

The Interest Rate Snap-Back and its Implication for the Keynesian-Quantity Theory Dispute *

Much recent work on the behavior of interest rates has argued that both long term and short term interest rates decline only very temporarily when the growth rate of money increases. Nominal interest rates quickly snap back to their previous level. Taking these findings, for the sake of argument, at face value what do they imply for the Keynesian-quantity theory dispute? ¹ In this paper I will try to show that *if* the expected *real* interest rate actually does snap back rapidly, then this provides substantial support for the quantity theory and against Keynesian theory. Whether or not interest rates do snap back rapidly therefore becomes a central issue in the Keynesian-quantity theory debate.

I will, however, not discuss whether interest rates *do*, in fact, snap-back as quickly as Cagan and Gondolfi (1969), Gibson (1970), Friedman (1968), and Hester (1969) claim, except to note that it is not beyond question. Some other investigators have *not* found a rapid snap-back. Thus, in FMP model simulations the interest rate is still depressed four years after an increase in borrowed reserves [Frank de Leeuw and Edward Gramlich (1969)]. Similarly, Marcis and Smith (1973), using spectral analysis argue that the relation between changes in the money stock and interest rates is not at all

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¹ The quantity theory discussed here differs from the Brunner-Meltzer quantity theory since it does not include their relative price mechanism. It also differs from Patinkin's since Patinkin does not assume that the rise in prices necessarily occurs fairly rapidly. The quantity theory discussed here is closer to Friedman's version. Proportionality of changes in the money stock and in income implies, of course, that there is no economically significant constant term in the money demand function. This will be assumed throughout to simplify the exposition.

close, does not reveal a clear-cut lag of interest rates behind money stock changes, and may exhibit two-way causation (see also Hamburger and Silber, 1969). Econometric problems such as serial correlation, and two-way causation, create difficulties here, as does the possibility that the interest rate may overshoot, that is, that it may snap back rapidly, due to the acceleration type effects often found in dynamic systems, and then may decline again to a new, lower equilibrium. I will ignore all of these problems, and simply *assume* that the evidence for a rapid snap-back, a snap-back which does not just represent overshooting, is valid. Because it makes this assumption this paper obviously cannot claim to settle the Keynesian-quantity theory dispute, and that is not its aim. Rather its aim is to demonstrate the great importance of the interest rate snap-back in the Keynesian-quantity theory debate. It is more concerned with raising questions than with answering them.

I will use comparative statics rather than dynamics despite the fact that I am discussing the implications of the speed of adjustment of interest rates. This simplification is justified because I am assuming that once the interest rate snaps back it is in equilibrium rather than in the upper stages of an overshoot process from which it will decline again. The literature claiming a rapid snap-back suggests this implicitly, and what I am doing here is to explore the implications of this literature. Hence, I will not be concerned, except incidentally, with problems of overshooting.

I. Background

Before looking at the interest rate snap-back itself it is necessary to discuss the Keynesian and quantity theories to be compared here. The quantity theory discussed here is the Chicago version since it is primarily Chicago economists who have argued that interest rates snap back. Neither Patinkin's version nor the Brunner-Meltzer version of the quantity theory necessarily imply a quick interest rate snap-back.

The quantity theory to be discussed here has two main conclusions. One is that changes in the money stock bring about proportional changes in money income. The second is that most of the actually observed fluctuations in money income are the result of changes in the money stock. These two propositions do *not* amount

to the same thing. It is quite possible to imagine a world in which the (relatively few) changes in the money stock that do occur cause proportional changes in income, but in which most actually occurring changes in income are due to variations in velocity resulting from changes in the marginal efficiency of investment or fiscal policy.

