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## INFLATION, FORECASTING, "REAL" RATES OF INTEREST

*Moderator: ROBERT J. JOHANSEN. Panelists: DONALD D. HESTER\*, VICTOR ZARNOWITZ\*\**

MR. ROBERT J. JOHANSEN: This discussion of inflation, forecasting, and the "real" rates of interest has been arranged by the Business and Economics Section of the American Statistical Association. It continues the interchange of sessions between the Society and the American Statistical Association. I hope that this interchange between the Society and the ASA which I have been organizing over several years on an informal basis will be continued on a somewhat more formal and organized basis so as to assure not only continuation but also the sponsoring of discussions on items of interest to both groups.

I am sure you have all seen bank advertisements which state that if you contribute \$2,000 each year to an IRA, after 40 years at 12 percent interest you will be a millionaire. This is really a cruel April fool's joke because of the interrelationship between the interest rate and the rate of inflation. You will have to be a millionaire in 40 years to pay for a \$25 loaf of bread and a \$30,000 used car.

The speakers today will discuss not only inflation and the process of forecasting, but as well the relationships between interest rates and inflation and the concept of a "real" interest rate. The subject matter of today's discussions is important to actuaries not only in setting premium rates for life insurance and annuity products, but also in providing for inflation protection in pension plans. The excess investment return over the "real" rate of return is sometimes used in pension fund calculations to adjust for the effects of inflation on future benefit levels without making specific provision in contribution levels.

The first speaker, Dr. Victor Zarnowitz, is Professor of Economics and Finance in the Graduate School of Business in the University of Chicago. He is a member of the American Economic Association, American Statistical Association, and the Econometric Society. His main research interests are macroeconomic theory, business fluctuations, and time series analysis and forecasting.

\*Dr. Hester, not a member of the Society, is Professor of Economics, University of Wisconsin, Madison, Wisconsin.

\*\*Dr. Zarnowitz, not a member of the Society, is Professor of Economics and Finance, Graduate School of Business, University of Chicago, Chicago, Illinois.

Since 1968, he has edited and analyzed The ASA-NBER Quarterly Survey of the Economic Outlook and is co-editor and contributor to Economic Prospects and Economic Outlook USA. To his long list of publications, he has recently added articles: "On Functions, Quality, and Timeliness of Economic Information," "Sequential Signals of Recession and Recovery," and "Accuracy of Economic Forecasts." He has a PH.D., summa cum laude, from Heidelberg, is a member of the Senior Research Staff of the National Bureau of Economic Research, and has been the recipient of a number of Fellowships.

In speaking on forecasts and expectations of inflation, Dr. Zarnowitz will cover both formal predictions and informal predictions. The latter are those made by consumers in their decisions on saving, buying, etc. He will compare the accuracy of forecasts and how you can use them in making economic decisions.

The second speaker, Dr. Donald D. Hester, is Professor of Economics at the University of Wisconsin, and Chairman of the Social Systems Research Institute there. He is Associate Editor of the Journal of Money, Credit, and Banking; and has been a consultant to the Federal Reserve's Board of Governors; the Treasury; the House Committee on Banking, Currency, and Housing; and other organizations.

Dr. Hester has a magna cum laude, B.A., from Yale, where he won the Dickerman Prize, and a M.A. and PH.D. from the same university. He has been the recipient of a number of Fellowships including most recently one from the Guggenheim Foundation. He is a Fellow of the Econometric Society.

Dr. Hester will explain what is meant by the "real" interest rate and will describe the relationship between it and financial and monetary policy. He will also cover interest rate expectations, floating interest rates and interest rate futures, as well as implications for portfolio management. As noted earlier, actuaries who are involved in pension funds or pension designs, will be particularly interested in his discussion of "real" interest rates.

DR. VICTOR ZARNOWITZ: Inflation - what it means and does to us, how it is handled and mishandled, its recent history and near-term prospects--is obviously of great importance, yet it is widely misunderstood. In fact, the topic is so elusive, it seems quite appropriate for the first of April, All Fools' Day.

Let me begin with a few definitions and facts, some of which are not well known.

Inflation is a continuous and widespread rise in prices and costs, or, what amounts to the same, a continuous fall in the value (that is, purchasing power) of money. It is not a one-time increase in the general price level but a process stretching over some considerable time. It must be widely diffused: even a long lasting increase in prices does not constitute inflation if it is limited in scope to some particular categories of goods or services. However, relative prices always vary, even if the general price level moves steadily upward, as some prices increase more promptly or faster than others.

Here are some important examples of such divergent price movements. Prices of crude materials excluding foods, feeds, and fibers are highly sensitive to shifts in demand and supply but the effects of such shifts on consumer prices are much weaker and delayed. Hence the rate of change in the index of sensitive materials prices provides a useful "leading indicator" of movements in economic activity and consumer prices. The total producer price index (PPI) has much less predictive value vis-à-vis the consumer price index (CPI), partly because the two differ greatly in coverage. However, both PPI and CPI rates of change have historically conformed well to the business cycle. Even food prices show a definite pattern of response to changes in demand associated with the business cycles.

Prices of assets and labor often move very differently from prices of currently produced goods. Common stock prices fluctuated widely in the past 15 years without showing much of an upward drift, in contrast to the sharply rising trends in the general price indexes (CPI, PPI) which, of course, measure inflation. Bond yields fluctuated around upward trends reflecting in large part actual and expected inflation, so prices of outstanding bonds fell. Money wages increase but real wages (adjusted for cost-of-living changes) may rise, be approximately stable, or fall during an inflationary era. To be sure, a decline in real wages, that is to say a reduction in the workers' standard of living, is not something tolerated lightly over any long period. Such a decline is not at all a necessary part of inflation, and when it occurs its cause may be somewhere else (notably it is likely to reflect a decline in productivity, the accumulated effects of low rates of past capital formation, high costs of energy, etc.).

Inflation is basically a monetary phenomenon in two senses: (1) It is by definition a fall in the value of money, as already noted, and (2) it is typically accompanied by a rise in the quantity of money. On this there is general agreement, but most economists would go further and state that the main cause of long-term or "secular" inflation is excessive growth in money. "Excessive" here means relative to the growth in output, and hence also relative to the growth in the demand for money, which depends largely on increases in output and income. In the short run, however, nonmonetary factors associated with expectations, trends in output and productivity, wage demands, and even political and external pressures, can have important, though presumably temporary, effects on changes in the general price level.

