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Federal Reserve Bank of St. Louis
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March 1987

In This Issue . . .

In the first annual Homer Jones Memorial lecture, reprinted in this *Review*, Beryl Sprinkel, chairman of the President's Council of Economic Advisers, examines the dilemmas currently facing monetary policymakers. Sprinkel notes that the aberrant behavior of M1 velocity — the relationship between the M1 money stock and economic activity — has diminished its usefulness as an intermediate target of monetary policy and made the consequences of monetary policy actions less certain.

Sprinkel points out that, regardless of the current problems they face, monetary policymakers must avoid policy actions that rekindle inflation. Moreover, monetary policy must not be asked to resolve problems, such as the large federal deficit and the large U.S. trade deficit, that monetary policy can not effectively address. Sprinkel concludes by emphasizing that Homer Jones had a major influence on monetary economics over the past several decades. Homer's distrust of policy fine-tuning and his introspective, no-nonsense, analytical approach is the legacy for which he will be remembered.

* * *

Interest rate forecasts receive considerable attention in the financial and popular press primarily because the public presumes that expert forecasters possess superior information about forthcoming events and better knowledge about how these events will affect credit markets. In the second article in this *Review*, "Predicting Interest Rates: A Comparison of Professional and Market-Based Forecasts," Michael T. Belongia compares the relative performance of interest rate predictions of professional forecasters to those that are easily obtainable from readily available market data. He finds that the market-based interest rate forecasts are as accurate, on average, as those obtained from financial experts.

* * *

In the third article in this *Review*, "Changes in Wealth and the Velocity of Money," G. J. Santoni describes an economic theory that shows how increases in wealth relative to income can produce reductions in the income velocity of money. He then considers whether the atypical behavior that income velocity has exhibited in recent years can be attributed to this cause. Santoni examines various measures of wealth and shows that, with the sole exception of a stock market measure of wealth, they did not increase significantly relative to current income from 1982 through 1985. Moreover, even though the stock market wealth measure has risen relative to current income since 1982, the behavior of this ratio over longer periods does not appear to be related to the behavior of velocity. Thus, the evidence suggests that the decline in the income velocity of money since 1981 can not be attributed to increases in these measures of wealth relative to current income.

First Annual Homer Jones Memorial Lecture

Confronting Monetary Policy Dilemmas: The Legacy of Homer Jones

Beryl W. Sprinkel

IT is an honor to deliver this first annual lecture in memory of Homer Jones. I first became acquainted with Homer when writing my thesis at the University of Chicago, and I found some of his writings to be particularly useful. When Homer later became Director of Research at the St. Louis Federal Reserve Bank, it was — like many things in life — not particularly momentous in itself, but the implications for monetary economics were certainly important. In his priceless style, Harry Johnson described Homer Jones as "... an oasis in the desert that Keynesian economics and concern with credit had made of the Federal Reserve System, [and] the last outpost of classical monetary civilization in a cancerous culture of barbarian bumptiousness." Only an academic, of course, could say something like that — and about an era that fortunately has long passed at the Federal Reserve.

Homer Jones should be remembered for many things, not the least of which is the many people whose intellectual development he shaped and whose professional lives he fostered. He was one of Milton Friedman's first teachers — not in economics, but in insurance and statistics. Milton credits him for providing the inspiration that sparked his initial interest in economics, as well as something more tangible — getting him a scholarship to attend the University of Chicago. And, of course, Homer had a strong influence on the professional lives of the many economists who worked for him in his years at the St. Louis Fed.

Homer had an intense respect for the market system; that permeated both his economic analysis and his views about economic policy. His basic policy prescriptions in macroeconomics reflected this free-market orientation: a distrust of the efficacy of fine-tuning and a fundamental belief in the inherent stability of a free market economy. His reliance on the market approach to problems also extended to international issues, labor market issues and regulatory policy. From my perspective, the extent to which such principles have become more generally accepted as a basis for public policy decisions is remarkable, not only in the United States, but in other countries as well. Both as an Undersecretary at Treasury and as CEA Chairman, I have been involved, along with officials from other governments, in policy discussions on issues ranging from agriculture to tax reform. In governments around the world, there is a greater recognition of the efficiency of the market system in pricing goods and allocating resources. While much progress can still be made toward improving public policy analysis and discussion, the movement toward greater reliance on market forces is one I applaud, as I am sure Homer would as well.

Beryl W. Sprinkel is the Chairman of the Council of Economic Advisers. *His speech, given on March 26, 1987, at Washington University in St. Louis, is the first annual Homer Jones Memorial Lecture, which was cosponsored by the Federal Reserve Bank of St. Louis, the Center for the Study of American Business at Washington University, and the St. Louis chapter of the National Association of Business Economists.*

One particular area where we have made substantial progress by relying on market forces is in the deregulation of financial markets and institutions. Regulations on interest rates paid by financial institutions to their depositors have been eliminated. Restrictions on competition within classes of financial institutions and between different classes have been reduced. In this area, however, more needs to be accomplished, and I suspect that Homer would share my desire to see rapid progress on the Administration's proposals for further financial market deregulation.

It was difficult to be around Homer without learning a great deal from him. He had a remarkable ability to focus on the practical issues and an impatience with intellectual pretense and academic irrelevancy. His technique was to put questions to you — always pertinent questions, frequently penetrating questions, sometimes relentless questions. In so doing, he forced you to understand and articulate what you knew, while discovering what you did not know. He had a truly unusual ability to stimulate you to search for the answers. In the St. Louis Fed Research Department, I am sure that many promising ideas were hatched, many empirical relations were tested, and many influential articles resulted directly from Homer's inquiring mind and his ability to transmit that interest to others.

The products of Homer Jones' style and approach at the St. Louis Fed are well known and well respected. The weekly and monthly publications of the Research Department, which have now become standard references for everyone from undergraduates to White House officials, were initially Homer's products. The St. Louis Fed Research Department became one of the most prominent in the country and its monthly *Review* became widely respected and earned the stature of a professional journal. The metamorphosis of the Research Department, its role in promoting policy-related research and in providing an alternative point of view within the System was what Karl Brunner has labeled "a remarkable institutional event," made more remarkable and more influential because it occurred within the System itself.

Given the nature of Homer Jones' legacy, it is ironic — and perhaps fitting — that we are gathered here to honor his contributions at a time when there are so many unanswered questions about the conduct of monetary policy. The policy issues we face today are different from those debated by Homer. Most analysts now accept the important role of monetary policy in economic performance. Most economists acknowledge an important relation between changes in money growth and economic activity, although in recent years there has been much more uncertainty about the precise form of that once-reliable relationship. Few doubt, at least in general terms, the long-run link between money growth and inflation. Rather than those fundamental issues that we debated in the 1950s and 1960s, the policy challenges of today relate to the changed environment in which monetary policy is now conducted.

In the four years since this expansion began, there have been substantial changes in both the institutional and economic environment in which monetary policy must be designed and implemented. These developments are well known to this audience. The inflation rate — excluding the effects of the oil price declines in 1986 — has been cut to one-third the 1980 rate. Similarly, interest rates are one-third to one-half their 1980 levels. Financial deregulation has changed the institutional structure in which monetary policy is conducted. In this decade, the introduction of NOW and money market accounts has significantly altered the composition of the monetary aggregates, and the relaxation of restrictions on deposit interest rates has led to the inclusion in M1 of interest-bearing deposits which pay market-determined rates of return.

These developments — and possibly others — appear to be affecting the basic relation between money and nominal GNP growth as indicated by the behavior of the "velocity" of money. Specifically, while there have always been sizable fluctuations in velocity from one quarter to the next, over longer periods velocity rose at a reasonably predictable rate of about 3 percent per year between 1947 and 1981. Since the cyclical peak of 1981, however, velocity has declined at more than a 3 percent annual rate.

There are a number of plausible explanations for this decline in velocity. However, with the limited data available, it is difficult to reach definitive conclusions.

To my knowledge, the most promising lines of empirical research attempt to relate velocity declines to the decline in inflation and interest rates and to their effect on the interest-elasticity of the demand for money. In the recent period of declining interest rates, the opportunity cost of holding the highly liquid balances in M1 has fallen, thereby raising desired M1 balances and suppressing velocity. As market interest rates change, the public response in terms of moving in and out of M1 balances is difficult to predict. In part this is because we have relatively little experience with deregulated deposit rates and also because it is not

clear how depository institutions will adjust deposit rates to changes in market rates. This implies continued uncertainty about the future behavior of velocity.

Over most of this expansion we have had monetary growth — particularly in M1 — that, based on the historical relation with nominal spending and inflation, would be viewed as excessive. Yet, we have not had the short-run surge in real growth and nominal spending that would be expected from such high M1 growth. We are therefore left with a difficult dilemma about the implications of recent M1 growth for future inflation. On that issue, a wide range of opinion exists. Some forecasters — many of whom are long-time friends of mine — foresee a major resurgence of inflation resulting from the monetary growth of the past two years. Other analysts discount recent M1 growth as being the result of financial deregulation, disinflation, declining interest rates, or some combination of such factors.

