Reinterpretations of The Short-Run Demand for Money

Farrokh R. Zand* 

INTRODUCTION

Recently, the validity of the real Chow-type mechanism and consequently the presence of the lagged dependent variable as a short-run determinant of real balances have been questioned in the literature of the demand for money. For example, Coas (1982), Goldfield (1976), Lafrader (1982), and Gordon (1984) have argued that the real Chow adjustment mechanism, though relevant to an individual experiment, does not aggregate behavior. Two alternative views of how the economy as a whole adjusts its cash balances, emerge from this literature.

The first view (Walters, 1965; Coas, 1982; Lafrader, 1982) regards the money supply as exogenous and the price level as an endogenous variable. Accordingly, for an exogenously given level of money, the adjustment of the aggregate cash balances towards the desired level takes the form of a price adjustment. Walters (1965), for example, suggests that the real Chow adjustment model might be interpreted as a price level adjustment in an economy where nominal balances are exogenous. He (p. 346) states "...the government controls, approximately at least, the value of M (nominal money); the future level of (nominal) income are dependent variables." Lafrader (1982, p. 73) states "When it comes to the market experiment the real adjustment model makes more sense because it tells us that real balances, rather than exogenous nominal balances adjust slowly to any disturbances." Endogeneity of real balances itself is explained by endogeneity of the price level. Therefore, according to Lafrader, the slow adjustment of real balances in the short run, for an economy as a whole, can be only explained in terms of price level stickiness and not by the portfolio adjustment costs.

The alternative view (Goldfield, 1976) regards the money supply as endogenous and the price level as exogenous. For a given price level, the adjustment toward desired cash balances takes place through the passive supply of nominal money by monetary authorities. A mechanism of the nominal Chow-type will capture this view. For example, Goldfield (p. 691) states "Although in the previous section and in most of my earlier work I relied on the real adjustment model...I now think it more plausible to use the nominal adjustment model." To apply the nominal adjustment model to the individual experiment is to argue that, if the general price level were fixed, the typical agent will adjust his nominal balances (with some lag) in order to keep his real money balances constant while raising the price level (as well as income and interest rate) beyond his control. However, for the economy as a whole, discrepancies between the desired and actual money holdings caused by changes in the price level can be bridged only if the aggregate nominal supply of money is changed endogenously (by monetary authorities). The presence of the lagged dependent variable on the right hand side can then be explained by the slow adjustment of the money supply.

The alternative explanations given in the literature, however, are hardly more satisfactory than the (real Chow) model they attempt to discredit. Exogenenity of the money supply, as viewed by Lafrader et al., can be valid for fiat and commodity money. Obviously in a world of credit money actions by the monetary authorities are not independent of ongoing macroeconomic conditions. And exogenenity of the price level, on a priori grounds, (as implied by the Goldfield’s mechanism) is even more difficult to defend. In fact neither proposed partial

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* Faculty of Administrative Studies York University North York, Ontario, Canada, MS 1P3

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adjustment mechanism can individually explain the whole story. It is the purpose of this paper to do so by advancing a more general view of how the economy as a whole adjusts its cash balances. This more general view assumes that both the price level and money supply are endogenous. Accordingly, changes in the money stock are a consequence as well as an independent source of changes in the price level. This interdependence has been recently reemphasized by Moore and Chock (1984) in a growing literature on the conduct of monetary policy. In the spirit of this literature, and by allowing for a gradual adjustment of both nominal balances and the price level we derive a general model of which Laidler's and Goddard's are special cases.

At the empirical level, almost all available studies (for example Godfrey, 1976; Helz, 1984; Gordon, 1984; Thornton, 1985; Mackinnon and Milbourne, 1986), using the U.S. data, have examined this issue by adopting a partial rather than the general-view of the adjustment process. The evidence, nonetheless, appears to be mixed. In this paper we subject our general model, via a via, the partial views to empirical tests using Canadian data.

