FEDERAL RESERVE BANK OF ST. LOUIS

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REVIEW

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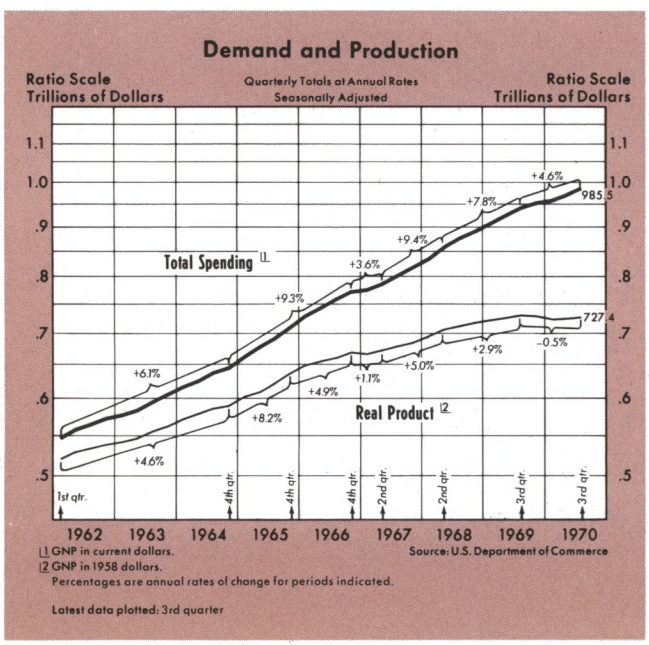
Monetary and Financial Developments

THE CRUCIAL problem for stabilization policy at this time is how to achieve the most tolerable trade-off between continued downward pressure on the rate of price increase and slack in economic activity. Excluding the effects of the automobile strike, total production is apparently increasing slightly, and a slow recovery seems in prospect. There is also evidence that the rate of price advance has begun to decelerate.

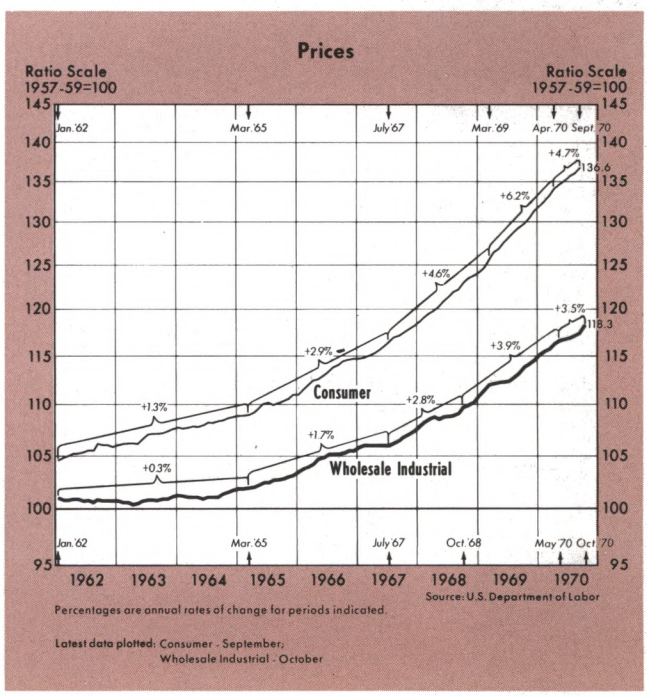
A repeat of the 1967 experience, when spending was excessively stimulated and inflation intensified by an overreaction by monetary authorities to some cutbacks in output, must be avoided. Two factors which make such a recurrence unlikely are that monetary growth this year has not been so rapid as in 1967, and the economy today is not so close to full capacity. However, the strong expectations of price increases that still prevail will probably allow only gradual decline in the rate of price increase.



Total spending has increased 4.6 per cent since the third quarter of 1969, compared with an 8.5 per cent average annual rate in the preceding two years. Real product has changed little on balance since the third quarter of 1969, compared with growth of 2.6 per cent in the preceding year and a 5 per cent rate from 1965 to 1968.

Industrial production declined abruptly in September and again in October, after drifting down 3 per cent in the preceding year. The substantial drop in industrial production from August to October is attributable largely to the auto strike which began in mid-September. By comparison industrial production rose at about a 5.7 per cent average annual rate from mid-1967 to mid-1969.

The inflation experienced since the mid-Sixties has stopped accelerating and apparently is moderating.



This improvement is a lagged response to the markedly slower growth of total spending, which began in late 1969 in response to restrictive monetary policy initiated in early 1969. Consumer prices increased at a 4.7 per cent annual rate from April to September, compared with a 6 per cent increase during the previous 12 months. Wholesale prices of industrial commodities rose at a 3.5 per cent rate from May to October, compared with about a 4 per cent rise in the preceding year. Overall prices (GNP deflator) rose at a 4.4 per cent rate from the first to the third quarter of 1970, down from the 5.5 per cent inflation in the preceding year. An index of prices of 13 raw industrial commodities has declined at about an 11 per cent rate since early this year.

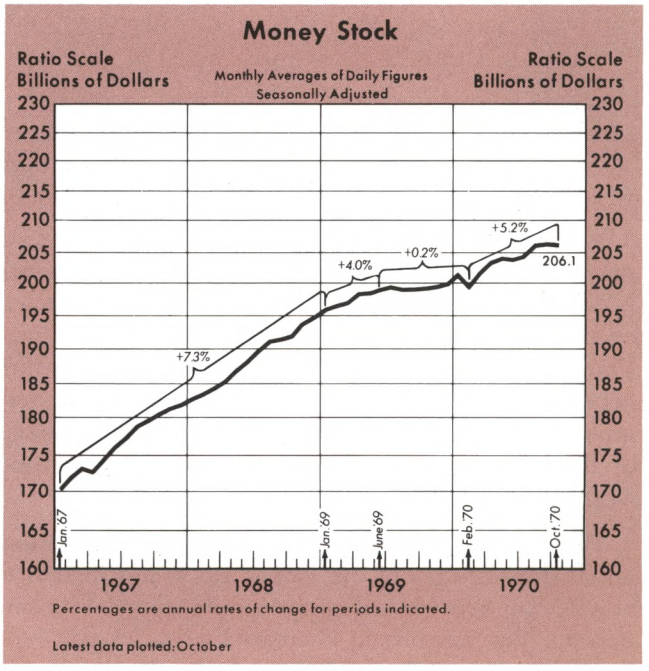
Monetary Aggregates

The restraint on total spending during the past year has been fostered by monetary restraint in 1969. The money stock was about unchanged from June 1969 to February 1970. Since February, the money stock has increased at about a 5 per cent annual rate. Previous to the restraint of 1969, money growth had accelerated from a 2 per cent trend rate in the 1953-65 period, to a 4 per cent trend rate in the 1965-67 period, and a 7 per cent rate during 1967 and 1968.

The recent growth of money has been relatively rapid by historical standards, but in view of the recent strong inflation a relatively rapid monetary growth rate perhaps has been appropriate. In the long run it may be desirable for total spending to rise at only about a 4 or 4.5 per cent annual rate to foster maximum attainable real growth without inflation, but a somewhat faster growth in spending may be temporarily desirable because of inflationary expectations which cannot be changed quickly. Total spending growth at a 6 or 7 per cent rate, higher than the most desirable rate in the long run, might permit a larger expansion in real output and more employment opportunities during the transition period to a lower rate of inflation.

A turn to moderate monetary expansion was undertaken by the System's Open Market Committee at its January and February meetings, when its directive to the operating manager expressed a "desire to see a modest growth in money and bank credit."[1] The directives in late 1969 had included no direct reference to money, and had stated that monetary policies "shall be conducted with a view to maintaining the prevailing firm conditions in the money markets." This language could be interpreted to mean that no relaxation of monetary policy was to be attempted at the time. Directives published by the FOMC since January (through the July meeting) have all stated a desire for "moderate" growth of money and bank credit.

February seems to be an appropriate base month for calculating the recent rate of growth in money, because this was about the time of the definite change in the policy directive of the FOMC, and because this seems to be the dividing line between a period of no money growth and a period of sustained growth. Other possible base points, such as January and late March or April, which contain large temporary jumps in the money stock, would provide a relatively poor base for determining a trend.

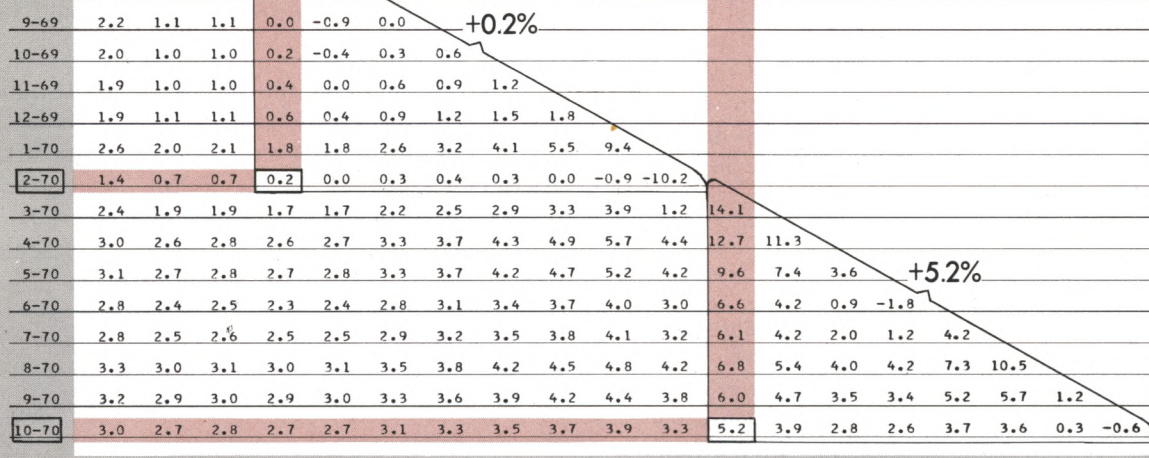


In the "rate of change" table for the money stock on the next page, compounded annual rates of change from various initial months to various terminal months are displayed, permitting the user to read the rate of change between any two points in time of the months covered. The table, which is similar to a mileage table on road maps, can be read by choosing an initial month at the top and a terminal month at the left side, so that the rate of change between the two months selected is found at the intersection of the column of the initial month and the row of the ter-

[1]At the February meeting of the FOMC, the word "modest" was changed to "moderate," and this has been used in subsequently published directives (through July meeting). Each month's directive is published, with a three-month lag, in the Federal Reserve *Bulletin*, Board of Governors, Washington, D. C.

MONEY STOCK
COMPOUNDED ANNUAL RATES OF CHANGE

TERMINAL MONTH	INITIAL MONTH 3-69	4-69	5-69	6-69	7-69	8-69	9-69	10-69	11-69	12-69	1-70	2-70	3-70	4-70	5-70	6-70	7-70	8-70	9-70	BILLIONS OF DOLLARS
4-69	8.2																			198.1
5-69	4.7	1.2																		198.3
6-69	4.5	2.8	4.3																	199.0
7-69	3.9	2.4	3.1	1.8																199.3
8-69	2.7	1.4	1.4	0.0	-1.8															199.0
9-69	2.2	1.1	1.1	0.0	-0.9	0.0														199.0
10-69	2.0	1.0	1.0	0.2	-0.4	0.3	0.6													199.1
11-69	1.9	1.0	1.0	0.4	0.0	0.6	0.9	1.2												199.3
12-69	1.9	1.1	1.1	0.6	0.4	0.9	1.2	1.5	1.8											199.6
1-70	2.6	2.0	2.1	1.8	1.8	2.6	3.2	4.1	5.5	9.4										201.1
2-70	1.4	0.7	0.7	0.2	0.0	0.3	0.4	0.3	0.0	-0.9	-10.2									199.3
3-70	2.4	1.9	1.9	1.7	1.7	2.2	2.5	2.9	3.3	3.9	1.2	14.1								201.5
4-70	3.0	2.6	2.8	2.6	2.7	3.3	3.7	4.3	4.9	5.7	4.4	12.7	11.3							203.3
5-70	3.1	2.7	2.8	2.7	2.8	3.3	3.7	4.2	4.7	5.2	4.2	9.6	7.4	3.6						203.9
6-70	2.8	2.4	2.5	2.3	2.4	2.8	3.1	3.4	3.7	4.0	3.0	6.6	4.2	0.9	-1.8					203.6
7-70	2.8	2.5	2.6	2.5	2.5	2.9	3.2	3.5	3.8	4.1	3.2	6.1	4.2	2.0	1.2	4.2				204.3
8-70	3.3	3.0	3.1	3.0	3.1	3.5	3.8	4.2	4.5	4.8	4.2	6.8	5.4	4.0	4.2	7.3	10.5			206.0
9-70	3.2	2.9	3.0	2.9	3.0	3.3	3.6	3.9	4.2	4.4	3.8	6.0	4.7	3.5	3.4	5.2	5.7	1.2		206.2
10-70	3.0	2.7	2.8	2.7	2.7	3.1	3.3	3.5	3.7	3.9	3.3	5.2	3.9	2.8	2.6	3.7	3.6	0.3	-0.6	206.1