It is interesting to note, however, that even those who rely most heavily on money growth as a forecasting tool are not predicting an inflation as high as would be implied by historical velocity behavior. The Shadow Open Market Committee, for example, forecasts inflation and nominal GNP growth consistent with the assumption that velocity growth remains well below its postwar trend growth path. Neither the most recent Blue Chip forecasts nor the Administration's economic projections reflect the expectation that recent M1 growth will be translated into spending and inflation in accordance with historical velocity behavior. In fact, I know of no serious, current forecast that does not implicitly assume continued atypical velocity behavior, at least over the coming year.

These and related questions have made the conduct of monetary policy particularly difficult over the course of this expansion. It is my judgment that in the context of considerable uncertainty about velocity growth, the Federal Reserve has done a reasonably good job balancing the risk of renewed inflation against the risks associated with too little money growth. I do not believe, however, that we can afford to be complacent about a long continuation of the money growth we have experienced in recent years. The Reagan Administration is committed not just to reducing inflation, but to the ultimate goal of restoring price stability. By distorting price signals and eroding productive incentives, inflation is a powerful deterrent to long-term real growth and job creation. Moreover, high inflation ultimately brings the high costs of reducing the inflation rate — costs that our economy paid in the recession of 1981–82 and that are still being paid in such sectors of our economy as agriculture and energy. Given the inevitable costs associated with reducing inflation and the importance to long-term prosperity of keeping inflation under control, it would be a policy blunder to allow inflation to reaccelerate.

In assessing monetary policy, it is important to recognize what it can and cannot accomplish. It cannot smooth out all short-term fluctuations in output, employment, or the price level. Nor can it sustain real growth rates that consistently exceed the economy's potential — as determined by underlying rates of productivity and population growth and trends in labor force participation. Monetary policy, however, can deliver reasonable stability of the price level in the longer run and can avoid being an additional important cause of disturbances to output and employment growth in the shorter run.

Monetary policy has contributed to the success we have enjoyed in resolving the critical problems that confronted the U.S. economy when President Reagan assumed office. The annual inflation rate has been cut by two-thirds — from double digit levels in 1979–80 to about 4 percent for the past four years. Interest rates generally have fallen to about one-third of the levels of six years ago. The economy is now in the 52nd month of what will soon become the longest peacetime expansion since World War II. As this expansion has proceeded, in contrast with the experience in earlier expansions, the inflation rate and interest rates have shown no tendency to rise and to bring about the strains that led to the ends of earlier expansions. Thus, the destructive sequence of business cycles with progressively rising inflation and interest rates has been broken, and the foundation has been laid for sustainable real growth with moderate inflation.

The problems that remain in the U.S. economy are not primarily problems that can be addressed with monetary policy — beyond its normal role in gradually moving toward the goal of long-run price stability, while avoiding being a source of macroeconomic disturbance. In particular, the critical and related problems of the large federal deficit and of the large U.S. trade deficit cannot be resolved by monetary policy.

The federal government has a deficit because the share of federal spending in GNP has risen well above the average share that federal revenue has maintained in GNP for three decades. The solution is to restrain the absolute growth of federal spending, while economic growth raises the absolute level of federal revenues.

The United States has a trade deficit because we as a nation spend more than the value of what we produce. To finance this excessive spending, we import capital from the rest of the world in an amount that corresponds to our current account deficit. Excessive federal spending and corresponding federal borrowing are an important part of the problem — and reversing them is an important part of the solution. So too are stronger, internally generated growth and more open trade policies on the part of our trading partners. We require a coordinated approach to reducing international payments imbalances in an environment that maintains world economic growth.

I could discuss further the problems of our fiscal and trade deficits, as well as other problems of the U.S. economy. However, my experience even before I went to Washington taught me brevity is a virtue — perhaps a virtue even more appreciated by audiences than by speakers.

Among the things that I *have* learned in Washington — and there are many — one of the most important is how simple things look from the outside, but how much more difficult it is when you actually have to take action and assume the responsibility for its effect on peoples' well-being. In policymaking, things are seldom simple. Certainly in the macroeconomic field, where policy tools are blunt and forecasts are frequently wrong, there are risks associated with any policy decision. Ultimately, policymakers must face the question: What are the consequences if I am wrong? If nothing else, it is a humbling experience.

No one in my memory had learned this lesson better than Homer Jones. His humble and unpretentious personal style was reflected in his professional approach: take nothing for granted and believe only what can be justified by the data. So what would Homer have to say about the current dilemma? I like to tell my staff — some of them think I tell them too often — that I'm from the "Show-Me" State. I want to see the data to support a conclusion. While Homer wasn't born in Missouri as I was, he certainly adopted the show-me attitude about economic issues. Knowing his insistence that policy be based on empirically tested relations, he surely would share the concerns about high money growth over the past few years. He surely would not easily discard long-term empirical relationships. But I also doubt that he would counsel ignoring current developments as they have varied dramatically from historical patterns.

Given the aberrant behavior of velocity over the past four years or so, policymakers have little alternative but to supplement the information provided by the monetary aggregates with other relevant data. To me, this implies looking in addition at interest rates, exchange rates, sensitive prices such as gold and other commodities, forward markets, and measures of real economic activity for signals as to the meaning and implication of money growth and monetary policy actions. The limitations and deficiencies of these data as guides to monetary policy are great and are well known, and I will not recount them here. It is not an ideal approach, but I see no workable alternative at the present time. To date, I know of no completely satisfactory explanation of what has happened to velocity. When more time has passed in a deregulated and low-inflation environment, I am confident that reliable relationships will re-emerge, which I trust can be identified by appropriate empirical testing. In the interim, policy decisions must be made that properly balance the risks to the economy of alternatively too much or too little money growth. As a nation, we cannot afford the pain and disruption of allowing inflation to resurge, nor can we afford to risk the economic consequences of excessive monetary restriction.

In a sense, the dilemmas and frustrations of today's policy issues lead those of us who knew Homer Jones to plead, "Homer, where are you when we need you?" For today, we surely could use his quiet, reasoned assessment of the issues.

Many people accomplish important things in their lives. I wonder whether there are not more important things to be remembered for than what you invented, discovered, wrote, or built. It may be a more lasting legacy to be remembered for how you influenced the thinking and accomplishments of others. Among those of us who call ourselves monetary economists, few can claim that legacy as readily as Homer Jones.

Predicting Interest Rates: A Comparison of Professional and Market-Based Forecasts

Michael T. Belongia

Interest rates have varied substantially in recent years. Since 1981, for example, the monthly average three-month Treasury bill rate has ranged between 5.18 percent and 16.30 percent while the Baa corporate bond rate ranged between 9.61 percent and 17.18 percent; the prime rate during this time reached a high of 20.5 percent and fell to a low of 7.5 percent. Interest rate movements are important, of course, because they affect the present value of streams of future payments, that is, wealth. Moreover, the risk of interest rate changes is related directly to the level of interest rates.[1] During the 1980s, therefore, firms and individuals have faced substantial exposure to interest rate risk.

There are at least two approaches that can be taken to reduce the magnitude of this problem. The first is to hedge interest rate risk, which has been discussed at length in this *Review* and elsewhere.[2] The second is to forecast the likely course of interest rates. This article investigates the reliability of such forecasts in general and assesses the specific usefulness of forecasts by professional economists.

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[1]Interest rate risk, for a firm whose portfolio is composed of streams of future receipts and payments, is measured by the interest elasticity of the portfolio; for a single asset, this can be expressed as $-n(i/1+i)$, where n is the term to maturity. A more general expression for a portfolio of assets and liabilities is derived in Belongia and Santoni (1987). In either case, the level of interest rate risk rises with the interest rate.

[2]See Belongia and Santoni (1984, 1985).

INTEREST RATE FORECASTS: THEORY AND EVIDENCE

Given the popular attention that such forecasts command, it is surprising to note what economic theory says about them: they are unlikely to provide accurate insights about the future. This argument is stated clearly by Zarnowitz:

> It might be argued that these are *forecasts* of people who study the economy (experts), which are quite unlike the *expectations* of those who act in the economy (agents). On the one hand, the experts are usually credited with more knowledge of the economy at large than the agents have. On the other hand, the experts are often charged with being less strongly motivated to predict optimally than the agents who are seen as having more at stake.[3]

Economists, at least on one level, lack sufficient incentives to make forecasts that are more accurate than information already available in the marketplace. Moreover, previous studies have shown there is little systematic difference among professional forecasts, at least partly because they "use to a large extent the same data, receive the same news, interact, and draw upon a common pool of knowledge and techniques."[4]

The key issue, however, really is not whether experts have more (or better) information than the public, but whether individuals who consistently can fore-

[3]See Zarnowitz (1983), p. 2.

[4]See Zarnowitz (1986), p. 6, and the references cited therein.

cast interest rates more accurately than the market are likely to make their forecasts public. The reason has to do with individual self-interest. Quite simply, why would anyone reveal valuable insight about the future when he could increase his wealth directly by appropriately trading in financial markets using this information?

If, for example, a person *knew* that the three-month Treasury bill rate would be 6.50 percent in December, while the futures market currently priced it at 7.00 percent, the forecaster's wealth gain would be limited only by his ability to buy December Treasury bill futures; in this example, he would make a profit of $1,250 on every contract he could buy.[5] Certainly, he has no incentive to make the same forecast public without appropriate compensation, at least until he had taken as large a position in the market as he could. Of course, forecasters may have incentives to sell forecasts that are of no value to their wealth; it is not clear, however, why other individuals would pay for such predictions.