MODEL

Experiment with Exogenous Money Supply

Following Laidler et al., money stock is regarded as exogenous and the price level as endogenous. Here, for the economy as a whole nominal balances are given and thus the adjustment of the aggregate cash balances towards the desired balances takes place through variations in the price level. If the adjustment of the price level is instantaneous, as it is generally assumed in a flexible price model, then the public will be on its long run demand for money function. In the short run, however, the slow adjustment of real balances and consequently the presence of the lagged dependent variable can be explained in terms of price level stickiness. The long run demand for money for a given exogenously determined money supply, in log linear, is as follows:

\[ M^* \cdot P^* = f(\rho) \]

where \( P^* \) represents the logarithm of the target price level consistent with the long run desired level of real balances. The sluggish adjustment of real balances, in the short run, is captured by equation (2):

\[ P_t - P_{t-1} = \mu (P^* - P_t) \]

Substituting equation (2) into (1):

\[ m_\text{t} = M_t - P_t = M_t f(\rho) + (1-\rho)(M_{t-1} - P_t) \]

Here the important point is that the slow adjustment of the price level, \( \rho < 1 \), provides a plausible explanation for the presence of some kind of a lagged dependent variable on the right hand side, which is different from the standard formulations (based upon the real Chow mechanism) in that instead of lagged value of \( M \) its current value appears on the right hand side.

Experiment with Exogenous Price Level

Following Goddard, the money supply is regarded as endogenous and the price level as exogenous. Accordingly, the public adjusts its real money balances through passive supply of money by monetary authorities. This, in turn, equates the nominal supply of money to the aggregate nominal desired demand for money at the price level given exogenously with respect to the nominal quantity of money. In log linear:

\[ M^* \cdot P = f(\xi) \]

where \( M^* \) represents the logarithm of the target (equilibrium) level consistent with the long run desired level of real balances for the economy as a whole.

In the short run, however, the slow adjustment of nominal money supplied by the central bank to the desired level is what pushes the economy off its long run position:

\[ M_t - M_{t-1} = \delta (M^* - M_{t-1}) \]

Combining equation (3), which is essentially a nominal Chow mechanism, with equation (4) gives:

\[ m_t = M_t - P_t = \delta f(\xi) + (1-\delta) M_{t-1} - P_t \]

Here the important point is that the slow adjustment of the nominal supply of money, \( \delta \cdot w \), provides another plausible explanation for the presence of a lagged dependent variable on the right hand side. This is different from the standard real Chow formulation in that the current value of \( p \) and not the lagged value appears on the right hand side.

General Model with Endogenous Price Level and Money Supply

The dichotomy between the alternative views of the exogenous money/endogenous price and the endogenous money/exogenous price is certainly not theoretically satisfactory. Clearly the correlation between money and price as evidenced in the literature does not imply causality. The possibility of one way or the reverse causation is widely accepted. The complex transmission mechanism that lies between money and the price level needs to be explained through a single equation such as (3) or (5). Furthermore, as Moore (1988) points out, exogeneity in control sense is not the relevant test of exogeneity in the statistical sense. On the one hand, in an economy such as the one described by Laidler (1982) the central bank is viewed to control the value of the monetary base and, therefore, the money supply through the purchase or sales of securities in the open market. Here the assumption is that banks respond symmetrically to an excess supply and demand for reserves and that reserves make deposits on the assumption that bank assets are marketable. Thus the money supply is exogenous and the money supply function is vertical. This is what Moore (1988) calls the "Verticalist position". The causality runs in the direction of money to price. But such a view would be valid only for a commodity or fiat money economy, where the nominal supply of money is determined independently of the demand for it, and not for an economy where money is almost entirely credit money. Credit money is different from fiat and commodity money in that the nominal supply of credit money is never quantity controlled because whenever agents desire to increase their money balances they are able to do so, at some price, by increasing their demand for loans. Moore (1990a, P. 88) states that "bank loans are essentially demand determined and non-marketable instruments". Thus there is no reason for the causality to run from the supply to the demand, the direction of causality runs from the excess supply of credit to the money supply.

On the other hand, the Horizontalist view that supply of credit is endogenous does not imply that the price level is exogenous. Endogeneity of the money supply, rather, implies endogeneity of the rate at which central banks supply base money. A justification for Goddard functional form is, therefore, the central bank's use of an interest rate instrument to control money supply. But it is erroneous to interpret the nominal Chow mechanism as the nominal money adjustment equation in an economy where the price level is exogenous. And to argue in favour of causality in the direction from the price level to money stock, as the model implies, is nothing but starting the transmission mechanism in the middle of the thee causal process. That is, the endogenous changes in the money supply can, in turn, be responsible for further changes in prices. Therefore, Goddard view is also flawed.