INITIAL MONTH

minal month. For example, the 5.2 per cent annual rate of increase in money from February to October is denoted in the table, and the same figure is shown on the money stock chart as the last bracketed figure. The column of numbers at the far right gives the actual average stock of money for each of the terminal months. Each figure along the diagonal edge of the table represents the rate of change from one month to the following month.[2]

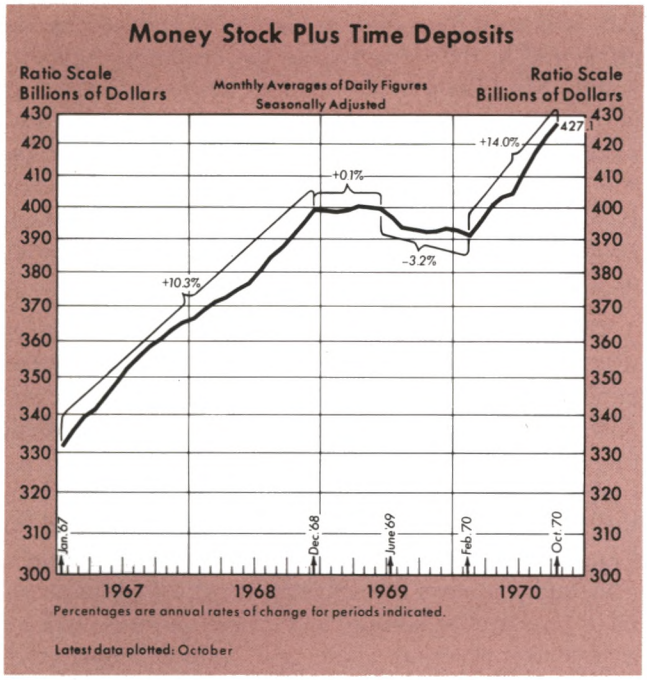
The demand deposit component, which comprises about three-fourths of the money stock, has increased at a 4.5 per cent annual rate since February. By comparison, this magnitude decreased at a 1.2 per cent rate from June 1969 to February 1970. The currency component has increased at a 6.9 per cent rate during the past eight months, after increasing at a 5.4 per cent during the previous eight months.

Member bank reserves, which underlie bank credit and the money supply, have increased at a 9.1 per cent annual rate in the past eight months. Federal Reserve credit, the most important determinant of bank reserves, has increased at a 7.9 per cent rate since February compared with a 1 per cent rate from June 1969 to February 1970.

Money stock plus time deposits, a broader concept of money which has largely lost its significance in recent years, has increased at a 14 per cent annual rate since February. This aggregate declined at a 3.2 per cent rate during the previous eight months when the money stock was essentially unchanged and disintermediation was occurring. Exclusive of large certificates of deposit, this measure has grown at a 9.4 per cent rate since February, after declining at a 1.3 per cent rate over the previous eight months. Some analysts feel this latter refinement of the measure may be more useful, since the volume of large CD's is most heavily influenced by the fluctuating relationship between Regulation Q ceilings and short-term market interest rates. Time deposits, other than large CD's, include primarily passbook savings and savings certificates.

Bank credit has increased at a 9.5 per cent annual rate from February to October, compared with about a 1 per cent rate from May 1969 to February 1970, a period of disintermediation and no monetary growth. Since February, bank loans have increased at a 5.2 per cent rate as demand has been moderate. Over the same period, total investments held by banks have increased at about a 19 per cent rate. The banks thereby have been able to take advantage of

[2]This Bank's *Monetary Trends* and *National Economic Trends* contain similar tables each month on selected financial data. More up-to-date rates of change regarding financial data are presented each week in this Bank's *U.S. Financial Data*. To receive these publications, write: Research Department, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, Missouri 63166.



the reintermediation and monetary expansion to rebuild their liquidity positions, which fell in 1969 when bank investments declined at about a 6 per cent rate.

Short- and intermediate-term interest rates have fallen rapidly in 1970, reflecting both the more rapid monetary expansion and a slowing in demand for loan funds. Yields on three-month Treasury bills averaged 5.57 per cent and four- to six-month commercial paper averaged 6.60 per cent in the first half of November, both down about 2¼ percentage points since January. Interest rates on three- to five-year Government securities declined from 8.14 per cent in January to 6.76 per cent in the first half of November.

Responding to the same supply and demand conditions as money market rates but usually with some lag, the prime rate has been lowered three times so far in 1970. The rate was lowered in March from 8½ per cent to 8 per cent, in September to 7½ per cent and, in November to 7¼ per cent. Following the changes in other interest rates, the rate which Federal Reserve banks charge on loans to member banks was reduced from 6 per cent to 5¾ per cent this month.

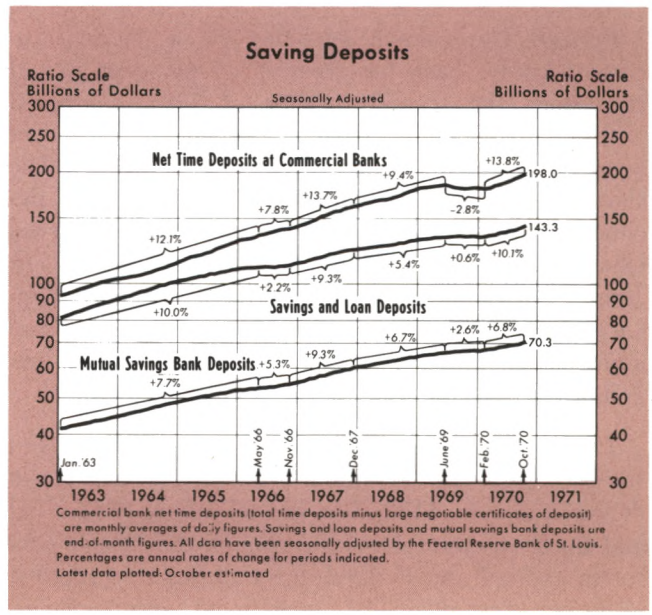
Financial Intermediaries

At the same time that the money stock has risen more rapidly since early this year, there has also been a large inflow of time deposits to banks and to nonbank savings institutions. As a result, total liquid assets of the public, as generally measured, have risen more rapidly in 1970 than in 1969. Part of the increase in funds at savings institutions probably represents new saving by consumers and businesses, but much reflects a redirecting of existing funds from nonfinancial intermediary markets, such as commercial paper, Eurodollars, and trade and individual credit.

Time deposits in commercial banks are not homogeneous assets, but rather consist of several different types of accounts, with different interest rate ceilings, minimum amount requirements, and time-to-maturity restriction. These different categories have grown at markedly different rates. Large CD's at commercial banks after dropping $13.1 billion from December 1968 to January 1970 have increased 12.6 billion since January.

Total time deposits at commercial banks have increased at a 23.5 per cent annual rate since February, after declining at a 5 per cent rate during the preceding year. Time deposits other than the large CD's have increased at a 14 per cent rate since February, after declining at about a 3 per cent rate from June 1969 to February 1970.

Net flows of funds into saving and loan associations and mutual saving banks have been substantial in 1970, but less rapid than the flow of time money other than large CD's into commercial banks. Since February saving and loan shares have increased at a 10 per cent annual rate and mutual saving bank deposits at a 6.8 per cent rate. These rates compare with a 0.6 per cent rate for savings and loan shares and a 2.6 per cent rate for mutual savings banks deposits in the previous eight months.



This inflow of saving funds seems to have helped the mortgage markets even though mortgage interest rates have declined little. Private housing starts have increased from a 1.3 million seasonally adjusted annual rate in the first quarter to a 1.5 million rate in the third quarter. By comparison, this measure decreased from a 1.7 million rate to the 1.3 million rate in the preceding year.

The slow growth of savings funds at both bank and nonbank financial intermediaries from June 1969 to February 1970 can be attributed to high market rates and fixed ceilings on interest rates that could be paid by financial intermediaries. As market interest rates rose in 1969, the ability of financial intermediaries to compete for funds was constrained by the maximum interest rates they were permitted to offer under Regulation Q and the corresponding regulations of the Federal Deposit Insurance Corporation and the Federal Home Loan Bank Board.

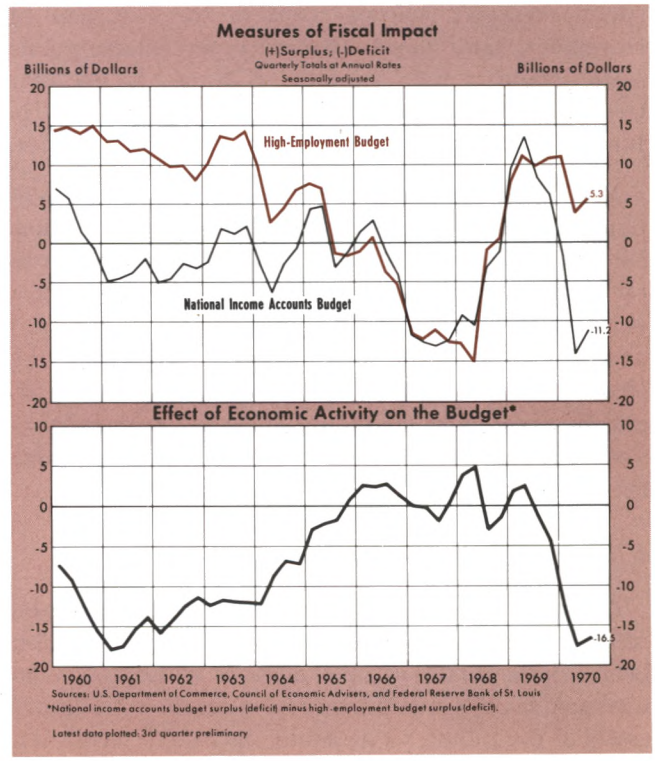
Since January, the disintermediation which occurred in 1969 has been reversed, as market interest rates have declined and Regulation Q ceilings have been raised ½ to ¾ percentage points in most categories. Maximum interest rate ceilings for saving and loan associations regulated by the Federal Home Loan Bank were also raised and differentiated as to type of account, maturity, and amount. In addition, Regulation Q ceilings on 30- to 89- day maturity large CD's were suspended in June, allowing banks to compete once again with market interest rates, and, as a result the volume of CD's has grown rapidly.

Federal Budget Developments

Federal Government spending on a national income accounts basis has risen at a 7 per cent annual rate since the second quarter of 1969, compared with 5 per cent in the previous year and a 15 per cent average annual rate from mid-1965 to mid-1968. The share of Federal expenditures for defense has declined since the second quarter of 1969, as defense expenditures have declined at about a 2 per cent annual rate while nondefense expenditures have increased at a 14 per cent rate. By comparison, from mid-1965 to mid-1968 defense and non-defense expenditures rose at rates of 17 and 13 per cent.

The national income accounts budget has moved sharply from the $9 billion surplus in 1969 to a deficit at about a $13 billion annual rate in the second and third quarters of 1970. Although the 10 per cent surtax expired and Federal expenditures rose rapidly, using our concept of full employment, approximately $16 billion of the shift in the NIA budget can be attributed to the slowdown in the economy. Approximately $14 billion of the change was due to the loss of receipts resulting from the slowdown in personal income and corporate profits, and about $2 billion was due to expenditures for unemployment benefits. It is estimated that a deficit at about an $11 billion annual rate is being incurred in the fourth quarter of 1970.