As a general rule, the accuracy of economic forecasts varies widely across variables. Previous research has found that predictions of the three-month Treasury bill rate six months into the future by major commercial forecasters are within two percentage points of the actual rate only 67 percent of the time.[6] Thus, if in June, the three-month Treasury bill rate was forecast to be 7 percent in December, there is only a 0.67 probability that the actual December rate would be somewhere between 5 percent and 9 percent. Other studies have shown that error statistics often double in size when the forecast horizon is extended as little as from one to two quarters ahead.[7]

The Efficient Markets Hypothesis and Interest Rate Forecasts

A model of interest rate determination demonstrates why individuals are unable (as opposed to unwilling) to forecast interest rates more accurately, on average, than the forecasts already implied by current spot rates or prices in the interest rate futures markets. This model, known as the efficient markets model, states that the *expected* interest rate at some specified future point in time, given all information presently available, is equal to the current interest rate plus whatever change in the interest rate is suggested by currently available information.[8]

The driving force behind the efficient markets model is the information available to traders in the market and the incentives they have to use this information. Current market rates and expectations of future rates are influenced by changes in information that affect expectations about the future. Because new information is unknown until it actually is released, success in predicting future interest rates depends upon predicting both future changes in the information *and* the market's reaction to such "news."

An Illustration of the Efficient Markets Model

One illustration of the efficient markets model applied to actual data is the change in interest rates that follows the weekly Federal Reserve M1 announcement that usually occurs at 4:30 p.m. [EST] each Thursday. The assumption is that the interest rate at 3:30 p.m., just prior to the announcement, fully reflects all currently available information relevant to the Treasury bill rate, including various forecasts of the Fed's yet-to-be-announced change in M1; thus, the available information at 3:30 p.m. includes both actual and predicted data.

When the Fed announces the M1 change at 4:30 p.m., the market's information set is revised with the actual M1 change replacing its predicted value. If no other significant information is released until rates are observed again at 5 p.m., the change in the Treasury bill rate from 3:30 to 5 p.m. reflects the market's reaction to the news in the M1 announcement. If the actual and predicted M1 values are different, the efficient markets model predicts that interest rates will react to the new information in the Fed's M1 announcement; many studies have found this result empirically.[9]

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[5]Treasury bill futures are priced by subtracting the Treasury bill interest rate from 100. Thus, interest rates of 7.00 and 6.50 percent imply contract prices of 93.00 and 93.50, respectively. Moreover, each basis-point change in the interest rate is worth $25 on the value of a contract. Buying one contract at 93.00 and selling at 93.50 would show a simple profit of 50 basis points × $25 = $1,250, abstracting from commission and other costs.

[6]McNees, p. 11.

[7]Typically, the criterion is root-mean-squared error (RMSE); see McNees (1986). Also, see Zarnowitz (1983).

[8]The efficient markets model applied to interest rate determination can be expressed as:

$$E(i_{t+1}|\Omega_t) = i_t(1 + E(i_{t+1} - i_t|\Omega_t)),$$

where E is the expectations operator and Ω_t is the information available to agents at the time forecasts are made. For more detail on this model, see Fama and Miller (1972) or Mishkin (1983).

[9]See Sheehan (1985) and Belongia and Sheehan (1987) for a survey and critique of these studies.

This example demonstrates the major point of the efficient markets model: changes in interest rates depend on changes in information. A forecast that interest rates will be higher six months from now than what already is implied by the underlying term structure really is a forecast that new information will be revealed which will cause market participants to raise the rate of interest. Such forecasts are potentially useful only if the forecasters consistently have better information, on average, than the other market participants generally possess. Or, to state the proposition differently, a useful forecast is not simply an accurate one; it also must tell something about the future that is not already reflected in current market interest rates.

A COMPARISON OF INTEREST RATE FORECASTS

A comparison of alternative interest rate forecasts is essentially a comparison of information sets that forecasters possess. The futures market, as well as forecasts that simply assume the future will resemble the present, provide useful alternatives to forecasts produced by specialized forecasting services. If all forecasts have similar accuracy, it would suggest that market participants use essentially the same information.

Survey Forecasts

The information content of economists' forecasts is intriguing for a variety of reasons. Presumably, their specialized training gives them insight to the workings of financial markets. In return for their services, the economists involved earn relatively large salaries; moreover, some command considerable public attention. The latter group should include those whose forecasts are among the best of competing alternatives.

Market Forecasts

The futures market offers an interesting perspective on forecasts. At a given point in time, individuals may enter into agreements to buy or sell interest-sensitive assets, such as Treasury bills, at a date as much as two years into the future. The collective actions of investors betting that interest rates will rise from today's level (who will sell Treasury bill futures short) and investors betting that interest rates will fall (who will buy, or go long in, Treasury bill futures) determine, at each moment in time, the "market's" expectation of what interest rates will be at a specified future date. Such forecasts are interesting for two reasons: they reflect all available information held by market participants and these participants have a compelling reason to forecast accurately. If they are wrong, the money lost is their own!

A naive or no-change model is an interesting third alternative because, as previously noted, predicting interest rates really involves predicting changes in information and the market's reaction to this news. If one believes it is impossible to predict actions by OPEC, changes in macroeconomic policy, revisions in economic data and other factors that affect expectations of future interest rates, the best strategy would be to predict no change in information and, hence, no change in interest rates. Certainly, as the length of the forecast horizon grows shorter, the probability of large changes in information (and interest rates) declines as well.

Sources of Forecasts: Professional and Market Data

The six-month-ahead forecasts of the three-month Treasury bill rate by nine economists surveyed regularly by the *Wall Street Journal* were collected over the period December 1981 through June 1986. These forecasts, which are published on or about each January 1 and July 1, yielded 10 forecast periods and 90 predictions to be evaluated. Each forecast was assumed to be made the day before publication.[10]

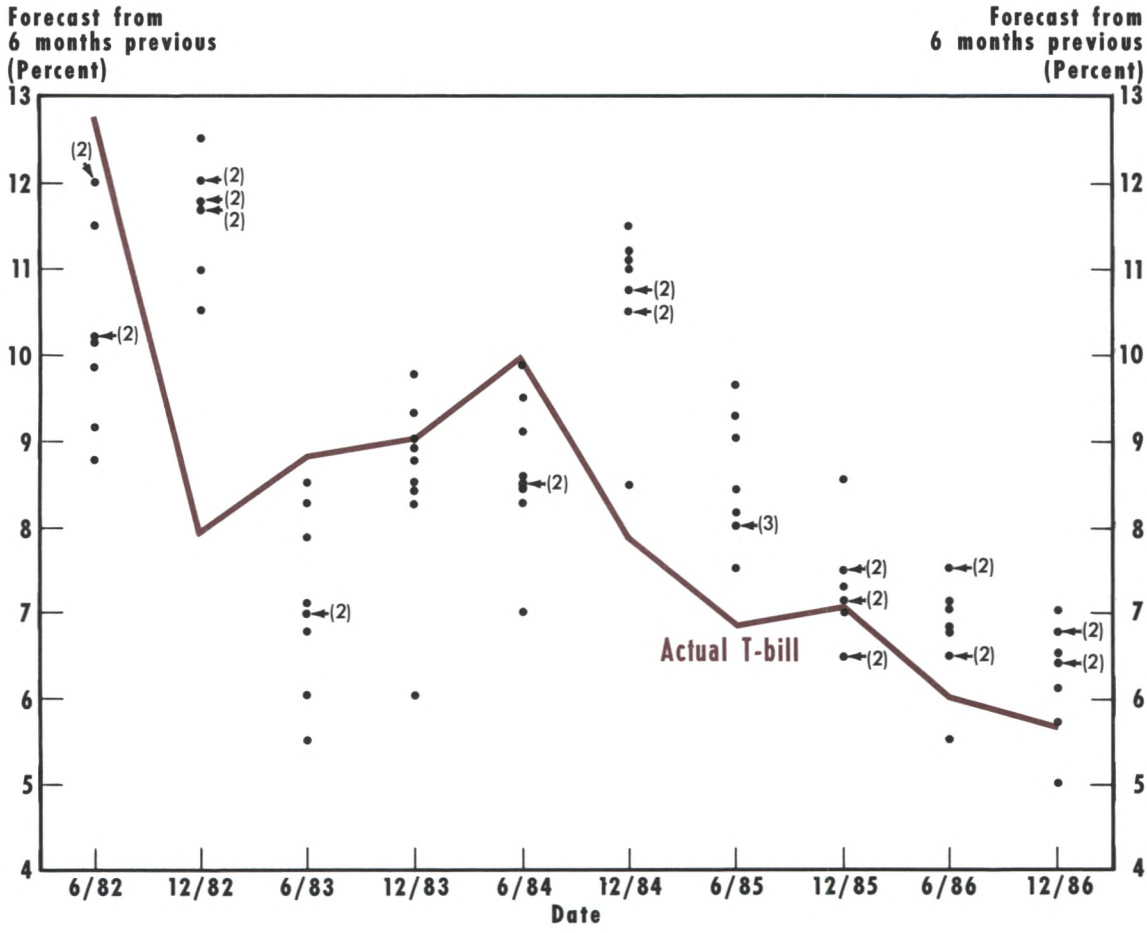
Comparable forecasts from the futures market were derived by observing on June 30 the three-month Treasury bill rate implied by the December Treasury bill futures contract and on December 31 the rate implied by the June contract. A larger sample to be used later also employed observations on the March futures contract from the previous September 30 and on the September contract from March 31. These data were compared with actual Treasury bill rates on the day the relevant futures contract ceased trading.[11] The procedure yielded 40 observations, of which 10 coincided with dates of the economists' forecasts. The naive or no-change forecast was obtained by observing the spot Treasury bill rates on the last business days of March, June, September and December and predicting that same rate would exist on the last day of the month six months hence. Again there are 40 observa-

[10]The full *Wall Street Journal* survey includes many more economists, but only nine individuals have responded consistently since the initial survey in December 1981.

