks change interest rates on primary securities, and how these powers are controlled by the central bank.

During any year, as we have seen, ultimate borrowers demand loanable funds by issuing primary securities. Ultimate lenders would consent to purchase all of these security issues only at very high interest rates. At somewhat lower interest rates, ultimate lenders would reject a small portion of the security issues. At very low interest rates, they would reject most of them.

Commercial banks, by purchasing primary securities and creating money, affect the level of interest rates on primary securities. If commercial banks purchase a small portion of the primary security issues, ultimate lenders must purchase the remaining large portion (neglecting nonmonetary intermediaries for the moment), and they will do so only at high interest rates.

If commercial banks purchase a large portion of the primary security issues, only a small portion is left for ultimate lenders, which they will consent to purchase at low interest rates. Thus, by varying the proportion of primary security issues that they purchase, commercial banks can change interest rates on these securities.

The reserve mechanism that the central bank has, the Federal Reserve has, over its member banks, is really a direct control imposed by the central bank over the commercial banking industry. It is a direct control in this sense: The commercial banks produce money output by purchasing two main types of input: reserves and primary securities. If they could get all of both types of inputs that they desire, there would theoretically be no limit to the amount of money output that could be produced. But what the reserve mechanism does is to control the supply of one of the bank's inputs, reserves, and tell the commercial banks that they must use so much of that input to produce a dollar of money output.

Of course by varying the amount of rationed input going to commercial banks or by changing the reserve requirement itself, the central bank can control the level of money output of commercial banks and in this way control the portion of primary security issues that commercial banks purchase during any period of time.

The nonmonetary intermediaries too can increase the supply of loanable funds and lower rates on primary securities. I am going to discuss this by first looking at nonmonetary intermediaries, aside from the time deposits of commercial banks. Then I will look at the time deposits of commercial banks separately.

Nonmonetary intermediaries increase the supply of loanable funds by first selling claims on themselves (nonmonetary indirect assets) for money and then selling the money for primary securities. These transactions clearly increase the demand for primary securities by nonmonetary intermediaries. And, just as clearly, the transmissions do not change the monetary system's demand for primary securities, for demand deposits are simply transferred from one holder to another without affecting total deposits. The question remains whether the transactions affect ultimate lenders' demand for primary securities.

The answer to this question depends on what it is that ultimate lenders want to give up when they purchase nonmonetary indirect assets. If they want to give up primary securities, then the increase in demand for these securities by nonmonetary intermediaries will be met by an equivalent increase in the supply of them from ultimate lenders, the result being no change in the total demand.

If, however, ultimate lenders want to give up money and not primary securities, then the increase in demand for primary securities by nonmonetary intermediaries is a net increase in total demand. Consequently, the more that nonmonetary indirect assets compete with money rather than with primary securities in the portfolios of ultimate lenders the greater will be the increase in total demand for primary securities when nonmonetary intermediaries expand.

When the growth of nonmonetary intermediaries leads to an increase in the supply of loanable funds, interest rates on primary securities fall as the intermediaries increase their demand for these securities. This can continue for as long as the intermediaries are willing to sell claims on themselves for money and use the money to purchase primary securities. The central bank does not attempt in any direct way to regulate the amount of these transactions.

Now let us look at time deposits.

The time deposit departments of commercial banks are nonmonetary intermediaries, and the time deposits themselves are nonmonetary indirect assets. They are "nonmonetary" because they are not part of the money supply: they are not generally accepted as means of payment. They are "indirect" because they are claims on a financial intermediary. This is the one portion of nonmonetary intermediation over which the central bank has direct control.

An increase in ultimate lenders' demand for time deposits increases time deposits and reduces demand deposits. Because the reserve requirement on time deposits is lower than on demand deposits, commercial banks are able to increase their demand for primary securities. This increases total demand for primary securities unless ultimate lenders and other nonmonetary intermediaries reduce their demands for primary securities by an equal or greater amount.

These demands will be reduced to the extent that ultimate lenders choose to give up primary securities or other nonmonetary indirect assets when they purchase time deposits. On the other hand, the more that time deposits compete with money rather than with primary securities and other nonmonetary indirect assets the greater will be

the increase in total demand for primary securities when time deposits grow. Under these circumstances, the growth of time deposits is "inflationary" in the sense that it lowers interest rates on primary securities.

Representative PATMAN. May I ask you a question there?

Mr. GURLEY. Certainly.

Representative PATMAN. You state that time deposits are not part of the money supply?

Mr. GURLEY. That is right.

Representative PATMAN. As I understand it, commercial banks do not keep separate books on time deposits and demand deposits to the extent that they segregate the additional deposits created by reason of their ability to do so.

Let us say that a bank has so much in time deposits against which they have a reserve of 5 percent. But the reserves are intermingled as I understand it, so that if the bank is loaned up, and a demand deposit requiring a 20 percent reserve is switched to time deposit, the bank would be enabled to make loans aggregating \$3 million more in order to be loaned up.

To the extent that deposits can be shifted in this way, I do not see how your statement is in every way correct when you suggest that time deposits are not part of the money supply.

Mr. GURLEY. Time deposits are not generally accepted as a means of payment.

Representative PATMAN. I know they are not.

Mr. GURLEY. The commercial bank can create all sorts of things, Mr. Patman. It can create claims that have maturities of a hundred years if it obtains permission to do so. But we would not count everything that banks create as part of the money supply.

Representative PATMAN. That is all I care to ask you. You may continue.

Mr. GURLEY. An increase in time deposits is inflationary to the extent that time deposits compete actively with money—to the extent, that is, that an increase in demand for time deposits reduces the demand for money holdings.

Representative PATMAN. Demand deposits are comparable to the deposits made in other entities such as savings and loans and credit unions, and institutions like that. How can commercial banks argue that these institutions are competitors when the commercial banks have such tremendous power to create money and these others do not have power to create money at all?

Mr. GURLEY. The others do not have power to create money but they have power to create such things as savings and loan shares. Those come into the world created too. Credit unions also have power to create shares or deposits, mutual savings banks have the power to create mutual savings deposits. These creation powers are different.

Representative PATMAN. But they cannot expand on them like the commercial banks can expand with the Federal Reserve System?

Mr. GURLEY. Well, the mutual savings bank does not have quantitative controls imposed on it, so it does not have multiple creation in the legal reserve sense. But that is simply because it is not controlled in the same way that commercial banks are.

Representative PATMAN. The mutual savings are only in about 16 States, up here in the northeast.

Mr. GURLEY. I am using those only as an example.

Representative PATMAN. But savings and loans cover the entire country, as do the credit unions?

Mr. GURLEY. That is right. There is a part of my paper which covers the question that you have just raised about the creation powers, although I had not planned to deal with it in this brief statement here.

Representative PATMAN. Very well. Go ahead. I am sorry to have interrupted you.

Mr. GURLEY. Chart IV shows the percentage of primary security issues that were purchased by ultimate lenders, the monetary system, and nonmonetary intermediaries during each of 13 short cycles.

It may be seen that ultimate lenders supplied an increasing share of loanable funds from 1897-1900 to 1915-21, while the monetary system supplied a declining share. Nonmonetary intermediaries about held their own over this period, first gaining relatively and then losing. The monetary system continued to supply a declining share of loanable funds during the 1920's and 1930's, while nonmonetary intermediaries, on balance, gained significantly.

During 1939-46, when war finance took over, the monetary system increased its share of loanable funds to 32 percent, but in the post-war period it has again supplied a relatively small part of the total—about 12 percent since 1947. Nonmonetary intermediaries, on the other hand, have supplied an increasing share of loanable funds during this period; since 1950 they have become the dominant force in the loanable funds market.

In the past decade there have been three brief recessions, but on the whole there has been excessive demand for current output of goods and services at prevailing price levels and at relatively full employment of labor services. This excess demand has led to rising levels of money wage rates and commodity prices, and at times these price increases have anticipated the continuation of excess demands. The result has been a rise in the consumer price index since 1948 of 20 percent.

Why have monetary policies failed to halt the price increases? The basic reason is that these policies have failed to slow down sufficiently the growth of aggregate demand for current output of goods and services. They have failed to do this, I believe, largely because the monetary system's supply of loanable funds has not been limited nearly enough in view of the very large supply of these funds coming from other sources, principally from nonmonetary intermediaries.

The monetary authorities have operated under the mistaken belief that it is sufficient to restrain growth in the money supply; they have failed to appreciate the inflationary consequences of the enormous increase in the supply of loanable funds that has come from the creation of time deposits and claims on nonmonetary intermediaries. By encouraging the growth of time deposits and by failing to compensate for the growth of other nonmonetary indirect assets, they have permitted the supply of loanable funds to grow too rapidly to bring aggregate demand down to noninflationary levels.

During this period the money supply rose by approximately \$32 billion, time deposits by \$27 billion, and other nonmonetary indirect assets by \$120 billion. The combined growth of time deposits and other indirect assets exceeded the growth of the money supply on the order of 5 to 1. In the last 4 years this ratio has been around 10 to 1.

Representative PATMAN. Is it your understanding that the law that provides that interest shall not be paid on demand deposits is considered unenforceable and that no effort is really made to enforce it?

It is violated all over the country, generally by giving certain customers benefits and favors in different forms in order to compensate them for their demand deposits.

Mr. GURLEY. I imagine that that is true, though I do not know whether it is a technical violation or not.

Representative PATMAN. It is not a technical one the way I construe it.

Mr. Robertson of the Federal Reserve Board said the law is just simply unenforceable, and Chairman Martin of the Federal Reserve Board said it was unenforceable.

In a hearing conducted recently the testimony was brought out that the banks have a lot of ways of violating this law. They provide free parking space; they even give free tickets to Europe, and tickets to shows.

Mr. GURLEY. They will even cash checks for one.

Representative PATMAN. They have many and different ways of violating it without their actually paying interest in cash over the counter. I think Congress should take another look at that, do you not?

Mr. GURLEY. I think Congress should take another look at the interest rate, restrictions on both demand deposits and time deposits.

Representative PATMAN. It is certainly unfair for you as a customer of a bank, if your deposit gets down low, to be charged for it when other depositors are not. Some depositors receive pay indirectly for a deposit when it reaches a certain stage and others do not receive anything at all. Do you not think that there should be uniformity enforced by the commercial bankers themselves in order to give each persons an equal fair opportunity. Possibly a law should be passed to require or compel equal treatment of their customers.

Mr. GURLEY. I have no informed opinion about that, Mr. Patman.

Representative PATMAN. Very well.

Mr. GURLEY. The growth of time deposits has been encouraged by relatively low reserve requirements against these liabilities and, in recent years, by an increase in the interest rate ceiling on the deposits. The rapid growth of nonmonetary intermediaries has been due to the favorable composition of primary security issues during the period (weighted heavily toward mortgages and consumer debt), to the attractive indirect securities they have offered the public, and to the relatively high deposit rates they have been able to pay.

As interest rates on primary securities have risen, these intermediaries have been able to increase the demand for their indirect securities through increases in deposit rates.

The monetary authorities have restrained growth in the supply of loanable funds sufficiently over this period to raise interest rates

on primary securities and to tighten other terms of lending. But, in view of the heavy demands for current output—and I realize by this statement, Mr. Patman, I am walking into the lion's den—interest rate increases have been on the meager side; indeed, interest rates in recent years have been low relative to levels attained in previous periods of prosperity.

Moreover, any level of interest rates may be less effective today in restraining spending than in the past. In recent years, the composition of demand for loanable funds has swung toward government and consumers and away from business, and this has probably made the economy as a whole less sensitive to changes in interest rates. In addition, high corporate income tax rates have probably made the business sector itself less sensitive to monetary policy.

Representative PATMAN. I would like to invite your attention to one thing about the increases being low.

If we compare the interest cost of short-term Federal obligations now with, say, 1945 or 1946–47, the dollar is only worth 10 cents now in comparison with then, because the rates are 10 times as high. So when you said that the increases are low, you certainly did not refer to the cost of short-term obligation to the Treasury.

Mr. GURLEY. I am referring to them, but I was not comparing the interest rates now on those short-term obligations with those that prevailed in 1945–46. It is true they are much higher now than they were then.

Representative PATMAN. The preceding years too?

Mr. GURLEY. I am looking back to the period, say, 1880 on, and looking at periods of prosperity, including the 1920's.

Representative PATMAN. Do you not think that instead of shooting for the higher interest rates of the past, we should shoot for the lower rates that we once maintained over a long period of time?

Mr. GURLEY. I think there is a lot to that argument. I am not really addressing myself to it at this point. What I am asking is, Why did the monetary authorities not stop the rise in prices through quantitative controls, assuming that they really wanted to do so? Why didn't they bring about sufficiently tight credit conditions to achieve their goal of price stability? I am not advocating that they should have made credit a whole lot tighter during the postwar period than they actually did.