If inflation were fully anticipated, its costs could be minimized by "indexation," that is by tying all wage and salary rates, retirement benefits, tax brackets, interest rates, etc., to some socially agreed upon measure of the dollar's purchasing power, e.g., the CPI. Thus the cost-of-living adjustments (COLA), now used selectively in large areas of union wage payments, and in social security would have universal applicability. But indexation is not without its costs and problems, and many fear that its use would merely help to institutionalize and perpetuate inflation.

More important, however, rates of inflation have actually been highly variable and apparently poorly predicted (as discussed below).

Unanticipated inflation has much higher costs than anticipated inflation against which people can protect themselves by various means even in the absence of general indexation. For example, unanticipated inflation redistributes income and wealth from net creditors to net debtors. (This assumes that rises in interest rates lag behind rises in prices, which has

often been the case when inflation was accelerating; but a surprising slowdown in inflation may have the opposite effects.)

Inflation is clearly related to the business cycle. Each of the eight recessions since 1948 was associated with a downturn in the rate of inflation, and each of the intervening expansions was associated with an upturn in the rate of inflation. The only two occasions when inflation declined without a recession occurred in 1950-52 and 1966-67, both periods of a pronounced slowdown (though not an absolute contraction) in the rate of economic growth. This is not difficult to understand. Recessions are times of declining, and slowdowns of weakening, aggregate demand. Business firms strive to cut costs, are forced to accept lower profit margins or even suffer losses, and give discounts to get rid of accumulating or heavy inventories. Costly overtime work is rare, layoffs are widespread and frequent, and unionized and non-unionized workers must increasingly agree to lower wage increases or even wage reductions ("givebacks").

The reductions in inflation caused by recessions and slowdowns became gradually smaller and tardier during the post-World War II period. Since mid-1965 the long upward trend in inflation accelerated strongly. Among the main factors in this development were adjustments to governmental policies designed to reduce business recessions; the Vietnam war; a series of "supply shocks" in the form of rising costs of energy and raw materials; and the spread of self-fulfilling expectations that prices in general will continue to increase. The stable trade-off between unemployment and inflation (the so-called "Phillips curve") that was observed and accepted as an enduring relationship during the 1960's all but disappeared in the 1970's when the trends were up in both inflation and unemployment. What happened is that the rising expectations of inflation repeatedly shifted the short-term Phillips curve upward. Still, the tie between inflation and the business cycle, though temporarily weakened, definitely persisted during this entire period.

The most recent drop in inflation rates shows clearly the major impact of two recessions that followed each other in quick succession and resulted in a protracted period of economic sluggishness. A short but large decline in economic activity occurred in the first half of 1980. After only a year of weak, aborted recovery (normally, business expansions last several years), another recession started in mid-1981 and deepened alarmingly in the winter of 1981-1982. Its ultimate severity and duration are still uncertain. Despite the recession and the decline in inflation, interest rates remain high, presumably because of tight monetary policies and prospects of large Federal deficits (hence massive governmental borrowing) in the next few years. The burden of high real rates of interest has aggravated the contraction and continues to becloud the outlook for a vigorous expansion.

The Federal Reserve is much criticized for overly restricting the flow of money and keeping the price of credit excessively high. But the Fed, long blamed for causing alternately periods of too high and too low monetary growth, wants to maintain a reasonably steady position of combating and eventually suppressing inflation. It fears that a relaxation now could prove premature, undermining the credibility of the adopted policy and resulting in new upward pressures on prices and wages. Indeed, the financial markets dislike monetary volatility and lack of control, as

illustrated by the recent tendency of interest rates to increase in response to the unanticipated spurts in the money growth. But it is also true that economic conditions have worsened more than expected and the Fed runs the risk of overstaying its course.

It should not be surprising by now to find that inflation seldom proceeds at an even, easily predictable rate. The flows of money and credit vary irregularly and so does the pace of real economic activity during business cycles which differ greatly over time in both size and duration. When inflation is highly variable, it is difficult to predict and hence largely of the "unanticipated" kind. Indeed, the quarterly surveys of well-known business forecasters and econometric model services indicate that errors in predicting the course of inflation since the late 1960's have often been disturbingly large. Other important economic variables such as the rate of change in real GNP, although similarly volatile, were in general predicted more accurately, i.e., with smaller and less systematic errors. The forecasts of inflation, however, often resembled simple projections of the most recently observed rates of inflation. In times of steady inflation such extrapolations work very well, but the actual inflation of this era was far from steady. Predictions of this kind have the property of missing the accelerations and decelerations in inflation. Such turning points will therefore be identified only after, not before, they happen.

Consumer prices rose at annual rates of 15 to 18 percent early in 1980; the most recent figures are near 5%. Producer prices show the same trend even more dramatically. Inflation has been easing throughout the industrial world in the past two years, and particularly so in the United States during recent months. However, recession is a strong force at work in this development, and a major question is: Will the moderation last when the economy recovers and starts expanding? Most forecasters are now optimistic that inflation will not build right back up as has happened repeatedly in the past but will remain relatively restrained. The average forecast from the March survey of the National Bureau of Economic Research and American Statistical Association is that the CPI will rise at an annual rate of about 6% in the second quarter of 1982, between 6.4% and 7% in the next three quarters, and 6.9% in 1983. The predictions for the broader measure of inflation, the so-called GNP implicit price index, are similar. An important reason for thinking that inflation will not rebound strongly this time is that wage gains have slowed much more than usual, reflecting the unprecedented "give-backs" in several major industries exposed to competition either from imports or as a result of domestic deregulation (automobiles, tires, airlines, railroads, trucking, meatpacking). This moderation in wage settlements could well have rather persistent consequences in reducing inflation.

DR. DONALD D. HESTER: My discussion of interest rates will focus on the measurement and significance of real interest rates and their relationships with inflation and nominal interest rates.\*

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1. Introduction - The instantaneous return from holding an asset is the change in its value plus the yield which accrues to its owner. Yield, in this general discussion, should be thought of as a stream of benefits associated with ownership; it may take the form of coupons on bonds or merely be the service flow from owning an asset such as a car or a painting. It is conventional but not essential to express the return in monetary units. The monetary value of the return expressed as a percentage of the monetary value of the associated asset is the asset's nominal rate of return. For simplicity, I assume that yields are continuous and that the time path of asset prices is differentiable. If values are measured in terms of something other than money, say, a pound of steel, the percentage rate of return would tend to differ from the nominal rate because the dollar price of steel varies over time.