[11]Treasury bill futures contracts usually are liquidated in the third week of their terminal months, not the last day of the month as with the economist forecasts.

Chart 1

Treasury Bill Rates: Actual and Predicted



tions over the 1977–86 interval with 10 coinciding with dates of the economist survey. Although this sample of market-based forecasts includes only 10 observations that coincide with the economists' forecasts, it serves as the basis for the first comparison. Subsequent analysis uses the entire sample back to 1977 for a stronger test of forecast accuracy.

Forecasts of Direction of Change

A first assessment about the accuracy of the professional forecasts was made against a relatively weak criterion, the predicted *direction* of change. That is, if rates were forecast to increase (or decrease), did they? The individual forecasts relative to subsequent actual values are plotted in chart 1.

The 90 individual expert predictions correctly forecast the *direction* of change on 38 occasions, or 42 percent of the time. If interest rate movements are random, a 50 percent record of accuracy would be expected.[12] Only one of the nine forecasters guessed

[12]This type of performance — the strategies of professional investors yielding returns inferior to those of simple rules — is common. For example, the mean equity fund managed by professional institutional money managers rose 16.7 percent in 1986 compared with an 18.7 percent rise in the S&P 500 index. Moreover, more than 67 percent of the money managers produced returns in 1986 smaller than the general increase in market values, as measured by the S&P 500; see Wallace (1987). For a more extensive discussion of this result and a similar finding of inferior performance by mutual fund managers over time, see Malkiel (1985), pp. 147–82, and the references to his chapter 7.

Table 1

Summary Statistics for Errors from Alternative Forecasts: June 1982-December 1986

	MAE	Mean error	RMSE	n
Economist individual forecasts	1.625	–0.406	2.056	90
Economist mean forecast	1.550	–0.406	1.889	10
Futures market forecast	1.466	–1.132	2.253	10
Naive forecast	1.321	–0.543	1.859	10

the direction of change correctly more than one-half of the time; he was correct on six of 10 occasions. Three others guessed the correct direction of change on five of 10 occasions. The worst individual performance was two correct predictions.

For the 40 quarterly predictions derived from futures market observations, 22, or nearly 55 percent, correctly forecast the direction of change. Over the shorter 1982–86 sample, five of 10 directions of change were predicted correctly by the futures market. On the simple criterion of direction of change, the futures market outperforms the economists surveyed.[13]

Point Forecasts

A different criterion by which to evaluate forecasts is a comparison of the point estimates of the predicted changes in interest rates with the actual changes. These comparisons were analyzed several ways. First, forecasts by the nine experts provided 90 individual predictions of the Treasury bill rate. These individual predictions also could be aggregated to form a consensus, or average, prediction for the nine economists at a specific moment in time. The performance of the experts relative to the futures market and naive forecasts first was judged over the short 1982–86 sample that coincided with the economist survey. Differences between actual Treasury bill rates and, respectively, the economist, futures market and naive forecasts were calculated to generate values for forecast errors. All errors were calculated as actual minus predicted values. Table 1 shows the summary statistics for these errors.

The entries in table 1 represent the mean absolute error (MAE), mean error and root-mean-squared error (RMSE) from forecasts for the three-month Treasury bill rate six months into the future. The first two rows are associated with the individual and consensus forecasts from the survey of experts. The third row is based on the differences between the actual Treasury bill rate and the futures market prediction. The fourth row is based on the naive predictions, the differences between current and previous actual rates.

The most interesting aspect of these summary statistics is their remarkable similarity. Of course, this result was predicted by the earlier theoretical discussion, which emphasized that all available information would be reflected in current market rates. The mean errors for all forecasts are negative, indicating that these methods tended to overestimate the interest rate; the futures market, however, tended to be the most bearish forecaster on this account by overpredicting the Treasury bill rate an average of 1.132 percentage points. MAE statistics also are similar, with a range of about 30 basis points between the best (naive) and worst (individual economist). The RMSE statistic, which is a measure of the dispersion of forecast errors, shows the naive and economist consensus to perform best.[14]

[13]There is no meaningful way to construct a direction-of-change criterion for the naive forecast.

[14]The likely explanation for the futures prediction having the highest RMSE is the method of calculation. The RMSE will tend to be lower for forecasts that made many errors of a similar size relative to forecasts that had smaller errors, on average, but had several very large errors. This result occurs, of course, because calculating the RMSE involves squaring the forecast errors. The effects of random variation in small samples also is a potential source of distortion. Thus, two very large futures market errors offset a record of generally accurate forecasts as indicated by other statistics.

Table 2
Market-Based Forecasts Over a Longer Horizon: March 31, 1977 - December 31, 1986

	MAE	Mean Error	RMSE	n
Futures market forecast				
Daily data	1.676	–0.163	2.589	40
Weekly averages	1.702	–0.141	2.634	40
Naive forecast				
Daily data	1.740	0.035	2.578	40
Weekly averages	1.788	0.027	2.695	40

Longer Sample Results for Market-Based Forecasts

Error statistics from the longer 10-year sample of quarterly observations described earlier are reported in table 2. Because daily interest rate changes are volatile and a large, one-day change could affect the results, forecasts for a specific date also were compared with the average Treasury bill rate for the week in which that date occurred.

Relative to the previous results, the futures market average errors declined substantially to near 15 basis points, compared with the shorter sample mean error of about 113 basis points. MAE and RMSE values increased slightly, however, for the longer sample. The forecast errors do not appear to vary with the use of daily or weekly average values for the terminal period spot rate. The naive forecast also shows slight increases in MAE and RMSE values but its mean error falls about 50 basis points to near zero. Again, while these statistics are not directly comparable with the economist forecasts because of the different sample periods, nothing in them suggests superior performance by the economists.

Market Reaction to Forecasts

As a final check on the information content of the expert forecasts, daily Treasury bill rates were divided into two groups: those for days when the experts' forecasts were published and those for other trading days. (Recall that the forecasts are useful to the market only if they add to the existing pool of market information.) To test whether this is true, equation (1) was estimated:

$$(1)\quad TB_t = \underset{(1.02)}{0.015} + \underset{(657.2)}{0.998}\, TB_{t-1} + \underset{(0.95)}{0.049}\, ANNOUNCEMENT + e_t,$$
$$\bar{R}^2 = 0.99 \qquad DW = 1.77$$

where the daily value of the Treasury bill rate (TB_t) is regressed on the previous day's value (TB_{t-1}) and a dummy variable (ANNOUNCEMENT) that takes a value of one on the 11 days that the expert forecasts were released.[15] If the expert forecasts add to the market's information, the coefficient for the ANNOUNCEMENT variable should be significantly different from zero; as the t-statistic of 0.95 reveals, however, we cannot reject the hypothesis that the forecast announcements have no effect on Treasury bill rates. Apparently, the Treasury bill market had already incorporated the information underlying these forecasts prior to their public release.

SUMMARY

Interest rate risk has been substantial in the 1980s, and, by no coincidence, the demand for interest rate forecasts has increased. There are strong theoretical reasons to believe, however, that such forecasts are subject to large errors. Moreover, anyone who could predict interest rates more accurately, on average, than other market participants would have no reason to make his forecasts publicly. Comparisons of interest rate forecast errors support the notion that several market-based forecasts, using information easily accessible to the general public, predict the Treasury bill rate six months into the future as well as a panel of prominent forecasters.

Why, then, do economists make public forecasts of interest rates and seemingly earn large salaries for doing so? Several explanations related to other primary functions of corporate economists seem plausible. First, economists may serve an advertising function for their firms: they are paid, in part, to get the

[15] It is possible to use the January 3, 1987, survey for this estimation.

firm's name mentioned in the press often, and forecasting interest rates is one way to achieve this end. Second, economists may provide a managerial insurance function. If a business decision has the potential to cause large losses, managers who have relied on the input of economists cannot be held negligent, in the sense of acting without seeking "the best information available at the time." Finally, forecasting interest rates may be a trivial portion of an economist's overall function; his compensation may be based primarily on analytical performance in other areas. It is unlikely, however, that economists are employed primarily for their ability to predict interest rates more accurately than the market.

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Changes in Wealth and the Velocity of Money

G. J. Santoni

ONE long-standing view among economists is that the quantity of money in circulation and aggregate income are closely related in the long run.[1] This relationship, known as the income velocity of money, is particularly important because it makes it possible to determine the effect of changes in money growth on income over extended periods.[2]

Unfortunately, this relationship has not behaved well in recent years. Various investigators have attempted to identify the reasons for this unusual behavior, focusing on institutional changes that allowed the payment of interest on transaction deposits, the rise in the trade deficit, and changes in tax rates.[3] In general, however, their results have been inconclusive.