The Keynesian theory's results, for purposes of this discussion, can also be described by two propositions. One is that fluctuations in income are to a considerable extent explained by variations in the marginal efficiency of investment and by fiscal policy.² Second, Keynesian theory asserts that, *except in the long run*, an increase in the money stock lowers interest rates, and hence lowers velocity.³

However, for the long run Keynesian theory agrees with the quantity theory in asserting that an increase in the money stock raises money income proportionately. This is so because prices are flexible in the *long run*. If the money stock is increased during a recession, the initial impact will be primarily on output. But sooner or later, either some exogenous shock or the multiplier-accelerator interaction, brings the economy to full employment. When this happens, perhaps in the next cyclical expansion, perhaps only in an expansion several cycles into the future, prices will rise, and will rise by more than they would have had the money stock not previously increased. And, once all the effect of the increase in the money stock is on prices, and none on output, then money income will have risen proportionately to the increase in the money stock.⁴ Thus, if one takes a long enough period the Keynesian theory and the quantity theory agree in their predictions of the effect of an increase in the money stock on money income. But this agreement does not extend to the issue of what factors account for most of the observed fluctuations in income. This is a quite different question and will not be discussed here.⁵

The fact that Keynesian theory agrees with the quantity theory about the effect of changes in the money stock on money income

² The term "considerable extent" is intentionally vague; various Keynesians differ in the relative importance they assign to changes in the money stock, and to other factors in explaining income fluctuations.

³ For a further discussion of the differences between Keynesians and monetarists see MAYER (1975).

⁴ Thus in the FMP model, changes in the money stock are neutral in the long run. (See J. PHILLIP COOPER, 1974, p. 184.)

⁵ But it is an important issue that is too frequently ignored.

in the very long run allows one to view the Keynesian theory as a theory of the transition process, and the quantity theory as a theory dealing with equilibrium positions. This does not mean, of course, that the quantity theory assumes an immediate movement to equilibrium. In the quantity theory too, the initial impact of an increase in the money stock is normally on output rather than prices. Thus Friedman (1971, pp. 30-40) in his discussion of the missing equation suggests avoiding the whole problem of the breakdown of the nominal income increase between output and prices by using the quantity theory to predict only nominal income. But in his empirical work Friedman (1972, p. 15) has argued that while a change in the money stock initially affects output, it has its effect on prices with a lag of less than two years. This estimate fits with his estimate of the interest rate snap-back.

Thus both the quantity theory and the Keynesian theory agree that the initial impact of an increase in the money stock is to reduce the interest rate and raise output, and that the long-run effect is to raise prices. But they disagree on the central issue of how long it takes to reach this long run position. To the quantity theorist the Keynesian model is one which applies to a period so short that it is of little interest, while to the Keynesian the quantity theory applies to such a long run that it is of little interest. It was after all in his discussion of the quantity theory that Keynes wrote his famous "in the long run we are all dead" (Keynes, 1924, p. 80).⁶

How long does the transition period have to be to validate the Keynesian model? This is a hard question to answer, and is obviously a matter of degree; the longer the transition period, the more useful is the Keynesian approach. But one can think of the Keynesian theory in two ways. One is as a guide to policy. For it to be useful in this way the transition period need not be long. Specifically, a Keynesian's belief in the efficacy of fiscal policy need not be seriously weakened if he learns that its effects are reversed within, say three

⁶ Although this formulation applies directly only to the question of the impact of an increase in the money stock on prices, to a considerable extent it also applies to the dispute about the proportion of the income variance that can be explained by changes in the money stock rather than by changes in the marginal efficiency of investment or by fiscal policy. Since money is a stock variable growing over time, while changes in the marginal efficiency of investment or in fiscal policy are sometimes positive and sometimes negative, changes in the monetary growth rate surely explain a larger proportion of the income variance in the long run than in the short run.

years. Three years after the adoption of an initially expansionary fiscal policy, its contractive effects may be welcome, and if they are not a new expansionary fiscal policy can be initiated. But Keynesian theory is usually interpreted as more than just a guide to policy; most Keynesians believe that it also provides the best available insight into the macroeconomic nature of a capitalist economy. And for this to be true it must apply to a much longer period. It is with this use, and only with this use, of Keynesian theory that I will deal with here.