The high-employment budget has shown a somewhat different picture of the Federal budget than the national income accounts budget because of the slowdown in the economy. An estimate of the Federal budget surplus or deficit at a constant level of resource utilization provides a measure of changes in the budget due to changes in the tax laws and to Congressional provisions for Federal expenditures. This budget shows a surplus at about a $4 billion annual rate in the second and third quarters and an estimated surplus at about a $7 billion annual rate in the fourth quarter. This compares with an average surplus at about an $11 billion rate from the second quarter of 1969 to the first quarter of 1970. The budget outlook for the first half of 1971 is for a surplus at an annual rate of about $10 billion. This estimate assumes the effects of the proposed speed-up in collections of estate and gift taxes and the new tax on lead used in gasoline will appear in the first half of 1971, and that growth of expenditures through



SIMULATION OF THE EFFECTS OF MONETARY AND FISCAL ACTIONS*

Projected Rate of Change in Money Stock	1970 I	1970 II	1970 III	1970 IV	1971 I	1971 II	1971 III	1971 IV	1972 I	1972 II
	Adjusted Actual*			Projections						
3 Per Cent										
Rate of Change in:										
Nominal GNP	4.1%	4.9%	5.1%	4.9%	4.6%	4.5%	4.5%	4.5%	4.5%	4.5%
Real GNP	—1.4	—0.1	0.3	0.3	0.3	0.5	0.7	1.0	1.4	1.8
GNP Price Deflator	5.5	5.0	4.8	4.6	4.3	4.0	3.8	3.5	3.1	2.7
Unemployment Rate	4.2	4.8	5.2	5.4	5.7	6.1	6.4	6.5	6.8	7.0
Corporate Aaa Rate	7.9	8.1	8.2	7.9	7.9	7.8	7.7	7.6	7.4	7.2
Commercial Paper Rate	8.6	8.2	7.8	7.4	7.0	6.4	6.1	5.5	4.9	4.4
5 Per Cent										
Rate of Change in:										
Nominal GNP	4.1	4.9	5.1	5.3	5.6	6.0	6.3	6.5	6.6	6.7
Real GNP	—1.4	—0.1	0.3	0.7	1.2	1.8	2.3	2.7	3.0	3.4
GNP Price Deflator	5.5	5.0	4.8	4.6	4.4	4.2	4.0	3.8	3.6	3.3
Unemployment Rate	4.2	4.8	5.2	5.4	5.7	5.9	6.1	6.1	6.2	6.3
Corporate Aaa Rate	7.9	8.1	8.2	7.8	7.8	7.8	7.7	7.6	7.5	7.3
Commercial Paper Rate	8.6	8.2	7.8	7.1	6.7	6.4	6.2	5.8	5.4	5.0
7 Per Cent										
Rate of Change in:										
Nominal GNP	4.1	4.9	5.1	5.8	6.5	7.4	8.5	8.9	8.9	8.9
Real GNP	—1.4	—0.1	0.3	1.2	2.1	3.1	4.3	4.7	4.9	5.0
GNP Price Deflator	5.5	5.0	4.8	4.6	4.4	4.3	4.2	4.2	4.0	3.9
Unemployment Rate	4.2	4.8	5.2	5.4	5.6	5.8	5.9	5.7	5.7	5.6
Corporate Aaa Rate	7.9	8.1	8.2	7.7	7.7	7.7	7.7	7.7	7.5	7.4
Commercial Paper Rate	8.6	8.2	7.8	6.8	6.5	6.3	6.2	6.0	5.8	5.6

*The simulation is based on equations using data through III/1970. High-employment expenditures are estimated through II/1971 by this Bank, and are projected at a 6 per cent rate thereafter. Some actual and projected figures are smoothed to remove irregular fluctuations.

the second quarter of 1971 will continue at about the same rate as over the past 5 quarters.

Projections

Using this bank's model as presented in the April 1970 *Review,* various assumed alternative rates of change of money can be used to project rates of change in spending, real product, and prices.[3] If a 5 per cent rate of money growth were to be followed from now until the fourth quarter of next year, total spending might be growing at about a 6.5 per cent annual rate a year hence, compared with about a 5.3 per cent rate now. With this growth in total spending, prices might be rising at about a 3.8 per cent rate, compared with a 4.6 per cent rate now. Real output would be expanding at an estimated 2.7 per cent rate, compared with little growth at present.

If a slower 3 per cent rate of growth in money were followed until the fourth quarter of next year, total spending would probably be advancing at a more moderate 4.5 per cent rate a year hence. Real output would be advancing at a 1 per cent rate, up slightly from the present rate. The rate of price increase would probably decrease about 1 percentage point from the current rate to a 3.5 per cent rate. Alternatively, if a faster 7 per cent rate of money growth were followed, total spending would be growing at a rapid 9 per cent rate a year hence, and real product at about a 4.7 per cent rate. Price trends, however, would show little improvement relative to the present situation.

These alternative rates of money growth all imply some expansion in real output and continued inflation. Choice depends upon the real growth we are willing to give up transitionally in order to move more rapidly toward a lower rate of inflation.

[3]See "A Monetarist Model for Economic Stabilization," this *Review* (April, 1970), pp. 7-25. For current simulations see *Quarterly Economic Trends,* prepared by this Bank.

The International Payments System and Farm Exports

A Speech by DARRYL R. FRANCIS, President,
Federal Reserve Bank of St. Louis, to the
St. Louis Agribusiness and World Trade Clubs, October 22, 1970

IT IS GOOD to have this opportunity to discuss with you some vital issues of international trade. Each of us has an interest in this subject — some as producers of goods which compete with imports, others as producers who export part of their output, and all as consumers who gain from the efficiencies of international specialization of labor and resource use.

First, I shall briefly review some historical developments in our international payments system. Then, I shall discuss certain policy actions that have been taken to increase foreign trade and, finally, basic factors which tend to limit foreign trade expansion.

Earlier Payments System — Self-Adjusting

In the half century prior to World War 1, the Western World had a self-equilibrating system of settling international accounts. Most commercial nations were on the gold standard with the domestic stock of money tied to the stock of gold. A balance-of-payments deficit led to a gold outflow which, in turn, led to a reduction in the nation's money stock. A decline in the stock of money reduced domestic demand for goods and services, thereby discouraging imports and encouraging exports. This process continued until the balance-of-payments deficit was eliminated.

With the monetary disruptions during the war, most nations left the gold standard. In the 1920's, attempts were made to restore the system, but the relationships established between currencies and gold were often set at the pre-war rates, and some important currencies were overvalued. In those countries with overvalued currencies, imports were stimulated and exports declined, thereby depressing their economies. Attempts were made to make the necessary adjustments, but the depression of the 1930's dealt a death blow to the gold standard before new equilibrium rates could be restored.

Losing gold in a period of growing unemployment like the 1930's meant further contraction of national money stocks and further deflation. Most nations consequently broke the link between gold and domestic money, being unwilling to let international gold movements influence the domestic money stock and income. Following the breakdown of the gold standard, most nations moved to a gold exchange system in which national currency values were arbitrarily pegged to the dollar and the dollar pegged to gold.

Current System Not Self-Adjusting

The gold exchange system automatically permitted free currency convertability among participating countries. Under the present system, funds flowing out of a country reduce its international reserves just as under the gold standard in former years. Now, however, these flows can be offset by central bank actions, and they have no automatic impact on domestic money, prices, and income. Actions can be taken by central bankers to reduce the stock of money and the demand for goods and services and put a brake on domestic prices when international reserve outflows occur, but such actions now reflect conscious policy rather than the automatic operation of the system. Because of these destabilizing effects on domestic income and prices, such actions are taken with extreme caution. We are thus at times torn between actions for implementing balance-of-payments objectives and actions for optimum domestic conditions.

A few nations have altered their exchange rates when large excesses or shortages developed in their foreign exchange accounts. The United Kingdom reduced the value of the pound as a result of a large and continuous deficit, while Germany increased the value of its currency following a large and continuous surplus. This method of changing the terms of trade has not proven a practical solution to the United

States, as the dollar is a key international reserve currency widely held for official balances. Any reduction in its value in terms of gold would result in an immediate loss to all foreign dollar holders.

Other methods used to maintain a balance-of-payments surplus include tariffs, import quotas, capital export controls, and foreign travel restrictions. Each of these methods, however, tends to reduce the volume of international trade. In most instances, they are arbitrary and subject to extreme abuse by the enforcing agencies.

The special drawing rights (SDRs) activated by the International Monetary Fund (IMF) early this year extended the period over which an imbalance of international payments can occur. These rights essentially increase the quantity of international money by a regulated amount of SDRs each year, with the IMF acting as a clearing agent. Although serving to ease the problem of short-run payment imbalances, SDRs do nothing to alter the terms of trade or reverse basic imbalances. Terms of trade between two nations are altered in the market by changes in national price levels and exchange rates. The SDRs permit more time for a nation to take actions to alter the terms of trade and are beneficial in this respect. Nevertheless, if basic steps are not taken to equilibrate the terms of trade, an imbalance of international payments on the basis of fixed exchange rates cannot persist indefinitely without total loss of foreign exchange holdings.

Recent U. S. Experience

With this background, let us briefly review the U. S. situation with reference to the balance of payments and holdings of foreign exchange. Following World War II, this country had a gold balance of $24 billion, or about two-thirds of the free world's stock of gold. We were likewise endowed with a large portion of the free world's productive capacity. Justifiably, domestic policies were instituted to provide other nations of the free world with a better balance in foreign exchange. We generally maintained expansive monetary and fiscal policies and engaged in massive foreign aid programs, which tended to reduce U. S. gold stocks. By early 1968 our gold stock had declined to $10.7 billion, only slightly more than one-fourth of the world's total. Our gold holdings have since increased slightly, but the basic factors underlying our balance-of-payments position have not improved.

Our needs for foreign exchange, like an individual's needs for cash balances, depend upon the volume of transactions to be settled and the synchronization of receipts and payments. Since international trade by the United States accounts for only about one-sixth of the world's total, we apparently do not need two-thirds of the free world's stock of gold possessed twenty years ago. Yet, in view of the volume of our international transactions and the foreign claims held on the United States, we do need a sizable stock of gold. Most importantly, however, we require means for altering the balance of payments to avoid further loss of liquidity. To alleviate this problem, I would suggest greater flexibility in setting exchange rates between the dollar and other currencies. A system of "crawling" exchange rates, whereby the rates are permitted to change a small amount each week or month toward new market levels when imbalances occur, would be a major improvement over the current system. By altering rates to meet payment imbalances, the monetary authorities can concentrate on the appropriate actions for domestic stabilization.

Protection — The Major Trade Restraint

Although the international payments system has imperfections, it probably is not the major factor tending to retard trade growth. Policies designed to protect domestic producers from foreign competition have probably been a more important restraint to foreign trade. All commercial nations pursue protectionist policies which reduce the quantity of goods and services available to consumers, and we are equally guilty of this practice. When the nation was young, it levied tariffs for income in preference to domestic taxes. Later, tariffs were raised to protect our so-called infant industries from foreign competition. The protectionist argument still prevails in one form or another. Between 1865 and 1935 our average rate on dutiable imports never fell below 39 per cent, except for the period during and immediately following the First World War when other nations had a very small output of civilian goods for export.[1] The Underwood Law in 1914 imposed an average rate of 29 per cent on dutiable imports, which was raised to 39 per cent in 1923 under the Fordney-McUmber Law and further increased to 53 per cent in 1930 under the Hawley-Smoot Law.

Since the Reciprocal Trade Agreements Act of 1934, the nation has pursued an announced policy of "freeing" international trade. Numerous tariff reductions have been negotiated. Nevertheless, duties have of-

[1]Don D. Humphrey, *American Imports* (New York: The Twentieth Century Fund, 1955), p. 74.

ten remained so high and other restrictions so effective that foreign trade has not been greatly freed.

Protection Through Nontariff Barriers

While tariffs have traditionally been the chief means of protecting domestic producers from foreign competition, other protective devices have increasingly been used in recent years. Chief among them are import quotas; domestic subsidies; bilateral trade agreements; import licensing; domestic monopolies operating under governmental authority; and "voluntary" controls, such as the case of cotton textiles. In some instances, the restrictions have involved special legislation. In others, informal agreements have been sufficient to limit trade to arbitrarily determined levels. With the aid of one or more of these measures, nations can maintain tariff duties at relatively moderate levels and still protect producers from foreign competition. This change in method of protection provides an opportunity for great obscurity in discussing trade policies and results of tariff reduction agreements. A reduction in tariff rates may have little meaning, since real barriers to trade often remain unchanged.

International trade barriers are as unreasonable under competitive production and marketing conditions as are trade barriers between states, cities, or counties. To the extent that they reduce the volume of goods and services traded, they reduce welfare.

Our country has not been innocent with respect to the use of these protective devices. Even in agriculture, which has such a large stake in free trade, we have established highly protectionist policies. We have sugar import quotas which, based on the New York wholesale price, cost U. S. consumers an additional 4 cents for each one pound of sugar purchased.[2] We have subscribed to international trade agreements which set minimum prices on coffee and wheat, thereby limiting trade in these commodities. We have meat import quotas which provide limits on imports of beef. Our cotton export subsidy, designed to offset the trade-retarding features of our domestic price support program, is sufficient to permit exports of cotton to Japan and imports of goods made from the cotton to the U.S. for sale in competition with our own mills. In order to avoid excessive disruptions from such competition, however, we have a tacit agreement with the Japanese to limit cotton goods exports to the United States. Such tacit arrangements are apparently preferred over formalized legal actions, but, if they are equally effective in reducing trade, they are likewise equally effective in reducing welfare.

Domestic Subsidies Restrictive

Also important in limiting foreign trade are production controls and subsidies. For a number of years, the British have subsidized their farm production, maintaining excessive labor in agriculture which, in effect, limits their imports and our exports of farm products to them. These workers could produce more real income in nonfarm pursuits, and, under free trade conditions, the British would export more nonfarm products and import more farm products, thereby enhancing their total production and welfare.

Our own domestic farm programs inhibit world trade. Despite an announced policy of free trade since 1934 and lower tariff rates, our domestic farm policies have probably offset the advantages gained from the reduced tariff levies. Farm production control and price support programs were initiated in the mid-1930's which contributed to higher farm production cost and higher prices for farm products both here and abroad. Our farm products became less competitive in the world market. Worse, from a long-range view, our policy of arbitrary farm product pricing at higher than free market levels led to a loss of confidence in the United States as a long-run source of farm products. This move from competitive to arbitrary pricing indicated to our customers abroad that hereafter prices of U.S. farm commodities would be in excess of free market prices. Higher export prices in turn indicated higher food and fiber costs to importing nations. Their costs of imported food thus hinge on the decisions of our price-making authorities, who are likely to be more influenced by political pressures at home than by living costs elsewhere.