This article discusses how changes in wealth can affect velocity and considers whether the atypical behavior that velocity has exhibited in recent years can be attributed to changes in wealth.[4]

VELOCITY: A MEASURE OF THE RELATIONSHIP BETWEEN MONEY AND SPENDING

The most commonly used measure of the relationship between income and the stock of money is the income velocity of money. It is the ratio of GNP to M1 (the sum of currency in the hands of the public and checkable deposits).

Chart 1 plots the income velocity of money from I/1959 through III/1986. As indicated, this measure has risen fairly steadily throughout most of the period. Before 1982, the growth rate of income velocity was remarkably stable, averaging about 3 percent per year.[5] Hence, the average annual growth rate of GNP exceeded the average annual growth rate of the quantity

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[1]See, for example, Fisher (1963) who notes that: "This theory, though often crudely formulated, has been accepted by Locke, Hume, Adam Smith, Ricardo, Mill, Walker, Marshall, Hadley, Fetter, Kemmerer, and most writers on the subject." (p. 14) See also pp. 157–59 and 296–97. More recent examples are Friedman and Schwartz (1963 and 1982). Thornton (1983) presents a nontechnical discussion of the theory.

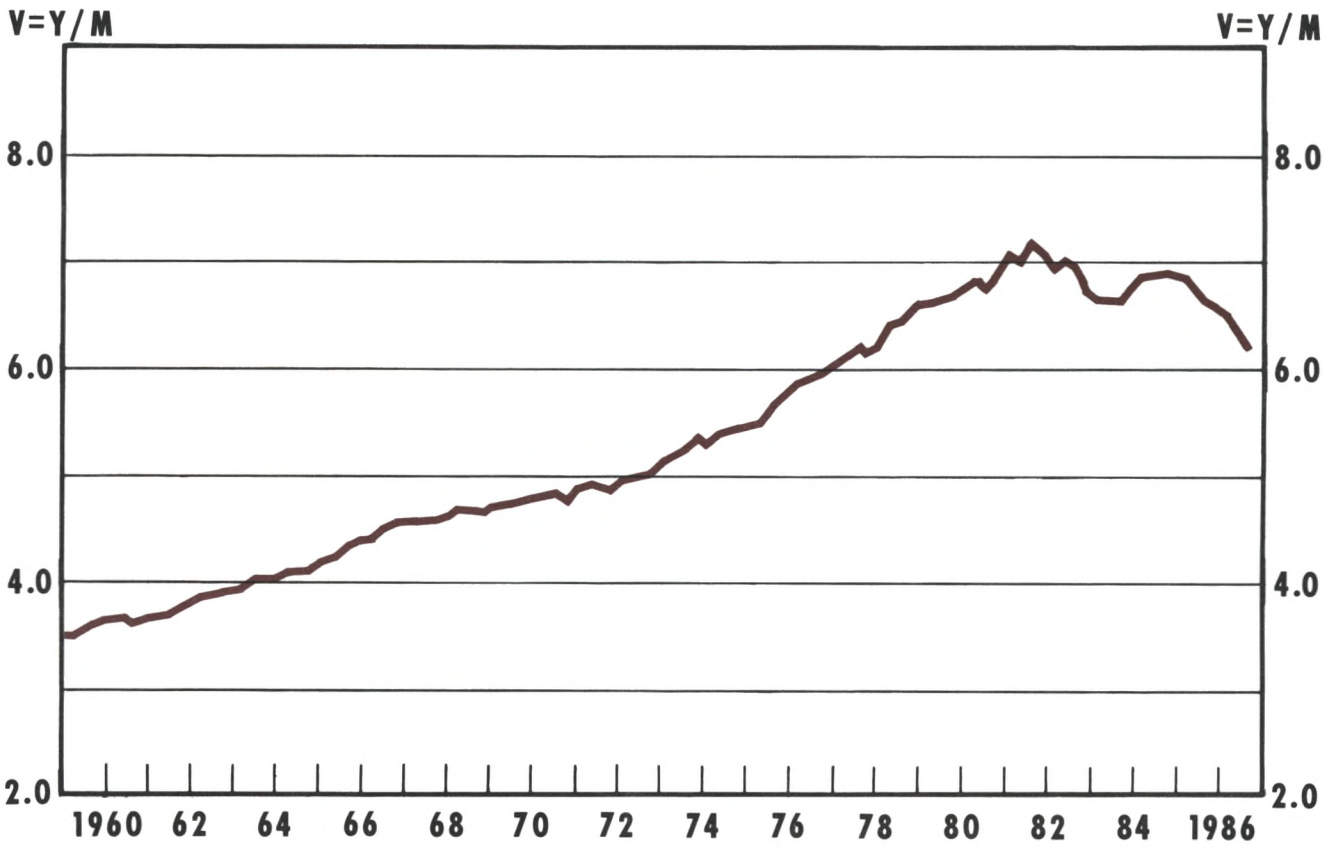
[2]Using monetary policy to hit short-run stabilization objectives is problemmatical if not impossible. See Thornton (1983) and Mankiw and Summers (1986), p. 419, for discussions of this point.

[3]Rasche (1986), Mankiw and Summers (1986), Tatom (1983), Taylor (1986), Siegel and Strongin (1986) and Kopcke (1986) represent some of the recent attempts to resolve the issue.

[4]See Knight (1941), Friedman (1956) and Meltzer (1963) for examples of this argument.

[5]The average annualized growth rate was 3.13 percent with a standard deviation of 4.03. The standard deviation is a measure of the variation in velocity growth around its average. Short-run changes in velocity growth have been attributed to cyclical factors, changes in the pattern of receipts and payments, financial innovations and changes in the nominal interest rate. See, for example, Fisher (1963), pp. 58–73, Tatom (1983) and Thornton (1983), p. 10.

Chart 1
Income Velocity



of money by about 3 percentage points.[6] In recent years, however, velocity growth has changed considerably. As chart 1 indicates, velocity generally has *declined* at an annual average rate of about 3.0 percent since the end of 1981.[7]

If monetary policymakers were certain that the long-run average growth in velocity had changed permanently from +3 percent per year to −3 percent per year, they could, once again, determine the impact of any given long-run growth in M1 on GNP. There is considerable uncertainty, however, about whether the change in velocity's average growth is permanent or only temporary. Identifying the reasons for the recent declines might help resolve this issue.

VELOCITY AND MONEY DEMAND

Velocity relates the equilibrium level of income to the equilibrium quantity of money; the latter depends importantly on the quantity of money demanded.[8] Momentarily ignoring other things that may influence people's choices, money demand theory states that the demand for money is proportionally related to

[6]If V is the income velocity of money while Y and M are GNP and the quantity of money, then V = Y/M. This equation can be written in growth rate form as below. The dots over the variables indicate compounded annual growth rates.

$$\dot{V} = \dot{Y} - \dot{M}$$

Since $\dot{V}$ averaged about 3 percent before 1982, $\dot{Y}$ exceed $\dot{M}$ by about 3 percentage points on average.

[7]The break in velocity growth has been dated at the end of 1981. See Rasche (1986), pp. 2 and 8. The average annualized growth rate in velocity during I/1982–III/1986 was −2.9 percent with a standard deviation of 5.67.

[8]See Friedman (1956), p. 4.

some scale variable, either income or wealth. The transaction theory of money demand uses the *flow* of current income as the scale variable while the portfolio approach to money demand uses the stock of wealth.[9]

The Transaction Approach to Money Demand

The transaction approach presumes that money is held to support current spending and that current spending is closely related to current income. This theory relates the demand for money (M^D) to current income (Y) by some proportion (k). In equilibrium, since the quantity of money demanded is equal to the quantity supplied ($M^D = M^S = kY$), the ratio of income to the quantity of money (income velocity) is equal to the inverse of this proportion ($V = Y/M^S = Y/kY = 1/k$). If current income rises, desired spending rises in proportion; consequently, people will want more money to facilitate their increased spending.

The transaction approach has an important advantage from an empirical point of view. The data on income are relatively good and readily available. What's more, numerous empirical tests of the theory have been conducted, and the empirical relationships between money and income have performed well during certain time periods.[10] There have been occasions, however, when they have broken down. Various analysts have pointed to breakdowns in the mid-1960s, when velocity fell unexpectedly, in the mid-1970s, when it rose unexpectedly, and, in recent years, when it has fallen again unexpectedly.[11]

A Portfolio Approach to Money Demand

An alternative theory of money demand suggests that the quantity of money balances that people hold is related more closely to their wealth than their current income.[12] Money is simply one of many assets in which wealth may be held. The desired mix of assets that make up wealth depends on both the net benefits of holding wealth in the various forms and risk preferences. The portfolio theory states that an increase in wealth is associated with an increase in the quantity of money people want to hold and vice versa.

Again, ignoring other factors that may influence choices, this theory says that the demand for money is a constant proportion ($\emptyset$) of wealth (W).[13] In equilibrium, the quantity of money demanded is equal to the quantity supplied; thus, the ratio of wealth to money (wealth velocity) is equal to the inverse of this proportion ($W/M = W/\emptyset W = 1/\emptyset$).

The Difference between the Two

Both theories of money demand agree that certain variables, such as short-term interest rates, population, the pattern of receipts and payments, the technology of the payment system and risk preferences, are important for money demand. They differ, however, in regard to the scale variable.