Taking the speed with which the economy returns to equilibrium as the central issue in the dispute about the effect of an increase in the quantity of money on income is contrary to a widely accepted view. By what is now a long tradition, comparisons of the Keynesian and quantity theories have usually focused on the interest elasticity of the demand for money. Tobin's famous paper, "Liquidity Preference and Monetary Policy" (1947), is the leading example of this paradigm. However the Tobin paradigm is one in which (usually implicitly) prices are fixed and only output varies. Treating different assumptions about the interest elasticity of liquidity preference as the centerpiece of the Keynesian-quantity theory dispute is therefore only one way of looking at the Keynesian revolution. Soon after the publication of the *General Theory*, classical economists argued that the basis of the Keynesian underemployment equilibrium analysis is to be found in Keynes' assumption of wage inflexibility rather than in his liquidity preference analysis. More recently Friedman (1972) has complained about the Keynesian tendency to take prices as fixed, or to concentrate on the "first round effects" of an increase in the quantity of money. As he has pointed out (Friedman, 1969, pp. 146 and 149):

If interest rates are stable, knowledge of interest rates is not necessary to predict changes in nominal income... Changes in the quantity of money need not affect interest rates, and so rebound on the real sector, if prices react rapidly enough so that there are no changes in the real money stock.

To see how the assumption of complete price flexibility can, so to speak, substitute for the assumption of a completely interest inelastic liquidity preference function in generating "classical" results, consider both the initial and the subsequent effects of an increase in the quantity of money *within the framework of a simple Key-*

nesian liquidity preference function, while maintaining the usual assumption that the interest elasticity of investment is neither zero nor infinite. The initial effect is to reduce the interest rate so that the economy moves down, *along* the liquidity preference curve. But this curve does not stay put; with a lower rate of interest income increases, and hence the (nominal) liquidity preference curve shifts upward again and the interest rate rises. (See Hansen, 1953, p. 140.) But if prices are fixed and output variable, then the interest rate cannot return all the way to its previous level. This is so because if the interest rate were to return to its previous level income would decline again to its previous level, and hence the economy would return to its former liquidity preference curve.⁷ Given price inflexibility, an increase in the quantity of money permanently lowers the interest rate, and raises real income.

By contrast, consider what happens if prices are completely flexible and output fixed.⁸ Assume further, that we have a simple Keynesian money demand function containing only (measured) income and the interest rate. In this case — unless we are in a liquidity trap, or expenditures are completely interest inelastic, an increase in the stock of money *must* result in a proportionate increase in prices with the real interest rate returning to its previous level.⁹ Thus, starting with a certain *real* quantity of money let the stock of real money rise. The interest rate then falls. But the resulting increase in expenditures raises the price level thus reducing the real stock of money and raising the interest rate. This process continues as long as the real stock of money exceeds the initial stock, because at any interest rate below the initial one aggregate demand exceeds the level corresponding to price stability. Hence prices stabilize only when the interest rate is back at its previous level. Since in this model the demand for money depends only on money income and on the interest rate, a return of the interest rate to its previous level implies that money income has changed enough to absorb all the addition

⁷ Admittedly, it might take income some time to return to its previous level because the temporary increase in income might raise the expected marginal efficiency of investment. But these favorable expectations would be disappointed, and hence investment would fall again.

⁸ Since we start from equilibrium, prices, though flexible, are initially stable.

⁹ This is so only because the simple model used here does not have a full scale real balance effect in it. If there is a real balance effect then the equilibrium interest rate may not return to its previous level due to the existence of inside and outside money and government debt. See also ROBERT MUNDELL (1963).

to the supply of money. But, with real income constant, all the increase in income must be an increase in prices. Thus, with price flexibility we obtain the simple classical results despite having an interest elastic liquidity preference function. The price level changes in proportion to the stock of money, while the interest rate is independent of the stock of money.