In this paper, assuming that both variables, the price level and money supply, are endogenous we derive, along the line suggested by Jordan (1984), a general dynamic specification where both variables are regarded simultaneously as the cause and effect, and of which Laidler and Goddard views are two special
cases. In the light of the implied simultaneity, therefore, the estimated equations should be viewed as reduced forms summarising the dynamic of a good part of the economic system and not merely the structural dynamic of the money demand function itself.\cite{35,36,37,38}

\[
M^*_t - P_t = f(y_t),
\]

where \(M^*_t\) and \(P_t\) are the logarithm of the equilibrium levels towards which nominal money and the price level adjust slowly. From equations (2) and (3) we have:

\[
M_t = \delta M^*_t + (1-\delta) M_{t-1},
\]

and

\[
P_t = \mu P^*_t + (1-\mu) P_{t-1}.
\]

To derive the implication of these assumptions for the behaviour of real balances we substitute equations (8) and (9) in equation (7) to derive the following expression

\[
(M_t - P_t) = Z_\delta (x_t) + Z_{\mu} (M_{t-1} - P_{t-1}) + Z_\delta (M^*_{t-1} - P^*_{t-1}) + Z_{\mu} (P^*_{t-1} - P^*_{t-2}) + \epsilon_t,
\]

where \(Z_\delta (x_t) = \delta x_t - (\delta y_t)\) and \(Z_{\mu} (\mu x_t - \mu y_t - \delta (1-\mu) x_t + \delta (1-\mu) y_t\). Here the gradient adjustment of both the price level and the nominal money provide a complete explanation for the partial adjustment of real balances and the presence of the lagged dependent variables. This general expression, however, will be reduced to Laidler specification equation (3), if \(\delta = 1\) and \(\mu = 1\), and to Goddard specification, equation (6), if \(\delta = 1\) and \(\mu = 1\) and to Goddard specification, equation (6), if \(\delta = 1\) and \(\mu = 1\). Therefore, both these cases are special cases of our general model.\cite{39,40}

Evidence

A test of our general specification via a viz the two special hypotheses is simply to estimate equation (10). If the slow price adjustment specification (2) is correct, \((M_t - P_t)\) should be significant and \((M^*_{t-1} - P^*_{t-1})\) should not, and vice versa if the nominal change specification (3) is correct. If our general specification is correct, however, both lagged terms should be significant, in which case the special cases will be rejected for failing to reject the general hypothesis. This test may thus be inconclusive in both cases.

Table 1 presents estimates of equation (10). Using the Canadian quarterly data for the period of 1973-1986 the Ordinary Least Squares (OLS) method of estimation is employed. The test of equation (10) rejects, as indicated by a t-statistic of 26.34 and 3.09, respectively, the null hypothesis that the coefficients of the equations

| Table 1 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Dependent Variable: Real Balances \((M_t - P_t)\) |
| Constant | Income Rate | \((M_t - P_t)\) | \((M^*_t - P^*_t)\) | \(R^2_{adj}\) | D-W | S.E.E. |
| 0.223 | 0.09 | -0.0017 | 0.803 | 0.091 | 1.96 | 0.0042 |
| 0.106 | 0.137 | -0.833 | 2.655 | 0.66 | 2.65 |

Note: t-statistics are in parentheses.

OLS method of estimation is employed.

\[(M_t - P_t)\] and \((M^*_t - P^*_t)\) equal zero. Both lagged dependent variables are statistically significant at the 1% level. Therefore, the results are supportive of our general specification that the gradual adjustment of both the price level and nominal balances, and not just one or the other, is responsible for the presence of the lagged dependent variables on the right hand side. The Laidler and Goddard specifications constrain the adjustment speed \(\delta\) and \(\mu\), respectively, to be equal to one. Because of this, omitted variables, the estimated regression equations will be misspecified and the results obtained this way are usually plagued by serious autocorrelation. Furthermore, our results reject the validity of yet another special case (see equation 12) derived from the real Chow mechanism. Such a specification would constrain the two adjustment speeds to be equal.