The distinction between expressing interest rates in terms of money or steel is not especially interesting in the abstract; it simply involves an arbitrary choice of a numeraire or standard. For example, when examining a portfolio of several assets, the only effect in going from a money to a steel numeraire is the addition of a constant to each asset's rate. The ranking of (or differences among) asset rates of return is not affected by the choice of a numeraire. The same conclusion obtains if the numeraire is a linear combination of different commodities. Laspeyres price indices such as the consumer price index are linear combinations of commodities.<sup>1</sup> Real interest rates are rates of return that have a price index as a numeraire. Therefore, the rankings of instantaneous real and nominal interest rates across a set of hypothetical assets are identical. It also follows that alternative real interest rates, constructed from different Laspeyres price indices, differ by a constant. Finally, so long as no reinvestment is involved, nominal and real interest rates that are compared over some arbitrarily long time interval also differ by a constant.

An elementary problem in welfare economics is to determine whether or not an individual is made better off by a change in the structure of market prices. In this problem individuals are assumed to derive satisfaction or utility by being able to consume bundles of commodities in some time period and to derive no satisfaction from the level of a price index per se. A conclusion from analyzing the problem is that a necessary condition for the individual to be better off is that the Laspeyres price index has risen and a sufficient condition is that both the Paasche and Laspeyres indices have risen.<sup>2</sup>

If tastes are additively separable over time, this argument applies directly to analyses of the welfare effects of changes in interest rates. To illustrate, consider a two-period, one-good example. If an individual was planning to be a borrower and the interest rate at which he can borrow

<sup>1</sup>A Laspeyres price index is an index that uses base period quantities as weights. That is,  $I_t = \sum_b q_b p_t / \sum_b q_b p_b$

<sup>2</sup>A Paasche price index is an index that uses current period quantities as weights. That is,  $I_t = \sum_t q_t p_t / \sum_t q_t p_b$

unexpectedly rises (or, equivalently, the price of the good in the second period falls), he may be but is not necessarily worse off. If he were planning to be a lender, he unambiguously is better off. The two-period example generalizes to  $n$  commodities if all commodities are consumed in fixed proportions or if all commodity prices rise in fixed proportion to one another.<sup>3</sup> When neither of these conditions is satisfied it is not generally possible to evaluate the welfare gains of arbitrary individuals. The implausibility of satisfying these conditions is a serious obstacle when attempting to protect the purchasing power of diverse clients.

It is much more difficult to analyze welfare gains or losses in a multi-period context because people are born, retire, and die; because the age distribution of the population changes; and because we cannot know how technology and tastes will change prices and consumption patterns over time. Further, as actuaries are well aware, fluctuations in interest rates over time make it very difficult to provide for payment commitments in the distant future, when insurance premiums are not yet in hand. Policies that attempt to immunize perfectly are very conservative and are unlikely to maximize the purchasing power of beneficiaries. Nevertheless, I attempt to advance some intuitively appealing guidelines for long-term investors at the end of this paper.

Interest rates, real and nominal, can conveniently be broken down into two conceptually distinct classes, realized or ex post and expected or ex ante. Ex post interest rates have already been experienced and are observable. Today, there is reason to doubt that the distribution of ex post interest rates provides much information about the distribution of ex ante rates. The sources of this doubt are recent controversies about the measurement of capital [Hicks (1974)], evident technical progress in data processing and its application to money and capital markets, changing regulatory environments, and institutional innovations. These doubts are reinforced by the facts that nominal short-term interest rates have hit 100-year highs on five occasions in the last dozen years, 1969, 1973, 1974, 1979, and 1980, and real short-term interest rates appear to have hit post World War II highs in each of the past three years. This pattern is not too plausible as an outcome from a stationary stochastic process.

The next section briefly reviews evidence about ex post real interest rates and interprets it in terms of monetary policy and capital formation. The third section views interest rates from an ex ante perspective where interest rates are inherently unobservable. Although much of the discussion necessarily concerns nominal interest rates, I hope to convince you that something can be said about real rates as well.

<sup>3</sup>When all prices move proportionately, all real interest rates that are based on Laspeyres price indices have a common value and differ from an interest rate with money as a numeraire by a constant.

2. Real Interest Rates and Their Consequences: an ex post Perspective - In this discussion I shall focus on short-term interest rates because they are generated in very broad markets, are relatively uncontaminated by capital gains and other tax considerations, and largely avoid thorny questions about holding periods. The federal funds rate is probably the premier short-term rate because it is the shadow price of legal or "outside" money. Arbitrageurs insure that daily averages of the federal funds rate move almost in lock step with rates on commercial paper, short-term Treasury securities, repurchase agreements, certificates of deposit, Eurodollars, etc.

In passing, it should be noted that even very long-term interest rates have fluctuations that are surprisingly large and in phase with those of short-term rates [Shiller (1979)]. This high volatility of long rates has not been satisfactorily explained, but probably reflects the nature of inflation expectation formation, the perceived risks by issuers (buyers) of being caught with holdings of high (low) fixed interest rate bonds, and nonstationarity in the distribution of nominal rates of return. Whatever the explanation, the high volatility of long rates has caused the bond market to shrink in importance. This collapse of the bond market is potentially destabilizing for it exposes corporate and municipal borrowers to much greater risks of insolvency. As the maturities of liabilities on corporate balance sheets shorten, long-term corporate investments in technology, plant, and equipment become more risky and will tend to diminish. American enterprise as a consequence has seemed increasingly to be myopic.

I do not need to tell you that issuers of long-term corporate and government bonds and mortgage borrowers in the years 1951-1977 were richly rewarded for their efforts, because buyers seriously underestimated the subsequent inflation. This inept performance by buyers seems to have traumatized potential long-term investors and led to a number of innovations that involve long-term securities which pay variable interest rates that float with short rates. Through those instruments corporate borrowers may eventually be able to lengthen the maturity of their liabilities. Underlying this move to floating interest rates is the perception that short-term interest rates, at least until recently, have moved closely with the rate of inflation, as measured by the gross national product implicit price deflator.

