11-1999

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Published In
The International Economy.

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Advice to the
Bank of Japan:
Consider the
Federal Reserve’s
experience with
monetary policy at
zero inflation earlier
in this century.

Liquidity Claptrap

BY ALLAN H. MELTZER

Economists are rarely satisfied with evidence that something works in practice. They tend to be more interested in whether it works in theory. In the case of monetary policy at low (or zero) inflation, the now famous theoretical conjecture is John Maynard Keynes’s claim that when inflation is low and market interest rates are below 2 percent, monetary policy might be incapable of changing the interest rate, price level, or any other relevant variable.1 He gave the problem a name, liquidity trap. Paul Krugman and Takatoshi Ito conjecture that Japan is now in a liquidity trap, because short-term interest rates are near zero.2 Larry Summers argued a related proposition—that zero inflation is socially costly because it sets a lower bound for nominal interest rates.3 Monetary policy becomes ineffective: It cannot lower the short-term nominal rate or prevent falling prices from raising the real rate of interest. With money wages less than fully flexible, unemployment rises. The central bank is powerless to lower the short-term nominal interest rate once it reaches (or approaches) zero.

These conjectures arise in models with a single interest rate where bonds and capital are perfect substitutes. Many years ago, Karl Brunner and I presented a theoretical argument showing that a liquidity trap cannot occur if there are three distinct asset types—money, bonds, and capital.4 In this model, bonds and capital are not perfect substitutes. Instead of repeating that rather complicated analysis, I will make a general argument and present some evidence from past periods of deflation—periods in which prices fell. Two of these periods had interest rates close to zero. These are the only periods with market interest rates near zero in U.S. history.

We can see the issues at work by turning to a practical problem—the ongoing mild deflation and recession in Japan. Suppose that with its short-term interest rate at zero, the Bank of Japan an-

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nounces that it wants the dollar exchange rate to fall by 25 percent and that it will print yen to buy dollars until that occurs. Does anyone doubt that the yen would depreciate or that the depreciation would affect spending, output, and prices in Japan?

Suppose, instead, that the Bank of Japan makes no announcement but buys dollars with the intention of depreciating the yen by 25 percent. There may be differences in the timing of responses, but the ultimate effect would be the same: Monetary expansion would affect the economy. There would be no liquidity trap, whatever the short-term interest rate in the market in which the central bank usually operates.5

Two questions occur. First, how can we reconcile our standard assumption that all assets are close substitutes with this obvious contradiction? Second, does this argument imply that a liquidity trap is impossible in a multi-asset world?

The liquidity trap, by assumption, makes short-term Treasury bills (or similar security) a perfect substitute for base money or bank reserves. Exchanging one for the other does nothing of interest. By assumption in standard models, bonds and real capital are perfect substitutes, so all assets are now perfect substitutes. Exchanging either money or Treasury bills for some other asset such as foreign money, domestic or foreign long-term bonds, equities, or commodities cannot change relative prices and real wealth. In this hypothetical case, base money plus bills is a composite good. The composite good is a perfect substitute for other assets, so increasing either money, bills, or both, has no effect.

These assumptions raise a critical question. If all assets are perfect substitutes why do we use a medium of exchange? Why is there money? My answer is that in a world without transaction and information costs, where all assets are perfect substitutes, either all assets are money or, equivalently, there is no money. This world is a useful abstraction for many purposes, but it interferes with carefully considering the practical issue of a zero interest rate. If assets other than bills and money are not perfect substitutes for money, a liquidity trap means only that one row and one column in the matrix of asset returns has been eliminated. All other returns remain non-zero. Monetary policy remains effective if the central bank buys (or sells) any asset that does not have a zero yield. Assets with zero yield are part of the composite good.

Changing one assumption removes the theoretical basis for a liquidity trap. The changed assumption could be that bonds and real capital are not perfect substitutes as in Brunner and Meltzer or in James Tobin.6 Or, the change could be that foreign assets are not perfect substitutes for domestic assets, as in McCallum.7 If uncovered interest rate parity does not hold in the short-run, expected exchange rates do not keep expected returns to foreign and domestic assets equal. The empirical foundation for removing either of these assumptions seems strong for periods during which economies are in transition from one long-run equilibrium to another. Information costs are high under these circumstances. In the case of interest parity, most studies reject it empirically. I suspect the costs of information are a main reason for rejection.