Putting the point differently, consider a simple Keynesian model:

$$(1) C_r = \psi(Y_r, i)$$

$$(2) I_r = \psi(i_r)$$

$$(3) M = \psi(Y_r, p, i_r)$$

where, as usual, C_r is real consumption, Y_r real income, i_r the real interest rate, M the stock of nominal money, and p the price level.¹⁰ Assume now that M has increased, but that i_r has snapped back. Equation (3) then tells us that either Y_r or p must have risen. But equation (2) tells us that I_r cannot have risen since the interest rate is back at its previous level. And, with I_r constant, and the mpc constant, C_r must be constant as well so that Y_r is constant too. Hence, in equation (3) p must have risen enough to absorb all the increase in M . But in the absence of a money illusion this means that p must have risen proportionately to the increase in M , so that we are back in a simple quantity theory world.¹¹

A way of escaping from this conclusion is to make an allowance for the lags in the investment process (i.e. substituting i_{-1} in place of i in equation 2) so that investment and income are still rising after the interest rate has already snapped back. But this possibility does not provide much of an "out" for the Keynesian system since investment lags are of an order of about two years (Mayer, 1958, p. 370). Another possibility is to add ΔY_r to equation (2), thus allowing for accelerator effects. But this too is not likely to lengthen the time

¹⁰ The use of the real interest rate in equation (3) is a departure from the simple Keynesian model in which money holders can hold only money or bonds. It implies that they can also buy real goods. The implications of the distinction between the nominal and the real rate is discussed below.

¹¹ Or, to rephrase the argument in terms of IS-LM curves, an increase in the money stock initially lowers the LM curve thus reducing the interest rate. But once the interest rate is back at its previous level, then, given an unchanged IS curve, this implies that the real stock of money is back at its previous level so that prices must have risen proportionately to the increase in the money stock.

domain of the Keynesian theory sufficiently to make it more useful than the quantity theory.

Let us therefore see whether the observed rapid interest rate snap-back can be reconciled with the Keynesian model if one replaces the simple Keynesian demand for money function with some alternative ones.

II. Alternative Money Demand Functions

In place of the simple Keynesian money demand function used so far, let us consider the following four money demand functions:

$$(4) \quad M = \psi(Y_p, i)$$

$$(5) \quad M = \psi(W, i)$$

$$(6) \quad M = \psi(Y, W, i); \text{ or } M = \psi(Y_p, W, i)$$

$$(7) \quad M = \psi(Y, i, i_d); \text{ or } M = \psi(Y_p, i, i_d); \text{ or } M = \psi(W, i, i_d)$$

where Y_p is permanent income, W nonhuman wealth, i the interest rate on securities, and i_d the interest rate on deposits.

At first I will assume that: (1) the public is always on its money demand curve, (2) there are no distributional effects, (3) there is no real balance effect, (4) there is no money illusion, and finally that (5) prices are not expected to change. The effect of removing the first two of these assumptions turns out to be minor, and is therefore discussed only in a duplicated appendix available upon request. The effect of removing the other assumptions is discussed below.

Substituting the permanent income demand function for money (equation 4) in place of the simple Keynesian one does not change the conclusions reached in the previous section. Since real income is constant it does not matter whether one uses measured or permanent real income. But if one follows Friedman and evaluates permanent income at « permanent prices » or more generally, if one allows for some lag in the public's price perception, then the price level has to overshoot and rise initially even more than in proportion to the quantity of money. This is so because if the public evaluates its money holdings at a lower price level, rather than at the actual price level, it initially overestimates its money holdings so that it takes a higher price level to bring the money market into temporary equilibrium.

Turning to the Brunner-Meltzer (nonhuman) wealth function, equation (5), it is clearly the price of assets which must rise to allow the interest rate to return to its previous level. The initial decline in the interest rate generates, on conventional assumptions, such an increase in asset prices. To be sure, as the interest rate rises again this effect disappears. But as Zwick (1974) has shown one can generate a longer term effect on asset prices by invoking an accelerator effect. Moreover, even, quite apart from the initial effect of interest rates on asset prices, an increase in the money supply via its portfolio effect, raises asset prices permanently. But note that when wealth prices have risen proportionately to the growth of the money supply, income *may* — but need not — have risen proportionately too. Since income is not included in the money demand function one cannot determine exactly what has happened to it by looking at the money demand function. All one can say is that money income has to rise because, with asset prices having risen, the demand for factors to produce more capital goods has also risen.¹² (There is no reason why this increase in money income need be wholly an increase in prices rather than in real income.) And income can continue to rise for some time after asset prices have risen. Hence, given the (nonhuman) wealth demand function for money the rapid interest rate snap-back does not necessarily imply that the Keynesian transition period is over.¹³

¹² As in TOBIN'S (1961) model the driving force of the economy here is the gap between the price of capital assets and their cost of production. See also JAMES WHITE (1963).