The figures in the following table show that until recently the real federal funds interest rate has rarely deviated from zero by more than three percent in any quarter. Averaged over calendar years, it infrequently deviated from zero by more than two percent. Lenders slowly began to recognize that only short rates were keeping up with the rate of inflation and adapted accordingly. By requiring borrowers to borrow short or at floating rates, lenders have managed to shift a significant share of the burden of inflation risk back to borrowers and have made borrowing less attractive. This correction of an earlier imbalance in capital markets has had a deflationary impact that has contributed to rising unemployment and stagnation in the U.S. economy.

This change in capital markets obviously has potentially profound implications for providers of annuities, pensions, and straight life insurance. If anyone were trying to manage a portfolio that is immunized against short-term interest rate fluctuations, that person would be in big



Nominal and Real Federal Funds Rates in Recent Years

<u>Year and Quarter</u>	<u>Nominal</u>	<u>Real</u>	<u>Year and Quarter</u>	<u>Nominal</u>	<u>Real</u>
1963:4	2.38	1.21	1976:1	4.84	0.21
1964:4	3.85	0.57	1976:2	5.48	1.06
1965:4	4.32	0.26	1976:3	5.25	-0.38
1966:4	5.40	3.03	1976:4	4.65	-1.19
1967:4	4.51	-0.63	1977:1	4.69	-2.80
1968:4	6.02	1.69	1977:2	5.39	0.68
1969:4	8.97	2.96	1977:3	6.14	-0.12
1970:4	4.90	-1.17	1977:4	6.56	0.40
1971:4	4.14	-1.53	1978:1	6.79	-3.42
1972:4	5.33	-0.98	1978:2	7.60	0.09
1973:1	7.09	0.10	1978:3	8.45	-0.98
1973:2	8.49	1.28	1978:4	10.03	1.85
1973:3	10.78	2.23	1979:1	10.09	2.48
1973:4	9.95	0.52	1979:2	10.29	2.70
1974:1	9.35	-1.69	1979:3	11.43	3.54
1974:2	11.93	0.10	1979:4	13.78	4.80
1974:3	11.34	-0.76	1980:1	17.19	7.73
1974:4	8.53	-1.17	1980:2	9.47	0.57
1975:1	5.54	-0.10	1980:3	10.87	0.57
1975:2	5.55	-1.56	1980:4	18.90	9.20
1975:3	6.24	0.09	1981:1	14.70	8.49
1975:4	5.20	1.21	1981:2	19.10	9.57
			1981:3	15.87	7.75
			1981:4	12.37	(n.a.)

Note: The federal funds rate is an average of daily rates for the last month in a quarter. The real rate is the difference between this rate and the percentage change in the quarterly GNP price deflator -- both expressed at annual rates.

trouble. He was not serving his clients well anyway, if it were true that the short-term rate, but not the long-term rate, were equal to the rate of inflation.

It is instructive to compare the federal funds rate, averaged over a calendar year, with the annual rate of change of the implicit price deflator.<sup>4</sup> The implied real federal funds rate was negative from 1955 through 1958, positive from 1959 through 1970, intermittently positive and negative from 1971 through 1978, and strongly positive thereafter. It is not happenstance that the economy encountered serious inflationary episodes in the late 1950's and in the decade of the 1970's -- shortly after the real federal funds rate turned negative.

In several recent papers and in one a decade old [Hester (1972), (1981), (1982a), and (1982b)] I have been arguing that monetary policy has been fundamentally mismanaged by attempting to control monetary aggregates and by ignoring technical progress and innovations in financial intermediation. The Federal Reserve should focus more on controlling real short-term interest rates. The Fed should not focus exclusively on any single real interest rate, however, for as was implied in the introduction, there are as many plausible real interest rates as there are interesting price indices. Also, there are other linkages to the economy besides interest rates that are worth considering -- including some monetary aggregates.

Before turning to ex ante interest rates, I wish to comment briefly on two aspects of the current scene. First, as is clear in the table, since the third quarter of 1978 the Federal Reserve has been playing a very different game. It claims only to be controlling monetary aggregates, but the consequences of its policy for real interest rates are evident and devastating. The Fed has forced the real federal funds rate to be strongly and persistently positive. Industrial production peaked in the first quarter of 1979 and it only briefly reached that level again in early 1981. The index of leading economic indicators has not regained its level of early 1979. Today, real interest rates are not falling, but rising as the rate of inflation abates. Few firms or households can survive by borrowing at such rates, which exceed the average real rates that existed in the 1929-1933 era.

Second, tax reforms under the Reagan administration have the effect of increasing the importance of real interest rates. Large prospective future deficits matched by low growth in the monetary base imply an increasing ratio of debt to the base which, unless the laws of supply and demand and the quantity theory of money have been revoked, will result in higher nominal interest rates and lower rates of inflation -- i.e., higher real interest rates. Tax cuts are expansionary on balance, but their effects are in danger of being nullified by restrictive monetary policy.

<sup>4</sup>The source is the Economic Report of the President, 1982, pp. 239, 310. The comparison is rough because the time intervals do not conform. The annual rate of inflation is roughly from June to June, whereas the federal funds rate interval is a calendar year. Information in the table of federal funds rates is relatively free of this defect.

3. Real Interest Rates and Their Consequences: an ex ante Perspective - Ex ante or expected real interest rates are more difficult to analyze than those just considered, and they are more important for understanding how long-term portfolio management is likely to evolve. This discussion unavoidably has a science fiction undertone, but I intend it to be taken seriously. The expectations that I am concerned with are not those of the individual investor, but those of the market. I assume that the lesson has been learned from the experience of the last thirty years that contracts with fixed nominal interest rates are likely to be unfair to lenders, unless institutional changes are made. A mechanism is desired so that after allowing for borrower idiosyncracies and conventional loss experience, financial contracts will permit institutional lenders to earn for their clients, say, two percent per annum in constant purchasing power dollars.

What mechanisms are available?