Representative PATMAN. Do you not agree that if they were to tighten it to the extent that they would control it, it would cause a lot more unemployment?

Mr. GURLEY. On the whole, we have had price increases during the postwar period, we have had excess demands for current output, and full employment.

Representative PATMAN. You may continue, if you will.

Mr. GURLEY. The inflationary effect of growth in nonmonetary intermediaries can be offset by the monetary authorities. All they need do is to restrain, more than they otherwise would have to do, the growth of money and time deposits. This will force primary securities into the hands of ultimate lenders and so raise interest rates and tighten other terms of lending. It will compensate for the rapid growth of financial intermediaries that lie outside of the controlled area.

But they are not likely to do this if they continue to concentrate almost exclusively on the money supply and fail to recognize the inflationary impact of growth in time deposits, savings and loan shares, mutual savings deposits, shares in credit unions, and so on.

To slow down inflation, the monetary authorities, as I have said, would have had to restrain growth in the supply of loanable funds more than they did during the past decade. That is, if you wanted to do it by monetary policy. Given the fact, however, that they have direct controls only over commercial banks, this would have greatly curtailed the growth of these institutions. And if inflationary pressures continue for another decade, the monetary authorities, to stop them, will have to crack down hard on commercial banks, especially if there continues to be rapid growth in the uncontrolled institutions. This prospect does raise a few questions about our present control techniques.

The first has to do with the simple matter of equity. Is it equitable to control one area of financial intermediation when, as I have shown, the activities of all can add to inflationary pressures? The second question is whether such control techniques can lead to balanced growth in our economy. Some sectors of the economy are heavily dependent on funds from commercial banks; other sectors rely more on other financial institutions.

When commercial bank growth is slowed down to compensate for rapid growth of other financial intermediaries, we are in effect denying growth to some areas of the economy in order to compensate for rapid growth in other areas. Is such unbalanced growth tolerable in our economy?

Third, what effect in the long run do direct controls over one area of financial intermediation have on that area, in view of the fact that this area is subject to severe competition from other, uncontrolled intermediaries? Does the controlled area in the long run lose vitality, fail to attract the best leaders, fail to attract sufficient capital, lower the quality of its product, and fail to supply funds to borrowers on the frontiers of economic growth?

Finally, when a relatively diminishing area of financial intermediation is subject to controls, does so much "slippage" develop in the mechanism as to make it impossible to formulate intelligent monetary policies? These are the questions that must be answered in deciding whether to string along with our present control techniques for another decade.

Thank you.

Representative PATMAN. And you want to insert the tables, too?

Mr. GURLEY. Yes.

Representative PATMAN. Your statement will be inserted in the record, and also the tables, at this point.

(The material referred to follows:)

MONETARY THEORY AND FINANCIAL INSTITUTIONS

(John G. Gurley, Brookings Institution ¹)

The monetary authorities attempt to regulate the market for loanable funds for the purpose of achieving interest rates and other terms of lending that are

¹ The views expressed in this paper are those of the author. They do not necessarily reflect the views of other members of the Brookings staff or of the administrative officers of the institution.

compatible with policy goals of steady output growth at reasonably stable prices. The market for loanable funds is the market the monetary authorities enter in their efforts to influence prices and quantities on other markets. It is this market, therefore, that must be studied first.

THE MARKET FOR LOAN FUNDS

This market can be described by a demand for loanable funds, a supply of loanable funds, and an equilibrium condition. I proceed in that order.

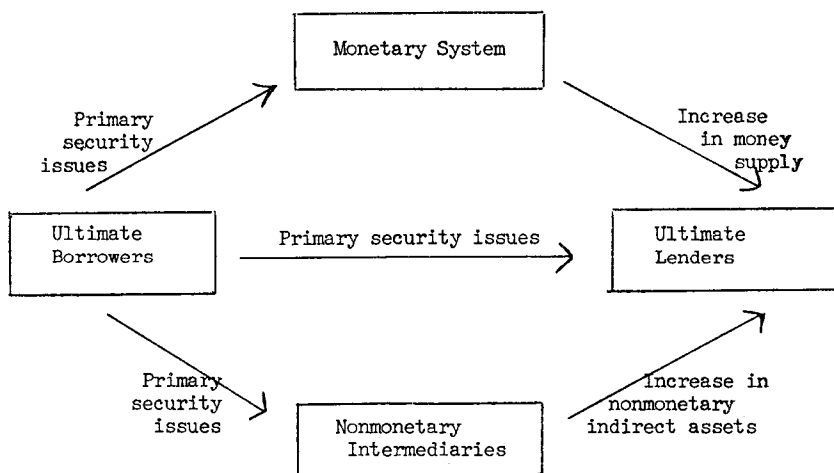
The demand for loanable funds

The demand for loanable funds, during any period, is the planned issues of primary securities by nonfinancial economic units—by consumers, business firms, and Government units. Primary securities are the obligations of these economic units, and they include corporate bonds and equities, short-term business debt, trade debt, consumer debt, mortgages, Federal, State and local government securities, and other claims.

As chart I illustrates, ultimate borrowers may sell primary securities through any of three channels: (1) directly to ultimate lenders; (2) indirectly to them through the monetary system; or (3) indirectly to them through nonmonetary financial intermediaries.

CHART I

The Market for Loanable Funds



When primary securities are sold directly to ultimate lenders, the latter of course acquire these securities. This is called direct finance.

When primary securities are sold to the monetary system, the ultimate lenders acquire money balances instead of primary securities. This is called indirect finance through the monetary system. Money is defined as currency outside of banks, adjusted demand deposits, and U.S. Government demand deposits. The monetary system includes the monetary accounts of the Treasury, Federal Reserve banks, and commercial banks. This system excludes the time deposit departments of commercial banks.

When primary securities are sold to nonmonetary financial intermediaries, ultimate lenders acquire, instead of primary securities, claims on these intermediaries, or nonmonetary indirect assets. This is called indirect finance through nonmonetary intermediaries. These intermediaries include time deposits of commercial banks, mutual savings banks, savings and loan associations, life insurance companies, credit unions, private pension funds, and similar

institutions. Nonmonetary indirect assets are time deposits, mutual savings deposits, savings and loan shares, and so on.

The supply of loanable funds

The supply of loanable funds, during any period, is the demand for primary securities by ultimate lenders, the monetary system, and nonmonetary intermediaries.² These demands, as chart I shows, lead to accumulations by ultimate lenders of primary securities, money, and nonmonetary indirect assets.

Market equilibrium

The market for loanable funds is in equilibrium when the total demand for loanable funds is equal to the total supply of loanable funds. It is in equilibrium, in other words, when issues of primary securities by ultimate borrowers are equal to total demand for these securities by ultimate lenders, the monetary system, and nonmonetary intermediaries. When there is excess demand for loanable funds, interest rates on primary securities rise and other terms of lending tighten. When there is excess supply of loanable funds, interest rates on primary securities fall and other terms of lending are eased.

The scope of monetary controls

The monetary authorities ordinarily do not control directly the demand for loanable funds. Further, they have no direct control over the supply of loanable funds coming from ultimate lenders and from nonmonetary intermediaries. Instead, monetary controls usually impinge on only one portion of the total supply of loanable funds—that coming from the monetary system.

The monetary authorities seek to regulate the total supply of loanable funds in relation to the total demand for these funds. They try to bring about an excess demand for loanable funds when they want credit tightness. They endeavor to achieve an excess supply of loanable funds when they want credit ease. The purpose of credit tightness is to reduce spending for current output and to lower commodity prices. Credit ease is meant to increase spending for current output and raise commodity prices. Hence, by controlling one portion of the total supply of loanable funds, the monetary authorities attempt to influence total economic activity.

The scope of this paper

The following pages examine more closely the various parts of the market for loanable funds that we have just looked at briefly. The discussion is both analytical and empirical.

THE DEMAND FOR LOANABLE FUNDS: ISSUES OF PRIMARY SECURITIES

Ultimate borrowers demand loanable funds by issuing primary securities. These securities are issued to finance excesses of expenditures over income on income and product account (deficits), and to finance the acquisition of financial assets and existing tangible assets (e.g., land).

Determinants of primary security issues.

Actual gross national expenditures for output by the economy as a whole (including the foreign sector) are always equal to its gross national income

² This is what the orthodox definition boils down to. The supply of loanable funds is defined as:

Planned saving by economic units

+
Increase in stock of money

—
Increase in economy's demand for money (hoarding).

Assuming that saving and investment are done by different groups and that savers do not repay debts, planned saving is equal to economic units' increase in demand for primary securities, money, and nonmonetary indirect assets. The increase in the economy's demand for money minus that of economic units is the increase in demand for money by nonmonetary intermediaries. With these definitions, the supply of loanable funds is redefined as:

Economic units' increase in demand for primary securities

+
Economic units' increase in demand for nonmonetary indirect assets

+
Increase in stock of money.

—
Nonmonetary intermediaries' increase in demand for money.

The second item is equal to nonmonetary intermediaries' increase in demand for primary securities and money; the third item is equal to the monetary system's increase in demand for primary securities, neglecting gold. This yields my definition

earned in producing the output. It follows, therefore, that if some economic units have excess expenditures, or deficits, others will have an equivalent amount of excess incomes, or surpluses. Deficits and surpluses are simply two sides of the same coin; like love and marriage in the popular song, you can't have one without the other.³

Economic units with deficits generally finance the deficits by issuing primary securities, though they may use their previously accumulated financial assets. Economic units with surpluses generally "invest" the surpluses in financial assets, though they may reduce previously incurred debt.⁴ Consequently, the growth of deficits and surpluses among economic units generally leads to larger issues of primary securities and accumulations of financial assets.

Given the size of deficits and surpluses, the growth of primary securities and financial assets is larger when deficits and surpluses are located more or less permanently among economic units, for chronic deficits are eventually financed by issues of primary securities and chronic surpluses are eventually "invested" in financial assets. On the other hand, when deficits and surpluses "rotate" rapidly among economic units, primary security issues and financial-asset accumulations are generally small. The reason is that deficit-surplus rotation gives economic units greater opportunity to shuttle existing financial assets back and forth to each other, without having to create new ones.

Primary security issues also tend to be relatively large when economic units issue these securities for the purpose of acquiring financial assets. Security issues for this purpose are more likely to occur as the structure of financial assets becomes more variegated—as there are more and more different types of financial assets from which to choose. Then it becomes increasingly rational for economic units to be in debt and to hold financial assets at the same time.

Primary security issues and GNP, 1897-1958

Over the long period from 1897 to 1958, net issues of primary securities (valued at issue prices) averaged around 10 percent of the sum of gross national product (valued in current prices).⁵ That is, it required about \$10 of primary debt and equity issues to finance each \$100 of expenditures for current output.

Primary security issues during 14 short business cycles since 1897 are compared to GNP in chart II. Each ratio is found by dividing primary security issues during a cycle by the sum of GNP during that cycle. Each short cycle begins with a recovery year and ends with a recession or depression year. It is clear that the ratio of issues to GNP got out of line only during short cycles characterized by war or deep depression; it was high in the former periods and low in the latter. In the other 10 short cycles, the ratio moved within the narrow range of 7.5 to 10.6 percent, shown by the shaded area in the chart.

There is no evidence of an upward or downward trend over this long period. The ratio rose above its normal range only when GNP itself rose sharply above its previous levels, as during the two World Wars. In these years deficits were abnormally high relative to GNP and both deficits and surpluses were chronically embedded among sectors of economic units. Both of these factors led to relatively large security issues. The ratio fell below the normal range only when GNP fell abruptly and moved along at levels well below those previously attained, as during the 1930's. In that decade, deficits were low relative to GNP and deficit-surpluses rotation was prevalent. These factors produced relatively low security issues.

³ Deficits and surpluses reflect the fact that the distribution of spending among economic units is not the same as the distribution of income among them. If these distributions were exactly the same, each economic unit would have a balanced budget, and all expenditures for current output by each unit would be financed internally from that unit's current income.