International Trade Impeded

Our tariff reduction policies have not led to more trade relative to total output. In the 1920-34 period, prior to the Reciprocal Trade Agreements Act, U.S. commodity exports averaged 5.1 per cent and imports 4.1 per cent of gross national product (Table 1). In contrast, since the announced liberal trade policies in the mid-1930's, total exports have averaged only 4.1 per cent and imports only 2.9 per cent of GNP. The proportion of foreign trade in farm products declined even more sharply than the total. Commercial farm exports declined from 17.4 per cent of farm output in the 1920-34 period to 8.6 per cent since 1934,

[2]International Monetary Fund, *International Financial Statistics,* Sept. 1970, p. 29.

Table I

Foreign Trade Relative to Total U.S. Economy and to Agriculture

Period	Per Cent of GNP		Per Cent of Cash Farm Receipts	
	Exports	Imports	Commercial Farm Exports*	Farm Imports
1920-24	6.4%	4.6%	21.3%	22.0%
1925-29	5.0	4.3	16.4	20.6
1930-34	3.4	3.1	13.5	15.5
1920-34	5.1	4.1	17.4	19.9
1935-39	3.2	2.7	9.6	14.8
1940-44	5.0	1.9	3.1	10.7
1945-49	5.2	2.3	6.0	9.4
1950-54	4.1	2.9	7.4	14.0
1955-59	4.1	2.8	8.0	12.6
1960-64	3.8	2.8	10.0	10.8
1965-69	3.9	3.4	12.0	10.4
1935-69	4.1	2.9	8.6	10.9

*Commercial (dollar) sales; that is, shipments under specified Government-financed programs are excluded.

Sources: USDA, *Agricultural Statistics, Farm Income Situation,* and *Foreign Agricultural Trade of the United States;* U. S. Department of Commerce, *Survey of Current Business* and *The Statistical History of the United States.*

and imports declined from 19.9 to 10.9 per cent. In the five-year period 1965-69, commercial farm exports totaled 12 per cent of cash farm receipts, somewhat above the 1935-69 average but well below the per cent exported prior to the so-called change to more liberal trade policies. Furthermore, export subsidies such as government credits and guarantees, government commodity sales at less than market prices, and export payments in cash were responsible for a large portion of recent exports. We view such practices as "dumping" when other countries export products to us under similar conditions.

Thus, despite our announced freer trade policies, our new barriers to international trade have offset our trade-freeing actions. The trade barriers are usually imposed in such a way as to inhibit trade growth rather than have a strong immediate impact, and thus become successively more restrictive over time.

It is my conclusion that the predominent political forces in most nations today do not really want large increases in foreign trade. Large gains in trade upset markets and cause changes in resource use. Some hardships occur in the short run in the relatively less efficient industries. Gains occur immediately, however, in the relatively more efficient industries and among all consumer groups. In the longer run, all groups gain from the greater efficiency of international specialization. But, neither this nation nor other nations have to date indicated a willingness to adopt policies that will assure these major gains at the expense of minor adjustments among some producer groups.

Restrictive Arguments Fallacious

Despite the fact that international welfare could be greatly enhanced through freer trade practices, the arguments of trade restrictive proponents have been predominent in determining public policies among leading commercial nations during the last half century. Reasons given for import restrictions are as follows:

1. Large imports of farm products lower domestic prices and farm incomes;
2. It is unfair to domestic labor to compete with producers under "sweatshop" conditions abroad;
3. Imports are not a reliable source of vital products, such as food and critical defense items; and
4. Excessive imports damage vital defense industries which are necessary for survival.[3]

Implicit in each of these arguments are the beliefs that import restrictions aid certain producer groups, or that some industries are so vital to national survival that we cannot afford to take the risk of relying on imports exclusively for such products.

The argument that import restrictions aid some producer groups is true only in the short run. Over the longer run, labor and other resources adjust to new supply and demand conditions, and real gains accrue to all groups. Furthermore, even in the short run such restrictions are at the expense of the rest of the nation.

Let us take agriculture as an example and consider the impact of greater exports of American farm products to Western Europe. Such exports will first cause a reduction in prices to European farmers and a reduction in food costs to European consumers. Their farm incomes will decline, providing incentive for farm workers to seek higher paying jobs in the nonfarm sector. The larger nonfarm labor force, which is relatively more efficient, will achieve greater output of nonfarm goods and services, and exports of these products to the United States will increase. Greater efficiencies will occur in both their farm and nonfarm sectors, and a larger volume of all products will be available at lower prices, enhancing real incomes and welfare. On the American scene, the larger volume of farm exports will tend to increase domestic farm prices and incomes. This will attract new resources into agriculture from other sectors or, more likely, reduce the outflow of resources from agriculture. The larger imports of nonfarm products by the United States will reduce demand for resources in our non-

[3]Humphrey, Chapter 7.

farm sector, but, similar to the European case, the increased efficiencies will provide more goods and services to our people.

The argument that imports from low-cost factories abroad are unfair to labor is similar to the farm import argument. Import restrictions aid workers in import-competing industries in the short run, but injure workers in export industries. But, once workers and other resources have adjusted to the new market forces, greater output is achieved and the benefits of greater production efficiency accrue to all.

Almost all major countries subscribe to the "vital-industries" argument for protection. Certain industries are assumed to be vital for national survival. England, for example, has in the past attempted to maintain domestic food production at about 50 per cent of domestic usage. These policies originated from a lack of confidence in supplies from abroad at critical periods, such as during wartime blockades. Many other nations, including our own, prefer to maintain sufficient resources in vital lines of production to provide a minimum level of output in case of loss of supplies from abroad. Oil and sugar quotas here are an example of such protection. Nations are willing to maintain production of these vital products, despite the fact that such inefficient use of resources is a waste of effort. Protection for these industries against competition from abroad maintains stability of employment for a few at the expense of many. Nations are willing to tax more for defense items and pay higher prices for the civilian output of such industries in order to maintain these industries, despite the fact that methods of modern warfare have made such excuses obsolete. Nations now have the power to destroy one another long before supplies of such critical products are depleted. The solution lies in increased confidence that world trade channels will remain open and supply sources unimpaired.

From the standpoint of U.S. agriculture, we look abroad at the rapid growth of Western European nations and see great opportunities for farm commodity exports, provided these nations will only open their trade doors and invite us in. It is my conclusion that we have not earned the invitation. Despite our numerous pronouncements, our policies have not contributed to two-way trade arrangements. We have done little to merit the dependence by Western European nations upon us for an indefinite source of vital products at competitive prices. We have followed neither tariff, quota, or other import regulatory policies nor domestic pricing policies that are conducive to free trade.

Although the arguments are overwhelming in favor of more trade between nations, I am quite pessimistic as to its future course. Forces tending to reduce welfare through trade barriers are better financed and more powerful than the forces active in promoting welfare through freeing trade channels. As an indication of the power of protective groups, about 590 import quota proposals were introduced in the recent session of Congress prior to the end of August.[4] One bill, approved by the House Ways and Means Committee, was described by the New York *Times* as the "most protectionist and reactionary trade legislation in forty years."[5] Signs admonishing us to purchase American goods and protect American jobs can be observed daily. Only the textbooks, however, are available to point out the gains from free trade, and few professors are reporting the story to the general public.

Summary

In summary, our international payments system has imperfections. It is not self-equilibrating as it was under the gold standard prior to World War I. It has not, however, been the major factor tending to retard foreign trade growth. This growth has been retarded because neither the political forces in this nation nor other nations are willing to forego the short-run interests of a few producer groups for the general welfare of the nation.

There are few who deny the gains from greater exports, but powerful groups fear a rise in imports. Both exports and imports enhance total welfare. The removal of trade restrictions would be especially beneficial to American agriculture. We have a major relative advantage in the production of farm commodites. Under free world trade policies and free domestic producing conditions, world-wide food prices could be lowered and world diets improved. The Reciprocal Trade Agreements Act, the recent Kennedy Round, and numerous other acts were designed to achieve these objectives. Proposed modern liberal policies, however, are often followed by restrictive actions more typical of the mercantilist ages. In practice we still follow the obsolete theories of several centuries ago.

Most of the arguments used against free trade practice are not applicable to modern world condi-

[4] *International Commerce*, Sept. 7, 1970, p. 10.
[5] New York *Times*, Sept. 21, 1970.

tions. The implied disruptions in local industries are generally overstated and are often excuses for maintaining resources in inefficient lines of production. Current unemployment insurance and labor retraining social programs minimize hardships to the labor force resulting from the change. Little capital loss would likely occur, as our heavily capitalized industries are better able to compete in the world market due to technological change. The vital-industries argument is no longer applicable, since, in case of all-out war under modern conditions, no industry is secure regardless of where it is located.

The United States should take the lead in dropping all trade barriers. Tariffs are not the only item to consider. We should move immediately to build world confidence in us as a supplier and market. Real accomplishments will require more than the rhetoric of recent decades followed by high level conferences, which tend to free trade where no potential trade exists. We must be willing to remove barriers, permit major increases in imports, and oppose the power of producer groups who have made their short-run interest paramount to the welfare of the nation. We must be willing to dismantle our inefficient production controls in agriculture and assure foreign consumers that our farm products will be available at competitive prices. A move toward free trade is a move toward less Government control of prices and production and greater reliance on market forces for resource adjustment.

These moves are counter to the great surge to alleviate all individual hardships through general legislation which temporarily aids the few but reduces national welfare. Their adoption can reverse the trend to isolationism in the current century and greatly enhance the welfare of both our own citizens and those of the rest of the world.

Fiscal Policy for a Period of Transition

Remarks by the Honorable MURRAY L. WEIDENBAUM, Assistant Secretary of the Treasury for Economic Policy, before the Annual Meeting of the Board of Directors of the Federal Reserve Bank of St. Louis, Little Rock, Arkansas, October 8, 1970

IT IS a great personal pleasure for me to address this combined meeting of the Board of Directors of the Federal Reserve Bank of St. Louis and of its Little Rock branch. As a St. Louisian, I am keenly aware of the important contribution that this institution is making to our region.

As an economist, I am perhaps even more aware of the very useful role of the Eighth Federal Reserve District in emphasizing the importance of monetary factors in our national economy. I come here to pay tribute to the pioneering work of the Bank and its economists even though my own approach to economic policy may differ in some substantial respects.

I thought that it might be useful today if I provided some thoughts on that area of economic policy in which I have particular involvement, and that is fiscal policy. Before turning to the outlook for the economy and the budget, I would like to offer some personal observations on the role of fiscal policy.

Only a few years ago, it seemed that fiscal policy was all that mattered. Monetary considerations were largely ignored. In good measure because of the work of economists specializing in monetary policy, I believe that shortcoming has been corrected. As modern economists in general now realize, money, of course, does matter. However, as with many things in life, there is always the danger that the correction will be carried too far.

I sense a parallel here with the dentist who sees me as two rows of teeth surrounded by a lot of miscellaneous matter. Similarly, exclusive focus on a single economic variable, no matter how important, is bound to ignore significant characteristics of our complicated economic structure. The fiscal position of the Government, of course, is also important in economic policy, and from at least two standpoints. On the one hand, government spending and taxing have a direct impact on the levels of income and output in the economy and, hence, on the allocation of resources. On the other hand, there is the fiscal effect on credit markets as the Government competes for investment funds to finance its deficits and related government-sponsored operations.

Impacts of Fiscal Policy

I thought that it might be helpful if I turn directly to some of the more recent, and controversial, instances of the use of fiscal policy. Events following the tax cut of 1964 seemed to verify the predictability of fiscal policy in promoting, as forecasted, a substantial expansion in the nation's output and employment. The belated tax increase of 1968 did not quite live up to that earlier standard of predictability in terms of producing the forecasted behavior in total spending.

The reasons are complex and deserve careful study. It does seem to me that disillusionment with fiscal policy, while understandable, is decidedly premature. My own analysis of the experience with the imposition of the income tax surcharge in 1968 convinces me that changes in taxation do have a visible impact on the allocation of personal income among consumption, taxation, and saving. The available data do show that increases in income taxes, temporary or permanent, do have the desired effects; they do tend – as would be expected – to depress both personal consumption expenditures and personal saving.

However, the precise proportions of these impacts, as we have seen, may vary according to the changing influence of many factors, including consumer expec-

tations concerning the future. Hence, the repercussions may be more modest than had been expected, at least by some analysts, but the results seem to me to be quite clear. A complicating consideration in analyzing the repercussions may be the swamping of effects from tax changes because other factors were operating. This does not mean that the tax changes, per se, were not effective; they may merely be hidden under the surface of more dramatic events.