¹³ Since it is plausible that wealth prices (e.g. stock prices) are much more flexible than output prices the observed quick snap-back of interest rates does not, as in equation (4), imply any puzzling conflict with the common observation that output prices are sticky.

It may seem that the Keynesian transition period must be over once the interest rate has returned to its previous level because output is no longer being stimulated by a lower interest rate. But unlike in the usual Keynesian model there is a relative price effect in this type of Tobin model. The price of assets has risen relative to the price of current output and this stimulates current output. (This increase in the relative price of assets is not recorded by the interest rate, as in principle it should be, because the data used to measure the interest rate snap-back are the recorded market rates and do not include imputed rates.)

Although the above discussion is in Keynesian terms the story is similar in Friedman's model. When the money stock changes:

generally the initial effect is not on income at all, but on the prices of existing assets... As people attempt to change their cash balances the effect spreads from one asset to another. This tends to raise the prices of assets and to reduce interest rates which encourages spending to produce new assets and also encourages spending on current services... (FRIEDMAN, 1970, pp. 24-25).

How long the Keynesian transition period lasts after interest rates have returned to their previous level depends upon how long it takes to produce enough capital assets to bring their prices back into equilibrium with the prices of current output. While no reliable information on this is available, it is doubtful that one could justify a, say, ten year Keynesian transition period in this way. Insofar as capital goods producers are unable to meet the demand during the expansion phase of the cycle, they are likely to do so during the next recession.

In any case, this explanation of the rapid interest rate snap-back is open to a serious objection; the empirical evidence suggests that a permanent income demand function for money somewhat outperforms a (nonhuman) wealth function.¹⁴

The next money demand function includes both income and (nonhuman) wealth. Such a money demand function is highly plausible and has received some empirical support.¹⁵ Given this demand function for money, what does the interest rate snap-back imply? One possibility certainly is that both output prices and asset prices have risen proportionately to the increase in the money stock so that the Keynesian transition period is over. But this is not the only possibility. Another is that the price of wealth items, and hence the value of the stock of wealth, may overshoot and rise more than proportionately to the stock of money.¹⁶ If this happens then, at the point where the interest rate has snapped back, the more than proportionate increase in wealth must be offset by a less than proportionate increase in money income, so that the economy is still in a Keynesian transition period with nominal income (and perhaps real income) rising. And there is a reason why the price of wealth items may over-shoot its final equilibrium. This is that the increase in production resulting from the increase in the money stock raises the demand for capital, and hence the price of a major component

¹⁴ See DAVID LAIDLER (1966, p. 55); STEPHEN GOLDFELD (1973, p. 615); RICHARD BARRET and PETER FORMUZIS (1974). It is, of course, true that these unfavorable results for the wealth hypothesis may be due only to our inadequate measures of (nonhuman) wealth.

¹⁵ See GREGORY CHOW (1966) and MARTIN BRONFENBRENNER and THOMAS MAYER (1966). On the other hand, STEPHEN GOLDFELD (1973) has found that, at least for quarterly data, the inclusion of a (nonhuman) wealth variable in addition to income lowers the predictive ability of a money demand function slightly, though it slightly improves its fit over the sample period.

¹⁶ The physical stock of wealth does not, of course, rise by much in the short period before the interest rate has snapped back.

of the stock of wealth. (Cf. Burton Zwick, 1974.) Thus, given a money demand function including both (nonhuman) wealth and income, the snap-back of interest rates does not *necessarily* indicate that the Keynesian transition period is over. However, as suggested in connection with the previous money demand function, one would not expect the Keynesian transition period to extend *very* long beyond the point at which interest rates have snapped back.