As expected, real income has a positive effect and the interest rate a negative effect on the demand for money and they are both statistically significant at the 1% level. The Durbin-Watson statistic indicates presence of no serial correlation of the first order.

The discussion so far has implicitly assumed that inflationary expectations are reflected in nominal interest rates and thus indirectly affect the demand for money. This assumption can be defended on several grounds. For instance, where nominal rates tend to reflect fully expected inflation rates, as is the case under rational expectations, an independent role for the latter in the money demand function cannot be justified. Furthermore, there is convincing evidence that the expected inflation rate, as an independent variable, influences the money demand function under conditions of hyperinflation and during rapid inflations. This is not the case during mild inflations.\cite{41}

One may be concerned about endogenity of \(P\) and \(M\) in estimating equation (10); the OLS method of estimation may not be appropriate as the estimates obtained this way will be biased and inconsistent. The standard procedure, in this case, is to employ the Two Stage Least Squares (2SLS) method. But even this method of estimation may not be quite reliable if the OLS bias is very large (Mackinnon and Millhouse (1964)). Alternatively, one can estimate equation (10) by first treating equations (3) and (5) as the price and the nominal money equations and next solving the obtained simultaneous system of equations for \(M\) and \(P\). Gipping for the latter, we write equations (3) and (5) so that the dependent variable, \(P\), and \(M\), appear on the left-hand side as follows:

\[
P_t = \gamma P_t + (1-\gamma) P_{t-1} + \mu M_{t-1} + \epsilon_t,
\]

and

\[
M_t = \delta M^*_t + (1-\delta) M_{t-1} + \delta P_{t-1} + \epsilon_t.
\]

Now solving for \(M\) and \(P\) we have:

\[
P_t = \gamma P_t + (1-\gamma) P_{t-1} + \mu M_{t-1} + \delta P_{t-1} + \delta P_{t-2} + \epsilon_t,
\]

and

\[
M_t = \delta M^*_t + (1-\delta) M_{t-1} + \delta P_{t-1} + \delta P_{t-2} + \epsilon_t.
\]

A test of our general hypothesis, is again, simply to estimate equations (13) and (14) and to test the restriction they impose. This restriction is that the sum of the coefficients of \(M_{t-1}\) and \(P_{t-1}\) in both equations equals one. This is essentially a test of causality similar to that developed by Granger (1969) which involves estimating an array of equations for each pair-wise test, but is different in that the Granger test assumes that the information relevant to the prediction of the respective variables is contained solely in the data series \(P\) and \(M\) whereas ours include other series contained in \(x_t\). Accordingly, unidirectional causation from \(M\) to \(P\) is implied if the estimated coefficients on \(M_{t-1}\) in equation (13) is statistically significant and that on \(P_{t-1}\) in equation (14) is not, and conversely unidirectional causation from \(P\) to \(M\) exists if \(P_{t-1}\) coefficient in equation (14) is significant and that on \(M_{t-1}\) in equation (13) is not. Feed back is suggested when the coefficients on \(M_{t-1}\) and \(P_{t-1}\) are significant in both equations.

The causality test results, based upon the same sample period, are reported in Tables 2 and 3. As indicated by the t-statistics there is strong evidence for feed back. This confirms our hypothesis that the price level and the nominal money are to be regarded both as the cause and effect. The restriction imposed the
TABLE 2
Regression Estimates of Equation (12)
Dependent Variable: Price level P<sub>t</sub>

<table>
<thead>
<tr>
<th>Constant</th>
<th>Income</th>
<th>Interest Rate</th>
<th>M&lt;sub&gt;4t&lt;/sub&gt;</th>
<th>P&lt;sub&gt;t&lt;/sub&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>D-W</th>
<th>S.E.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.09</td>
<td>-.71</td>
<td>.905</td>
<td>.045</td>
<td>.95</td>
<td>.997</td>
<td>1.85</td>
<td>.004</td>
</tr>
<tr>
<td>(2.09)</td>
<td>(-2.44)</td>
<td>(4.33)</td>
<td>(2.51)</td>
<td>(51.77)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: t-statistics are in parentheses.