Summers revived the argument that a zero inflation target is socially costly because it sets a lower bound for nominal interest rates.8 A more sophisticated version of Summers’ argument uses a stochastic model with non-linearity in the transmission process when inflation is below 2 percent. Athanasios Orphanides and Volker Wieland find that there is no evidence of an operative lower bound in U.S. postwar data.9 They claim that the lower bound was in effect during the 1930s, so monetary policy was useless for part of that decade.

As noted earlier, several periods in the nineteenth or twentieth centuries had falling prices, nominal interest rates near zero, or both. I have chosen three periods from the twentieth century after Congress established the Federal Reserve. Aside from the 1929-33 depression, these are the only periods of deflation, and they differ from the 1929-33 depres-
sion in that falling prices helped to end each of the recessions. I also briefly discuss why the 1929-33 decline persisted.

HISTORICAL EVIDENCE

In each of the examples I consider, prices fell raising real interest rates and real money balances through most or all of the recession. Expansive fiscal actions in each episode were usually modest or absent. Two of the recessions are considered severe according to rankings by the National Bureau of Economic Research. In each case the economy recovered, and two of the three recessions were of no more than average length.

The common feature that is relevant for the current discussion is that real money balances and real interest rates rose together. In each case there was a common cause: prices fell. In some cases gold inflows or Federal Reserve actions increased the monetary base; in other cases, the monetary authorities were passive or restrictive through most or all of the recession. Differences of this kind are of secondary importance in the three examples but not in the great depression. The dominant, common impulse in the three examples was deflation.

Two of the three episodes share a second relevant feature: The nominal interest rate on short-term Treasury bills was historically low. During the 1948-49 recession, the rate on Treasury bills was about 1 percent. In 1937-38, bill rates were close to zero. In the third case, 1920-21, short-term nominal rates remained well above zero, but deflation was sharp and severe, so real interest rates and real money balances rose together.

1937-38

The National Bureau ranks the 1937-38 recession as the third most severe recession in the years after World War I. Real GNP fell 18 percent and industrial production 32 percent in the thirteen months from May 1937 to June 1938. Unemployment reached a peak of 20 percent, not very different from the 25 percent peak in 1932.

The probable causes of the recession included both fiscal and monetary actions. There was a large reduction in the government deficit in 1937 and a large reduction in growth of the monetary base. The main fiscal actions were the end of the soldiers' bonus payment, the enactment of a small excess profits tax to pay for part of the bonuses in fiscal 1937, and the start of social security tax collections in fiscal 1936. The soldiers' bonus was the largest item, $1.7 billion of current spending. It was paid in June 1936, in time for the election later that year. The bonus was paid in bonds, but the bonds could be sold for cash. By December 1936, $1.4 billion had been cashed. Gordon's quarterly data show an 18 percent average rate of increase in real GNP for the last three quarters of 1936.

The most important monetary actions were the beginning of gold sterilization at the end of 1936 and the second and third increase in reserve requirement ratios in March and May 1937. These increases completed the doubling of reserve requirement ratios between August 1936 and May 1937.

During the entire period from December 1936 to December 1938 that brackets the recession, interest rates on Treasury bills remained between 0.03 percent and 0.56 percent. Long-term nominal rates on Treasury bonds were modestly higher during the recession than before or after, but the difference was small, ranging from 2.55 percent to 2.83 percent.

Annualized monthly rates of price change are consistently negative from October 1937 to February 1938 and intermitently negative for the rest of 1938. To smooth the data, I used moving twelve-month averages of rates of price change. Chart 1 compares the real interest rate to the annual growth of the monetary base.

The common element in the two series is the twelve-month moving average of the rate of price change. The divergence between the two series reflects some release of sterilized gold into the monetary base in September 1937 and a small volume ($38 million) of open market purchases in November, principally for seasonal reasons. Not until February 1938, after nine months of a deep recession, did the Federal Reserve propose countercyclical action and release additional gold from sterilization. In April, the Roosevelt Administration announced $2 billion of additional government spending for construction and relief. As part of this program, the Treasury released another $1.4 billion from sterilization and the Federal Reserve released $750 million of reserves by lowering reserve requirement ratios.

Chart 1 shows the sustained rapid increase in the real value of the monetary base beginning in February 1938. Real fi-
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ent ratio.

1936

1920-21

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nal sales rose in the following quarter, but inventories fell, so real
GNP did not increase until the third quarter.