For starters, why not just index all financial contracts to the quarterly GNP deflator or to the consumer price index? There are several reasons for discarding this idea. First, neither index is available continuously; the CPI is available monthly, but because of government cost cutting initiatives many items are only measured every three months. The deflator is available quarterly with a lag, but is subject to substantial revisions over time. Further, all of the weights in the indices are arguable; if indexation were extended these weights would become a very contentious matter. If these indices are adopted, we would have people betting on movements of the components which would waste vastly more resources than are presently consumed by today's Fed watchers. The weights in any price index would probably not be appropriate for any individual, and the confusion in trying to explain and interpret movements in the components of the CPI would be onerous. If we suddenly had an OPEC crunch, would it be fair or efficient to require borrowers to compensate lenders for this misfortune? Simplistic solutions such as indexation are not the answer.

A second approach is to go entirely to a floating interest rate system. This appears feasible and, in fact, is what we seem to be pursuing. It has many of the deficiencies of indexation, but has the saving grace that people can readily comprehend the meaning of variable interest rates. At any point in time, borrowers, lenders, or financial institutions can hedge (or more likely cross-hedge) their positions in financial instrument futures markets. There is a small problem about who determines the level of floating interest rates and how frequently and smoothly they are allowed to change. There are two main problems with the system. First, as is apparent in the table of federal funds rates, there need be no relation between inflation and the level at which nominal short-term rates are floating. The Federal Reserve can set real rates as high as it wishes; a very high rate subsidizes lenders at the expense of borrowers. If all financial contracts were indexed in this manner, it is difficult to believe that discretionary monetary policy could survive. Second, it surely is not feasible for long-term institutional investors to promise an adequate benefit level to their clients when the real interest rate is unknowable. Two percent plus the federal funds rate may be a legally acceptable interest rate, but over twenty years beneficiaries could take a real beating. This floating system is no better than what we have suffered through.

A third approach is to trade actively in commodity and financial instrument futures markets or simply to make long-term forward contracts with suppliers of commodities that beneficiaries will wish to consume. In the purest sense that is what pension fund and life insurance contracts are all about. Purchasers of contracts desire to provide for themselves or their heirs through a set of contingent contracts. By investing in what people claim they wish to have, long-term institutional investors can perform a hedge for their clients. Indeed one can imagine a set of different pension funds which respectively specialize in food, clothing, shelter, travel, transport, health, etc. Apart from the absence of long-term futures markets, the major problem with this approach is that it compartmentalizes long-term capital markets and is likely to exact a staggering loss in efficiency. A second problem is that it is likely that the set of client wants span the entire set of available commodities. The approach does suggest that institutional investors should respect the preferences of beneficiaries, especially if the institutions are mutually chartered. Housing for the elderly and nursing homes might take precedence over prestigious office complexes and South African investments.

A fourth approach is simply to recognize that the intertemporal optimization problem is too difficult to get a handle on and, for example, to move out of straight life insurance and into term insurance where life is easier. This approach will not suffice in the case of pension funds. Government intervention through ERISA was necessary because in the view of Congress private pension funds were not soundly and fairly administered. It remains to be seen whether the government will be any more successful than was the private sector in looking after retirees. The condition of the Social Security System is not a favorable indicator. Turning the mess over to the government by default is just a variation on the fourth approach. Both variations seem totally irresponsible to me.

Probably the most promising approach to assuring beneficiaries a positive return on their retirement contributions is through effective control of inflation by the government, both through monetary and fiscal policy. This is not as visionary as it sounds. The federal government presently is literally facing a revolt in capital markets; bond purchasers do not believe that the future budgets being projected by the Reagan administration are credible or controlled. The government is being required to pay 14% and more in nominal interest on long-term bonds. If one accepts the government's projected rates of inflation, the implied real interest rates are very high. Short-term real interest rates are also very high as was noted in the previous section. If such high real interest rates are maintained, they will surely precipitate a wave of financial failures which will arrest the continuing inflation with a vengeance. If the Federal Reserve and the administration do not understand this fact, the United States is doomed to a depression.

I believe that inflation can be effectively controlled without a collapse if deficits, both off and on the budget, are kept modest -- perhaps allowing debt to grow at 2-3% per annum -- and if the real federal funds rate is kept at about 2%. Using modern filtering techniques [see Kalchbrenner and Tinsley (1977)] it should be possible to control real short-term rates by plumbing commodity futures markets and continuing wage contracts. The control of deficits is more difficult, but enlightened citizens can prevail, once they grasp the substance of off-budget deficits. Constitutional amendments to balance the budget are not the answer; they will only lead to an explosion in off-budget finance.

4. Portfolio Management when Maximizing Real Spending in the Long Run - To an unusual extent, the responsibility for maintaining the spending power of future beneficiaries of life insurance contracts, trusts, pension funds, and endowments belongs to your firms. Your firms are the agents for millions of clients. I have the impression that these clients have not been well served in the recent inflationary period. They may recoup during the current transitory period of high real interest rates, but this is by no means assured.

In closing I wish to propose that you improve the treatment of your clients by establishing a formal series of futures markets which involve trading in consumer price index dollars with an horizon of sixty years -- one contract per year. During the next few years corporations will need to borrow vast amounts of long-term funds if their solvency is to be preserved. You would serve the interests of your clients, if you insisted that borrowing occurred on the following terms. When a bond (or mortgage pool) is floated, two varieties of paper are created: (1) a series of futures contracts on the CPI in the same amount as the repayments due each year and (2) a series of conventional coupon bonds which pay, say, 2% per annum. The former oblige the borrower to pay at maturity the product of the contract's face value and the percentage change in the consumer price index since the security was issued. The pension fund or other lender will receive both the conventional bond and the long side of the series of futures contracts. Either party could trade futures contracts on the CPI in the usual way in a secondary market, say, on the Chicago Board of Trade or another exchange.

This device seems preferable to constant purchasing power bonds because of the secondary market feature and yet seems capable of fully protecting the interests of beneficiaries. No reinvestment is involved to preserve the inflation premium. With an assured volume of contracts and settlement allowed in current dollars, this market might well become the dominant futures market in the country. An administration's policies would be valued quickly in the futures markets for all to see. The public would be able to conduct its affairs making use of the best available estimate of the rate of inflation.

MR. GERALD RICHMOND: Dr. Hester, you have pointed out that it is difficult to predict future interest rates and rates of inflation, but I did not detect in your talk any statement about what the true interest, the real interest, has been over the past 50 years, or what is the normative true or underlying interest rate and has there been a sharp break recently in this true interest rate? I suppose the ultimate question is do you believe there is a true interest rate? What are we talking about when we say true interest rate?