For example, consumer spending averaged 78.2 per cent of personal income in the eighteen months before the Federal income tax surcharge was enacted in July 1968, and 77.3 per cent in the 18 months after that tax increase became effective. If we make what often is the heroic assumption that all other factors were held constant, it would appear that the 10 per cent surcharge caused the proportion of personal income which was devoted to consumption to decline by nine-tenths of one percentage point. Similarly, the proportion of income saved dropped by 1.3 percentage points.

A somewhat more sophisticated analysis would make some allowance for the lags that may occur between the time that personal income is changed and a shift in consumer spending patterns is evident. For example, the authoritative study at the University of Michigan by George Katona and Eva Mueller of the 1964 tax legislation revealed a lag between tax action and personal spending of perhaps 6 months or more. For purposes of illustration, let us assume a more modest three-month lag for the temporary 10 per cent increase in Federal income tax rates enacted in 1968.

Hence, let us analyze the relationship between consumer spending and saving in a given quarter of a year and the income received in the preceding quarter. On that basis (see Table 1), the imposition of the income tax surcharge was followed by a drop of 1.2 percentage points in the proportion of personal income devoted to personal consumption expenditures, and a decline of one percentage point in the savings ratio for the time periods under study. In an economy the size of our own, a one percentage point shift is quite striking when we translate it into billions of dollars.

Table 1

EFFECT OF THE SURCHARGE ON CONSUMER SPENDING AND SAVING

	Percentage Distribution of Personal Income			
	Personal Consumption Expenditures	Personal Savings	Personal Taxes, etc.	Total
18 Months Before the Tax Surcharge				
Average of quarterly data for January 1967 — June 1968	79.8	6.3	13.9	100.0
18 Months After Imposition of Tax Surcharge				
Average of quarterly data for July 1968 — December 1969	78.6	5.3	16.1	100.0

Note: Consumption and saving are lagged one quarter (see text).

I suggest that, in retrospect, the direct economic impact of the surcharge was as we should have expected: the major share of the higher taxes came out of funds that consumers otherwise would have devoted to personal consumption expenditures, and the remainder came out of income that would otherwise have been saved and invested. To me, this experience vindicates rather than discredits the usefulness of fiscal policy for purposes of economic stabilization.

Our experience to date with the phase-out of the surcharge tends to confirm the pattern of adjustment. Both consumer spending and consumer saving have risen as a proportion of personal income, and, here again, a lagged reaction may be developing. The impact on saving seems to have been greater in the immediate period than it is likely to be in subsequent months when consumers have had time to adjust their consumption patterns to their higher disposable income. Hence, we can expect the savings ratio to recede somewhat from its current peak. Certainly, the phase-out of the surcharge has contributed to the higher level of economic activity and, together with appropriate monetary policy, has enabled us to make the current economic adjustment to a less inflationary economy without the customary recession.

Hence, the current wave of skepticism concerning the effectiveness of fiscal policy seems quite ill-advised, and I do sense its ebbing. Although fiscal measures have helped to slow down the economy, what neither fiscal nor monetary restraint has done was to arrest quickly a strong inflationary momentum. This should provide a sobering experience for advocates in either camp.

To this observer, one clear lesson of the last few years is the importance of the Federal fiscal position to money and capital markets. Federal deficits at high employment spell trouble in terms of overstrained financial markets and upward pressures on interest rates.

To be sure, a distinction between "passive deficits" (resulting from economic slowup) and "active deficits" (to stimulate economic growth) still can be made. As economic

slowup develops, Federal receipts fall, and, indeed, this was a factor in the more-than-projected deficit of the past fiscal year. This has meant more Federal financing and more pressure in financial markets, already feeling the effects of continuing heavy private requirements for liquidity. Interest rates, of course, nevertheless have subsided somewhat – but not yet in as substantial a degree as has characterized many other cyclical slowups. The small declines of yields in both short- and long-term markets have been one manifestation of this.

And, as long as the economic adjustment now underway remains small, as it has, the pressure in financial markets will place limits to the decline in yields. The risk is now turning in the other direction – to higher yields, should the recovery now apparently in progress move up too fast. Unfortunately, this could channel the flow of funds to sectors other than those with high national priority – allocation of credit to housing, state and local governments, small businessmen, etc.

Hence, appropriate fiscal policy in an economy of high employment must play a strategic role; the links between fiscal and monetary policies are complex and unbreakable.

Some fiscal skeptics fail to see how a few billion dollars – of government money – can matter one way or another. What some of the critics forget is that the extra Federal borrowing, while small relative to total output, impinges on credit markets whose short-run capacity is limited. This can be disruptive in terms of the functioning of markets, the allocation of credit among different classes of borrowers (e.g., for home mortgages), and the level of interest rates.

We do need to recognize the practical limitations under which fiscal policy operates. There are serious barriers to very frequent changes for short-run stabilization purposes. Political restraints may at times result in an inappropriate fiscal policy. Certainly, the $25 billion budget deficit in the fiscal year 1968 was a mark of wrong, but not of ineffectual, fiscal policy. In retrospect, we would have hoped that fiscal effects then were weaker than they actually were.

To sum up, there are many sides to the economic elephant, around which economists are stumbling and of which we are taking various measurements. Money matters, as do fiscal actions. The state of our economic knowledge does not justify a doctrinaire dismissal of either stabilization policy approach. We have too few effective economic policy tools to be in a position to abandon any.

Indeed, as we examine economic policy in recent periods, we do indeed find that we have continued to utilize fiscal tools. For example, at the President's request, the Congress passed several revenue-raising measures last year which were designed to assist in dampening down a then overheated economy.

The items that I have in mind include extending the 10 per cent income tax surcharge from June 30, 1969 to December 31, 1969, and, at a five per cent rate, to June 30, 1970. Also, scheduled reductions in selected excises were postponed one year (and the Administration has asked that these tax reductions be postponed again).

It is clear to me that fiscal measures continue to play an important, but not solitary, role in the execution of national economic policy.

Federal-State-Local Relations

I would like to turn briefly to an aspect of fiscal and economic policy that often is overlooked in discussions of national trends – the interrelationships between the Federal Government and state and local governments. The Federal Government, as we know, possesses rather potent monetary and fiscal tools which it can use to help promote economic stabilization and growth.

In contrast, state and local governments, far more limited in their fiscal capabilities, are more in the position of reacting to aggregate economic trends. Many local governments, for example, find themselves in a budgetary bind when so much of their income comes from sources not responsive to economic growth, such as the property tax.

Mindful of the financial problems facing state and local governments, the Nixon Administration has advanced an innovative program for sharing a portion of Federal revenues with states, counties, and cities. Under the revenue-sharing proposal, a percentage of the Federal personal income tax base – the fairly steadily rising total of individual taxable incomes reported to the Internal Revenue Service – will be disbursed each quarter to every state, county, and city in the nation.

Although revenue sharing will not be a panacea, it should help to strengthen the capability of state and local governments to respond to the needs of their citizens.

The Outlook

My own reading of the economic tea leaves leads me to believe that the economy is in the process of turning up while inflationary pressures are being reduced. However, it is important during this period of transition to keep the inevitable month-to-month fluctuations in their proper perspective.

For the period immediately ahead, each month's statistics are not likely to steadily reflect an upturn in the level of economic activity nor a downward trend in the rate of inflation. In fact, a short pause or even a temporary turn for a month or so in some of these statistical series is quite likely and, in some cases, has been occurring. We need to avoid confusing these volatile and temporary fluctuations with changes in the underlying trend.

It is when we examine these underlying trends that we find the basis for the expectations of advancement in the level of economic activity and a continued reduction in the rate of price increases. Perhaps the major and very real change that we have been witnessing is in the general atmosphere of improved expectations.

Despite the current strike in the automobile industry, I anticipate that real GNP will rise in the third quarter of 1970. The results for the fourth quarter will depend in good measure on the extent to which the strike will continue. In any event, I would expect the current work stoppage merely to slow down or interrupt the recovery which is already under way.

My own evaluation of the economic outlook leads me to conclude that the upturn will be moderate enough to be accompanied by continued measureable progress in bringing down the rate of inflation. The performance of both consumer prices and wholesale prices in recent months is quite reassuring on that score: ignoring inevitable month-to-month fluctuations, the trend in 1970 to date shows a dampening in the rate of inflation. My forecast for the coming year is along the same lines: ignoring inevitable month-to-month fluctuations, the outlook is for a further dampening in the rate of inflation. The specific degree of improvement in the price level, of course, will depend in part on the results of decisions in the private sector on wages and other elements of costs and prices.

Given this background of economic developments, the budget situation is a source of considerable attention. It is too early for any definitive statement on the prospects for the fiscal year 1971. There are still actions which can, and should, be taken on both the revenue and expenditure sides which would hold down the likely deficit to reasonable proportions.

The budget rule announced by the President on recent occasions certainly provides a good and clear guide: to keep expenditures within the limits of the revenues that our Federal tax structure provides at full employment. By following this guideline, we will restore budgetary balance when the economy is operating at full potential.

Keeping expenditures within full employment revenues will not be easy to do, especially if new initiatives are to be pursued, let alone the general updrift in costs of existing programs. It is likely to require hard decisions on the expenditure side — perhaps some program deferrals, reductions and phase-outs.

In the area of military spending, the leading indicators all portend a continued slowdown in dollar terms and a further decline in real terms in coming months. In the longer run, the trend of defense expenditures will depend on the course of international developments and this nation's reaction to them.

In the area of civilian government outlays, I am struck by the cogency of the recent warning of Caspar Weinberger, the Deputy Director of the Office of Management and Budget: "A pilot project normally turns into an essential program in three years . . . The distance from an urgent priority to an untouchable sacred cow is usually no more than five fiscal years."

A fiscal policy adequate and proper for the transition to a period of renewed growth but lessened inflationary pressures calls for a tighter control over Federal spending. To keep expenditures within the revenues that can be expected when the economy returns to full employment will require hard choices among alternative spending programs.

There is much talk these days about the need to change our priorities. But, there are two parts to the process. The attractive and much easier part of increasing spending for high priority items has, as we would expect, received the great bulk of the attention. We now need to focus on the second and harder step which is necessary in order to achieve the required shift of resources: identifying those programs of lower priority which can be reduced, postponed, or even eliminated and then taking action to do so. Not until this second step is accomplished will the necessary changes in priorities truly be effected.

Aggregate Price Changes and Price Expectations

by RAY C. FAIR

Economic events since 1965 have intensified interest in the problem of inflation. A fundamental question is how to forecast movements in the price level. Explaining and forecasting the price level has been one of the most difficult problems associated with econometric model building.

The following article by Professor Ray Fair of Princeton University was prepared for presentation to a seminar at this Bank. Professor Fair has developed a short-run forecasting model which includes the price level as one of the variables to be forecast. The key variable in his price equation is a measure of current and past demand pressure. In contrast to Andersen and Carlson (April 1970 REVIEW*), he has found, using nonlinear techniques of estimation, that it is not necessary to include explicitly a measure of price expectations in order to obtain a satisfactory explanation of changes in the price level. In addition, by refining the measure of potential output, the explanation of prices is improved further.*

Professor Fair's results suggest that the price level is demand-determined. Cost-push or mark-up factors do not need to be introduced explicitly in order to explain upward movements in prices in the face of sluggish economic activity. Such a phenomenon can be explained as the result of the delayed effect of past demand pressure on prices.

This article is presented in hopes of stimulating further discussion and research into the problems of explaining and forecasting movements in the price level.

A PROBLEM common to models in which nominal GNP is determined independently of the price level is the determination of the price level given the level of nominal GNP. Once the price level is determined, real GNP is then by definition equal to nominal GNP divided by the price level. In Section I of this paper the theory and basic specification of the price equation developed in an earlier paper[1] are discussed, and various versions of the equation are estimated and examined. In Section II the Andersen-Carlson price equation[2] is then analyzed. Andersen and Carlson for their model have a price expectations term in their basic equation, and the primary aim in Section II is to evaluate the importance of this term.

[1]Ray C. Fair, "The Determination of Aggregate Price Changes," Research Paper No. 25, Econometric Research Program, Princeton University, February 1970.

[2]Leonall C. Andersen and Keith M. Carlson, "A Monetarist Model for Economic Stabilization," this *Review* (April 1970), pp. 7-25.

The Determination of Aggregate Price Changes[3]

In most macroeconomic models the expenditure equations are in real terms, prices are determined in a wage-price sector by various cost and excess demand variables, and money expenditures are determined by multiplying the real expenditures by their respective prices. In most of these models the wage-price sector has tended to be a large source of error.[4] The simultaneous and lagged relationships

[3]The price equation described in this section is discussed in more detail in Fair, "The Determination of Aggregate Price Changes." The price equation is also discussed in Ray C. Fair, *A Short-Run Forecasting Model of the United States Economy* (Lexington, Massachusetts: D. C. Heath and Company, forthcoming 1971), Chapter 10, within the context of an overall forecasting model. In Andersen and Carlson, footnote 17, my paper, "The Determination of Aggregate Price Changes," was listed as forthcoming in the *Journal of Political Economy*. This is an incorrect reference, and I assume responsibility for this error.