If current income were always a constant proportion of wealth, there would be no substantive empirical difference between the two theories. In this case, $\emptyset$ and k would differ by a constant factor that reflects the ratio of income to wealth [$V = 1/k = Y/M = (W/M)(Y/W) = (1/\emptyset)(Y/W)$]. If income is not a constant proportion of wealth, however, and if the portfolio theory of money demand is correct, income velocity will fluctuate whenever current income changes relative to wealth. If current income rises relative to wealth, for example, the income velocity of money will rise also, other things the same. The reverse movement in the income velocity of money would occur if wealth rises relative to current income.

Two Important Conditions

The above discussion indicates that two conditions must hold if changes in wealth relative to income are important in explaining the decline in velocity since

[9]The transaction approach includes other variables besides current income in the money demand function. These are mentioned below. See Laidler (1985), pp. 49–97, for a more complete discussion of the various approaches to money demand.

[10]See Laidler (1985), pp. 117–34.

[11]Few people dispute the importance of the recent breakdown. There is some disagreement, however, regarding the significance of the earlier breaks. See Judd and Scadding (1982), Laidler (1985), pp. 135–51, and Rasche (1986), p. 7, for a discussion of the earlier breaks.

[12]See Knight (1941) and Friedman (1956), pp. 4–5. Knight, for example, argues that "The economic process in a pecuniary economy involves the holding or owning, by somebody, of wealth — all the wealth of the economy — and also the entire stock of money. Hence every property owner has the alternative either of holding money up to the amount of his fortune or of choosing the concrete kind of wealth other than money he will hold." (p. 210)

[13]The portfolio theory does not necessarily imply a constant proportional relationship between money and wealth. This is an empirical question. See Laidler (1985), p. 58. There is evidence that the relationship is proportional for at least some wealth proxies. See, for example, Mankiw and Summers (1986) and Meltzer (1963). It is assumed to be proportional above for illustrative purposes.

the end of 1981: 1) the demand for money must be more closely related to wealth than to current income (that is, wealth is the appropriate scale variable); 2) wealth must have risen relative to current income since 1981.

Although the choice of the appropriate scale variable is still an unresolved issue among economists, it is useful to determine whether the second condition holds. If wealth has not risen relative to current income since 1981, whether the first condition holds or not is irrelevant; we can conclude that changes in wealth do not help explain the recent decline in velocity. On the other hand, if wealth has risen relative to current income, resolving the first issue becomes more important.

WHAT IS WEALTH?

To see why the ratio of current income to wealth may vary, it is helpful to understand how they are related.

An individual's wealth is the market value of his net assets; this market value is found by adding together the present values of all his assets and subtracting the sum of the present values of all his liabilities. This difference is equal to the present value of the expected stream of net receipts (income minus expenses). In the simplest case, it is the expected net income flow divided by the long-term interest rate.[14] Thus, an individual's wealth at any time depends on both the expected future flow of net income and the relevant long-term interest rate.

The Effect of Current Income on Wealth and Vice Versa

Current income is the actual amount of income received each period. Because unanticipated events influence the income actually received, current income generally differs from the income expected for any period. The difference between current and expected income is called transitory income.

Since wealth is the present value of the expected future income flow, transitory income has only a small effect on wealth. For example, suppose a person receives a surprise Christmas bonus of $2,000. If the person's annual income is $20,000, the bonus is 10 percent of current income, a fairly large percentage. If, however, the person does not associate the bonus with a change in his future income prospects, and his wealth before the bonus was $200,000, the effect of the bonus on his wealth is relatively small (1 percent of wealth).

Another way to view this is to note that the individual's "permanent income" is not much affected by the bonus. Permanent income is the amount of consumption that can be sustained without changing wealth. Permanent income and wealth are closely related.[15] In the above example, if the person consumed $22,000 in the year the bonus is received, he would necessarily have to reduce his consumption in the following year or draw down his wealth, other things the same.

Suppose the person in this example is promised an increase in his annual salary beginning some time in the future. His wealth increases immediately upon learning of the prospective raise, other things the same, and his expected stream of future income is now higher, even though his current income does not yet reflect the raise. A decline in the interest rate induces a similar increase in wealth, other things the same, because it increases the present value of the unchanged stream of expected future income; current income, again, is unchanged.

While these examples refer to individuals, the argument applies to the whole community as well. Unexpectedly good harvests, favorable relations between unions and management, or tranquil foreign relations can produce positive transitory components of income for the whole community. A reduction in trade barriers or changes in the tax laws that result in more productive use of resources can raise the expected future flow of aggregate income and, thus, raise wealth relative to current income. Finally, a decline in the level of interest rates can raise the present value of a given expected future flow of aggregate income; this increase in wealth occurs without affecting the current or expected future levels of income.

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[14]See Fisher (1954), pp. 12–13, and Friedman (1956), pp. 4–5. Fisher, for example, defines wealth (or capital value) as "simply future income discounted or, in other words, capitalized. The value of any property, or rights to wealth, is its value *as a source of income* and is found by discounting that expected income. . . The bridge or link between income and capital is the *rate of interest*." (emphasis in original)

[15]See Friedman (1956), p. 5. For a perpetual stream of income that is expected to increase at a constant rate (ρ), wealth is

$$w = y_o (1+\rho)/(r-\rho),$$

where y_o is the initial income receipt and r is the real interest rate ($r>\rho$). Permanent income is $y^* = rw$. Wealth and permanent income are constant across time as long as r and ρ are constant and saving is zero. Expected income in period n, however, is $y_n = y_o (1+\rho)^n$.

As the above discussion suggests, the ratio of current income to wealth generally is not a constant. Thus, if wealth is the appropriate scale variable for money demand, velocity will vary as the ratio of current income to wealth varies.

MEASURING NATIONAL WEALTH

Since we are concerned with the relationship between wealth and society's demand for money, we need to establish a concept of national wealth. National wealth is simply the aggregate wealth of the nation's residents.[16] There are two theoretically equivalent methods of measuring national wealth: the income and balance sheet methods.

The Income Approach

National wealth, in theory, can be measured by discounting the expected stream of net national income by the appropriate interest rate. Some practical problems must be dealt with, however, when applying this method of measuring national wealth. One obvious problem is that the expected stream of income is not directly observed. Only current and past incomes are known. Thus, practical applications of the income method must depend on good estimates of the expected stream of net national income.

Many studies have used univariate time-series methods to estimate the expected stream of future income.[17] Roughly, time-series models account for patterns in past movements of a particular variable (national income, in this case) and use the information contained in the pattern to predict future values of the variable. In a sense, a time-series model is a sophisticated method of extrapolation.[18]

While these models are a useful estimating tool, they have a serious drawback. When using them, the investigator must assume that the underlying economic structure that generated the observations will remain unchanged during the period of analysis. For example, a time-series model is not designed to forecast changes in the stream of future income that are produced by significant technological changes, institutional changes such as a major shift in the tax law, or significant changes in relative supplies such as produced by OPEC production quotas.

Another problem concerns the interest rate that is appropriate for discounting expected national income. National income is the sum of wages, rents and profits. Wage income, which accounts for about 75 percent of national income, is produced by human capital while nonhuman capital is the source of rents and profits. Unfortunately, the interest rate that is relevant in discounting the expected stream of wage income (i_H) is not observable; moreover, because human capital is not as liquid as nonhuman capital, i_H is probably higher than the interest rate that applies to income produced by nonhuman capital (i_k).[19] If expected wages are discounted at the lower rate i_k, national wealth will be overstated.[20] Of course, percentage changes in the wealth estimate will not be distorted as long as the ratio of i_H to i_k does not change. Empirical estimates that depend on a constant relationship between these two interest rates, however, will produce misleading results whenever this ratio changes substantially.

The Balance Sheet Approach to Estimating Wealth

Some investigators have estimated national wealth using the balance sheet approach.[21] This measure is obtained by summing the present values of the assets owned by U.S. residents and subtracting the sum of the present values of all the liabilities owed by U.S. citizens.

When these assets and liabilities are aggregated, all claims of one U.S. citizen against another U.S. citizen cancel out. Since most liabilities of U.S. citizens are owed to other U.S. citizens, these liabilities and their asset counterparts disappear from the aggregation. What remains is national wealth. It includes nonreproducible and reproducible tangible assets such as land, buildings, structures, machinery, vehicles, consumer durables, inventories (of raw materials, work in

[16]See Goldsmith (1968), p. 51.

[17]See Laidler (1985), pp. 88–90.

[18]See Pindyck and Rubinfeld (1981), p. 470.

[19]See Friedman (1956).

[20]The only interest rates that are directly observable are those that apply to financial instruments. Consequently, neither i_H or i_k are directly observable. The capital asset pricing theory developed in the finance literature, however, can be used to produce estimates of i_k.

[21]See Goldsmith (1968). In theory, the balance sheet and income approaches to measuring wealth are equivalent. But there are numerous practical problems that arise. These are discussed below.

Should Government Bonds and the Money Stock Be Included in Wealth?