DR. HESTER: Thank you for that question. I believe that there is a rate of return to capital. The rate of return to capital benefits from improvements in technology and from using skilled labor with capital. I estimate that the real rate of return to capital would be between 1 and 6 percent in different years. It varies over time as technological innovations become available, as employment increases and decreases and as opportunities and competition from foreign countries enter in. It is not unreasonable at all that over extended periods of time you should be able to earn a real rate of return which approaches 3 percent per year over decades. I do not mean you

can get that rate every year, and certainly you cannot hope to pick that up in periods when unemployment is rising rapidly, when there is a war, when there is no new capital formation, and when resources are being devoted to other activities, such as restoring the environment.

MR. SAMUEL ECKLER: I was intrigued but mystified by Dr. Hester's proposed solution to the investment and inflation problem for pension funds and insurance companies by offering a kind of standard security and a series of futures, as far as I understood. I wonder if he could lead us a little more carefully into the differences between that particular approach he is suggesting and the more conventional index bonds, which I understand Dr. Friedman endorses still. How does his proposal differ from that more difficult index series of bonds which Israel, for example, has been issuing for some time?

DR. HESTER: The proposal to have a futures market is an attempt to respond to what we have not seen in this country, namely, the index bond, in an interesting way. It occurred to me that one way to make this idea somewhat more saleable would be to provide borrowers and lenders with an opportunity to get in or get out of a guarantee of purchasing power by selling the futures contract independently of the particular bond which is being offered. I have decoupled these two transactions. Now why should that be appealing to people? Well, corporations who are borrowing also will benefit if there is an inflation. Their prices will rise, and, therefore, they can afford in part to insure the purchasing power of the beneficiaries of your companies by being able to acquire or offer a hedge themselves. The corporations are not really exposing themselves to a great risk. If prices rise, they will benefit and can pay off their obligations or they can get out if they want to. So the thought is that this instrument will actually not be particularly onerous to business firms and will provide some protection to lenders which is not otherwise being offered.

The proposal also takes advantage of a change which is occurring in financial markets. Since 1975 we have had financial instrument futures markets, and they are growing very rapidly. It seemed to me that an obvious extension of these financial instrument futures markets was to the retirement field. Futures markets have two basic functions. One is to permit people to hedge their positions, that is, they redistribute risks in society according to a market mechanism. That seems to be a healthy principle which we should all advocate. The second thing they do is - and this refers to the earlier question as well - they reward people for discovering what the actual rate of inflation is. So if there is a futures market for 30-year CPI dollars, then people will be able to trade them, and investors will think carefully about and will be rewarded if they guess correctly what the rate of inflation is. I do not see that particular signaling mechanism presently in the capital markets. It should provide a real service to people making decisions.

MR. ECKLER: Has it been tried?

DR. HESTER: Not that I know of, but that does not mean that we should not try it. Nobody tried financial instrument futures markets until 1975.

MR. LLOYD K. FRIEDMAN: Dr. Hester, did you envision these futures covering periods of traditional long-term bonds, for example, 25 or 30 years or more?

DR. HESTER: Yes. I suggested in the paper they might go out as far as 60 years so that people starting work, say, at age 20 would - and the life span is, I understand, bounded at 84, although I am sure you have counter examples among your policyholders - that such people would have a chance to have all of their dollars protected through these contracts if they and the pension fund wished to.

MR. A. DAVID PELLETIER: There was no mention of taxation anywhere in the discussions that we have had so far, but there was a comment made that real short-term interest rates in the last 10 years, I think, have reached 100-year highs five times. I have to wonder if those two things are related. When you have high inflation and the interest earnings, which are really just inflationary interest, are being taxed away, would you not expect to have higher real interest rates to compensate for the fact that really you are being taxed on your capital. So would we not expect then in these periods of high inflation perhaps to have higher real interest rates long term, which then would benefit qualified pension plans because they are not in fact being taxed on their interest earnings?

DR. HESTER: Thank you for that question. I was asked in drafting this paper to ignore taxation on the grounds that it did not apply to people in the pension fund industry. I do not mean to imply that taxes are unimportant. However, I would like to make two observations about taxes.

First, in order to have to pay taxes, you have to make a profit and these days many firms - certainly the automobile industry - are not making profits. The Reagan Administration has introduced the notion of being able to make leases in ways which distribute tax credits from firms with no profits to firms with profits. There will, of course, continue to be some tax effects so long as profits are positive.

Second, the corporate tax cuts which have recently been put through have substantially reduced the marginal rate of taxation for corporations. Any large corporation, with a multi-national exposure, having subsidiaries and various tax arrangements in Switzerland and Panama or wherever should not have to worry about the rate of taxation anymore. I anticipate that within five years corporate profits taxes will be on the order of 5 to 10 percent of their profits, at a maximum. So while your argument was valid in the past, I do not think it applies in the future, and I am not sure that it even applies too much today.

MR. RICHMOND: I wonder if any members of the panel are familiar with the classic study of the Federal Reserve Board of St. Louis in 1972, which indicated the real rate of interest had been between 3 and 4 percent over a substantial period of time? More recent studies by Ibbotson and Sinquefeld which seem to indicate a negative real rate of interest where they looked at especially long-term bonds and inflation adjusted them - claimed that the underlying real rate of interest was negative. If the members of the panel are familiar with the studies, can they comment on the methodology of the two different studies and which study is likely to be nearer to the truth?

DR. ZARNOWITZ: I could address myself to this question, for which I thank you. Not only did the Federal Reserve Bank of St. Louis, but some highly respected studies - one by my colleague, Eugene Fama, the University of Chicago, published in the American Economic Review a few years ago - all these studies seem to argue that real interest rates are constant or nearly constant. But it was often an assumption rather than a conclusion of the study and data were limited to very short periods of time. Now some of these same authors - I know about Fama - would not stick to that conclusion because obviously these rates are not constant. Their constancy was never convincingly demonstrated.

Of course, very much depends on which interest rates you use - whether you talk about ex post or ex ante interest rates as Dr. Hester pointed out. That makes a great deal of difference. For example, Dr. Hester's Table includes enormous fluctuations. Not so long ago, in 1980, the real interest rate went down for two quarters, almost to zero, and then shot up again very strongly. So it is not like a constant nor even a reasonably steady series; it is highly variable.