What does this episode suggest about the influence of mon-
etary policy? In the months preceding recovery, and in the early
months of expansion, the real interest rate rose from 2.9 percent
in January 1938 to more than 6 percent in September through
November 1938. Although nominal rates remained historically
low, real rates were relatively high. In contrast, real money bal-
ances accelerated five months before the end of the recession;
between February and June, growth of real balances rose from
7.6 percent to 17.6 per-

cent. By the end of
1938, growth of real bal-
ances reached an annual
rate of almost 25 percent.

I draw three con-
clusions from the mone-
tary actions of the time.
First, low nominal inter-
est rates misled the Fed-
eral Reserve, on this oc-
casion as on others, into
believing that monetary
policy was expansive.
Second, although short-
term interest rates stayed
at or near zero, monetary
policy was not power-
less. Desterilizing gold
to increase the monetary
base raised nominal and real money balances and increased
spending. Third, the financial system was not in a liquidity trap.
Channels other than the short-term interest rate transmitted mon-
etary expansion to output and the price level.

1948-49

The 1948-49 recession provides a second example rejecting the
liquidity trap hypothesis and the small or vanishing effect of
monetary policy at low nominal interest rates. The Federal Re-
serve pegged nominal long-term interest rates below the 2.5 per-
cent ceiling in effect from 1942 to 1951. Despite the pegging
policy, the monetary base fell through most of 1948. The prin-
cipal reason was that the Treasury used its budget surplus to re-
tire debt held by the Reserve banks. The monetary base fell as
a consequence of the Treasury’s actions. Although the Federal
Reserve complained about being an engine of inflation, prices
fell in half the months of 1948 and 1949.

The National Bureau dates the end of the expansion in No-


During most of the recession, the Federal Reserve was

more concerned about a return of inflation than about the reces-

sion. The nominal rate on Treasury bills remained between
1.02 percent and 1.17 percent throughout the recession.

Chart 2 compares annual growth of the real monetary base
to the real interest rate in the two years that include the reces-
sion. Data are computed as in chart 1. As before, the high pos-
itive correlation reflects the common effect of the rate of price
change on the two series. The high correlation and parallel
movement show that until the recession was almost over in late
1949, the Federal Reserve
took few actions to increase
base growth.

Real base growth fell to
11 percent in September 1948, two months before the
cyclical peak. Theretof
base growth rose, but did not
become positive until April
1949, six months before the
trough. The peak rate of base
growth is close to 6 percent in
August 1949, two months be-
fore the end of the recession.
At that time the real long-
term interest rate was above
5 percent.

Once again, the move-
ment of real base growth is
consistent with the beginning
and end of recession; the movement of real interest rates is not.
Once again, low nominal short-term interest rates do not appear
to have weakened the effects of monetary policy. And once again,
there appears to be more to the transmission process than is con-
tained in standard models with one interest rate and all assets,
foreign and domestic, perfect substitutes.

1920-21

The third episode is the recession from January 1920 to July
1921. The National Bureau ends the expansion in January
1920 and puts the last month of recession in June 1921. The
Federal Reserve undertook larger policy actions, so nominal in-
terest rates and nominal base growth reflect these actions.
Inflationary policies in much of Europe and restrictive policies in
the U.S. brought an inflow of gold. The base and interest rate
changes also reflect these influences.

Nevertheless, real base growth and real interest rates are
positively correlated during the recession. Both are negative at
the start of the recession, turn positive about a year later, and
reach a peak at the end of the recession. Judged by base growth,
monetary actions are countercyclical in the first half of 1921;
judged by real interest rates, these actions are procyclical.
Chart 3 shows these data. The long-term nominal rate remains within a narrow range but is higher at the trough of the recession than at the previous peak. The dominant influence on real rates and real base growth during the recession is the decline in inflation followed by deflation.

As in the previous two episodes, interest rates give a misleading signal about the thrust of policy. Real base growth gives a more correct signal. In this recession, the deflation was severe; the peak annualized rate reached 17 percent, and it was above 10 percent for ten consecutive months. The real long-term interest rate, \( (i-p)/(1+p) \), is above 25 percent at the end of the recession. The economy recovered despite, not because of, the level of real interest rates.

The three historical periods raise doubts about the central role assigned to a single short-term interest rate in the monetary process. They suggest an important role for real balances. I return to these issues briefly in the conclusion.