[4]See, for example, Gary Fromm and Paul Taubman, *Policy Simulations with an Econometric Model* (Washington, D.C.: The Brookings Institution, 1968), p. 11, for a discussion of the limited success so far achieved by the Brookings model in this area.

in the wage-price sector make the sector difficult to specify and estimate with precision, and the possibility of errors compounding in the sector during simulation is generally quite large.

The model of price determination described here bypasses the whole wage-price nexus and essentially takes prices as being determined by current and past aggregate demand pressures. The price equation of the model can thus be considered to be a reduced form equation of a more general wage-price model. The equation is also similar to simple Phillips-curve equations, where wage changes (or price changes) are taken to be a function of excess supply (as approximated by the unemployment rate) in the labor market.

The Theory

The theory behind the model is quite simple. Aggregate price changes are assumed to be a function of current and past demand pressures. Current demand pressures have an obvious effect on current prices. If there is current excess demand, then prices are likely to be bid (or set) higher, and if there is current excess supply, then prices are likely to be bid (or set) lower.

There are two ways in which past demand pressures can affect current prices. One way is through the lagged response of individuals or firms to various economic stimuli. It may take a few quarters for some individuals or firms to change their prices as a result of changing demand conditions. This may, of course, not be irrational behavior, since individuals or firms may want to determine whether a changed demand situation is likely to be temporary or permanent before responding to it. The other way in which past demand pressures can affect current prices is through input prices. If, for example, past demand pressures have caused past input prices to rise, this should lead to higher current output prices, as higher production costs are passed on to the customer. The lag in this case is the time taken for higher input prices to lead to higher costs of production[5] and for higher costs of production to lead to higher output prices. It may also take time for input prices to respond to demand pressures, which will further lengthen the lag between demand pressures and output prices.

Note that nothing specifically has been said about wage rates. Labor is treated like any other input — demand pressures are assumed to lead (usually with a lag) to higher wage rates, which then lead (perhaps with a lag) to higher output prices. The present approach avoids the problem of having to determine unit labor costs or wage rates before prices can be determined.

The present model is thus based on the simple theory that price changes can ultimately be traced to the existence of excess demand or supply in the market. If this is true, then for purposes of explaining aggregate price changes, one may not have to specify the intermediate steps between demand pressures and price changes, but may be able to specify price changes as direct functions of current and past demand pressures.

The Measurement of Potential Output

Potential output plays an important role in the work below, and two measures of potential output have been considered in this study. The first measure is the potential GNP measure of the Council of Economic Advisers (CEA), which grew at a 3.5 per cent annual rate from II/1955 through IV/1962, at a 3.75 per cent annual rate from I/1963 through IV/1965, and at a 4 per cent annual rate from I/1966 through II/1970. The second measure considered here, a potential GNP measure developed by the author,[6] is similar in concept to the CEA measure. "Potential GNP" is meant to refer to that level of GNP that could be produced at a 4 per cent unemployment rate.

In Table I on the next page, the actual values of real GNP, the estimated values of this second measure of potential GNP, and the percentage changes (at annual rates) of the second measure of potential GNP are presented quarterly for the I/1954-II/1970 period. One of the basic differences between the potential GNP series presented in Table I and the CEA series, aside from the smoother nature of the latter, is the relatively slow growth of the series in Table I during the last two quarters of 1965 and all

[5]Since firms stockpile various inputs, this lag is not necessarily zero.

[6]The measure is described in Fair, "The Determination of Aggregate Price Changes," and in Fair, *A Short-Run Forecasting Model of the United States Economy*, Chapter 10. There is one basic difference between the measure of potential output described in these two works and the measure used in this paper. In a recent study by the author, "Labor Force Participation, Wage Rates, and Money Illusion," Research Memorandum No. 114, Econometric Research Program, Princeton University, September 1970, wage rates were found to have a significant effect on the labor force participation of some age-sex groups, and in the construction of the potential labor force series in this study (a series that is needed for the construction of the potential output series), account was taken of this effect.

Table I

ESTIMATES OF POTENTIAL REAL GNP

(Billions of 1958 Dollars)

Quarter	Real GNP (X)	Potential GNP (X^F)	Percentage Change* in Potential GNP	Quarter	Real GNP (X)	Potential GNP (X^F)	Percentage Change* in Potential GNP
1954 I	402.9	426.0	3.7%	1962 II	527.7	572.9	3.6%
II	402.1	429.6	3.3	III	533.4	579.0	4.3
III	407.2	432.8	3.0	IV	538.3	585.6	4.5
IV	415.7	436.6	3.5				
				1963 I	541.2	592.5	4.8
1955 I	428.0	440.6	3.7	II	546.0	598.8	4.2
II	435.4	444.7	3.7	III	554.7	604.4	3.7
III	442.1	449.1	3.9	IV	562.1	609.1	3.1
IV	446.4	453.0	3.5				
				1964 I	571.1	615.4	4.2
1956 I	443.6	456.5	3.1	II	578.6	621.1	3.7
II	445.6	460.1	3.1	III	585.8	627.3	4.0
III	444.5	464.4	3.7	IV	588.5	632.4	3.3
IV	450.3	468.0	3.1				
				1965 I	601.6	638.3	3.7
1957 I	453.4	471.6	3.0	II	610.4	644.2	3.7
II	453.2	475.6	3.5	III	622.5	648.8	2.9
III	455.2	480.6	4.1	IV	636.6	653.6	2.9
IV	448.2	485.8	4.3				
				1966 I	649.1	657.0	2.1
1958 I	437.5	490.3	3.7	II	655.0	660.2	2.0
II	439.5	494.4	3.4	III	660.2	664.2	2.5
III	450.7	498.4	3.2	IV	668.1	667.8	2.2
IV	461.6	503.4	4.1				
				1967 I	666.6	672.8	3.0
1959 I	468.6	507.7	3.4	II	671.6	678.1	3.2
II	479.9	512.8	4.0	III	678.9	685.3	4.2
III	475.0	517.7	3.8	IV	683.6	691.4	3.5
IV	480.4	521.7	3.1				
				1968 I	693.5	696.6	3.0
1960 I	490.2	530.0	6.3	II	705.4	701.5	2.9
II	489.7	534.8	3.6	III	712.6	707.3	3.3
III	487.3	539.4	3.5	IV	717.5	713.3	3.4
IV	483.7	545.0	4.1				
				1969 I	722.1	720.0	3.8
1961 I	482.6	550.6	4.1	II	726.1	726.0	3.3
II	492.8	555.7	3.7	III	730.9	733.5	4.2
III	501.5	560.6	3.6	IV	729.2	739.0	3.0
IV	511.7	564.1	2.5				
				1970 I	723.8	746.9	4.2
1962 I	519.5	567.8	2.6	II	724.9	753.6	3.6

*Annual rates of change computed here differ slightly from annual rates of change computed elsewhere in this Review and in other publications of this Bank. The formula for quarterly annual rates of change used here is as follows:

$$\text{quarter-to-quarter rate (in per cent)} = \left[\left(\frac{V_t}{V_{t-1}}\right) - 1\right] \cdot 4 \cdot 100$$

of 1966. This slow growth is due primarily to the Vietnam troop buildup during the period. As measured by the national income accounts, average output per government worker is less than average output per private worker, and the movement of workers from private to government work (as when the level of the armed forces is increased) has a negative effect on total potential output.

Specification of the Price Equation

The first question that arises in specifying the price equation is what measure of demand pressure should be used. Two measures, denoted as D_t^* and D_t respectively, were considered in this study:

(1) $D_t^* = X_t^F - X_t$

(2) $D_t = (X_t^F - X_{t-1}) - (Y_t - Y_{t-1})$

Y_t denotes the level of money (current dollar) GNP during period t, X_t denotes the level of real (constant dollar) GNP, and X_t^F denotes the level of potential (real) GNP. D_t^* as defined by (1) is the difference between potential and actual real GNP and is a commonly used measure of demand pressure.[7] $(X_t^F - X_{t-1})$ in (2) is the change in real GNP during period t that would be necessary to make real GNP equal to potential real GNP (to be referred to as the "potential real change in GNP"), and $(Y_t - Y_{t-1})$ is the actual change in money GNP during period t. D_t as defined by (2) is thus the difference between

[7]The notation adopted for this article is designed to be as consistent as possible with the notation in Andersen and Carlson. Note, however, that the sign of D_t in equation (2) is reversed from that in Andersen and Carlson.

the potential real change in GNP and the actual money change. D_t can also be considered to be a measure of demand pressure. If, for example, the potential real change in GNP is quite large, then the money change can be quite large and still lead to little pressure on available supply, but if the potential real change is small, then even a relatively small money change will lead to pressures on supply.

By definition, money GNP is equal to real GNP times the GNP deflator. If the deflator is taken to be endogenous, then whether D_t^* or D_t should be used as the measure of demand pressure in the equation determining the deflator depends on whether real GNP is taken to be endogenous, with money GNP being treated as the "residual," or whether money GNP is taken to be endogenous, with real GNP being treated as the "residual." In the Fair model, for example, the expenditure equations are in money terms and money GNP is endogenous. Likewise, in the Andersen and Carlson model, the expenditure equation is in money terms. In these models it would not be appropriate to use D_t^* in the equation determining the deflator, since the real GNP part of D_t^* is determined as money GNP divided by the deflator (that is, as the residual) and thus the deflator enters on both sides of the equation. It would be appropriate to use D_t, however, as long as it could be assumed that the variables and error terms that determine money GNP in the models are independent of the error term in the equation determining the deflator. Conversely, for models in which real GNP is endogenous and is determined by variables and error terms that are independent of the error term in the equation determining the deflator, it would be appropriate to use D_t^* in the equation, but not D_t.

In most large-scale macroeconomic models, of course, money GNP, real GNP, and the GNP deflator are all endogenous in that they are all determined within a simultaneous system of equations. No one variable can be considered to be determined simply as the ratio or product of the other two. Since in most of these models the expenditure equations are in real terms, however, it is probably true that money GNP is closer to being the residual variable in these models than is real GNP.

Whether a given expenditure equation in a model should be specified in real or money terms depends on whether spending units take money income and other money variables as given and determine how much money to spend as a function of these (and other) variables, or whether they deflate money income and the other money variables by some price level and determine how many goods to purchase as a function of these "real" (and other) variables. In the first case the number of goods purchased is the residual variable (people plan to spend a given amount of money, and real expenditures are determined merely as money expenditures divided by the price level), and in the second case the money value of goods purchased is the residual variable (people plan to purchase a given number of goods, and money expenditures are determined merely as real expenditures times the price level).

In the long run it seems clear that real expenditures are determined by real variables, as standard economic theory suggests, but in the short run the case is not so clear. Given the uncertainty that exists in the short run and the lags involved in the collection and interpretation of information on price changes, people may behave in the short run in a way that is closer to the first case described above than it is to the second.

An argument can thus be made for specifying expenditure equations in short-run models in money terms, although even for short-run models it may be the case that some equations should be specified in real terms. It may also be the case that consumption expenditure equations should be specified in the manner suggested by Branson and Klevorick[8] to incorporate money illusion directly. Whatever the case, D_t has been used as the excess demand variable for most of the work below, on the assumption that in the short run real GNP is closer to being the residual variable than is money GNP. Some results using D_t^* will also be presented.

The price deflator that has been used for the estimates below is actually not the total GNP deflator, but the private output deflator. Because of the way the government sector is treated in the national income accounts, the GNP deflator is influenced rather significantly by government pay increases, such as those that occurred in III/1968 and III/1969, and the private output deflator is likely to be a better measure of the aggregate price level. The private output deflator will be denoted as P_t.

In the table on the next page, values of the private output deflator and demand pressure are presented

[8]William H. Branson and Alvin K. Klevorick, "Money Illusion and the Aggregate Consumption Function," *The American Economic Review* (December 1969), pp. 832-849.