This would be an example of an ex post interest rate because both the inflation rate and the rate of interest refer to the same periods looked at retrospectively rather than forward into the future. What is really very important, however, is the ex ante or expected real rate of interest. Obviously, this rate is not directly observable or measurable; it will very much depend on what kind of a measure you use for expected inflation. You can get a very large range of measures there. Indeed, different authors do work with very different measures of expected real rates of interest.

I have nothing better to propose here as a solution than to say that you have got to define your terms very, very clearly and look at the literature very, very carefully before you conclude anything about these real interest rates. There are good reasons and some of them are pointed out here in our two papers why real rates of interest should not or need not be constant, even in the short run of the business cycle. There are many earlier studies that assumed that they are not constant and that hypothesized about how they move.

The most recent and informative studies I know of, not all of them published yet, are by another young colleague of mine, Rick Mishkin, who concludes that real rates of interest are not constant - for the United States and for other countries.

DR. HESTER: I have looked at some of the studies you mentioned, but I do not want to comment on them because I have not looked at them recently and I fear that whatever I said might be unfair to the authors.

In general, long-term interest rates are very misleading as a vehicle for estimating real rates of return. We have not waited long enough for long-term interest rates to provide us with a stable distribution from which estimates can be constructed. I guess Keynes was on the right track: when we are all dead we will know whether or not the real long-term interest rates were in fact positive or negative! We just have not drawn a large enough sample.

Long-term rates are very confusing because they have all kinds of tax aspects. People should hold long-term securities, even though the



securities are not covering the rate of inflation, if they are able to trade them often enough to take advantage of capital gains and other tax possibilities. They may earn a positive long-run rate of return even though entities which are not subject to tax such as pension funds cannot do so. Part of the reason the long rates do not appear to be covering the rate of inflation is that you are not able to take advantage of tax angles. If you could, then you might find long rates more attractive than they seem to be.

MR. ROBERT H. STAPLEFORD: If I understood Dr. Hester's answer to the first question, you felt that you could expect as an investor a 3 percent real rate of return. If I understood you correctly too, you were referring to long-term investment in bonds and mortgages. What about the equity investors today? What sort of real long-term rate of return can they expect? Is it such that it would be 5 percent for an equity investor having an automatic adjustment factor through the dividend mechanism such that as prices go up and profits increase, the dividends can be increased which should then enhance the value of the equity investment? I would be interested in your comments as to how all this relates to the investor in equities.

DR. HESTER: Equities, as you know, in this country have been very uncharitable investments since 1964. The explanation is not entirely clear and I do not want to give you a glib answer. While dividend rates have increased, nevertheless the value of a claim on a company through equity markets does not seem to have kept pace with the rate of inflation. I suspect their weak performance has something to do with the fact that equities are just very long-term bonds with an ownership kicker. I think that the equity market's role as a vehicle through which control of a corporation is maintained, has not been adequately appreciated by most investors in equities.

People who are acquiring equities are doing so not so much in order to get a rate of return as to get jointly a rate of return and control of an enterprise. I know of no other reason why, for example, closed-end equity mutual funds sell at 20 percent or so below their liquidation value. It must be that there is a premium for having those stocks which control firms, apart from their dividend streams. You cannot count on the dividend streams being revised upwards and adequately compensating you for rates of inflation, because the control feature of equities has not been appropriately factored into the model. I am doing research on that problem right now, but I have no answers to report yet.

MR. JOHANSEN: I will quote from an Eckler-Brown-Segal Newsletter discussing a report of the Select Committee on Pensions which was appointed last year by the Ontario (Canada) Legislature. In discussing inflation protection it says that the Committee favored the use of the excess interest approach. The theory behind the excess interest approach is that a rate of investment return consists of two parts, a real rate and an excess rate. The excess return on the portion of the pension fund allocable to pensioners would be used to increase the pensions each year. The Committee's report hinted at serious technical and practical problems but went on to recommend acceptance in principle. Would either or both of you like to comment on that? Some pension consultants make considerable use of this concept in trying to allow for the effect of inflation on future promised benefits.

DR HESTER: I do not have a clear understanding of what excess interest is. I understand that you might earn more than the rate of inflation.

MR. JOHANSEN: The idea is that the real rate of interest is what you have figured into your pension plan, assuming no inflation. Then, if there is inflation, the interest rate that is actually earned by the funds will be in excess of the real rate by a sufficient amount to counteract the effect of inflation.

DR. HESTER: But is there reason to think it would be sufficient to offset the effects of inflation?

MR. JOHANSEN: That is part of the question.

DR. HESTER: My conjecture is that it will not be sufficient unless you have taken some further steps. If you are buying and holding long-term bonds or stocks, I do not think there is any basis for believing that you can be sure of a real rate of return that is positive. We really need some work on the nature of the distribution of rates of return from which we are sampling. One way to provide some stability for that distribution is to introduce something like a futures market. It seems to be blind faith to believe that holding bonds and stocks will result in a positive real rate of return.

DR. ZARNOWITZ: One simple reason as to why real returns were negative, looked at ex post, in Dr. Hester's table was very simply that there was a widespread underestimation of inflation, as I pointed out. There was a surprisingly strong acceleration of inflation; at least it surprised people at that time. That could, of course, change in the future - although I am not optimistic about it. As long as inflation rates are very variable, as they have been, it will be difficult to predict them and so we will have large errors on that score. How that will work, particularly with the very long predictions that would be involved in Dr. Hester's proposal of futures markets, seems to me an important question to which I do not have an answer. I will question my colleagues, but perhaps it is too large a question to bring up.

DR. HESTER: Could I answer that question? I really find it amazing that somebody from the University of Chicago would ask how markets work. For many years I have thought that the Chicago school had incredible faith in markets and in their working.

Let me try to interpret why the inflation which occurred in the 70's was misunderstood. I do not think anybody correctly factored in the consequences of Euro-dollar markets and the very rapidly growing volumes of repurchase agreements - particularly in 1973-74. We know they had a dramatic affect on the demand for money. Nobody really understood what the nature of those innovations was nor understood how firms would be able to take advantage of them. I do not think that financial technical progress is appreciated adequately by investors. It is possible that technology could continue to grow sufficiently that the underlying rate of inflation will rise even in these recessionary times. It just is not being analyzed properly.