THE GREAT DEPRESSION

The only other period of large, sustained U.S. deflation after 1914 was from 1929 to 1933, the Great Depression. The real interest rate rose from 5 percent to 15 percent and remained near 15 percent through the last two years of the recession. Real base growth rose once bank runs began late in 1930, but this is, of course, misleading. As Chart 4 shows, growth of real balances—measured here by M1—is very different in this period than in other deflationary periods. The principal difference is that monetary contraction was strong enough to offset the effects of deflation on real balances.

Further, although the economy recovered in 1933, sustained recovery did not begin until 1934. In January 1934, President Roosevelt devalued the dollar against gold by almost 60 percent. Gold flows to the United States rose, increasing the monetary base and the money stock. The main difference between 1929-33 and the other periods is that from 1929 to 1933, the Federal Reserve permitted nominal money growth to fall so much that real balances fell for much of the period despite severe deflation. Once money growth resumed, growth of real balances contributed to a sustained expansion that lasted until the 1937-38 recession discussed earlier.

CONCLUSION

Neither the historical data nor my discussion of the liquidity trap explains the process by which monetary changes affect the price level. The analytic argument tells us only that policy will remain effective at low inflation rates provided all assets are not perfect substitutes. The data suggest that this has been true in the recessions examined. Experiences in 1920-21, 1937-38, and 1947-48 show that expansion of the monetary base in real terms was consistent with recovery in each of these cases, despite high and occasionally rising real rates of interest and, in some cases, a zero nominal interest rate.

The 1929-33 experience is not a contradiction. Quite the opposite. That experience suggests that contractive monetary actions were effective. The price level continued to fall, and the economy continued to contract as money and real balances fell. The economy responded to monetary policy. The policy actions, not the responses, were perverse.

There are two main explanations of the role of money during these (and other) periods. The more familiar of the two is that the change in real money balances measures (approximately) the gap between actual and desired real balances. The economy adjusts to this gap by spending to reduce real balances when larger than desired, or increasing real balances by reducing spending when they are less than desired. This so-called real balance effect is generally considered small. Real balances are a small part of real wealth in developed countries so it would take an improbably large response to support this explanation as the principal explanation of the data.

Alternatively, the gap between desired and actual real balances can be viewed as a measure of the relative price adjustment required to restore full equilibrium. As in Friedman,1 the demand for real balances depends not on a single interest rate but on many different interest rates, or more generally, on the prices of assets relative to the prices of new production of the same assets. These relative prices settle down as the economy adjusts to an equilibrium at which all assets sell at replacement cost. After complete adjustment of the economy, prices of bonds and real capital, domestic and foreign assets, new and used houses and automobiles and many other relative prices can be usefully summarized by a single interest rate. In transitions this is not the case, and as long as it is not, the demand for real balances differs from long-run desired real balances.

Several examples from recent work suggest that many
economists use less than perfect substitution to explain monetary transmission. John Taylor emphasizes the role of exchange rates, Ben Bernanke and Mark Gertler use bank lending, and I have used the relative prices of assets and output and uncertainty about the persistence of observed changes. These factors supplement interest rates in the transmission of monetary and other impulses.

What inference can be drawn from the relation of actual to desired real balances? Lars Svensson and Stefan Gerlach find that this difference is informative for the European Central Bank. But, they say, there is no reason for central banks to set a money growth target. I don’t understand the relation between these statements.

One way to describe part of the central banker’s task is that the central bank seeks to adjust actual to desired money balances. The ratio of actual to desired money balances is a measure of the excess supply of money, the amount by which prices and other nominal variables must change to restore equilibrium in markets for assets and output. Changes in nominal money growth increase or decrease this difference.

Central banks could facilitate this adjustment by changing the short-term nominal interest rate in response to permanent changes in the excess supply of money. As the experiences discussed here suggest, in periods of deflation, persistent changes in money balances have given useful information to help them in their task. At or below zero inflation, as well as elsewhere, the growth of money balances offers useful information to central bankers who pay attention.

A liquidity trap is a theoretical curiosity for a world in which costs of information are zero. In such a world, money would have no role, and central bankers would have other jobs. This audience need not worry about those possibilities. For my part, I worry more about what the data show about central bankers. In the experiences considered, the Federal Reserve was convinced that low nominal interest rates showed that policy was easy. They either did nothing, delayed acting, or allowed nominal money growth to fall. Contrary to the liquidity trap proposition, falling prices (or devaluation of the dollar in 1934) did far more than central bank actions to revive the economy.

7 Brunner and Meltzer, op.cit.
8 Summers, op.cit.