OLS method of estimation is employed.

Data are from the CANSIM data tape.

null hypothesis that the sum of the coefficients of P<sub>t</sub> and M<sub>4t</sub> equals one, as indicated by t-statistic 1.66 for equation (13) and 0.3 for equation (14), is not rejected. The Cochrane-Orcutt method of estimation is employed, for equation (13), due to the presence of first-order autocorrelation. With respect to equation (14), however, OLS is used, as the Durbin-Watson statistic indicates inconclusive results. Income is significant and of the correct sign in both equations. The interest rate, however, is significant and of the correct sign only in equation (13).

The test of causality can be alternatively, along the lines suggested by Hetzel (1984) and Mackinnon and Milbourne (1986), implemented by simply estimating the price and the nominal money equation, equations (11) and (12), and testing the restrictions they impose. The results obtained from estimating equations (11) and (12), reported in Tables 4 and 5, reject the Goldfield view of the endogenous money supply/exogenous price level in favour of the Laidler view of the exogenous money supply/endogenous price level. The causality implied is, therefore, from the money supply to the price level. This finding, however, should be handled with care. And this is so because the OLS method of estimation, employed above, can be defended only if exogeneity of the money supply and the price level, respectively, are assumed in the derivation of equations (11) and (12). But if neither the money supply nor the price level can be considered exogenous, as we have argued, then the results reported in Tables 4 and 5 are biased and incomplete, and the causality test conducted this way is invalid since it implies starting the transmission mechanism in the middle of the causal process rather than at the beginning of it. Finally, Chow tests were employed to ascertain whether the money demand equation, as specified by equation (10), (13), and (14), is seasonally stable over the full sample period. Two alternative points were examined: (1) 1974-1975; and (2) 1980-1981, two points of recent

TABLE 3
Regression Estimates of Equation (14)
Dependent Variable: Nominal Money M<sub>t</sub>

<table>
<thead>
<tr>
<th>Constant</th>
<th>Income</th>
<th>Interest Rate</th>
<th>M&lt;sub&gt;4t&lt;/sub&gt;</th>
<th>P&lt;sub&gt;t&lt;/sub&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>D-W</th>
<th>S.E.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.92</td>
<td>.501</td>
<td>-.011</td>
<td>.698</td>
<td>.104</td>
<td>.995</td>
<td>1.78</td>
<td>.018</td>
</tr>
<tr>
<td>(-1.79)</td>
<td>(2.21)</td>
<td>(-1.21)</td>
<td>(6.05)</td>
<td>(2.66)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: t-statistics are in parentheses.

OLS method of estimation is employed.

Data are from the CANSIM data tape.

price level in favour of the Laidler view of the exogenous money supply/endogenous price level. The causality implied is, therefore, from the money supply to the price level. This finding, however, should be handled with care. And this is so because the OLS method of estimation, employed above, can be defended only if exogeneity of the money supply and the price level, respectively, are assumed in the derivation of equations (11) and (12). But if neither the money supply nor the price level can be considered exogenous, as we have argued, then the results reported in Tables 4 and 5 are biased and incomplete, and the causality test conducted this way is invalid since it implies starting the transmission mechanism in the middle of the causal process rather than at the beginning of it. Finally, Chow tests were employed to ascertain whether the money demand equation, as specified by equation (10), (13), and (14), is seasonally stable over the full sample period. Two alternative points were examined: (1) 1974-1975; and (2) 1980-1981, two points of recent

TABLE 4
Regression Estimates of Equation (11)
Dependent Variable: Price level P<sub>t</sub>

<table>
<thead>
<tr>
<th>Constant</th>
<th>Income</th>
<th>Interest Rate</th>
<th>P&lt;sub&gt;t&lt;/sub&gt;</th>
<th>M&lt;sub&gt;t&lt;/sub&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>D-W</th>
<th>S.E.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>.558</td>
<td>-.104</td>
<td>.001</td>
<td>.95</td>
<td>.069</td>
<td>.997</td>
<td>1.89</td>
<td>.004</td>
</tr>
<tr>
<td>(1.42)</td>
<td>(-2.13)</td>
<td>(6.26)</td>
<td>(79.18)</td>
<td>(2.79)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: t-statistics are in parentheses.