Table II

VALUES OF PRIVATE OUTPUT DEFLATOR (P_t) AND DEMAND PRESSURE (D_t)

Quarter	P_t	Percentage Change* in P_t	D_t	Quarter	P_t	Percentage Change* in P_t	D_t
1956 I	93.15	4.07%	8.3	1963 II	105.70	1.19%	50.8
II	93.97	3.52	10.9	III	105.88	.69	47.9
III	95.14	4.99	14.4	IV	106.23	1.30	43.3
IV	95.89	3.16	14.6	1964 I	106.47	.91	41.4
1957 I	96.87	4.07	13.9	II	106.82	1.31	39.7
II	97.52	2.70	19.2	III	107.21	1.49	37.8
III	98.45	3.82	21.0	IV	107.70	1.82	40.4
IV	98.82	1.50	35.4	1965 I	108.24	2.02	32.1
1958 I	99.52	2.84	48.9	II	108.77	1.93	29.7
II	99.77	1.02	53.3	III	108.96	.71	23.0
III	100.07	1.20	45.8	IV	109.30	1.27	12.2
IV	100.48	1.61	39.7	1966 I	110.08	2.84	.9
1959 I	100.99	2.02	36.5	II	111.15	3.88	—2.7
II	101.23	.99	31.3	III	112.03	3.18	—3.4
III	101.64	1.61	40.7	IV	112.91	3.14	—7.2
IV	101.78	.55	40.2	1967 I	113.54	2.24	1.0
1960 I	102.24	1.79	37.1	II	114.08	1.89	1.4
II	102.67	1.69	42.9	III	115.19	3.89	—2.7
III	102.84	.67	50.2	IV	116.28	3.79	—2.5
IV	103.34	1.95	58.6	1968 I	117.21	3.18	—6.0
1961 I	103.58	.92	66.6	II	118.38	4.01	—15.2
II	103.61	.12	61.8	III	119.37	3.34	—15.8
III	103.59	—.08	58.5	IV	120.65	4.29	—14.9
IV	104.10	1.96	48.1	1969 I	122.08	4.74	—13.7
1962 I	104.44	1.31	46.0	II	123.54	4.78	—12.2
II	104.58	.52	44.0	III	124.88	4.34	—11.5
III	104.79	.82	44.1	IV	126.33	4.61	—1.0
IV	105.09	1.13	44.6	1970 I	127.96	5.16	9.9
1963 I	105.38	1.13	48.8	II	129.22	3.94	18.2

*Annual rates of change computed here differ slightly from annual rates of change computed elsewhere in this Review and in other publications of this Bank. The formula for quarterly annual rates of change used here is as follows:

$$\text{quarter-to-quarter rate (in per cent)} = \left[\left(\frac{V_t}{V_{t-1}}\right) - 1\right] \cdot 4 \cdot 100$$

quarterly for the I/1956-II/1970 period.[9] The values of demand pressure were constructed using the potential GNP measure presented in Table I. Notice that demand pressure was quite large during the early 1960's, when there was little increase in the aggregate price level, and that it was much smaller (and in fact negative) during the late 1960's, when the price level was increasing quite rapidly. (Low values of D_t correspond to periods of high demand pressure).

The basic equation explaining the change in the deflator is specified as:

$$(3)\quad P_t - P_{t-1} = \alpha_0 + \alpha_1 \left(\frac{1}{\alpha_2 + \frac{1}{n} \sum_{i=1}^{n} D_{t-i+1}} \right) + \varepsilon_t \quad ,$$

where ε_t is the error term and n is the number of periods over which lagged values of the demand pressure variable have an influence on the current change in the deflator. $\frac{1}{n} \sum_{i=1}^{n} D_{t-i+1}$ is the simple n-quarter moving average of D. Equation (3) is consistent with the theory expounded above. The current change in the price level is taken to be a function of current and past demand pressures, as measured by the n-quarter moving average of D. A nonlinear functional form has been chosen, the functional form being similar to that used in studies of the Phillips curve, where the reciprocal of the unemployment rate is most often used as the explanatory variable.

Equation (3) is nonlinear in α_2 and must be estimated by a nonlinear technique.[10] In studies of the Phillips curve in which the reciprocal of the unemployment rate is taken to be the explanatory variable, a coefficient like α_2 in equation (3) does not arise, since it is assumed that as the unemployment rate (excess supply) approaches zero, the

[9] P_t is taken to be in units of 100, rather than in units of 1.

[10] The technique that was used for this purpose is described in footnote 11.

change in wages (or prices) approaches infinity. In the present case, no such assumption can be made. D_t is a simple and highly aggregative measure of demand pressure, and there is no reason why zero values of D_t should correspond to infinite changes in the private output deflator. Indeed, D_t has actually been negative during part of the sample period, as can be seen from the accompanying table. Even D_t^* (potential minus actual real GNP) has been negative during part of the sample period, and again there is no reason to think that a zero or slightly negative gap between potential and actual real GNP should result in an infinite change in the price level. Potential GNP is not meant to refer to maximum GNP, but to that GNP level that is capable of being produced when the unemployment rate is 4 per cent. Including α_2 in equation (3) allows the equation to *estimate* the value of the moving average variable that would correspond to an infinite rate of change of prices. Including α_2 in equation (3), in other words, allows the excess demand variable in the equation to differ from the "true" measure of excess demand ("true" meaning that zero values of this variable correspond to infinite price changes) by some constant amount and still not bias the estimates of α_0 and α_1. The error will merely be absorbed in the estimate of α_2.

The Results

Equation (3) was estimated for the I/1956-II/1970 sample period for various values of n.[11] Various weighted averages of the current and past values of D were also tried in place of the simple average specified in equation (3). The equation finally chosen used the simple average of current and past values of D and a value of n equal to 8. The results of

[11]The quarters III/1959, IV/1959, I/1960, IV/1964, I/1965, and II/1965 were omitted from the sample period because of the steel and automobile strikes. These six quarters were also omitted for the work in Fair, *A Short-Run Forecasting Model of the United States Economy.*

The equation was estimated by an iterative technique. The equation to be estimated is first linearized by means of a Taylor series expansion around an initial set of parameter values. Using the linear equation, the difference between the true value and the initial value of each of the parameters is then estimated by ordinary least squares. The procedure is repeated until the estimated difference for each of the parameters is within some prescribed tolerance level. Convergence is not guaranteed using this technique, but for most of the work in this study, achieving convergence was no problem.

Table III

PARAMETER ESTIMATES OF EQUATION (3)*

$$P_t - P_{t-1} = \alpha_0 + \alpha_1 \left(\frac{1}{\alpha_2 + \frac{1}{n} \sum_{i=1}^{n} D_{t-i+1}} \right) + \varepsilon_t$$

	$\hat{\alpha}_0$	$\hat{\alpha}_1$	$\hat{\alpha}_2$	S.E.	R^2	D-W	Actual and Predicted Values of the percentage change in P_t (annual rates) 1969 I	1969 II	1969 III	1969 IV	1970 I	1970 II	
							4.74%	4.78%	4.34%	4.61%	5.16%	3.94%	Actual
(a)	−.99	156.4	76.1	.184	.827	1.83	4.41	4.55	4.63	4.55	4.27	3.78	Predicted
	(−1.01)	(1.37)	(2.36)										
(b)	−1.85	309.9	115.8	.220	.755	1.33	4.04	4.06	4.05	3.88	3.58	3.13	Predicted
	(−.90)	(0.62)	(1.18)										
(c)	−.51	67.2	35.4	.190	.817	1.75	4.41	4.52	4.53	4.45	3.99	3.41	Predicted
	(−1.48)	(1.70)	(2.29)										
(d)	1.08	−.0176[a]		.195	.803	1.61	4.08	4.13	4.14	4.10	3.93	3.66	Predicted
	(27.16)	(−14.29)											
(e)	.87	−.0203[a]		.221	.746	1.31	3.88	3.90	3.85	3.75	3.51	3.19	Predicted
	(24.76)	(−12.12)											
(f)	−3.21	948.6	225.0	.186	.734	1.95	3.88	3.96	3.98	3.94	3.77	3.44	Predicted
	(−0.58)	(0.35)	(0.63)										

*Assumptions used to estimate equation (3):

(a) n=8, Table I values of XF_t

(b) n=8, CEA values of XF_t

(c) n=8, Table I values XF_t, D* used instead of D.

(d) linear version of (a)

(e) linear version of (b)

(f) n=8, Table I values of XF_t, sample period ending in IV/1968.

[a]Estimate of the coefficient of the demand pressure variable.

Note: "t" statistics appear with each regression coefficient, enclosed by parentheses. R^2 is the percent of variation in the dependent variable which is explained by variations in the independent variable. S.E. is the standard error of the estimate. D-W is the Durbin-Watson statistic.

estimating this equation are presented in line (a) of Table III. The potential GNP series presented in Table I was used for the estimates in line (a).

The estimates of α_0, α_1 and α_2 are fairly collinear, and thus the t-statistics presented in line (a) of Table III are low. When, for example, the value of α_2 was set equal to 76.1 (the estimated value) and equation (3) estimated by ordinary least squares, the resulting t-statistics for α_0 and α_1 were 9.02 and 15.48 respectively. The fit of the equation is quite good, with a standard error of only .184.[12] The inflation in 1969 and the first half of 1970 was captured fairly well, with errors in the six quarters of −.33, −.23, +.29, −.06, −.89, and −.16 per cent respectively.[13] As measured by the Durbin-Watson statistic, there appears to be little evidence of serial correlation in the equation.

Equation (3) was also estimated using the CEA measure of potential GNP, and these results are presented in line (b) of Table III. The standard error of the equation is .220, which is considerably larger than the standard error in line (a), and the inflation in 1969 and 1970 was considerably underpredicted by the equation. The results are clearly not as good as those achieved in line (a) using the potential GNP estimates presented in Table I, which perhaps indicates that the potential GNP series in Table I is a better measure of supply constraints than is the trend series of the CEA.

Equation (3) was also estimated using D^* instead of D as the demand pressure variable, and these results are presented in line (c) of Table III. The results are almost as good as those achieved in line (a) using D, but the fit is slightly worse and the inflation in 1969 and 1970 was not captured quite as well. The results thus seem to indicate that D is the better measure of demand pressure, although as discussed above, whether D^* or D should be used in the equation depends on whether real GNP or money GNP is closer to being determined as the residual variable in the short run.

As mentioned above, equation (3) was estimated for values of n other than 8 and for weighted averages other than the equally weighted average. In particular, various declining weighted averages were tried. None of these results were an improvement over the results presented in line (a) of Table III. The fits were worse, and for the values of n less than 8 and for the declining weighted averages, the inflation in 1969 and 1970 was underpredicted much more than it is in line (a) of Table III. As can be seen from Table II, D_t was negative and large in absolute value throughout 1968. Only including the current and one-, two-, and three-quarter lagged values of D in the equation, for example, was not enough to capture the demand pressure which built up during 1968 and which presumably led to the large price increases in 1969 and 1970. Going from n equal to 4 to n equal to 8 substantially improved the ability of the equation to explain the inflation in 1969 and 1970.

Various linear versions of equation (3) were also estimated, and the fit of each of the linear versions was always worse than the fit of the corresponding non-linear version, and the inflation in 1969 and 1970 was always underpredicted more. An example of this can be seen from line (d) of Table III, where the results of estimating the linear version of the equation estimated in line (a) are presented. Also, for purposes of comparison in the next section, the results of estimating the linear version using the CEA measure of potential GNP are presented in line (e) of Table III.

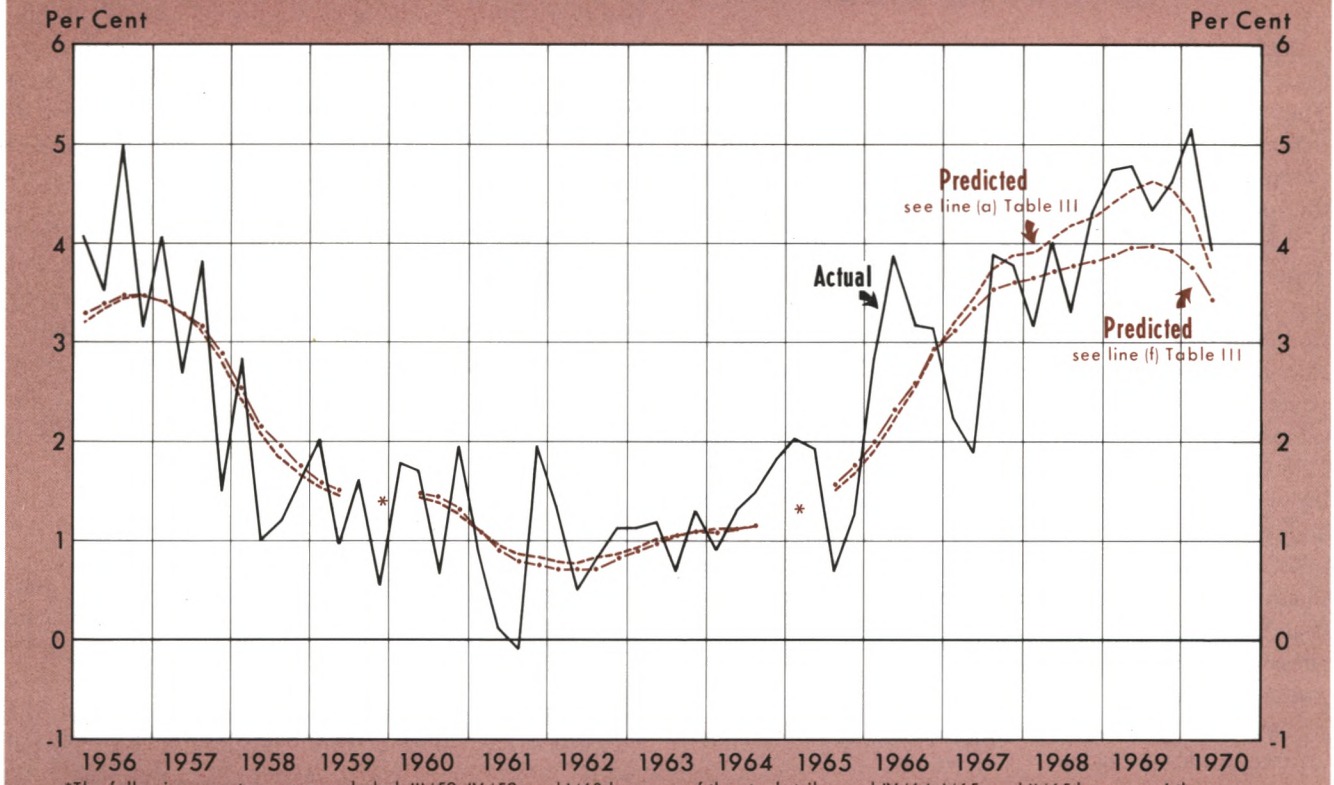
Finally, equation (3) was estimated for the sample period ending in IV/1968 instead of II/1970, and the equation was used to predict values for the four quarters of 1969 and the first two quarters of 1970 (D being treated as exogenous). The results are presented in line (f) of Table III. The coefficient estimates are much different for the shorter period, although the collinearity among the estimates makes the results look more different than they actually are. More importantly, however, the equation did not extrapolate as well into 1969 and 1970. A fairly high rate of inflation was still forecast by the equation for the I/1969-II/1970 period, but not as high as actually occurred. It was necessary, in other words, to estimate equation (3) through the end of the sample period before it was capable of accounting for the rapid rate of inflation in 1969 and in the first half of 1970.