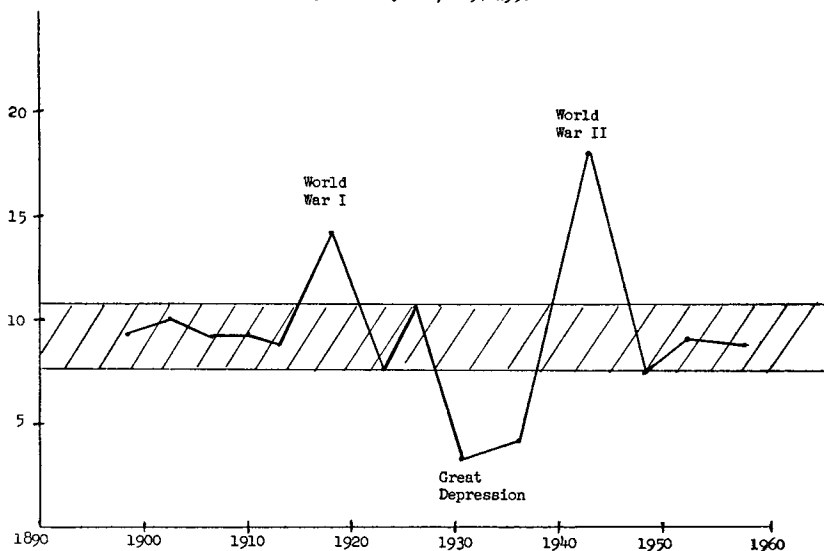
⁴ A financial system restrains output growth, however, if it ties the distribution of spending too rigidly to the distribution of income among economic units. This is because the economic units with the most productive spending opportunities are not necessarily those with current income to cover such spending. If investment projects are to be exploited in order of their expected profitability, it is generally necessary for some economic units to spend in excess of their current incomes and others to spend less than their current incomes. That is, an efficient ordering of spending throughout the economy generally requires deficits by some economic units and surpluses by others.

⁵ For simplicity I am ignoring trading in existing tangible assets.

⁶ Primary securities include Government securities, corporate bonds and equities, mortgages, and a variety of short- and intermediate-term debt.

CHART II

Ratio of Primary Security Issues to
GNP by Short Cycles, 1897-1958



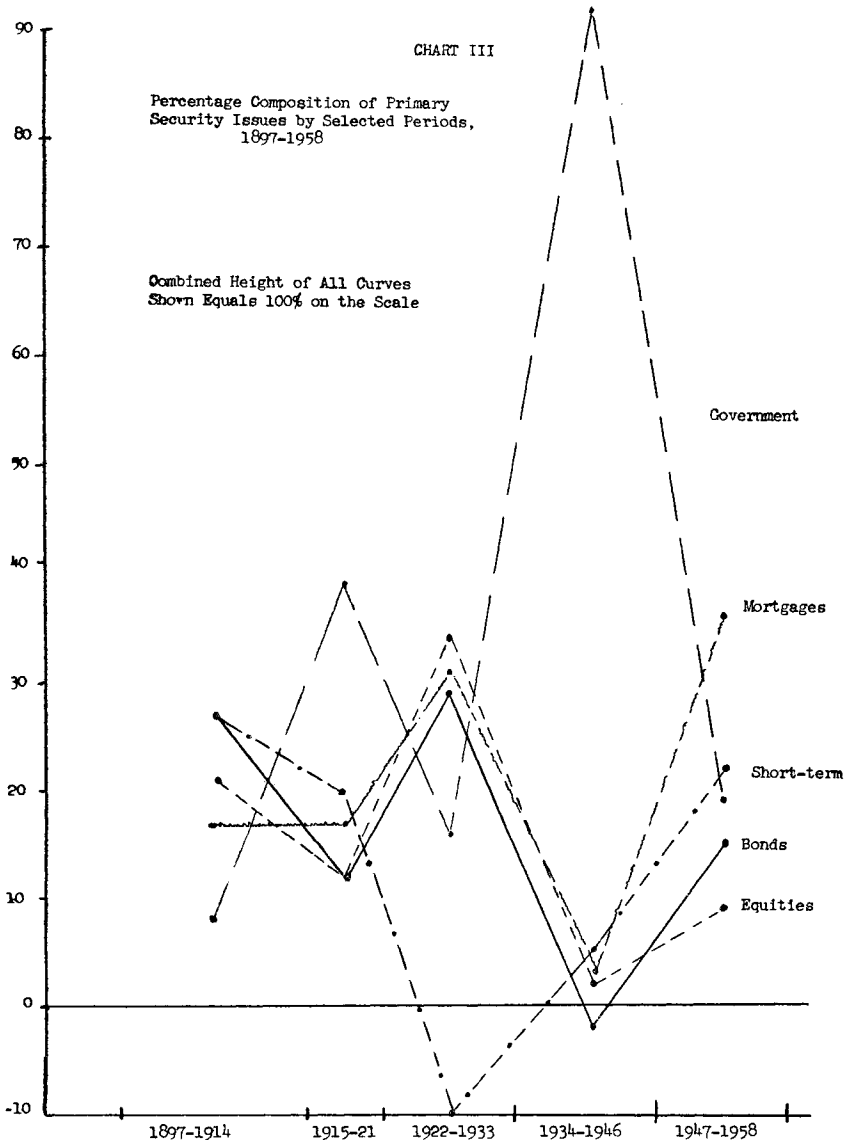
Based on data in Appendix Table I

Composition of primary security issues, 1897-1958

The composition of primary security issues depends on the rate and pattern of real economic activity over periods that vary from the long sweep of a century to the seasons of a single year. For decades Government units may play so large a role in economic activity that Federal, State, and local government issues dominate the security markets. Over other long periods the corporate business sector may be bidding for the lion's share of loanable funds, so that corporate bonds, equities, and short-term business debt take precedence. Mortgages are issued in heavy volume during the rising phases of the building cycle, and then dry to a trickle when construction activity is at low ebb.

Over the shorter periods of business cycles, the composition of primary security issues seems to vary systematically. During early recovery years, the flow of issues tends to be most heavily weighted with short-term business borrowing, and long-term flotations feature bonds rather than equities. In the later phases of the upturn, corporate bond issues may decline as equities appear in heavier volume. Recession and depression minimize private short-term issues; bond financing becomes more attractive; and the Federal Government often succeeds State and local governments on the security markets. There is variation in the composition of primary security issues, too, between intervals of war and peace and between periods of net foreign investment and disinvestment.

Chart III shows the composition of primary security issues during five long periods since 1897. Each period had its distinctive rate and pattern of real growth and hence its own mixture of primary security issues. The relatively high levels of Government expenditures during 1933-46 led to Government issues that almost completely dominated the security markets. The construction booms of the 1920's and the recent postwar period show up in relatively heavy mortgage issues. The dominance of business spending in 1897-1914 is clearly reflected, too, in these financial data. The real world and the financial world are actually one world.



SUPPLY OF LOANABLE FUNDS: ULTIMATE LENDERS

I turn now to the other side of the market. The supply of loanable funds comes from ultimate lenders, the monetary system, and nonmonetary intermediaries. Each is taken up in turn.

Ultimate lenders and portfolio diversification

During any year ultimate borrowers issue a certain mixture and amount of primary securities. In most circumstances, ultimate lenders demand only a portion of these security issues, since they also desire to accumulate money and nonmonetary indirect assets (claims on nonmonetary intermediaries). Ultimate lenders ordinarily want diversification of their financial assets—some corporate bonds, some money, some time deposits, and so on. The portion of primary

security issues rejected by ultimate lenders is sold to the monetary system and to nonmonetary intermediaries. When the issues are sold to these intermediaries, ultimate lenders acquire money and nonmonetary indirect assets rather than primary securities.

What determines the portion of primary security issues wanted by ultimate lenders? This portion depends, for one thing, on the interest rates on primary securities. Ultimate lenders will want a large portion of primary security issues at high interest rates, a small portion at low interest rates. Further, given these interest rates, they will want more or less primary securities depending on the composition of these securities. They will increase their purchases if the issues are mostly short-term and riskless; they will reduce their purchases if the issues are dominantly long term and risky. Moreover, the portion of primary security issues demanded by ultimate lenders depends on the types of claims offered by financial intermediaries, and on the interest rates paid by these intermediaries. Ultimate lenders will reduce their demand for primary securities if these other claims are especially attractive and if intermediaries pay high deposit rates on them. They will also reduce their demand for primary securities as national income rises, for this increases their need for money balances. Finally, the portion of primary security issues wanted by ultimate lenders depends on the stage of development of techniques for distributing these securities from borrowers to lenders, a subject which deserves a few more words.

Development of distributive techniques

Good distributive techniques get primary securities distributed efficiently from borrower to lender. These techniques include the broadcast of information—to borrowers regarding the asset preferences of lenders and to lenders regarding the issues of borrowers. They include, too, a widespread network of communication that tends to overcome regional market barriers. Facilities for rapid contract and settlement of loan transactions—security exchanges—increase the resemblance of security markets to competitive commodity exchanges. Facilities for brokerage, for market support and seasoning of new issues, for dealer inventories, for future as well as spot deliveries are other familiar distributive techniques. The guarantee of private securities by Government and the issue of Government securities themselves in place of private securities are still other examples.

The development of these techniques increases ultimate lenders' demand for primary securities. They widen security markets and permit each borrower and lender a higher degree of diversification in his debt and financial assets. Investing in primary securities alone, each lender can spread his budget of financial assets over a greater variety of claims than he could acquire on local markets. He can increase the advantages associated with the last dollar's worth of purchases of primary securities. And each borrower can diversify the form of his debts, reducing the disadvantages associated with the last dollar's worth of indebtedness.⁶

SUPPLY OF LOANABLE FUNDS: FINANCIAL INTERMEDIARIES

While distributive techniques get primary securities distributed efficiently from borrower to lender, intermediative techniques take primary securities off the market and substitute in their place indirect securities—money and nonmonetary indirect assets. The principal function of financial intermediaries is to purchase primary securities from ultimate borrowers and to issue indirect securities for the portfolios of ultimate lenders.⁷

Financial intermediaries may be divided into two main groups: the monetary system and nonmonetary intermediaries, the latter including time deposits of commercial banks. In its intermediary role, the monetary system purchases

⁶ The development of distributive techniques tends to raise the level of investment and saving by increasing the marginal utility of the last dollar's worth of financial assets to the lender and reducing the marginal disutility of the last dollar's worth of debt to the borrower. At the same time, such development tends to increase the efficiency of resource allocation by pitting more investment opportunities against one another for lenders to look over.

⁷ Intermediative techniques give lenders a wide variety of financial assets particularly suited to them and at the same time make it less necessary for borrowers to issue types of securities that are ill-adapted to their businesses. Like distributive techniques, then, intermediative techniques raise the marginal utility of the last dollar's worth of financial assets to the ultimate lenders and reduce the marginal disutility of the last dollar's worth of debt to borrowers. In these ways, they tend to raise investment and saving and to allocate scarce savings optimally among investment alternatives.

primary securities and creates money. In its role as administrator of the payments mechanism, the monetary system transfers deposit credits on its ledgers between economic units. Nonmonetary intermediaries purchase primary securities and create nonmonetary indirect assets.

There are various criteria for classifying nonmonetary intermediaries. Some intermediaries are private, others governmental. Mutual savings banks, savings and loan associations, private life insurance companies, and credit unions, among others, are included in the former category. Federal land banks, the postal savings system, and Government trust funds, among others, are in the latter. Some of the private intermediaries are incorporated for stockholders' profit, and some are mutuals. Most purchase a narrow band of primary securities—mortgages, or corporate equities, or government securities—while a few purchase a wide assortment. Many intermediaries issue only a few varieties of indirect securities, but others, such as life insurance companies, have a bewildering array of issues. A few intermediaries, principally sales finance companies, rely heavily on other intermediaries as purchasers of their indirect securities.

The product of intermediation is the indirect financial asset coined from the underlying primary security and bearing its own utilities. The reward of intermediation arises from the difference between the rate of return on primary securities held by intermediaries and the interest or dividend rate they pay on their indirect debt. There are notable differences among indirect financial assets, in the utilities that command a market price and yield a profit to intermediation. Money is a means of payment, claims on life insurance companies provide a defense against misfortune, shares in mutual funds offer opportunities for capital gains, shares in credit unions and deposits in mutual savings bank provide utilities of convenience and perhaps camaraderie, and shares in savings and loan associations may give one future access to mortgage funds. Yet there are also notable similarities among indirect financial assets. For most of them there is a constant or determinable redemption value, and investment costs are low. Contracts are divisible into convenient units from low to high denomination. In these and other respects, indirect financial assets are a class apart from the bulk of primary securities that are the raw material for the process of intermediation.

SUPPLY OF LOANABLE FUNDS: MONETARY INTERMEDIATION

Part of the total supply of loanable funds comes from commercial banks. This section explains how the money-creating powers of commercial banks change interest rates on primary securities, and how these powers are controlled by the central bank.

Monetary intermediation and interest rates

During any year, as we have seen, ultimate borrowers demand loanable funds by issuing primary securities. Ultimate lenders would consent to purchase all of these security issues only at very high interest rates. At somewhat lower interest rates, ultimate lenders would reject a small portion of the security issues. At very low interest rates, they would reject most of them.