The final money demand function includes a composite deposit rate, i_d . Assume that the deposit rate is a lagged function of the open market rate, i.e. of the rate to which the empirical evidence for a fast snap-back refers. If so, then when the open market rate has snapped back the deposit rate is still below its previous level. Hence, more money is demanded at each level of income, and the snap-back of the market rate occurs before income has risen proportionately to the increase in the money stock. In other words, given this money demand function, the empirical evidence on the rapid snap-back of the interest rate is misleading because it looks at only one of the relevant interest rates, and ignores deposit rates.¹⁷

Thus, of the various money demand functions considered here only those which exclude wealth, and the deposit rate, imply that the Keynesian transition period is necessarily completed when the market rate of interest has snapped-back. But this defense of the Keynesian model is open to the criticism that, while it leaves a larger scope for the Keynesian transition period than the rapid interest rate snap-back seems at first to imply, it *may* still be a very limited scope. As suggested above, neither one of the wealth models can be interpreted with any degree of confidence as supporting a Keynesian transition period longer than a single business cycle, and the transition period they suggest *may* even be substantially shorter than that.

¹⁷ An alternative version of equation (7) uses the yield on equities in place of the deposit rate. However, the empirical evidence suggests that stock yields do not lag behind the long term rate when the money stock is increased. See MICHAEL HAMBURGER and LEVIS KOCHIN (1972, pp. 241-242).

DONALD TUCKER (1969) in his criticism of Cagan and Gondolfi's argument that one can measure the lag of monetary policy by the snap-back of interest rates used a money demand function employing the distinction between permanent and measured interest rates and income. This demand function is discussed in a duplicated appendix available upon request. To be sure, there are other possible money demand functions one could write, but the ones considered here are quite comprehensive since they include measured income, permanent income, (nonhuman) wealth, market rates, and deposit rates. Two other variables which one might want to include in a money demand function, real balances and price expectations, are discussed below.

This leaves the last money demand function embodying the deposit rate. Unfortunately, the information on the lag of the composite deposit rate is conflicting. Thus, Scadding (1974, p. 31) found that the time deposit rate lags nine years behind the open market rate. On the other hand, Hendershott (1968, p. 52) estimated that banks close 13 per cent of the gap between the current and the desired deposit rate each quarter, which implies that after three years four-fifth of the gap has been closed. And Slovin and Shuska (1975, ch. 7) found only a two to four quarter lag for commercial banks and a four to five quarter lag for Savings and Loan Associations and mutual savings banks. Hence, it is far from clear that the introduction of deposit rates can save the Keynesian model. Let us therefore see whether the removal of the special assumptions made so far helps.

III. The Real Balance Effect

The real balance effect suggests that the time at which the interest rate has snapped back should not be taken as necessarily indicating the time at which money income has risen proportionately to the increase in the money stock. Only if all money is outside money (or if Pesek and Saving are correct, and inside money is fully wealth) and if, in addition, there are no government bonds outstanding (or if there is no taxpayer illusion at all), or if government bonds exactly offset inside money, then and only then, does an increase in the money stock leave the equilibrium interest rate unaffected. But if there is inside money (which is not fully wealth), and no government bonds, then the new equilibrium interest rate will be above, or below, its previous level depending upon whether the increase in the money stock raises or lowers the ratio of inside to outside money. If there is *some* taxpayer illusion the effect of introducing government bonds is to cause income to rise *less* than proportionately to the increase in the money stock, and to cause the equilibrium interest rate to fall.¹⁸

Thus when one makes a distinction between inside and outside money, and introduces (not fully discounted) government bonds, one cannot say whether the equilibrium interest rate is raised or lowered

¹⁸ ROBERT MUNDELL (1963, pp. 280-284) has pointed out another way in which anticipated inflation reduces the equilibrium interest rate. However, so far it is assumed that the inflation is not anticipated. See also ANTHONY SANTOMERO (1973).

by an increase in the money stock, and whether equilibrium income rises more or less than proportionally to the increase in the money stock. Suppose that the equilibrium interest rate is raised; if so, the point at which the interest rate snaps back to its previous level on its way to its new higher equilibrium level is not yet the point at which income has fully adjusted. Conversely, if the equilibrium interest rate falls, then income adjusts before the interest rate has fully snapped back, and in fact a complete snap-back has to be explained by some extraneous factor or by overshooting.