This result is not necessarily surprising, however. As can be seen in Table II, the price increases in the four quarters of 1969 and the first quarter of 1970 were considerably larger than for any other quarter of the sample period, and similarly the values of $\frac{1}{8}\sum_{i=1}^{8} D_{t-i+1}$ were considerably smaller in 1969 than for the rest of the sample period. As a practical

[12] Remember that P_t is in units of 100.

[13] Although the equations in Table III were estimated using $P_t - P_{t-1}$ as the dependent variable, the actual and predicted values given for the I/1968-II/1970 period in the table are in terms of percentage changes at annual rates.

Annual Rates of Change in Prices: Actual and Predicted Values [1]



*The following quarters were excluded: III/59, IV/59, and I/60 because of the steel strike, and IV/64, I/65, and II/65 because of the automobile strike.

[1] Implicit price deflator for total private gross national product, 1958=100.

Note: Annual rates of change computed here differ slightly from annual rates of change computed elsewhere in this Review and in other publications of this Bank.

The formula for quarterly annual rates of change used here is as follows: $\text{quarter-to-quarter rate (in per cent)} = \left[\left(\frac{V_t}{V_{t-1}}\right)-1\right]\cdot 4\cdot 100$

matter, one generally cannot expect an equation that has been estimated by least squares to extrapolate well into periods in which the values of the dependent and independent variables are considerably different from what they were during the period of estimation. It is encouraging that the equation did not forecast a lessening of the rate of inflation in the I/1969-II/1970 period, but only failed to forecast the acceleration of the rate of inflation. It is also somewhat encouraging that a Chow test rejected the hypothesis that the coefficients of equation (3) were different for the I/1969-II/1970 period than they were for the I/1956-IV/1968 period.[14]

To give the reader an idea of how well the model has explained the price deflator, the actual and predicted values of the percentage change in P_t are plotted in the chart above. The predicted values from the equations estimated in lines (a) and (f) of Table III are plotted in the chart. As can be seen from the chart, the rate of inflation in 1969 and 1970 is not captured as well by the equation estimated only through 1968. Otherwise, the price deflator appears to be explained quite well by the two equations.

In summary, then, a simple excess demand equation like (3) appears to be capable of explaining most of the inflation in 1969 and in the first half of 1970, in addition to explaining quite well the price changes in the other quarters of the sample period. However, the equation did have to be estimated through the end of the sample period in order to account for the acceleration of the rate of inflation in the I/1969-II/1970 period, which means that the possibility that the equation is not stable over time cannot be ruled out. More observations are needed before the usefulness of an equation like (3) for forecasting or other purposes can be established.

[14]The estimated value of the F-statistic was 1.38, which compares with a 5 per cent value of 2.81 (at 3,46 degrees of freedom). Because of the nonlinear nature of equation (3), the use of the Chow test in the present circumstances must be interpreted with some caution.

The Effect of Expectations on Aggregate Price Changes

Andersen and Carlson have a price expectations term in a linear version of an equation like (3). They use a polynomial distributed lag of D as the demand pressure variable and take the dependent variable to be the dollar change in total GNP due to the price change. The price expectations term is a 17-quarter distributed lag of past changes in the GNP deflator divided by the unemployment rate.[15] The lag coefficients are taken from a long-term interest rate equation. Andersen and Carlson's results indicate that the demand pressure variable and the price expectations term are about equally important in explaining the change in price, although they state that "the influence of these two variables should perhaps be viewed in combination, rather than as independent and separate influences."[16] They do report in footnote 24, however, that the fit of the equation was much worse without the price expectations term, and that the estimates of the coefficients of the demand pressure variable were only slightly larger. This, they argue, provides some evidence that the price expectations term can be interpreted as an independent and separate influence.

Given the reduced form and highly aggregative nature of an equation like (3), it is not clear that a price expectations term like that of Andersen and Carlson should be interpreted as providing an estimate of the effect of price expectations on aggregate price changes. Since the price expectations term is a distributed lag of past price changes, it is likely that this term and the lagged values of the demand pressure variable will be picking up similar effects. As discussed in the previous section, the lagged values of the demand pressure variable are designed to pick up the lagged behavioral response of individuals and firms and the effect of changing input prices, and it is likely that lagged price changes will pick up some of these effects as well. Conversely, it is likely that the lagged values of the demand pressure variable will pick up some of the effects of price expectations, since past demand pressures may be as important in determining future price expectations as are past price changes. It thus seems that very little confidence should be placed on the results of any attempt to separate the influence of price expectations from other influences by including both a distributed-lag price term and a distributed-lag demand pressure term in an aggregative equation like (3).

A number of distributed-lag price terms were added to equation (3) to see if these terms improved the explanatory power of the equation. The results were not very sensitive to the use of alternative distributed lags, and only the results achieved using the Andersen-Carlson distributed lag will be presented here. The distributed lag that was used is the following:

$$(4)\quad DLAG_t = \sum_{i=1}^{17} p_i \frac{(P_{t-i} - P_{t-i-1})}{U_{t-i}} \quad ,$$

where U_{t-i} is the unemployment rate during quarter $t-i$. The values of p_i are presented in Andersen and Carlson, Table II, page 12. The one-quarter lagged value of Moody's Aaa corporate bond rate (denoted as R_{t-1}) was also added to some of the equations, and some of these results will be reported below. The bond rate is significantly influenced by past price changes, and Andersen and Carlson found R_{t-1} to be significant when included instead of the distributed-lag price term in their price equation.

The results of adding $DLAG_t$ and R_{t-1} to the equation estimated in line (a) of Table III are presented in lines (a) and (b) of Table IV. The coefficient estimates of both variables are of the wrong sign, and the fits of the equations are not improved from the fit of the equation in line (a) of Table III. Because of collinearity problems, the t-statistics in Table IV are low. When the value of α_2 was set equal to the estimated value for each equation and the equation estimated by ordinary least squares, the resulting t-statistics for α_0 and α_1 were -7.63 and -10.51 for the equation in line (a) of Table IV, and -7.87 and -10.70 for the equation in line (b). The resulting t-statistic for the coefficient of $DLAG_t$ was $-.78$, and the resulting t-statistic for the coefficient of R_{t-1} was $-.12$. In summary, then, the demand pressure variable completely dominated $DLAG_t$ and R_{t-1} for the price equation estimated in line (a) of Table III.

Since Andersen and Carlson used the Council of Economic Advisers' measure of potential GNP and the linear version of the price equation, $DLAG_t$ and

[15]The price expectations term is also multiplied by GNP lagged one quarter to scale the term in dollar units. The unemployment rate is used "as a leading indicator of future price movements." The price change each quarter is divided by the unemployment rate of that quarter to reflect the fact that "if unemployment is rising relative to the labor force, decision-making economic units would tend to discount current inflation in forming anticipations about future price movements." (Andersen and Carlson, p. 13.)

[16]Andersen and Carlson, p. 13.

Table IV

Results of Adding Distributed-Lag Price Term ($DLAG_t$) and Moody's Aaa Corporate Bond Rate (R_{t-1}) to Equations (a) and (e) of Table III*

	Λ α_0	Λ α_1	Λ α_2	Coeff. est. of $DLAG_t$	Coeff. est. of R_{t-1}	S.E.	R^2	D-W	Actual and Predicted Values of the percentage change in P_t (annual rates) 1969 I	1969 II	1969 III	1969 IV	1970 I	1970 II	
									4.74%	4.78%	4.34%	4.61%	5.16%	3.94%	Actual
(a)	−.81 (−1.58)	126.2 (1.54)	64.9 (2.51)	−.0050 (−0.69)		.185	.829	1.85	4.44	4.59	4.66	4.55	4.21	3.63	Predicted
(b)	−.93 (−1.08)	147.3 (1.08)	73.2 (1.73)		−.0040 (−0.08)	.186	.827	1.83	4.41	4.55	4.63	4.55	4.27	3.78	Predicted
(c)	.65 (8.42)	−.0168[a] (−8.98)		.0177 (3.19)		.203	.790	1.55	4.14	4.23	4.31	4.29	4.18	3.97	Predicted
(d)	.52 (2.85)	−.0176[a] (−8.44)			.0697 (2.02)	.215	.766	1.41	4.01	4.13	4.11	4.08	3.96	3.72	Predicted

*Combinations used:
(a) $DLAG_t$ added to (a) of Table III
(b) R_{t-1} added to (a) of Table III
(c) $DLAG_t$ added to (e) of Table III
(d) R_{t-1} added to (e) of Table III

[a]Estimate of the coefficient of the demand pressure variable.

Note: "t" statistics appear with each regression coefficient, enclosed by parentheses. R^2 is the percent of variation in the dependent variable which is explained by variations in the independent variables. S.E. is the standard error of the estimate. D-W is the Durbin-Watson statistic.

R_{t-1} were also added to this type of an equation. In particular, the variables were added to the equation estimated in line (e) of Table III.[17] The results are presented in lines (c) and (d) of Table IV. Both $DLAG_t$ and R_{t-1} are now significant in the equation, and the fits have been improved over the fit of the equation in line (e) of Table III. In particular, the addition of $DLAG_t$ has improved the equation considerably. This result is thus similar to the result achieved by Andersen and Carlson. The distributed-lag price term is not as significant here as it was for Andersen and Carlson, but this is due in large part to the different demand pressure variables used. The use of the eight-quarter moving average here instead of the five-quarter declining average used by Andersen and Carlson took away some of the significance of $DLAG_t$.

It should be noted, of course, that the fit of the equation in line (c) of Table IV is worse than the fit of the equation in line (a) of Table III, and that the inflation in 1969 and 1970 was not captured quite as well. It was very evident from all of the results that $DLAG_t$ and R_{t-1} (and the other distributed-lag price variables considered) were most significant in the equations using the CEA measure of potential GNP and in those equations using weighted averages of the demand pressure variable of less than about six quarters. The variables were also significant in many of the linear versions of the price equation, although they were not significant for the linear equation in line (d) of Table III.

The overall results thus indicate that the distributed-lag price variables do not improve the explanatory power of the best-fitting versions of equations like (3), but that they are of some help in the poorer fitting versions. Because the importance and significance of the distributed-lag price variables are dependent on the particular demand pressure variable used and on the functional form of the equation, the results also suggest that it would be unwise to interpret the distributed-lag price term in a particular equation as measuring the effect of price expectations. Both the distributed-lag price terms and the distributed-lag demand pressure terms appear to be picking up similar effects.

Finally it should be stressed that equation (3) was developed primarily for forecasting purposes and should be judged primarily on these grounds. Its reduced-form nature makes it of little use in analyzing questions about the structure of wage and price determination. In line with this comment, this paper should not necessarily be interpreted as a serious criticism of the Andersen and Carlson specification of the price equation. It does not appear that the distributed-lag price term is really needed in the best-fitting versions of the price equation, but there is nothing wrong theoretically with including it in

[17]It should be noted that this equation is not identical to the Andersen-Carlson equation because of the different weighted averages used for the demand pressure variable and the different price variables used. The periods of estimation also differ slightly.

those versions in which it is significant. Both lagged values of the demand pressure variable and lagged price changes are likely to be picking up similar effects, and it is an empirical question as to which is the best way to specify these effects.

An important property of the Andersen-Carlson version of the price equation is that it takes a relatively long time for the rate of inflation to subside in their model once it has begun. This is because of the large coefficient estimate of the distributed-lag price term in their equation and thus the large weight given to the sum of past price changes.[18] The forecasts from the Andersen-Carlson model thus tend to be rather pessimistic with respect to slowing down the rate of inflation in 1971 and 1972. This is in contrast to the forecasts from the Fair model, which tend to be much more optimistic in this regard. The events during 1971 and 1972 should thus provide a good test of the forecasting accuracy of the two equations.

[18]From Tables II and III of Andersen and Carlson, it can be seen that the sum of past price changes has a weight of .96(.86) = .8256 in their equation.