Commercial banks, by purchasing primary securities and creating money, affect the level of interest rates on primary securities. If commercial banks purchase a small portion of the primary security issues, ultimate lenders must purchase the remaining large portion (neglecting nonmonetary intermediaries for the moment), and they will do so only at high interest rates. If commercial banks purchase a large portion of the primary security issues, only a small portion is left for ultimate lenders, which they will consent to purchase at low interest rates. Thus, by varying the proportion of primary security issues that they purchase, commercial banks can change interest rates on these securities.

The nature of quantitative controls

The central bank imposes quantitative controls on (member) commercial banks for the purpose of regulating the total supply of loanable funds so as to produce interest rates and other terms of lending that are compatible with steady output growth at reasonably stable prices. These controls are administered through changes in reserves and reserve requirements.

Reserves are claims on the central bank which must be held by commercial banks in some (minimum) proportion to their own liabilities. These claims are, of course, created by the central bank when it purchases assets. Commercial banks are required to hold them in an amount that is usually some mini-

imum percentage of their deposit liabilities. This minimum percentage is the reserve requirement.

The reserve mechanism is a direct control imposed by the central bank over the commercial banking industry. Commercial banks produce money output by purchasing inputs of reserves and primary securities. In many circumstances, given their deposit rate, as set by the central bank, commercial banks would like to produce more money than economic units are willing to hold at the income, price, and interest rate levels aimed at by the central bank. Therefore, the money output of commercial banks must be reduced below the level at which the banks would like to operate. The central bank does this by rationing one of the banks' inputs and specifying how much of it is to be used per unit of their output. The rationed input is the reserves of commercial banks, and the reserve requirement defines how much of this rationed input must be used to produce a dollar of output.

The rationed input is produced and allocated through purchases of primary securities and other assets by the central bank. The more of these assets that the central bank purchases the more of the rationed input becomes available to commercial banks for use in money production. The central bank, then, controls the supply of the rationed input and, through the reserve requirement, places a ceiling over money output. A dollar of money output, for example, may require 20 cents of the rationed input and 80 cents of other, unrationed, inputs.⁸

Quantitative controls and interest rates

The central bank and commercial banks both supply loanable funds by demanding primary securities. The primary securities (and other assets) held by the central bank determine the reserves of commercial banks. These reserves, along with the reserve requirement, determine the amount of primary securities that commercial banks can hold. The reserve requirement, therefore, is a method of sharing primary securities between the central bank and commercial banks. In general, the higher the reserve requirement the larger is the central bank's share of the primary securities held by it and commercial banks together—by the monetary system.

The central bank can increase the monetary system's supply of loanable funds by purchasing primary securities and creating reserves on which commercial banks can purchase additional primary securities. The central bank can also lower the reserve requirement, allowing commercial banks to purchase additional primary securities. The resulting increase in the supply of loanable funds lowers interest rates on primary securities. Opposite policies by the central bank raise interest rates.

SUPPLY OF LOANABLE FUNDS: NONMONETARY INTERMEDIATION

Nonmonetary intermediaries, too, can increase the supply of loanable funds and lower interest rates on primary securities. I discuss this by first looking at nonmonetary intermediaries other than time deposits of commercial banks. Time deposits are dealt with after that.

Nonmonetary intermediation and interest rates

Nonmonetary intermediaries increase the supply of loanable funds by first selling claims on themselves (nonmonetary indirect assets) for money and then selling the money for primary securities. These transactions clearly increase the demand for primary securities by nonmonetary intermediaries. And, just as clearly, the transactions do not change the monetary system's demand for primary securities, for demand deposits are simply transferred from one holder to another without affecting total deposits. The question remains whether the transactions affect ultimate lenders' demand for primary securities.

The answer to this question depends on what it is that ultimate lenders want to give up when they purchase nonmonetary indirect assets. If they want to give up primary securities, then the increase in demand for these securities by

⁸ Put this way, the method is quite familiar. To limit the output of some industries in wartime, the Government rations certain scarce inputs (materials) to them. Given the amount of these inputs that are needed to produce a unit of output, a ceiling is placed on the total output of the industry. The difference here is that the Government does not specify the "reserve requirement" to these industries—the amount of the rationed input that must be used per unit of output. But in most industrial processes this is fairly well set by technological conditions.

nonmonetary intermediaries will be met by an equivalent increase in the supply of them from ultimate lenders, the result being no change in the total demand. If, however, ultimate lenders want to give up money and not primary securities, then the increase in demand for primary securities by nonmonetary intermediaries is a net increase in total demand. Consequently, the more that nonmonetary indirect assets compete with money rather than with primary securities in the portfolios of ultimate lenders the greater will be the increase in total demand for primary securities when nonmonetary intermediaries expand.

More generally, the extent to which nonmonetary intermediaries increase the total supply of loanable funds in any period depends on the absolute amount of their expansion, the degree of substitutability between money and the various claims on other intermediaries, and the incremental demand for money by intermediaries as they expand.

When the growth of nonmonetary intermediaries leads to an increase in the supply of loanable funds, interest rates on primary securities fall as the intermediaries increase their demand for these securities. This can continue for as long as the intermediaries are willing to sell claims on themselves for money and use the money to purchase primary securities. The central bank does not attempt in any direct way to regulate the amount of these transactions.

Time deposits and interest rates

The time deposit departments of commercial banks are nonmonetary intermediaries, and the time deposits themselves are nonmonetary indirect assets. They are "nonmonetary" because they are not part of the money supply: they are not generally accepted as means of payment. They are "indirect" because they are claims on a financial intermediary. This is the one portion of nonmonetary intermediation over which the central bank has direct control.

An increase in ultimate lenders' demand for time deposits increases time deposits and reduces demand deposits. Because the reserve requirement on time deposits is lower than that on demand deposits, commercial banks are able to increase their demand for primary securities. This increases total demand for primary securities unless ultimate lenders and other monetary intermediaries reduce their demands for primary securities by an equal or greater amount. These demands will be reduced to the extent that ultimate lenders choose to give up primary securities or other nonmonetary indirect assets when they purchase time deposits. On the other hand, the more that time deposits compete with money rather than with primary securities and other nonmonetary indirect assets the greater will be the increase in total demand for primary securities when time deposits grow. Under these circumstances, the growth of time deposits is "inflationary" in the sense that it lowers interest rates on primary securities.

A DIGRESSION ON ALLEGED DIFFERENCES BETWEEN COMMERCIAL BANKS AND NONMONETARY INTERMEDIARIES

I have attempted to show that there is no analytical difference of any importance between commercial banks and nonmonetary intermediaries. In particular, both are capable of creating loanable funds, lowering interest rates on primary securities, and adding to aggregate demand for goods and services. I have not dealt, however, with all the alleged differences between these two types of institution. In this section I wish to cover the more important of these.

Banks "create" money

It is frequently said that commercial banks are a class apart from other financial institutions because they create money. To begin with, put the emphasis on "create." It is clear, though, that there is nothing strange in the fact that commercial banks create something. All financial assets in the economy are created. Corporate bonds are created by corporations, mortgages by individuals and others, mutual savings deposits by mutual savings banks, and so on.

Money is created when the monetary system purchases nonmonetary assets, mainly primary securities. Other financial assets are created when their issuers purchase money—yes, "purchase" money, because money is also a claim, though generally a non-interest-bearing one. The difference between, say, mutual savings banks and commercial banks is that the former create savings deposits by purchasing money, while the latter create money by purchasing, say, bonds. And the difference, in this regard, between nonfinancial corporations and commercial banks is that the former create bonds by purchas-

ing money, while the latter create money by purchasing bonds. These are, of course, differences, but there is nothing in these processes of creation to suggest that we should stand in awe of one at the expense of the others.

Banks create "money"

Now put the emphasis on "money"; that is, banks are different because they create money. The implication of this may be that money is inherently more important than other financial assets. It is true that money, as the means of payment, is a highly useful financial asset. But so are financial assets, such as corporate equities, that give people the opportunity to participate in private enterprise; or financial assets, such as claims on insurance companies, that protect one's family against a myriad of catastrophes. And money, as a liquid asset to hold, has many close competitors.

The implication, however, may be that only the creation of money is "inflationary." But this is wrong. I have already shown that the creation of non-monetary indirect assets can lead to an increase in the total supply of loanable funds, which lowers interest rates on primary securities. Lower interest rates, along with easier terms of lending generally, can generate an excess demand for current output at prevailing price levels. In this way the creation of non-monetary indirect assets may produce an excess of ex-ante investment over ex-ante saving, which place upward pressure on output and prices. Thus, the growth of both commercial banks and nonmonetary intermediaries may be inflationary.

In quantity theory terms, commercial banks can add to inflationary pressure by creating money; nonmonetary intermediaries can do the same thing by increasing the velocity of money through the creation of nonmonetary indirect assets. The money-creating institutions are unique in being able to raise M ; nonmonetary intermediaries are unique among financial institutions in being able to raise V .

The process of multiple creation

Let's now go back to "creation" and take up the allegation that commercial banks are different because they engage in multiple creation of deposits. In analyzing this, I have to distinguish between multiple creation in the general sense and multiple creation in the legal reserve sense.

In the general sense, multiple creation is found almost everywhere. Take automobiles. Suppose that the production process calls for 10 cents' worth of rubber inputs and 90 cents' worth of other inputs to produce a dollar of automobiles. Then automobiles are produced or created in a ratio of 10 to 1 to rubber inputs. This is multiple creation of automobiles. Housewives create omelettes by some multiple of cream inputs. Laundries create laundry services by some multiple of their starch inputs. There is multiple creation in each of these cases because the value of the output exceeds the value of any one of the inputs with which the output is being compared.

In much the same way, there is multiple creation of financial assets by all financial intermediaries. Commercial banks create money by purchasing a variety of assets. If the money output is compared to any one of the banks' asset inputs, it is clear that the output is a multiple of this input. Mutual savings banks create savings deposits by purchasing money and with the money purchasing primary securities of various types. If the savings deposits are compared with any one of the savings banks' assets, we find that there has been multiple creation of savings deposits. The same is true for all financial intermediaries. This is simply a way of saying that it generally takes more than one ingredient to make a cake, the value of the cake being a multiple of the value of any one of the ingredients.

In the legal reserve sense of the term, only commercial banks engage in multiple creation, because only commercial banks are subject to quantitative controls in the form of legal reserves. Multiple creation in this sense means that commercial banks must purchase a dollar's worth of a special input in order to produce several dollar's worth of output. It is obvious, then, that the value of the output is a multiple of this special input. All nonmonetary intermediaries, however, would engage in multiple creation if they, too, were subject to quantitative controls—if they had to purchase a dollar's worth of a special input to produce several dollar's worth of output. In brief, if there is anything different about commercial banks in this respect it is because they are controlled: they are not controlled because they are different.

Volatility

It is felt that commercial banks are different from other financial institutions in that they are inherently more unstable or more volatile. This, I think, is largely an illusion that arises from the fact that commercial banks are controlled by the central bank while other intermediaries are not.

Commercial bankers often have a profit incentive to produce more money output than the central bank wants them to produce. To limit production, the central bank imposes direct controls by rationing one of the banks' inputs and specifying how much of this input is to be used per unit of the banks' output. The imposition of these direct controls, along with restrictions on free entry, creates a disequilibrium system in the banking industry—an excess of the money supply that banks would like to produce over the money supply that they are forced to produce. As in any disequilibrium system, pressures are created that make the industry look quite volatile.

In this situation of strain, an increase in total reserves or a reduction in reserve requirements would naturally lead to a rapid and almost explosive expansion of output to the new legal limit. And, of course, a tightening of controls would cause banks to contract output rapidly—for that is the law. Thus, when controls are first eased and then tightened and then eased on an industry in a disequilibrium position, an illusion is created from the responses of the industry that there is something inherently unstable about it.

There is not much doubt that nonmonetary intermediaries would exhibit much the same tendencies if they were subject to similar quantitative controls.

