Some Lags in Monetary Policy

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SOME COMMENTS ON LAGS IN MONETARY POLICY

by Allan H. Meltzer

LAGS IN MONETARY POLICY

For almost two centuries economists have recognized that changes in the quantity of money have a delayed or lagged effect on wages, output, prices, or gold flows. Recently there have been a number of attempts to measure some of the lags and to suggest the importance of the lags for monetary policy. I will make no attempt to summarize each of the many studies or to comment on the variety of procedures that have been used to generate particular estimates. Instead, I will discuss some of the main conclusions and their relation to the problem of conducting monetary policy.

The most widely accepted conclusion is that the response of prices, output, or balance of payments — variables that are principal goals of policy — to changes in monetary policy (or for that matter the response to fiscal policy) is distributed over a "long" period of time. This is equivalent to saying that the response within the first month or quarter, and even the first year, is generally thought to be a small fraction of the eventual total or to saying that there is a "long" delay between the time that monetary action is taken and the time that "most" of its effects are felt.

Summary of the Empirical Findings

Once these rather general statements have been made, there are few remaining areas of clearcut or widespread agreement. One of the few is the rather obvious point that the initial effect of monetary policy on short-term interest rates or bank reserve positions is extremely rapid. But between these very short-term effects which are measured in fractions of a day or a week to the effect on gold flows, which Cagan argues takes place over decades, there are about as many estimates as there are
estimators. The results appear to be sensitive to the statistical method chosen, to the definitions used for the variables, and to the implicit choices about causation.

Nevertheless, the opposing viewpoints can be grouped into two categories represented by those who believe that most of the effect on output of changes in the money supply occur within a year and those who believe that most of the effect is felt after a longer period of time. If we ignore, temporarily, measures of the lag between monetary policy action and the components of spending such as purchases of new housing, investment in plant and equipment or inventory investment, we can group the principal views about the lag between money and output as in Table 1.

**TABLE 1**

Some Measures of the Length of the Lag in Monetary Policy

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Findings</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friedman</td>
<td>At the peak 6 to 29 months - average 16 months At the trough 4 to 22 months - average 12 months</td>
<td>The lag is long and variable</td>
</tr>
<tr>
<td>Culbertson</td>
<td>3 - 6 months</td>
<td>Lags are short</td>
</tr>
<tr>
<td>Kareken and Solow</td>
<td>At most 3 months</td>
<td>This lag is short, but this is an inappropriate way to measure the lag</td>
</tr>
</tbody>
</table>

Each of the three investigators used different measures of money and output, a point which is important because the purpose of the Kareken and Solow measure was to show that Friedman’s estimate was not only inaccurate
but fallacious. They concluded that his result was based wholly on his comparison of peaks and troughs in the level of output with peaks and troughs in the rate of change of money. As noted in Table 1, they did not think that their own procedure was a useful way to measure the lag. It was designed to show only that a comparison of turning points in money with turning points in output would show results substantially different from Friedman's.

The conclusion that the lag is long is reached in most of the large and growing list of studies that purport to measure the lag in monetary policy by estimating how long it takes the demand for money to return to equilibrium once it has been displaced. These studies are relevant to the discussion, if we interpret the results as saying that monetary policy has had its full effect when equilibrium is restored. Prices, output and interest rates have then adjusted to positions at which the public is willing to hold the nominal quantity of money at the new levels of interest rates, prices and output. On this interpretation, it takes about four or five years before most of the effect of monetary policy has been achieved.

The estimates of a four to five year or longer lag, and the related conclusion that monetary policy has a small effect in the first year, depend on the use of measurement procedures and a line of reasoning that I find difficult to accept. Virtually all of the studies I have seen force output and interest rates to affect the amount of money demanded with an identical lag and include as part of the lag the adjustment of prices to changes in output. In fact, prices may not begin to adjust until long after output, interest rates, and the quantity of money demanded have
completed a substantial part of the initial adjustment to monetary policy.

In short, these studies do not measure the lag that is of principal interest for policy making, so that even if the results are unaffected by the statistical properties of the estimating methods, we cannot conclude that the lag in monetary policy is as long as these studies suggest. Or, to put the same point in another way, we cannot conclude on the basis of these studies that the initial effects of monetary policy on output and interest rates are as small or as long delayed as the studies suggest.

One cannot conclude from Table 1 that we have the usual case of Friedman and one or two allies against almost everyone else. Having shown that Friedman's findings of a long and variable lag are incorrect, Kareken and Solow go on to show that the lag is long and variable. These conclusions are based on their preferred procedure, the investigation of the lags in adjustment of various components of output. Monetary policy is viewed as having an immediate impact on net reserves and short-term interest rates. These, in turn, affect the components of spending either directly or by changing intervening variables such as new orders for capital equipment. Their tentative estimates of the average length of time that it takes for some of the effects to become evident is shown in Table 2.
TABLE 2