Government Debt

The market value of domestic government debt that is held by domestic citizens is sometimes included in national wealth estimates. Presently, however, there seems to be no agreement among professional economists about whether it belongs in the wealth aggregate.[1] On one side of the argument, government bonds are like other financial instruments, assets to the creditor and liabilities to the debtor. The creditor's wealth in government bonds is equal to the present value of the expected stream of future receipts of interest and principal. The debtors are the taxpayers who must pay the future taxes obligated by the bond interest and principal payments. In theory, the present value of the taxpayers' liability offsets the creditors' wealth in the bonds. It is unclear, however, whether taxpayers actually take account of the future tax liability obligated by the bonds. If these liabilities are wholly or partially 'ignored, an increase in the present value of outstanding government bonds causes people to behave as if their wealth has increased.

The Money Stock

Outside money is money issued by sovereign governments; it consists of notes and coins issued by foreign governments, as well as U.S. Treasury coin and Federal Reserve notes.[2] Outside money is typically included in national wealth since it is an asset to the holder and is not offset by any domestic taxpayer liability.

Inside money is the sum of checkable deposits issued by depository institutions. These deposits represent about 75 percent of M1 balances. Though these deposits are part of the wealth of the people who hold the deposits, they must be redeemed by the bank on demand of the depositor. Because of this provision, some economists view these deposits as liabilities for the owners of depository institutions. Consequently, in this view, inside money is like other domestic financial instruments: it represents a claim by one citizen on another, and these claims cancel in computing national wealth.[3]

Some investigators have argued that the distinction between inside and outside money is irrelevant. They suggest that checkable deposits are the output of the banking system in the same sense that autos are the output of the motor vehicle industry. In their view, inside money, like autos, is a component of national wealth.[4]

While economists generally agree that outside money is part of wealth, there is no general agreement about inside money.

[1]See Barro (1974), Kormendi (1983), and Thompson (1967).

[2]See Patinkin (1965), p. 15.

[3]See Patinkin (1965), pp. 295–96.

[4]See Pesek and Saving (1967).

process and finished goods), military assets, works of art, human capital and net claims on foreigners.[22] Most investigators who estimate national wealth by the balance sheet method agree that the above items belong in national wealth. There is some disagreement, however, about which other things should also be included. These controversial items are discussed in the shaded box above.

The balance sheet method of estimating national wealth is costly because it requires an extensive inventory of the nation's assets and liabilities. As a result, estimates of national wealth that employ this method are available only on an annual basis.

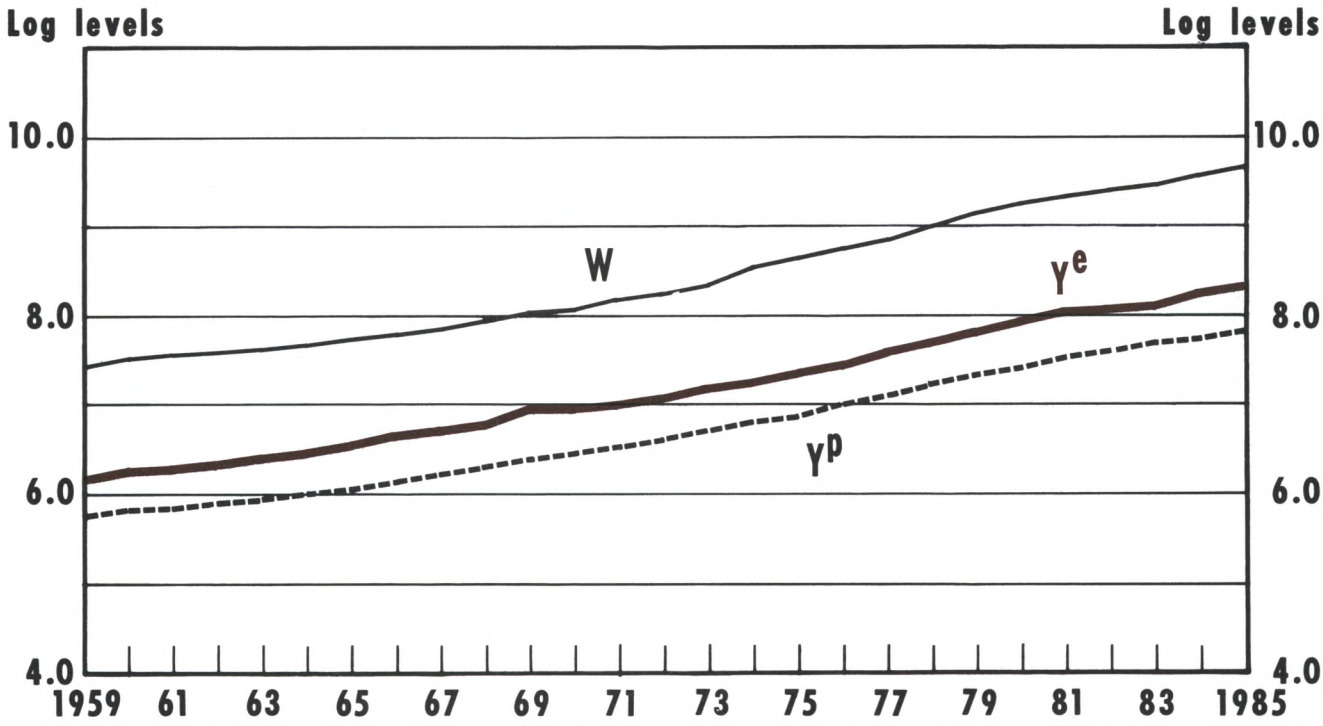
There are several other problems with this method.[23] It requires that assets and liabilities be val-

[22]See Goldsmith (1968), p. 52.

[23]See Goldsmith (1968), pp. 52–54, for a further discussion of the practical problems of applying this method.

Chart 2

Expected Income and Physical Wealth



ued at their market prices. Many assets, however, are traded infrequently, if at all. For example, the discounted value of people's wages is never traded in markets, yet this makes up a substantial part of everyone's wealth. There are many privately held businesses, unique pieces of real estate and personal property that are infrequently traded; consequently, it is difficult to obtain accurate assessments of their market values.

In practice, measurements of national wealth based on the balance sheet method depend on estimates of market values. Reproducible assets are valued at their replacement cost net of straight-line depreciation, land holdings are valued at assessed market prices and no estimates are made of the value of human capital.[24] The exclusion of human capital means that estimates of national wealth seriously understate the actual wealth of the nation.

[24]See for example, "Balance Sheets for the U.S. Economy 1946–85," p. i.

HAS WEALTH RISEN RELATIVE TO CURRENT INCOME?

Empirical studies that test the portfolio theory have used various empirical measures for national wealth. In most cases, the studies have based the wealth estimates on either the income or balance sheet approach to measuring wealth.[25]

Various empirical estimates of money demand have used three different scale variables as proxies for national wealth: expected income, permanent income

[25]Some studies have used "financial wealth" as an empirical measure of national wealth. Financial wealth is the sum of "household and business deposits and credit market instruments." This measure bears little theoretical relationship to the measures of national wealth discussed above. It is largely composed of claims by one U.S. citizen on another, claims that cancel when national wealth is calculated. As a result, it is difficult to interpret empirical estimates that employ this wealth proxy, so they are ignored in the following analysis. See, for example, Kopcke (1986), p. 19, and Friedman (1978), p. 625, note b.

Table 1

Growth of Expected Income, Permanent Income Wealth and Current Income: 1959–85 (average annual percentage rates of change)

Period	$\dot{Y}^e$	$\dot{Y}^p$	$\dot{W}$	$\dot{Y}^c$	$(\dot{Y}^e - \dot{Y}^c)$	$(\dot{Y}^p - \dot{Y}^c)$	$(\dot{W} - \dot{Y}^c)$
1959–81	8.24%	8.23%	8.56%	8.26%	−.02%	−.03%	.30%
1982–85	6.79	7.65	5.38	6.75	.04	.90	−1.37
1959–85	8.02	8.01	8.08	8.03	−.01	−.02	.05

$\dot{Y}^e \equiv$ Growth rate of expected income from the time series model
$\dot{Y}^p \equiv$ Growth rate of personal consumption expenditures — a proxy for permanent income
$\dot{W} =$ Growth rate of physical nonhuman wealth
$\dot{Y}^c =$ Growth rate of current income

and physical nonhuman wealth taken from balance sheet data.[26] These proxies are examined to determine whether they have risen relative to current income since 1981.

Chart 2 plots the logarithms of expected income (Y^e), permanent income (Y^p) and physical nonhuman wealth (W). The time-series model used to estimate expected income is given in the appendix. Personal consumption expenditures are used as a proxy for permanent income.[27] Finally, physical nonhuman wealth is estimated from balance sheet data and includes an estimate of the market value of federal government debt.[28]

Chart 2 indicates that all three wealth proxies behave in much the same way over 1959–85. Each variable rises in a smooth fashion at about the same growth rate.

The average annual growth rates of these variables are presented in table 1 along with the average annual growth rate of current income. The growth rates across all four variables are virtually identical for the 1959–85 period.[29]

Changes in wealth help explain a decline in velocity if wealth rises relative to current income. The data presented in table 1 give no indication that this occurred during 1982–85, the period of declining velocity. In fact, the growth rate of physical nonhuman wealth actually fell relative to the growth of current income from 1982–85. Thus, changes in this estimate of national wealth do not help explain the decline in the income velocity of money that began in 1982. Other investigators have found similar results.[30]

The average growth rates of expected income ($\dot{Y}^e$) and permanent income ($\dot{Y}^p$) are somewhat greater than the average growth rate of current income ($\dot{Y}^c$) during 1982–85. The averages of the quarterly differences between these growth rates and the growth rate of current income, however, are not significantly different from zero in a statistical sense.[31] The small positive differences that are observed are likely the result of chance variation in the data.