THE SUPPLY OF LOANABLE FUNDS: THE RECORD, 1897-1958

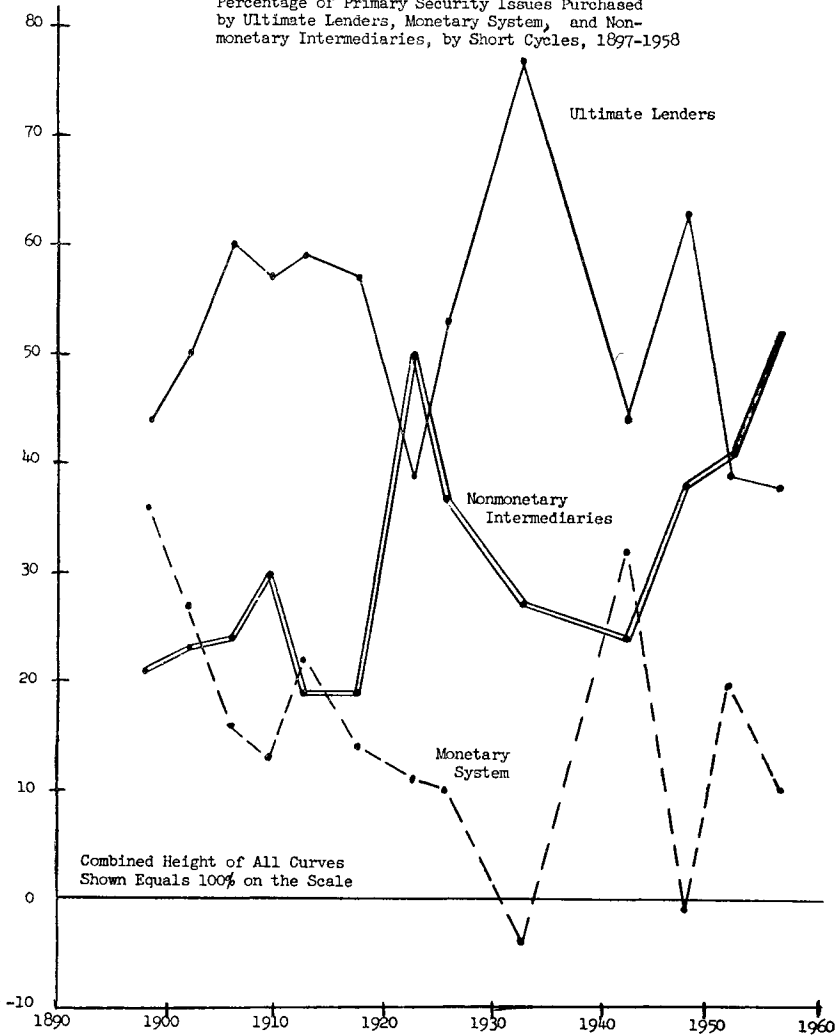
The supply of loanable funds comes, as I have shown, from ultimate lenders and financial intermediaries, including the monetary system and nonmonetary intermediaries. The record of this supply from 1897 to 1958 is now presented.

Chart IV shows the percentage of primary security issues that were purchased by ultimate lenders, the monetary system, and nonmonetary intermediaries during each 13 short cycles.⁹ Nonmonetary intermediaries, for this purpose, include time deposits of commercial banks, mutual savings banks, savings and loan associations, life insurance companies, credit unions, postal savings systems, and private pension funds.

⁹ I have combined the two short cycles of 1928-33 and 1934-38 into one period, solely for simplicity of chart presentation.

CHART IV

Percentage of Primary Security Issues Purchased by Ultimate Lenders, Monetary System, and Non-monetary Intermediaries, by Short Cycles, 1897-1958



It may be seen that ultimate lenders supplied an increasing share of loanable funds from 1897-1900 to 1915-21, while the monetary system supplied a declining share. Nonmonetary intermediaries about held their own over this period, first gaining relatively and then losing. The monetary system continued to supply a declining share of loanable funds during the 1920's and 1930's,³⁰ while nonmonetary intermediaries, on balance, gained significantly. During 1939-46, when war finance took over, the monetary system increased its share of loanable funds to 32 percent, but in the postwar period it has again supplied a relatively small part of the total—about 12 percent since 1947. Nonmonetary intermediaries, on the other hand, have supplied an increasing share of loanable funds during this period; since 1950 they have become the dominant force in the loanable funds market.

MONETARY POLICY DURING THE RECENT POSTWAR PERIOD

In the past decade there have been three brief recessions, but on the whole there has been excessive demand for current output of goods and services at prevailing price levels and at relatively full employment of labor services. This excess demand has led to rising levels of money wage rates and commodity prices, and at times these price increases have anticipated the continuation of excess demands. The result has been a rise in the consumer price index since 1948 of 20 percent.

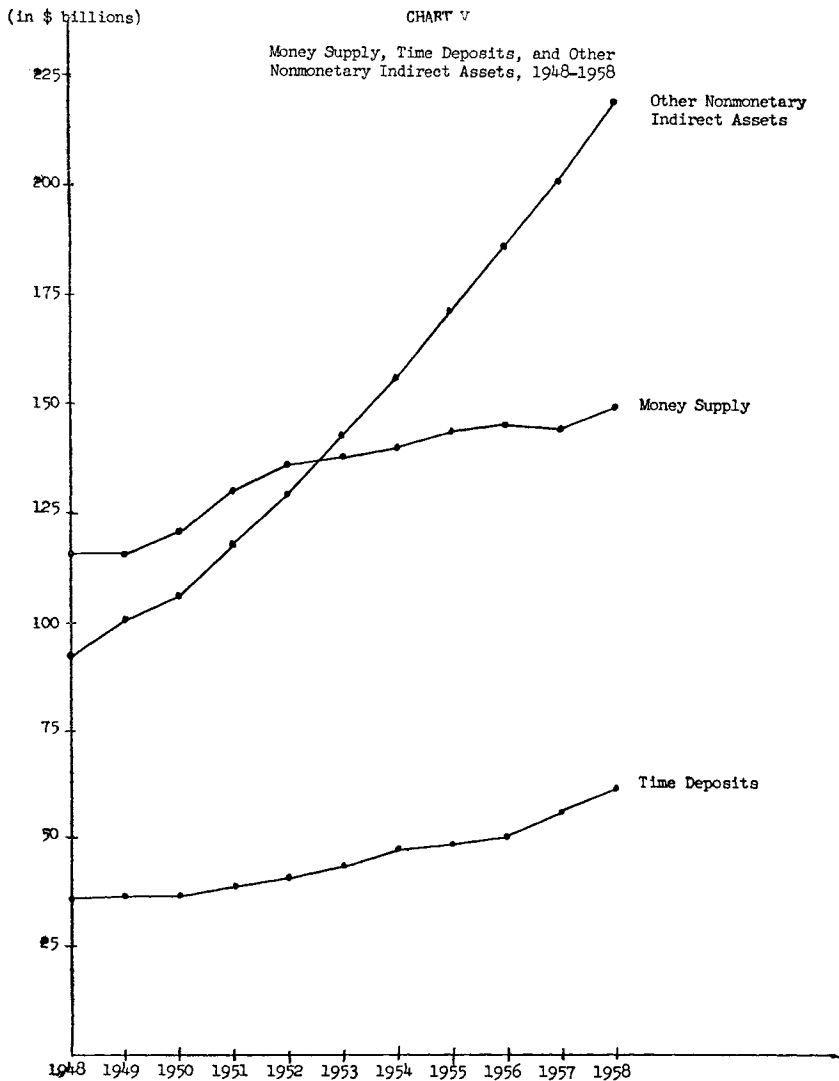
Reasons for failure of monetary policies

Why have monetary policies failed to halt the price increases? The basic reason is that these policies have failed to slow down sufficiently the growth of aggregate demand for current output of goods and services. They have failed to do this, I believe, largely because the monetary system's supply of loanable funds has not been limited nearly enough in view of the very large supply of these funds coming from other sources, principally from nonmonetary intermediaries. The monetary authorities have operated under the mistaken belief that it is sufficient to restrain growth in the money supply; they have failed to appreciate the inflationary consequences of the enormous increase in the supply of loanable funds that has come from the creation of time deposits and claims on nonmonetary intermediaries. By encouraging the growth of time deposits and by failing to compensate for the growth of other nonmonetary indirect assets, they have permitted the supply of loanable funds to grow too rapidly to bring aggregate demand down to noninflationary levels.

Chart V records the growth over the last decade in the money supply, time deposits, and other nonmonetary indirect assets.³¹ During this period, the money supply rose by approximately \$32 billion, time deposits by \$27 billion, and other nonmonetary indirect assets by \$120 billion. The combined growth of time deposits and other indirect assets exceeded the growth of the money supply on the order of 5 to 1. In the last 4 years, this ratio has been around 10 to 1.

³⁰ Primary security purchases by the monetary system do not include gold purchases. Hence, this measure grossly understates the increase in asset purchases by the monetary system during the 1930's.

³¹ The latter include mutual savings deposits, savings and loan shares, policyholders' equities in life insurance companies, shares in credit unions, claims on private pension funds, and deposits in the postal savings system.



The growth of time deposits has been encouraged by relatively low reserve requirements against these liabilities and, in recent years, by an increase in the interest rate ceiling on the deposits. The rapid growth of nonmonetary intermediaries has been due to the favorable composition of primary security issues during the period (weighted heavily toward mortgages and consumer debt), to the attractive indirect securities they have offered the public, and to the relatively high "deposit rates" they have been able to pay. As interest rates on primary securities have risen, these intermediaries have been able to increase the demand for their indirect securities through increases in deposit rates.

The monetary authorities have restrained growth in the supply of loanable funds sufficiently over this period to raise interest rates on primary securities and to tighten other terms of lending. But, in view of the heavy demands for current output, interest rate increases have been on the meager side; indeed, interest rates in recent years have been low relative to levels attained in previous periods of prosperity. Moreover, any level of interest rates may be less effective today in restraining spending than in the past. In recent years, the composition of demand for loanable funds has swung toward Government and consumers and away from business, and this has probably made the economy as a whole less sensitive to changes in interest rates. In addition, high corporate income tax rates have probably made the business sector itself less sensitive to monetary policy.

Nonmonetary intermediaries have not only supplied large amounts of loanable funds by creating claims on themselves and purchasing primary securities, but they (and commercial banks) have also, over the past decade, sold Federal Government securities in order to gain funds for purchases of private primary securities. These "switching" operations have made ultimate lenders more liquid as they have gained liquid Government securities and given up less liquid private ones. The operations have tended to increase ultimate lenders' demand for primary securities generally, and so have contributed to an increase in the supply of loanable funds. Nonmonetary intermediaries, therefore, have taken relatively illiquid primary securities out of ultimate lenders' portfolios and replaced them with highly liquid nonmonetary indirect assets and Government securities. By creating (nonmonetary indirect assets) and switching (from Government to private securities), the intermediaries have made the public substantially more liquid.

This sort of thing is exactly what economists have long advised the Treasury not to do in managing the public debt. Traditional debt management principles are that the maturity of the public debt should be lengthened during periods of inflationary pressure and shortened in recessions. Maturity lengthening in boom periods makes economic units somewhat less liquid and so tends to raise interest rates on primary securities generally. The activities of nonmonetary intermediaries, on the other hand, shorten maturities of private debt held by economic units during such periods and so tend to add to inflationary pressures. Thus, nonmonetary intermediaries engage in a kind of perverse private debt management that operates outside the area of financial control.

Conclusions and questions

The inflationary effect of growth in nonmonetary intermediaries can be offset by the monetary authorities. All they need do is to restrain, more than they otherwise would have to do, the growth of money and time deposits. This will force primary securities into the hands of ultimate lenders and so raise interest rates and tighten other terms of lending. It will compensate for the rapid growth of financial intermediaries that lie outside of the controlled area. But they are not likely to do this if they continue to concentrate almost exclusively on the money supply and fail to recognize the inflationary impact of growth in time deposits, savings and loan shares, mutual savings deposits, shares in credit unions, and so on.

To slow down inflation, the monetary authorities, as I have said, would have had to restrain growth in the supply of loanable funds more than they did during the past decade. Given the fact, however, that they have direct con-

trols only over commercial banks, this would have greatly curtailed the growth of these institutions. And if inflationary pressures continue for another decade, the monetary authorities, to stop them, will have to crack down hard on commercial banks, especially if there continues to be rapid growth in the uncontrolled institutions. This prospect does raise a few questions about our present control techniques.

The first has to do with the simple matter of equity. Is it equitable to control one area of financial intermediation when, as I have shown, the activities of all can add to inflationary pressures? The second question is whether such control techniques can lead to balanced growth in our economy? Some sectors of the economy are heavily dependent on funds from commercial banks; other sectors rely more on other financial institutions. When commercial bank growth is slowed down to compensate for rapid growth of other financial intermediaries, we are in effect denying growth to some areas of the economy in order to compensate for rapid growth in other areas. Is such unbalanced growth tolerable in our economy?