Kareken and Solow's Estimates of the Timing of Responses to Monetary Policy

<table>
<thead>
<tr>
<th>Variable Affected</th>
<th>(1) Proportion of the Total Effect</th>
<th>(2) Number of Months required to achieve the proportion in (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Equipment</td>
<td>17%</td>
<td>3</td>
</tr>
<tr>
<td>(assuming the full immediate effect on new orders*)</td>
<td>30-31.5%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>40-44.5%</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>50-55.7%</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>57.4-65.2%</td>
<td>15</td>
</tr>
<tr>
<td>Inventory Investment</td>
<td>16-21%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>35-42%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>52-56%</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>67%</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>75%</td>
<td>15</td>
</tr>
<tr>
<td>Total Bank Reserves</td>
<td>83-86%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>89-98%</td>
<td>2</td>
</tr>
<tr>
<td>Interest Rates on Bank Loans</td>
<td>25%</td>
<td>6</td>
</tr>
</tbody>
</table>

* Their estimate of the effect on new orders suggest that 45% of the adjustment takes place in the first quarter after the policy change and 90% occurs within one year. The percentages in column (2) would have to be adjusted to obtain the correct distribution of the response to monetary policy.

Kareken and Solow introduce a large number of qualifications to these findings, so there is little reason to discuss the particular results in detail. The main points to be noted are (1) that banks fully adjust their reserves to changes in monetary policy within one quarter while most other adjustments take substantially longer and (2) that the estimates of the lags are not constants but depend on the way in which they are measured and on...
assumptions about the way in which the economy operates. Kareken and Solow are quite explicit on the latter point. They note repeatedly that the estimate of the lag varies with the particular assumptions made about the determinants of inventory investment, capital expenditure, etc.

The Importance of the Lag for Policy

The fact that economists attempt to measure the lags and argue about their length indicates that there is now much more agreement that monetary policy has some affect on economic activity than there was at one time. However, the lag studies open a new question of interest, whether or not the existence of a long delay in the effect of monetary policy on output or its components improves or worsens the success of efforts to promote full employment and price stability by monetary policy. On this issue there are two divergent views which I will state simply, at the risk of removing much of their content.

One view is that a long lag allows ample time for the correction of errors. Since long lags mean relatively small initial effects, errors due to misinformation, changing conditions, or misinterpretation of prevailing conditions can be largely or completely offset by policies that push the economy in the opposite direction. Since monetary policy operations generally aim for small or marginal effects, long lags help to avoid serious errors. This argument would be more persuasive if the lag were constant or nearly so. By improving forecasts and methods of forecasting, most of the problems created by a long lag could be avoided if the lag remained constant. However, the evidence suggests that the lag is not constant, but variable, so we cannot accept the measures of length without keeping in mind that the length is subject to change. For example, if the Kareken and Solow estimates of
the response in inventory investment is adjusted for the variability of the lag, their finding that on the average 24% of the adjustment occurs in the first quarter is changed to a range of 14-33%, and their average of 67% in the first year becomes a range of 45 to 80%.

Those who have generally taken the second view, that long lags increase the problem of discretionary monetary policy, frequently start from findings such as those I have just cited which suggest that the lag is highly variable. The essential point in this position is that frequent changes in the direction of policy cannot be expected to offset one another. Instead, the changes may — and often will — increase the variability of income, cumulate for a time and thus increase the extent to which there is inflation or deflation, or produce other undesirable effects.

To pursue this line of discussion in more detail, I will briefly discuss some reasons why the lag is variable and comment on the findings about its length. I will then offer some suggestions designed to reduce the variability and the length of the lag and thereby increase the effectiveness of monetary policy.

The Effect of Policy on the Lag

Before turning to those topics, let me note that we have equated the lag, or delay, in the effect of monetary policy with the time that elapses before a substantial part of the effect of monetary policy is observable. Most recent discussions of lags in either monetary or fiscal policy have started by assuming that there are two other lags. The first is called the recognition lag, the length of time it takes for policy makers to
recognize that changes in policy are desirable. The second, or action lag, represents the delay between the recognition of need for action and the time action is taken. In the Kareken and Solow study, these two lags are grouped under the name "inside lag", and the lags we discussed a moment ago are called "outside lags." I will not dwell on this distinction because it appears to be unimportant. My studies with Brumer suggest that the lag between the recognition of the need for action and the time that the Federal Reserve takes action frequently is so small as to be inconsequential, at least in the postwar years. The more important question for policy is whether the Federal Reserve, having recognized the need to take action, has moved in the appropriate direction. This raises the question of how the Federal Reserve decides whether it has moved to a somewhat easier or somewhat tighter position and reopened the question of how "tighter" and "easier" are measured.

To make the discussion less complicated I will equate monetary policy actions with changes in the monetary base, defined as bank reserves plus currency held by the public. By this choice I have included in policy action all acts of commission, for example decisions to buy or sell securities in the open market, as well as decisions that permit the monetary base to change because of gold movements, changes in the Treasury balance, or any of the so-called non-controlled factors that affects the size of the base. This is not to suggest that the Open Market Committee attempts to control the base, only that whatever is chosen as the current target of monetary policy — interest rates, bank borrowing, free reserves, or total reserves — monetary policy will affect the monetary base. And since the base is the most important determinant of the money supply and bank credit and an important
determinant of market interest rates, the direction of changes in the base indicate the direction in which the money supply, bank credit and interest rates will be moved by policy action.