On net, then, table 1 indicates that none of the three wealth measures rose significantly relative to current

[26]See, for example, Meltzer (1963), Brunner and Meltzer (1963), Chow (1966), Laidler (1966), Laumas and Spencer (1980), Mankiw and Summers (1986) and Rasche (1986).

[27]It has been suggested recently that "consumption is an ideal proxy (for permanent income) since it is proportional to this unobserved variable. Indeed, it has often been noted that the procyclical behavior of the velocity of money is evidence for a permanent income view of money demand, since the ratio of GNP to consumption is also procyclical." Mankiw and Summers (1986), p. 416. See, in addition, Friedman and Schwartz (1982) who note that "income as measured by statisticians may be a defective index of wealth because it is subject to erratic year-to-year fluctuations, and a longer-term concept, like the concept of permanent income developed in connection with the theory of consumption, may be more useful." (p. 38)

[28]The data source for the wealth estimate is "Balance Sheets for the U.S. Economy 1946–85." It is Total Consolidated Domestic Net Assets (line 10) minus U.S. Gold and SDR's (line 8) plus the market value of federal debt. The market value of federal debt is calculated by the method suggested by Butkiewicz (1983). See also Seater (1981).

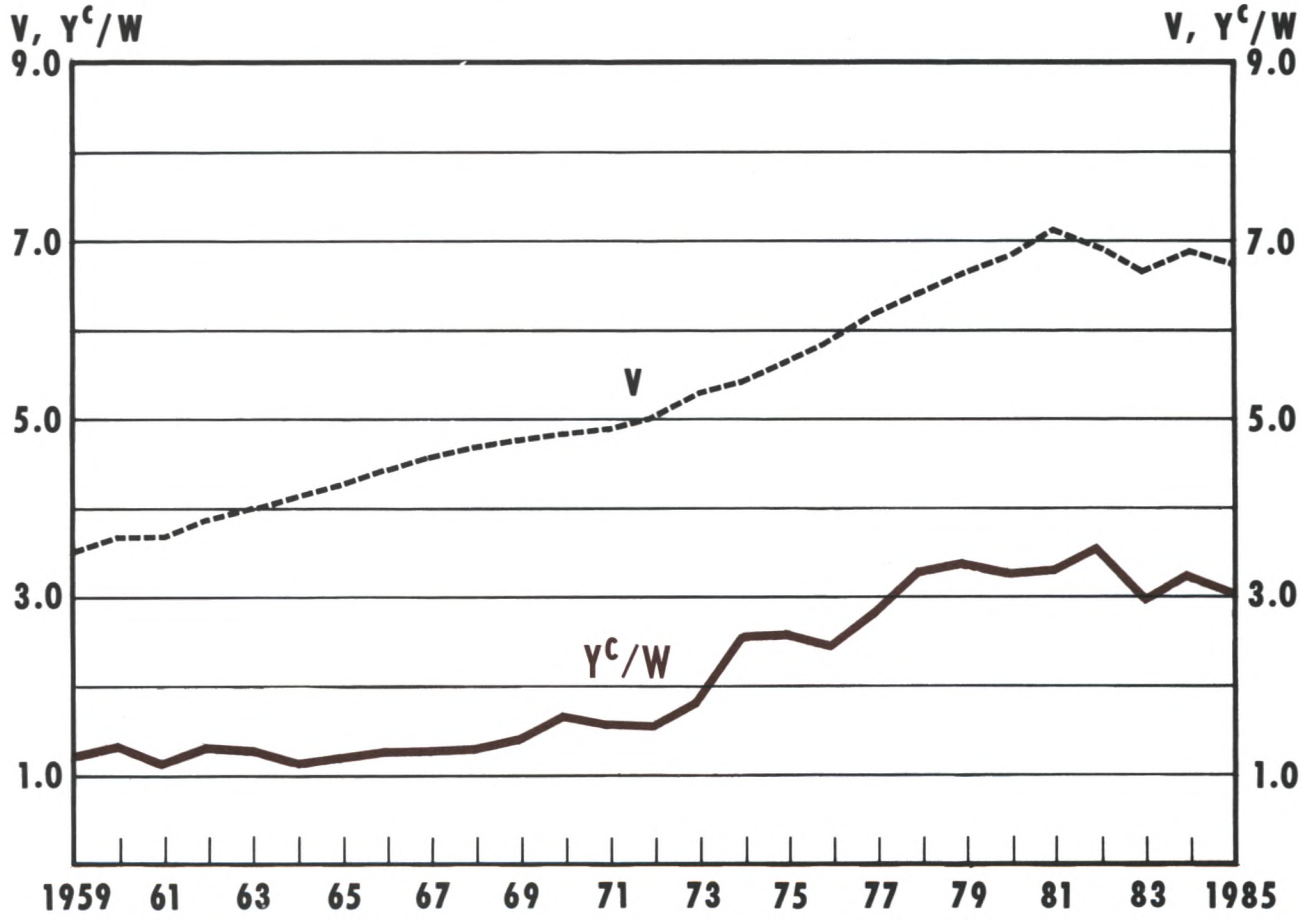
[29]This result is expected for the growth rates of Y^e and Y^c over long periods. Recall that Y^e is generated from a time-series model of Y^c which is a sophisticated technique for estimating the trend of Y^c.

[30]See, for example, Rasche (1986), pp. 50 and 94.

[31]The t-ratio is .33 for the average of the differences between $\dot{Y}^e$ and $\dot{Y}^c$ for the 1982–85 period. The t-ratio is 1.12 for the average of the differences between $\dot{Y}^p$ and $\dot{Y}^c$ for the 1982–85 period. Both are insignificant at the 5 percent level.

Chart 3

Velocity and Stock Market Measures of Y^c/W



income during the 1982–85 period. Consequently, changes in these measures of wealth do not help explain the decline in the income velocity of money that began in 1982.

A Stock Market Wealth Measure

The conclusion that wealth has not increased relative to current income since 1981 appears to conflict with the recent behavior of the values of common stock. This narrow measure of wealth has received an increasing amount of attention, especially as various indexes of stock market values have risen to record high levels.

Common stock values of publicly traded firms are a precise measure of the capital values of the firms. Chart 3 examines the behavior of one measure of the ratio of current income to the capital values of publicly traded firms and compares this to the behavior of income velocity over 1959–85. The measure used in chart 3 is the ratio of current income to the market value of stocks included in the Standard and Poor's 500 composite stock index.[32]

Chart 3 indicates that both the ratio of current income to stock market wealth and velocity have declined from 1982–85. At first glance, it appears that the recent decline in velocity may be the result of an increase in wealth relative to current income.

[32]Hamburger (1977 and 1983) uses the ratio of dividends paid (a measure of the current income generated by the capital of the firms) to the market value of stocks in his estimates of money demand. Hamburger's ratio behaves similarly to the ratio shown in chart 3.

Looking at the entire period shown in chart 3, however, there does not appear to be a close relationship between V and this income/wealth ratio. For example, the ratio did not change much from 1959 to 1969 or from 1978 to 1981, yet velocity rose. Except for the years 1973–74 and 1977–78, the income to wealth ratio appears to move "sideways" while velocity continuously rises over the whole period until 1981. Although other things that influenced velocity over the period shown in chart 3 were no doubt changing, perhaps markedly, it is still interesting to note that the simple correlation coefficient between changes in the income-wealth ratio and changes in velocity is .17, which is not significantly different from zero.

SUMMARY

The income velocity of money — the ratio of GNP to M1 — has behaved differently since 1981 than it had over the previous 30 years. This paper discusses the portfolio approach to money demand, which suggests that money demand is more closely related to wealth than to current income. The portfolio theory implies that, when wealth increases relative to current income, income velocity falls, other things the same. Therefore, if the theory is valid, a substantial increase in wealth since 1981 would serve as a possible explanation of the recent fall in velocity.

The paper examines the behavior of current income relative to alternative measures of wealth. With one exception, a stock market wealth measure, the wealth measures examined here did not increase significantly relative to current income during 1982–85.

Moreover, while the ratio of current income to the stock market measure of wealth declined after 1982, the behavior of this ratio over longer periods does not appear to be related to the behavior of velocity. Thus, the evidence suggests that the decline in the income velocity of money since 1981 cannot be attributed solely to an increase in these measures of wealth.

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Appendix

Time Series Forecasts

A time series forecast of the GNP growth rate is used as a proxy for the expected percentage change in GNP. The model, which uses quarterly data, was estimated over the period I/1959–IV/1985.

GNP appears to be a first-order homogeneous process. The estimated time series model is reported below. Calculated t-statistics appear in parentheses, and B is a backward shift operator, that is, $(1-B)x_t = x_t - x_{t-1}$.

$$(1 - .248B)\,\Delta \text{LnGNP} = 5.93 + e_t.$$
$$(2.63)$$

$$\text{Chi-square}\,(2, 24) = 23.53$$

This equation forecasts the growth in GNP. These forecasts were integrated to generate a forecast of the level of GNP.