MR. JOHANSEN: I think what you are saying to the actuaries is that we had better make explicit provision in pension plans for inflation rather than implicit provision.

MR. ECKLER: I do not have a question so much as a kind of reaction to the response to the quotation from that letter about the excess interest approach. It is an approach that is receiving some acceptance in many circles in Canada as a rather modest method to make adjustments to the pensions of pensioners over a long period of time.

I see here an actuarial professional group interacting with the economics professional group and trying to understand these concepts. We are concerned as actuaries with making adjustments here. I was intrigued with the idea of the futures market because I see this as tying in quite well with the ideas that are coming up in Canada now for adjustment of pensions because it would be another kind of vehicle that could tie in perhaps even better than the instruments we have at the present time. It is just that I really am not quite certain that practically it will get off the ground whereas the kind of approach that is being suggested with the more conventional instruments could be implemented rather quickly.

MR. RICHMOND: The United States has an example of the use of excess investment earnings to adjust pensions. The Rockefeller plan has been going for about six or seven years; I mentioned it in the paper, "Indexing Pensions."\* They have invested all retired life assets in short-term commercial paper of high quality and they have been very successful in selecting the better commercial paper, earning a very good yield for short-term paper and whereas the real rate of return has maybe been 1 percent over the past several years, they say they have been able to get 2 percent. In the most recent year, I think inflation went up about 12 percent, they were able to index pensions about 11 percent. So even if the real rate of return on the short-term assets was zero, if inflation were 8 percent and they earned the 8 percent and their true rate is 3 percent, they can still index 5 percent. Even though this is not the full amount, they have done an excellent job. Of course, the problem for the plan sponsor is can he just index anyway and invest his money somewhere else and earn even more money. That is a decision that he has to make. If you do it the Rockefeller way, you are pretty certain each and every year to come close to earning the rate of inflation. If you, however, invest in common stocks, you may make a killing one year and "go bust" the next year. How do you average it out? If you are going to do that, you have got to average it out and then you have to know what is an investment cycle. I do not think that is too clear yet in economic literature.

DR. HESTER: Let me say that we come to you trying to learn as well as to provide information. We do not have the answers to these questions either. One of the messages in Mr. Richmond's observation was that the short rates were much more reliable hedges against inflation than were the long rates, so that if one were following conventional 19th century British actuarial science and trying to immunize portfolios, you would have made a terrible mistake from the point of view of your clients. I am not accusing anybody here of having done badly. If I knew how to have done it better, I would have written that paper. I am only trying to suggest that futures markets are a way of getting at a very difficult problem.

MR. JOHANSEN: I would like to ask one question of our two panelists. When do you think interest rates will turn down? End of 1982? End of 1983? Ever?

\*Gerald Richmond and Mark L. Rosen, "Indexing Pensions---Protecting Post-Retirement Purchasing Power," TSA XXXIV (1982), to be published in 1983.

DR. ZARNOWITZ: I would like certainly to deny that interest rates will not ever turn down. There is no such thing as ever. I will claim no particular knowledge or foresight in this area. I found that for all their shortcomings, economists' forecasts do on the average work better than simple random guesswork or than laymen's perceptions which are usually tardier. Also we have found from studies of surveys of forecasts that averaging, or better, weighted averaging helps. So I have some very modest amount of confidence in these averages that I have quoted. These averages are pessimistic in the short run, that is to say, they do not foresee a decline in interest rates in the near future (below the teens). That forecast looks reasonable to me, but it is far from saying that interest rates will not ever go down; they will no doubt. Of course, we do not know exactly when this will happen. We now cannot preclude altogether a depression forecast, for example. Perhaps its probability is not very high, but it is certainly non-negligible and that would be directly inconsistent with the persistence of high interest rates.

DR. HESTER: The question which you are asking, of course, is something we all look at every day when we are thinking about our money market mutual funds, bonds, and stocks. There are two basic prerequisites before anything can come down. First, there has to be a credible financial package announced by the government over the next four or five years before anyone can make a sensible calculation. Interest rates are high not so much because people are expecting that there will be an increase in inflation, but because they are unwilling to buy anything until a credible policy is announced - not something which has deficits running at \$200 or \$300 billion in 1986.

The Federal Reserve has shown no inclination so far to "chicken-out" as we enter a fairly serious recession where some very large insolvencies and certainly a crisis in the thrift industry are facing us. So I do not think that you can expect interest rates to come down because of the Federal Reserve opening the sluices. I do not expect investors to go out and stick a large amount of money in a long-term obligation in such circumstances. So I think until a policy is announced, interest rates will stay high. As soon as a coherent policy is announced, interest rates will begin to come down. We live in very unusual times. This is the third year into a recession and we have rising short-term interest rates. That is unprecedented, except for 1929 to 1933.

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References in Dr. Hester's Presentation

Hester, Donald D. (1972) "Monetary Policy in the 'Checkless' Economy," Journal of Finance, Volume XXVI, Number 2 (May 1972), pages 279-293.

\_\_\_\_\_ (1982) "Innovations and Monetary Control," Brookings Papers on Economic Activity, 1981:1, pages 141-189.

\_\_\_\_\_ (1982a) "The Effects of Eurodollar and Domestic Money Market Innovations on the Interpretation and Control of Monetary Aggregates," in Raymond E. Lombra and Willard E. Witte, eds., The Political Economy of Domestic and International Monetary Relations, Ames, Iowa: Iowa State University Press, pages 506-542.

\_\_\_\_\_ (1982b) "On the Adequacy of Policy Instruments and Information When the Meaning of Money is Changing," forthcoming in American Economic Review, Volume LXXII, Number 2 (May 1982).

Hicks, John (1974) "Capital Controversies: Ancient and Modern," American Economic Review, Volume LXIV, Number 2 (May 1974), pages 307-316.

Kalchbrenner, J. H. and P. A. Tinsley with J. Berry and E. Garrett (1977) "On Filtering Auxiliary Information in Short-Run Monetary Policy," in K. Brunner and A. Meltzer, eds., Optimal Policies, Control Theory, and Technology Exports, Carnegie-Rochester Conference Series, North-Holland Publishing Company, pages 39-91.

Schiller, Robert J., (1979), "The Volatility of Long-Term Interest Rates and Expectations Models of the Term Structure," Journal of Political Economy, Vol. 87, No. 6 (December 1979), pp. 1190-1219.