Third, what effect in the long run do direct controls over one area of financial intermediation have on that area, in view of the fact that this area is subject to severe competition from other, uncontrolled intermediaries? Does the controlled area in the long run lose vitality, fail to attract the best leaders, fail to attract sufficient capital, lower the quality of its product, and fail to supply funds to borrowers on the frontiers of economic growth? Finally, when a relatively diminishing area of financial intermediation is subject to controls, does so much "slippage" develop in the mechanism as to make it impossible to formulate intelligent monetary policies? These are the questions that must be answered in deciding whether to string along with our present control techniques for another decade.

APPENDIX

TABLE I.—Average annual net issues of primary securities and GNP by short cycles, 1897–1958

[Dollar amounts in billions]

	Average annual net issues	Average annual GNP	(Percent-age) Issues-income ratio		Average annual net issues	Average annual GNP	(Percent-age) Issues-income ratio
1897-1900.....	\$1.4	\$16.3	8.6	1925-27.....	\$10.0	\$34.2	10.6
1901-04.....	2.2	21.5	10.2	1928-33.....	2.6	80.5	3.2
1905-08.....	2.5	27.5	9.1	1934-38.....	3.3	79.2	4.2
1909-11.....	3.0	32.7	9.2	1939-46.....	29.3	162.9	18.0
1912-14.....	3.2	36.4	8.8	1947-49.....	18.7	250.6	7.5
1915-21.....	9.7	68.5	14.2	1950-54.....	30.9	337.8	9.1
1922-24.....	6.2	81.4	7.6	1955-58.....	36.7	423.4	8.7

TABLE II.—Net issues of primary securities by short cycles, 1897–1958

[In billions of dollars]

	Net issues	Government securities	Corporate bonds	Corporate stock	Mortgages	Short-term debt
1897-1900.....	5.6	0.6	1.5	1.0	0.5	2.1
1901-04.....	8.6	.3	2.5	2.0	1.0	2.7
1905-08.....	10.1	.9	3.1	2.4	1.4	2.4
1909-11.....	9.1	.9	2.4	1.8	1.9	2.2
1912-14.....	9.6	.9	2.2	1.9	2.6	2.0
1915-21.....	67.9	26.4	8.3	7.9	11.8	13.4
1922-24.....	18.5	.5	5.8	4.2	6.1	1.9
1925-27.....	30.1	-.3	9.0	6.2	9.9	5.2
1928-33.....	15.9	9.9	4.0	11.5	3.9	-13.4
1934-38.....	16.7	16.0	-1.5	1.3	.3	.6
1939-46.....	234.1	215.5	-2.9	4.2	6.6	10.7
1947-49.....	56.1	4.2	11.5	5.2	20.8	14.5
1950-54.....	154.3	39.5	19.1	12.0	51.0	32.7
1955-58.....	146.9	23.5	22.0	13.4	57.5	30.5

TABLE III.—Average annual net issues of primary securities and their purchasers by short cycles, 1897–1958

[In billions of dollars]

	Average annual net issues	Average annual purchases by		
		Ultimate lenders	Monetary system	Nonmonetary intermediaries
1897-1900.....	1.4	0.6	0.5	0.3
1901-04.....	2.2	1.1	.6	.5
1905-08.....	2.5	1.5	.4	.6
1909-11.....	3.0	1.7	.4	.9
1912-14.....	3.2	1.9	.7	.6
1915-21.....	9.7	6.5	1.4	1.8
1922-24.....	6.2	2.4	.7	8.1
1925-27.....	10.0	5.3	1.0	3.7
1928-33.....	2.6	3.9	-.9	-.4
1934-38.....	3.3	.3	.8	2.2
1939-46.....	29.3	12.8	9.5	7.0
1947-49.....	18.7	11.8	-.2	7.1
1950-54.....	30.9	12.0	6.2	12.7
1955-58.....	36.7	14.1	3.5	19.1

TABLE IV.—Selected indirect securities, 1947–58

[In billions of dollars]

	Money supply	Time deposits	Others ¹		Money supply	Time deposits	Others ¹
1948.....	116.5	35.8	92.6	1954.....	140.3	46.8	156.6
1949.....	116.5	36.1	100.2	1955.....	143.4	48.4	171.6
1950.....	122.6	36.3	107.7	1956.....	145.0	50.6	186.7
1951.....	129.7	37.9	118.1	1957.....	144.0	56.1	201.4
1952.....	135.9	40.7	129.8	1958.....	148.7	62.9	218.8
1953.....	136.1	43.7	142.3				

¹ Includes mutual savings deposits, savings and loan shares, deposits in postal savings system, and assets of life insurance companies, credit unions, and private pension funds.

Representative PATMAN. You indicated that something should be done to require equity in the allocation of credit.

In 1958, as Mr. Martin testified before the Joint Economic Committee, Federal Reserve made the position of the banks easier so that they could expand greatly. I did not know at the time, but I discovered later that the Federal Reserve made the position for the banks to expand loans and investments by \$10,400 million. That money was however used not for business loans as the Federal Reserve obviously intended but was all used for purchase of U.S. Government obligations—incidentally without cost to the banks, the way it was handled. During that time, not only did they not make any business loans, but business loans were actually called to the extent of a billion and a half dollars during that period.

It looks like the country last year, in 1958, came out of the depression not because of the Federal Reserve but despite the Federal Reserve.

Do you have any comments to make on that?

Mr. GURLEY. As you know, 1958 was a depression year and I would not be surprised if, as in all depression years, business loans dropped. I would not be surprised if, as in all recession years, the Federal Reserve supplied reserves to commercial banks for them to expand their earning assets.

It is true I am sure, as you say, Mr. Patman, that the commercial banks used these funds to purchase primarily Federal Government obligations. This is not entirely without cost to them, however, because they are creating liabilities at the same time and there are interest and other costs connected with these liabilities.

The purchase of Government securities certainly eased interest rates on these securities and this case undoubtedly spread to other markets.

Representative PATMAN. By "ease" do you mean lower interest rates?

Mr. GURLEY. Yes, during the heavy purchases. There was one phase.

Representative PATMAN. When was that? I do not recall it.

Mr. GURLEY. Let me consult my data.

Representative PATMAN. Suppose you indicate what interest rates were at the beginning of the year, the middle of the year, and the end of the year?

Mr. GURLEY. I cannot give you all those figures from this table.

Representative PATMAN. You may put them in the record if you do not find them now and I would like Mr. Reuss to ask any questions about it.

(The following was subsequently received for the record:)

Yields on U.S. Government securities

	Long term	3 to 5 years	3-month bills
January 1958.....	3.24	2.77	2.44
June 1958.....	3.19	2.25	.83
December 1958.....	3.80	3.65	2.77

Representative REUSS. Thank you, Mr. Chairman.

I want to congratulate Dr. Gurley for his very searching paper and for raising the number of important questions that he does.

I gather your main conclusion from your study of the effect of the so-called financial intermediaries is that the monetary authorities of this country, in concentrating all their attention on credit creation by the commercial banks while ignoring the substantially much larger contribution to the total demand by the financial intermediaries, are in effect swallowing camels and straining at gnats, that they are over-emphasizing one phase of it.

Is that right?

Mr. GURLEY. Yes, that is one of the main conclusions.

Representative REUSS. You have led me to think that, in your opinion, monetary policy is the vastly preferable way of controlling inflation. Is that a correct inference from what you have said?

I am referring particularly to what you said to the chairman a moment ago when you said—and I think I quote you—"by monetary policy, if that is the way you want to do it."

Mr. GURLEY. That is right.

I think monetary policy can bring about a stable price level over a long period of time. I am not necessarily of the opinion that this is a preferable way at all times to do this.

Representative REUSS. This raises two questions in my mind.

Do you not think or agree with me that fiscal policy, specifically a quite courageous tax policy, is an awfully good way of dealing with inflation too? I am not saying that we should cast monetary policy aside; but should we not use fiscal policy more than we do?

Mr. GURLEY. I agree. A courageous fiscal policy is a good thing.

Representative REUSS. By which I mean mainly increases in tax revenues, because we have to spend a good deal on our Government, no matter what.

Secondly, would you agree with me that something called administered prices, namely prices in concentrated industries where a few are able to exercise some degree of market domination, have something to do with price rises in recent economic history; that, by and large, neither monetary nor fiscal policy is a sovereign remedy for administered price inflation; and that we have to look around for new institutional arrangements to restrain wage-price movements in those concentrated industries.

Mr. GURLEY. I am not convinced of that at all, Mr. Reuss, but I have not made a detailed study of it.

Representative REUSS. Now to ask a question in the field of political science, which has also been in the purview of Brookings Institution.

You have said that we are badly neglecting an important field of economic activity here in the field of financial intermediaries.

Under our governmental system, whose job in the executive branch is it to advise the Congress of what needs to be done in fields like this, and what, in fact, has been done about it? I think it is fine that you, from one of our great private foundations, are up here opening our eyes to this problem.

However, under our system of Government who is supposed to be doing this in the executive branch?

Mr. GURLEY. I do not know. The Council of Economic Advisers could certainly point to the deficiencies of monetary policy in this respect if they thought there were such deficiencies, and I imagine they could certainly bring it to the attention of Congress. I am almost positive the Federal Reserve would not call this sort of thing to the attention of Congress.

Representative REUSS. In fact they have not, have they?

Mr. GURLEY. In fact they have not to my knowledge.

Representative REUSS. In fact also the Council of Economic Advisers has not, has it?

Mr. GURLEY. To my knowledge, no.

Representative REUSS. Nor has the Treasury, so far as you know, nor any other agency of the executive branch?

Mr. GURLEY. I think that is right, so far as I know.

Representative REUSS. Is it not important under a good system of executive government that somebody somewhere in the executive branch be assigned the task of studying this, worrying about it, and coming up with recommendations to Congress on it?

Mr. GURLEY. I think it is important that the important things be studied. It might well be that people in the executive branch do not consider the factors I have mentioned to be important, and they might turn out not to be important. These things have to be thrashed out for quite a while, I would think, among economists and others. My

own view, of course, is that these are very important factors in watering down the effectiveness of monetary policy and I would certainly like to see them studied.

Representative REUSS. Now a word about your recommendations, conclusions, and questions.

You point out that the monetary authorities need only restrain the growth of money and time deposits more than they otherwise would have to do, to offset the inflationary effect of growth in nonmonetary intermediaries. By the monetary authorities you mean the Federal Reserve System?

Mr. GURLEY. Yes, the Federal Reserve System.

Representative REUSS. And how are they to restrain (a) the growth of money, and (b) time deposits? By what methods?

Mr. GURLEY. They restrain the growth of the sum of demand and time deposits. Under our system now time deposits may grow freely; there is a perfectly elastic supply of them.

Representative REUSS. They have no statutory mechanism for restraining the growth of time deposits now, do they?

Mr. GURLEY. There is a small reserve requirement against time deposits, but the important thing is to control the sum of demand and time deposits. If, for example, it is discovered that the growth of \$10 billion of time deposits was at the expense of demand for demand deposits, then the proper policy is to reduce reserves or raise reserve requirements in such a way as to get the supply of demand deposits down to the lower demand for them.

Representative REUSS. But is this not the very straining at gnats and swallowing camels technique which you deplored a moment ago? Are they not going to have to deal murderous blows to demand deposits in order to keep the total down?

Mr. GURLEY. Yes, I think that if by monetary policies we want to get rid of the excess demand for current output, and if inflationary pressures do last for several more years, then it is going to take a very vigorous restraint on commercial bank growth in order to achieve this result through this policy mechanism.

Representative REUSS. Would that not be subject to charges of inequality? Would it not be necessary to have the same kind of controls over time deposits that the monetary authorities now have over demand deposits?

Mr. GURLEY. Do you mean by that, Mr. Reuss, I raise the reserve requirements on time deposits to the level of demand deposits?

Representative REUSS. I do not want to go into the techniques of doing it, because, frankly, I am way beyond my depth there. I was trying to relate this sentence of yours on page 32, which suggests that all this is very easy, with the next page where you point out that, if the Federal Reserve is going to be restricted in its control powers to demand deposits, representing a small part of total deposits, and if it tries to do the whole job by concentrating on the one area over which they have power, this has two unfortunate consequences: First, it does not do its job, because it cannot; second, it creates great inequalities.

Aren't these disadvantages, therefore, equally applicable to the sentence I read?

Mr. GURLEY. Yes, sir; that is right.

Representative REUSS. You have an interesting question in your statement. Because our controls over the banking system are loose, you ask whether the system may not lose vitality, fail to attract the best leaders, capital, et cetera, vis-a-vis the savings and loan associations, the mutual savings banks, and the credit unions. Is that a fair paraphrase of your question?

Mr. GURLEY. Yes, it is.

Representative REUSS. Are you suggesting that there is a real sociological problem here, that bankers are becoming second rate and less imaginative as compared to officers of these other institutions?