IV. Money Illusions

If there is a money illusion in the liquidity preference function then there is another reason why the interest rate snap-back need not coincide with income having reached its new equilibrium. If the money illusion takes the form of the public wanting to hold more real money when prices are higher, then, as prices rise, the real demand for money increases, and hence interest rates rise and reach their previous level while income is still below its new equilibrium level, that is, the level it will reach when the money illusion wears off. Conversely, if the money illusion reduces the real demand for money, the interest rate snap-back occurs only after the money illusion has disappeared which is after income has reached its new equilibrium.

There is an extensive literature suggesting that there is a temporary money illusion in the labor supply function (e.g. Phelps, 1970). Such a money illusion leads to an increase in real output (even at "full employment") if the quantity of money is increased (Rasche, 1973). As a result both income and the interest rate overshoot their equilibrium level, and it is not clear in this process which of them first reaches its new equilibrium level.

But while there is little information on the length of time over which a money illusion persists one may well doubt that there is a significant money illusion over a time span long enough to represent a useful Keynesian transition period.¹⁹ In any case, the type of transition period implied by money illusion is quite different from the Keynesian transition period.

¹⁹ Thus, BRANSON and KLEVORICK (1969) found a money illusion with a lag of less than two years.

V. Flexible Price Expectations

Let us now drop the assumption that the public, while aware of the price increases that have actually occurred, does not expect any further price rises. Dropping this assumption allows one to view the snap-back problem in a way essentially different from Friedman's. While Friedman allowed for the price expectations effect, i.e. the "Fisher effect", he described this effect as "slow to develop",²⁰ and hence analyzed it as essentially subsequent to, rather than as part of, the snap-back process.

The previously reached conclusions now have to be modified in a major way; the nominal rate of interest can no longer be identified with the expected real rate. This is important because the observed snap-back phenomenon is a snap-back of the nominal rate, and not necessarily of the expected real rate.

The distinction between the nominal, and the expected real, rate can be introduced in either of two ways. One is to work with the traditional Keynesian model in which people choose only between bonds and money. Since money and bonds are affected equally by purchasing power risk, inflationary expectations are irrelevant for this choice, and hence what enters the demand for money function is the nominal, and not the real, interest rate. However, what is relevant for the investment equation is the real rate of interest. Hence, if there are inflationary expectations the previous nominal rate is no longer an equilibrium rate. Firms, perceiving the real rate as lower, increase investment. The point at which the nominal rate has snapped back to its previous level is therefore of little significance, and more specifically, it does not signify the end of the Keynesian transition period.

An alternative is to allow wealth holders a broader menu of assets, so that they are not limited to holding either money or bonds, but can hold equities instead. This is the case in Tobin's neo-Keynesian model as well as in the quantity theory where the transmission process does not work only via the bond market. In this case the interest rate which enters the money demand function is a

²⁰ MILTON FRIEDMAN (1968, p. 6). On the other hand, PHILLIP CAGAN (1972) makes some allowance for the operation of the Fisher effect prior to the snap-back of the nominal interest rate, and states that this speeds up the process.

real rate. Hence, once again, the point at which the nominal rate has snapped back is not relevant to determining the length of the Keynesian transition period.

What is relevant is the time at which the *expected real* rate has snapped back. This will correspond to the time at which the nominal rate has snapped back only if the public expects prices to be constant in the future. And this is certainly one polar possibility. And it is this polar case which is *implicitly* assumed by anyone who asserts that income has reached its new equilibrium when the nominal rate has snapped back. The opposite polar case is one in which price expectations change immediately so that the expected real rate has snapped back only when the new nominal rate is equal to the old nominal rate plus the inflation rate. In this case — or in an intermediate case — the snap-back of the nominal rate does not imply that income has reached its new equilibrium.