At this point, we come to the first lag of any consequence, the lag of the money supply, bank credit or interest rates behind monetary policy actions. The year 1960 provides an excellent illustration of the way in which the choice of indicators and the length of the lag are related. The Open Market Committee recognized the need for a more expansive monetary policy as early as the meeting of March 1st, i.e. at least two months before the cyclical peak. The decision "to supply reserves to the banking system somewhat more readily" was reviewed at each subsequent meeting during the year. Free reserves rose by more than $1 billion in the course of the year, but the growth rate of the base slowed until late in the year and the economy headed into recession.

The evidence for the period since 1919 suggests that 1960 is not a unique example. During mild cycles of the type that we have experienced in the postwar years, the growth rate of the base is highest, on the average, near the peak of an expansion and lowest, on the average, near the bottom of the recession. Measured by the growth rate of the base, monetary policy feeds the expansion and increases the severity of the contraction.

The argument can be translated into a statement about the length of the lag by noting two points. First, the length of the lag depends on how the lag is measured, which is another way of saying that it depends on the indicator of policy that is chosen. Second, the use of relatively poor indicators of the effect on output and prices has caused policy to move in the direction opposite to the direction that is desired and desirable. This delays the return to higher levels of employment or increases inflationary pressures,
which is to say that it lengthens the lag between policy and its effect on output and prices.

The reliance on money market indicators in place of indicators of the effect of monetary policy on output and employment has importance also for the variability of the lag. Hence, it is one source of the difficulty in getting adequate measures of length. My work with Brunner suggests that the variability of the lag depends on the way in which monetary policy is conducted. Frequent changes in the direction or size of monetary policy operations, whether for so-called defensive or dynamic reasons, appear to be an important source of variations in the length of the lag. This argument suggests that a steadily maintained policy will reduce the variability of the lag, although it cannot be counted upon to produce a constant lag.

The reason that a more consistent policy will reduce the variability of the lag, but not eliminate it, can be suggested by thinking of monetary policy as producing changes in prices by first changing output. A very expansive policy puts more pressure on output than can be absorbed in a short-time period and leads to price increases for particular commodities. These in turn have an expansive effect on the amount produced and a contractive effect on the amount demanded, so that prices may rise while output grows more slowly or falls. Since variations in the growth rate of output are related to variations in the size of policy operations and variations in output are both a cause and an effect of variations in prices, a more consistent direction for policy would reduce both the variability of the lag and the variability of output.
Let me make clear that I am not suggesting a monistic explanation of
the variability of the lag. Fiscal policy changes, major industrial strikes,
and a variety of other forces are operating. Federal Reserve cannot do very
much to eliminate these sources of variation, and I have ignored them
for that reason. The Federal Reserve can eliminate one important source
of variability by paying much less attention to money market indicators and
much more attention to indicators of the effect of monetary policy on
output, employment and prices.

Some Suggested Changes

My first suggestion for reducing the length and variability of the
lag is to obtain a better measure or indicator of the effect of monetary
policy on economic activity. Our own tentative conclusion is that if full
employment and price stability are the main goals of monetary policy, the
most useful indicator is a weighted combination of changes in the monetary
base, the reserve requirement ratios and the rediscount rate. Whether or
not this is the best indicator, it is a better indicator and would reduce
the length of the lag by reducing the time between turning points in the
economy and the timing of changes in the direction or size of policy
operations.

My second suggestion is that the rate of change of the monetary base
be made more uniform. The reason for this suggestion is that reducing
variations in the base will reduce variations in the money supply and in
the lag between changes in money and their effect on output and prices.
While many of the changes in the base are smoothed or eliminated in the
money market before they can affect output, others remain. Acceleration and
deceleration of output generally have a delayed affect on prices and are a
source of one of the more difficult policy problems — the choice of a
direction for policy when output is falling and prices are rising.

Much of the variability in policy could be eliminated by allowing the
banks to make adjustments in their reserve positions through the Federal
funds market when there are temporary changes in float or in currency, deposit
redistribution between different types of banks, etc.

Let me make clear that I am not suggesting the establishment of a rule.
The Open Market Committee has an excellent record in judging turning points
in economic activity but its choice of money market variables as the indicator
of monetary policy often leads it to believe that its policy is one of
restraint on the economy when it is in fact only restraining the money market.
For reasons suggested above, frequent changes in the direction or size of
changes in the base, contribute to the variability of the lag, the uncertainty
about the timing of the effect of monetary policy, variations in the rate of
change in output and similar problems.

A third suggestion designed to make the effect of monetary policy more
certain and more regular is the elimination of regulation Q. While time does
not permit me to go into the problem at length, it is clear that changes in
Regulation Q have had pronounced effects on the growth rate of the money
supply and have increased the variability of monetary policy and hence the
variability of its effect on output and prices.

While my suggestions do not provide either a measure or a means of
measuring the various lags, they suggest some ways in which the length
and the variability of the lag in output and in prices can be reduced. By removing these sources of variability in prices and output, a contribution can be made toward reducing the size of fluctuations in output and improving the performance of the economy.