Mr. GURLEY. I have an idea that it is so, and I have an idea that we can put two and two together.

When an area is controlled, an area of this sort that is part of a larger area, where there is pretty severe competition, and the controlled segment is held back in various ways over a longer period of time, the result is conservatism within that industry among the leaders. In other words, I would tend to reverse the usual argument. It is often said that conservative bankers are really the trouble with banks. But I think that it is really that the conservative bankers grow out of, they are the result of the controlled system that has lasted for a long, long time over this area of financial intermediation.

So far as the capital is concerned, Mr. Reuss, commercial banks, as you know, have lost capital relative to their assets or deposits for a century. That is, the capital-asset ratio has been declining. Why has management chosen to let the capital-asset ratio decline? I am almost positive that the reason is that banks have earned less net profits after taxes on assets for a century.

This ratio has been going down and down for a hundred years.

If you are earning less net profits after taxes on assets, the thing to do; if you are going to have a rate of return in this industry comparable to the rates of return elsewhere, is to let your capital fall relative to your assets. In this way, whatever net profits you have left will earn a comparable rate of return on the relatively lower amount of capital; that is, comparable to the rate of return earned elsewhere.

In a free economy this will come about anyway.

Representative REUSS. You are talking about the ratio of a commercial bank's capital to its deposits?

Mr. GURLEY. Yes, or to its assets; either way.

Representative REUSS. I should think——

Mr. GURLEY. This ratio has fallen for a century.

Representative REUSS. Yes, but I do not know whether that particular bit of evidence shows that banking is a poor business into which an enterprising young man ought not to venture.

Mr. GURLEY. No.

Representative REUSS. It shows that with a given hundred dollars I can rent a desk and office space and get a banking charter, and I can do a great deal more business, particularly as the monetary authorities pursue their present policy of lowering the reserve requirement. That gives me a bigger bang for a buck, as the man says.

I am questioning whether the decreasing ratio between bank deposits or assets on the one hand and bank capital on the other hand, in and of itself, shows that banking is less attractive than it once was.

However, with that one reservation, I am sure there is much other evidence bearing on your thesis.

Representative PATMAN. May I ask a question there?

If you will notice, Professor, in the country banks, the reserves are just about the same amount as their capital accounts. In the reserve city banks, reserves are more than capital accounts, and in the central reserve city banks, they are considerably more than capital accounts. Why would there be such a difference there between the classes of banks?

Mr. GURLEY. I do not have the difference here but I think I know—

Representative PATMAN. You agree that what I say is right?

Mr. GURLEY. I think what you say is substantially correct, yes.

It is also true—and this almost follows from what you said—that the ratio of capital to assets, not just to reserves but to total assets of banks, is lower in the largest banks, which are mostly in the central reserves city locations, than it is in the country banks. You will find the country banks with a much higher amount of capital relative to their assets than would be true in the larger banks. Since country banks have smaller reserves relative to assets, it follows that their reserves to capital are relatively small.

I think the reason for these differences—although once I give the reason it raises another question—is that the amount of net profits earned on assets is higher in the country banks than in the much larger banks in the central reserve cities. The larger banks earn lower amounts of net profits on their assets. Over the years their capital has been worked down relative to their assets so that rates of return throughout all banks—country, middle sized, big banks and so on—are just about the same in most years.

Representative PATMAN. May I invite your attention to the fact that banks are making a lot of money now on sales of Government securities. Last year in 1958, testimony has developed, they made \$618 million, which is 50 percent more than they made the banner year of 1954 just after the 1953 freeze.

Mr. GURLEY. Those years were recession years.

Representative PATMAN. Yes. After the recession of 1953 they cleaned up.

Mr. GURLEY. That is right.

Representative PATMAN. About four times as much as they ever made on an average before. And then after the depression year of 1957, they cleaned up again, much more, \$618 million.

I think it puts the burden of proof on somebody to defend this speculation in an unregulated, uncontrolled market for Government securities.

Mr. GURLEY. In all other years the commercial banks had larger losses on securities than they had profits.

Representative PATMAN. Well, they made some money each time. Of course they have a very favorable setup taxwise. We can take on their losses a hundred percent deduction.

I want to ask another question, Mr. Reuss, and then I will be through.

I want to ask you about Federal funds. Is that not getting to be quite a big thing, the use of Federal funds?

Mr. GURLEY. I have not followed the data. The use of Federal funds always gets to be a bigger thing whenever reserves are tight.

Representative PATMAN. What I am talking about is disassociated from the Federal Reserve. In the Federal Fund Market in New York now, oftentimes the rate quoted is 2 and 2½ percent, when the rediscount rate in the Federal Reserve bank is 3. Evidently they must have a lot of funds in order to compete with the Federal Reserve itself. Do you know the extent of the Federal Fund Market?

Mr. GURLEY. The amount of transactions? No, I do not.

Representative PATMAN. Go ahead, Mr. Reuss. Excuse me.

Representative REUSS. I have just one question.

Dr. Gurley, do you think Congress ought to pass legislation extending the power of the Federal Reserve System over lending by the so-called financial intermediaries? And if you do, what general technique do you recommend? This is a question among others that the Joint Economic Committee will have to answer by next January.

I wondered if you have a technique in mind.

Mr. GURLEY. That is a very difficult question to answer. I would just like to see the Federal Reserve conduct its monetary policies with the knowledge that the expansion of time deposits and claims on non-monetary intermediaries is inflationary and has to be offset; that one cannot just increase the money supply by 2 percent or 3 percent per year and think that somehow one is restraining things regardless of financial growth elsewhere.

The present tools cannot be used properly if one has the wrong theory of how to use them. It seems a shame, when the tools are not really being used properly, from the standpoint of Federal Reserve goals themselves, to change the tools at that time spreading them out to other intermediaries.

Even so—even if the present tools were used intelligently—it may well be that we would not consider them adequate. There are questions of equity, of resource allocation, of their impact on the behavior of the controlled sector, and others.

If it turns out that the present tools are inadequate, we should seriously consider the imposition of quantitative controls on some nonmonetary intermediaries. These controls could take the same form as those now imposed on commercial banks. My own feeling is that it will be necessary—as well as wise—to move eventually in that direction.

I should add that the growth of Government intermediaries, such as FNMA, also contributes to inflationary pressures, and despite Congress' control over these institutions there has been little attempt to coordinate their activities with monetary policy. This should be one of the first steps taken to broaden the base of financial control.

Representative REUSS. The Federal Reserve in the last 5 years, by use of the rediscount rate and open market operations, has allowed the monetary supply to grow very slowly. Between 1954 and 1958, the average annual rate of increase was only 1½ percent, and some of us on the Joint Economic Committee thought that that was an insufficient expansion of the money supply—cash and demand deposits.

Do I gather from what you are saying that it is your view that the Federal Reserve should have expanded the money supply at an even lower and smaller rate than 1½ percent a year?

Mr. GURLEY. It is not just the existence of the intermediaries, but it is the rapid growth of them, more rapid in the last 10 years than we have ever seen before. If one does not take this into account, then one goes ahead increasing the money supply by 2 or 2½ or 1½ percent, whatever it is, the same as one has done in the past under a different financial environment.

It is my opinion that the money supply should have been increased by less than it actually was if we wanted monetary policy to stop the rise of prices during this period.

Representative REUSS. Do you think that the rise in prices during the last 5-year period has been due to excess overall demand? Or, to put it another way, that the Federal Reserve, despite all the chewing-out they get from the Democrats on this committee and elsewhere for its tight money policy, has been insufficiently tight? I gather you do.

Mr. GURLEY. I do, yes.

Representative REUSS. How do you account for the fact that during more than half of this 5-year period we have had two major recessions which saw, in the case of the last one at least, 7 percent of the working force unemployed and more than one-quarter of the industrial resources of the country unused? How do you square that with your thesis that the trouble has been that we have had too much demand?

Mr. GURLEY. I am talking about the average over the full postwar period, Mr. Reuss. Sure, it is true that we have had three recessions and certainly during those times I would not call for a tighter monetary policy. But I think that on the average over the full postwar period, monetary policy has not been tight enough to stabilize prices.

Representative REUSS. I can and do agree, let me say in conclusion, with your central thesis that it is a rather vain thing to use a monetary policy which is incapable of doing the job assigned to it by its adherents because it reaches only a small part of the total monetary demand. I can agree with that thesis without necessarily agreeing—and I guess I do not agree—with your historical hindsight that in fact we have had insufficiently tight money in the last 5 years or so and that that has been the cause of the inflation we have had.

I would phrase it slightly differently by saying, thank God that the Federal Government's controls were as inefficient as they were, because at least the leakage has brought us somewhere closer to having the amount of demand that the economy needs.

Mr. GURLEY. Mr. Reuss, I would agree with just about everything you said on that. I do not think we are really in disagreement. The basic causes of the inflation are certainly not the lack of monetary restraint during this period. For myself I am not overly concerned at all about the small rise in prices that we have had during most of these years in the postwar period. I would much rather take those with the full employment output that we have had than a lesser amount of output with stable prices.

All I am saying is that the people who are really concerned about inflation, and the Federal Reserve apparently is, did not make money tight enough during this period as a whole to do the job they were really trying to do during the period. If other people are interested in doing this job, too, then I would say the same thing to them.

Representative REUSS. So historically for the last 5 years one might say that if the Fed has succeeded it is only because it has failed?

Mr. GURLEY. From our point of view, right.

Representative REUSS. Thank you.

Representative PATMAN. Several members of our staff would like to ask some questions, but before calling on them I would like to discuss with you very briefly, Doctor, what you said about three recessions, postwar recessions. You referred to 1949, 1953, and 1957, I assume?

Mr. GURLEY. Yes.

Representative PATMAN. We used to have these recessions about every 10 or 15 years. I hope this does not become a traditional pattern, every 4 years: 1949, 1953, 1957, 4 years between each. I hope we have not accelerated.

Mr. Eckstein?

Mr. ECKSTEIN. I have a couple of questions.

First, evaluating the growth of financial intermediaries, do you feel they serve some useful purpose?

Mr. GURLEY. I think probably over a long stretch of time they not only raise levels of saving and investment in the economy, but tend to allocate savings optimally among alternative investments.

Mr. ECKSTEIN. Another question. We have had this growth of intermediaries, a growth which has continued even in recent years. At the same time our Treasury has run into worse and worse problems in managing its debt. Do you feel that the intermediaries could play a more constructive role in helping the Treasury with its debt problem?

Mr. GURLEY. By purchasing more Government securities?

Mr. ECKSTEIN. I suppose that would be one way.

Mr. GURLEY. I notice Secretary Anderson has appealed to the mutual savings banks to do just this.

I see no reason why they should be forced to purchase any particular type of asset.

Mr. ECKSTEIN. If there were less financial intermediaries and if more of the funds were invested by ultimate lenders would not more of them buy Government securities than intermediaries do?

Mr. GURLEY. Yes, I think that might be so. What you are saying is that financial intermediaries do compete with certain types of primary securities, very liquid primary securities, and the Government securities are among these. I would agree. It works the other way too, of course. There is competition both ways.

Mr. ECKSTEIN. You are concerned with the lack of control which anybody has over the financial intermediaries. Do you think that the present Federal Reserve open market policy of bills only cuts them off even more than is necessary from any kind of controlled intermediaries?

Mr. GURLEY. Yes, I think it cuts them off more. Purchases and sales by the Federal Reserve of shorts or longs, Treasury issues of shorts or longs—all these are techniques of debt management. It is putting more long securities out into the market and taking shorts off, or vice versa, and financial intermediation is really the same thing. It is taking long-term private debt off the market and putting short-term liquid debt into the market. The more control over public and private debt management you have the better the control you have over the whole loanable funds market.

So the Fed is cutting itself off from part of this area of control by just sticking to "bills only."

Representative PATMAN. Senator Bush, I was going to call on Mr. Frucht here next, but since you have come in and certainly want to ask questions, you come first.

Senator BUSH. I am a little embarrassed at being late but it was one of these conflicts, Mr. Chairman, with another committee.

Representative PATMAN. Yes, we all have them.

Senator BUSH. I may be asking a question that has been asked before. If so, stop me.

Representative PATMAN. That is all right. We recognize that the members do that sometimes; but it is perfectly all right.

Senator BUSH. If it has been asked I will not press for an answer.

Let me ask you this:

Last year in the first few months of the year, the Congress was faced with some very critical decisions. It was recommended by many that taxes be cut at that time. In view of the fact that we had a substantial degree of unemployment some recommended very large increases in Government spending, and many bills were introduced to that end.

I would like to ask you this question: Was it your opinion in the early part of 1958 or at any time in 1958 that we should cut taxes in order to help come to grips with the unemployment situation that then existed?