The question therefore arises how long it takes for expectations to adapt to the inflation rate. It is tempting to use the long lag in the Fisher effect as evidence of a slow adaptation of expectations. But this is misleading. Discussions of the Fisher effect generally assume that the only reason the real rate is lowered by inflation is that price expectations are slow to adapt.²¹ This *assumes* that were it not for the expectational lag the real rate would have snapped back immediately. But this assumption is precisely what is at issue here. It is certainly *possible* that during an inflation following upon an increase in the money stock, expectations adapt rapidly, but the real rate is depressed by the increase in the quantity of money during a long Keynesian transition period.

However, some direct evidence on the lag of price expectations is available. Stephen Turnovsky (1970), using Livingston's data on the price expectations of (mainly business) economists, found that in the 1950's price expectations showed some, but only quite limited, correlation with actual price changes six months or a year earlier. This would support the use of the nominal rate, rather than the real rate in measuring the snap-back of interest rates. But from the early 1960's to the end of that decade this relationship was much closer. However, Feldman (1974), using different price expectations data, found that the nominal rate adapted quickly to price expectations.

²¹ For a notable exception see THOMAS SARGENT (1973).

Moreover, this was true for both the 1955-63 and the 1963-71 periods. This suggests that the rapid snap-back of the nominal rate also implies a rapid snap-back of the expected real rate.²²

VI. Conclusion

This paper started out with the proposition that the empirical evidence on a rapid interest rate snap-back implies the invalidity of the Keynesian theory by showing that the Keynesian transition period is very short. I then looked at various ways in which one could avoid drawing this conclusion even if one accepts the proposition that interest rates snap-back rapidly. My first step was to substitute various other money demand functions for the simple Keynesian one. Using wealth as the scale variable in place of, or in addition to, income justified a longer Keynesian transition period, but it is quite doubtful that the transition period it justifies is long enough to give much support to the Keynesian model. However, *if* the composite deposit rate lags very substantially behind market interest rates, and is important in the money demand function, then this would support a long Keynesian transition period. But the evidence on whether the deposit rate does have a long lag is mixed.

The next step was to remove the special assumptions made in the previously used simple model. Ironically, introducing the real balance effect supports the Keynesian model against the attack discussed here, though, of course, it weakens it in other ways. Allowing for flexible price expectations, and hence differentiating between the snap-back of the nominal and the expected real rate provides another *possible* way of maintaining Keynesian theory, though the limited empirical evidence that is available does not support this argument.

Beyond this, the Keynesian model can be defended by challenging the empirical evidence for a fast snap-back of the nominal

²² An Australian study found a fairly short lag (about two years) in the formation of price expectations. However, a number of other variables entered the regression and since they *may* be affected by the inflation rate with a long lag, the total lag may be considerably longer. See P. D. JONSON and D. M. MAHONEY (1973). A study of German expectations found a significant effect for price changes during the preceding quarter, although the Durbin-Watson statistic was bad. (See ADALBERT KNÖBL [1974, pp. 90-91].) However, this would not prevent earlier price change terms from being significant too.

rate. Specifically, Keynesians can raise the issue of single equation bias. Moreover, they can argue that what is observed here is the result of a complex oscillation of the LM curve, perhaps due to lags in the money demand function. Hence, eventually, beyond the 13 quarter period discussed by Cagan and Gondolfi interest rates *may* again decline. Thus what appears to be an anomaly for the Keynesian model may simply be a statistical artifact.

Or else, Keynesians could concede one aspect of the debate, and agree that changes in the money stock result fairly quickly in proportional changes in the price level, while continuing to argue that variations in the marginal efficiency of investment and in fiscal policy account for much of the actually observed fluctuation in money income. In addition, as pointed out above, even if interest rates snap back rapidly Keynesian theory can still be used as a guide to some policy issues, e.g. the use of fiscal policy, rather than as a way of viewing the way the economy functions.

Thus — not very surprisingly — this essay does not reach a firm conclusion on the validity of the Keynesian model. But it does set out some of the empirical issues on which Keynesians should focus their attention. Merely showing that the demand for money has some interest elasticity no longer suffices to meet the quantity theory's challenge.

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