Mr. GURLEY. Yes, it was in the early part of 1958.

Senator BUSH. You favored that?

Mr. GURLEY. I did.

Senator BUSH. To what extent did you think we should have cut taxes? Did you have any particular idea?

Mr. GURLEY. I had no particular idea.

Senator BUSH. You just thought that a tax cut would be a helpful move?

Mr. GURLEY. Yes.

I might say I changed my mind by June or July.

Senator BUSH. You changed your mind?

Mr. GURLEY. Later on, yes.

Senator BUSH. As you saw that the recovery caught hold and appeared to be correcting itself.

What about the bills that were introduced to substantially increase Government spending? Did you favor any of those particularly, do you recall?

Mr. GURLEY. No, I do not think I had any opinion. I favored a tax cut and I do not think I had any opinion at that time about increasing Government expenditures.

Senator BUSH. You did not want to make any recommendations as to increased Government spending bills?

Mr. GURLEY. I did not even express my opinions on tax cuts. These were my private nightmares; that is all.

Senator BUSH. I imagine before classes in the university you must get questions at sometime on what your opinion is on various important pending matters, do you not?

Mr. GURLEY. Yes. It depends on the class. If I have them well under control, I do not.

Senator BUSH. I had the privilege last autumn of serving on the Chubb Fellowship at Yale University for a week, and I was a guest in numerous classes in economics, international economics. I did not find them at all reluctant to ask me questions of very pressing importance, and they were somewhat difficult to answer at times.

At any rate, you simply stand on the statement that you did then favor a tax cut.

Why did you favor a tax cut at that time? What were the reasons in your mind?

Mr. GURLEY. Because I thought capital expenditures were going to decline more than it turned out that they actually did.

Senator BUSH. And you thought that a tax cut would cause increased capital expenditures?

Mr. GURLEY. Yes.

Senator BUSH. And you felt at the time you favored the tax cut that it should be done regardless of the fact that it would likely increase an already certain deficit in the budget?

Mr. GURLEY. Yes; that is right.

Senator BUSH. I have no other questions, Mr. Chairman.

Representative PATMAN. Mr. Frucht?

Mr. FRUCHT. I am concerned with your questions in your statement, and I would like to ask you several questions on those points.

The first, a question of the equity of controlling banks and not controlling in any direct sense the financial intermediaries. What I am wondering about here is, if we did not overcontrol—if you want to use that term—banks in regard to interest payments on deposits and portfolios on the time part of the bank operation, would this not significantly change your position with regard to this matter of equity?

Mr. GURLEY. With regard to what?

Mr. FRUCHT. The equity of controlling the banks as opposed to not controlling the nonfinancial intermediaries.

Mr. GURLEY. No.

Mr. FRUCHT. To go on, then, on that same point. On the question of balanced growth, for instance, is it or is it not true that the claims of borrowers from intermediaries get to the banks through the financial intermediaries to a large extent?

Mr. GURLEY. No. Consumer debt, mortgages, and so on can be sold to financial intermediaries as these borrowers depend on financial intermediaries to a very large extent other than the commercial banking system. When the commercial banking system is held down, it cuts out certain types of business loans, let us say. It does not stop the growth of other intermediaries that cater more to consumers through mortgage and consumer debt borrowing. This is a type of unbalance that I have in mind.

Mr. FRUCHT. There are two questions here; are there not? The sources of funds for the intermediaries: One would be just hoardings, probably, and the other would be borrowings from the commercial banks, either directly or indirectly through the sale of securities. Would that be true?

Mr. GURLEY. Well, the source of funds is the purchase in the first instance of money by the creation of a claim on these intermediaries. As long as they can purchase money by creating mutual savings de-

posits or a share or something of the sort, they have funds with which to purchase securities. This in no way reduces the size of the commercial bank system.

It in no way depends on the intermediaries borrowing directly from the commercial banking system.

Mr. FRUCHT. They do this to some extent; do they not? And then they float securities in the market and thus perhaps reduce hoardings?

Mr. GURLEY. They do what? I think I missed out on this question.

Mr. FRUCHT. I am just trying to figure out from whence comes the financial support for the intermediaries. One would assume that it either must originate in changes in the money supply or in substitutions or changes in hoarding.

Mr. GURLEY. The funds originate from the decision of some person to purchase a claim on these intermediaries with money. This is all that has to happen.

Mr. FRUCHT. This money is either created by new money, in a sense created by the commercial banking system, or results from a running down of idle balances?

Mr. GURLEY. That is right.

Mr. FRUCHT. I am in considerable agreement with you that present control mechanisms discriminate seriously between banks and non-banking institutions. But if we removed some of these discriminations, would we not then make the banking communities more responsive to the needs of the economy and more able to compete effectively?

Mr. GURLEY. Yes, I think there are certainly ways of making the commercial banking system better able to compete effectively, but this does not necessarily mean that the inequities of the control mechanism have been removed.

Mr. FRUCHT. I am concerned for instance with the question of the fact that in competing for hoardings or for idle balances, the commercial banks are quite powerless here, whereas the financial intermediaries are able to pay interest which the commercial banks are not.

I am wondering also what is your opinion as to the present justification for the distinctions and in controls between the time deposits and demand deposits.

Mr. GURLEY. Ideally, the difference in the two reserve requirements should reflect the degree of substitutability between time deposits and demand deposits. For example, if time deposits were exactly like demand deposits, if they were perfect substitutes, then clearly the reserve requirement should be the same on both demand deposits and time deposits.

If, on the other hand, every time time deposits grew by \$1 this reduced demand for money by 50 cents, then ideally the reserve requirement on time deposits should be one-half the reserve requirement on demand deposits.

Mr. FRUCHT. Does not the legal distinction between these two kinds of deposits have significant implications? For instance, does it not influence the time structure of loans in a period of expansion? For instance, might it not result in loans of longer duration, as when the banking system wants to expand?

Mr. GURLEY. Because its time deposits are growing very fast?

Mr. FRUCHT. Yes.

Mr. GURLEY. That is right.

Mr. FRUCHT. In other words, is this not an artificial factor in a sense which affects the duration of loans and also affects in the same way the position of the banks vis-a-vis the nonfinancial intermediaries? Because the nonfinancial intermediaries can pay significant interest payments to depositors, in a sense, on accounts that are used for a short-term purpose. Would you say that is true?

Mr. GURLEY. I am going to have to understand your question a little bit better.

Mr. FRUCHT. I am sorry.

In other words, the very thing in such a period which the commercial banks are precluded from carrying out, namely, paying interest on deposits used for short-term loans, is available and open to the nonfinancial intermediaries?

Mr. GURLEY. That is right.

Mr. FRUCHT. And does this not constitute a really significant discrimination against the commercial banks?

Mr. GURLEY. Yes, I think it does.

Mr. FRUCHT. Going back to the question of sociology that Mr. Reuss raised, if these particular discriminations were limited or reduced, might it not have a very big effect on the virility, on the aggressiveness of the commercial banker?

Mr. GURLEY. I think it would have an effect but I do not think a significant effect. I think the control mechanism itself, the mechanism of quantitative controls is so overwhelming here that the point you mention is not of great significance.

Mr. FRUCHT. Just to refer briefly to your point about the unintelligent use of controls by the Federal Reserve System, Professor Friedman's thesis, as you well know, is that these characteristics are of long duration, that there is a great consistency in this pattern of "unintelligence." I am wondering whether we ought to blame the Federal Reserve authorities for unintelligence really or whether this is built in to the control instruments themselves.

Mr. GURLEY. I do not know how to answer that.

Mr. FRUCHT. Professor Friedman's thesis is that as a general rule, if I understand it correctly, the Federal Reserve Board leans in one direction when it should lean in the other and vice versa, and that there is a great consistency in this sort of perverse behavior.

Mr. GURLEY. I disagree with that. I think that is much exaggerated. The thing that is more true I believe is that by not taking account over the long run of the inflationary impact of the growth of time deposits and claims on other intermediaries, the money supply has been allowed to grow too much to bring about stabilization of the price level.

There are times in short periods when the economy has needed not monetary restraints but the opposite, and we have reverse situations. So far as those turning points are concerned I think the record of the Federal Reserve is fairly good. I would not argue on Friedman's side on this.

Mr. FRUCHT. You would not agree with Mr. Shaw, then?

Mr. GURLEY. And I would not agree with Mr. Shaw on this point; that is right. It is a much exaggerated position I believe.

Mr. FRUCHT. Thank you, Mr. Chairman.

Representative PATMAN. Mr. Knowles, would you like to ask some questions?

Mr. KNOWLES. Yes, I have one or two I would like to bring up here to clarify some points.

First of all, was your answer to a question of Dr. Eckstein concerning the purchase of Government securities by these financial intermediaries rather than commercial banks, grounded in the notion that these financial intermediaries can obtain a higher rate of interest on other assets that they can purchase than they receive on Government's, and therefore, why should they sacrifice the difference in interest? Is that basically your point?

Mr. GURLEY. Yes.

Mr. KNOWLES. In other words, you would say that if the Treasury put out securities carrying a higher rate of interest, then your position would shift. If they were allowed to charge a higher rate of interest your position would shift and you would say in this case you would expect that the financial intermediaries ought to and would buy a higher fraction of Government security offerings?

Mr. GURLEY. Yes. However, interest rates on existing Governments will adjust anyway to make them competitive with other securities.

Mr. KNOWLES. In your statement you use a phrase about some non-monetary financial intermediaries supplying large amounts of loanable funds by creating claims on themselves.

The word "creating" is used in the commercial banks in the sense of creating deposits on a fractional reserve basis. Are you using the term "creating" here in this sense—that these people create a supply of funds in the same way that as a commercial bank, or is it that they create a claim on themselves and thus tap the real savings of savers and then act as an intermediary to pass these real savings on to the ultimate borrower.

Mr. GURLEY. I can put it in a slightly different way. The monetary system increases the money supply by creating money. The other intermediaries increase income velocity of money by creating other types of claims on themselves.

Does this restatement help?

Mr. KNOWLES. A little, but the point I am trying to get at is, are these intermediaries tapping as an ultimate source of their funds, saving by you and me and business and others; are they tapping a final saving somebody has made out of his income; he has saved this and put it aside and invested it through the intermediary; or is it in the form of a monetary creation in the same sense, to use an extreme case, as if they had minted the money.

Mr. GURLEY. Each person's saving is in financial assets or real assets of various types, and one type of financial asset is money, so our money holdings represent part of our saving. Other financial assets are claims on the nonmonetary intermediaries. So they too represent part of our saving.

In that sense the monetary system and the nonmonetary intermediaries stand on the same footing in creating a financial asset that we can acquire instead of consuming our income, that is, saving our income.

Suppose that you desire to buy savings and loan shares, a hundred dollars worth. That may or may not represent any increase in your

saving. It might simply mean you would like to change one type of financial asset that you now have, let us say a hundred dollars of money, for a hundred dollars of savings and loan shares. So there would be no new saving in the economy as a result of the growth of savings and loan associations by \$100.

Yet they then could go into the market with your hundred dollars and buy primary securities, bidding up the prices of securities, making terms of lending easier in the market.

Mr. KNOWLES. But unless someone saved, past or present, there would be no power on their part to expand the amount of loanable funds through the Federal Reserve System and the commercial banking system. Any expansion of a monetary character which does not represent real savings by consumers or business would have to come from monetary systems directly, not through the financial intermediaries.

Mr. GURLEY. The growth of nonmonetary intermediaries can bring about an excess amount of investment over saving in the planned sense. This can be done by the growth of nonmonetary intermediaries as well as by the growth of the commercial banking system. One does it by creating money; the other does it by increasing the velocity of money through the creation of special claims on themselves.

Mr. KNOWLES. And in this latter sense of increasing the velocity you would assert that they are inflationary?

Mr. GURLEY. Exactly.

Mr. KNOWLES. Now, on this last point of equity that was raised, I can recognize your equity argument but I wonder if you would make the same argument or raise the same issue about the question of the difference in control between the commercial banks and these other intermediaries in regard to the problem of growth.

Would you say that the rate of growth of the economy is slowed by the unequal pressure that is exerted in our monetary policy, versus what it would be if the pressure as you put it were applied across all, equally and equitably: that is, financial intermediaries and the commercial banking system, both?

Mr. GURLEY. That is a difficult question. I am not sure I am in a position to answer that.

Representative PATMAN. Is there any reason why we should not recess subject to call of the Chair? Without objection, we will recess subject to the call of the Chair.

(Whereupon, at 11:45 a.m., Thursday, May 28, 1959, the committee recessed, subject to the call of the Chair.)

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