CORC method of estimation is employed.

Data are from the CANSIM data tape.

TABLE 5
Regression Estimates of Equation (12)
Dependent Variable: Nominal Money M<sub>t</sub>

<table>
<thead>
<tr>
<th>Constant</th>
<th>Income</th>
<th>Interest Rate</th>
<th>M&lt;sub&gt;4t&lt;/sub&gt;</th>
<th>P&lt;sub&gt;t&lt;/sub&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>D-W</th>
<th>S.E.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.32</td>
<td>.036</td>
<td>-.000</td>
<td>-.0006</td>
<td>.572</td>
<td>.66</td>
<td>2.04</td>
<td>.019</td>
</tr>
<tr>
<td>(1.79)</td>
<td>(1.45)</td>
<td>(-5.02)</td>
<td>(-27)</td>
<td>(6.64)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: t-statistics are in parentheses.

CORC method of estimation is employed.

Data are from the CANSIM data tape.
concern and considerable testing. The calculated F-statistic reported(3) indicate that none of these equations is statistically different over any of the alternative sub-periods considered. The hypothesis of structural stability is, therefore, not rejected.

CONCLUSION

The validity of the real Chow mechanism and consequently the appropriateness of the presence of the lagged dependent variable as a determinant of the short run demand for money have been questioned in the literature. Two alternative interpretations of the money demand equation have been suggested. The first interpretation regards the money supply as exogenous and the price level as endogenous whereas the second views the money supply as endogenous and the price level as exogenous. In this paper we have offered a third view, a general view which regards both the price level and the money supply as endogenous such that the two alternative interpretations are special cases. Here the presence of the lagged dependent variables on the right hand side are explained by the gradual adjustment in both the price level and the nominal money and not just one or the other. Subjecting these hypotheses to empirical testing we find that the Canadian for the period 1973-1986 reject the two special hypotheses in favor of our general specification. This paper is unique in that by advancing a satisfactory theoretical argument it develops a general model which captures the alternative specifications of the short run demand for money in a nested fashion. This is crucial because only in a framework such as ours these specifications can be compared. Furthermore, this study is the first to employ Canadian data.

NOTES

1 The real Chow mechanism is also criticized for assuming that the lagged stock adjustment applies to changes in real income and interest rates, but when the disequilibrium is caused by a change in the price level, the adjustment takes place without a lag.
2 Undistributed terms are added.
3 Wolters has served as an advisor to Margaret Thatcher for many years. Recently, however, the Monetary position of the Bank of England has taken into disfavor forcing the Bank to abandon its policy of broad money targeting. It is interesting to know whether this shift reflects a fundamental change in the views of the authors of this policy or simply a strategic change, based on the wrong choice of the monetary target.
4 This point, that some of the alternative interpretations can appropriately represent the dynamic of the short run demand for money, has also been raised by Thornton (1985). But then he paradoxically, reaches his argument claiming that however, nothing is a statement of his position a "Verticalist" position, and, consequently, is subject to some criticism as the other partial views to this issue.
5 R. W. McKinnon's contribution to this literature is rather lengthy. For example, see Moore, (1979), (1983), (1983a) and (1988).
6 Gordon is the only one who employs a general approach to this issue. His specification, however, is different from ours in that he incorporates Laidler specification along with that of Goldfield (1973) instead of Goldfield (1970).
7 In fact, as Costs (1982) and Laidler (1982) have argued, equation (3) can be regarded as a price equation. This is discussed below.
8 See Moore (1983a) for a detailed discussion.
9 Evidence, as reported by Moore (1983a), indicates unidirectional causality running from basic lending to each monetary aggregate, and from each monetary aggregate to monetary base.
10 To make this more general analysis possible, it is necessary to assume that current nominal GDP is predetermined.
11 Laidler (1982) also refers to the same point, that the short run money function is not a structural relationship, but he bases his argument only on the parameter μ rather than both μ and δ.
12 It is interesting to note that our general specification will be reduced to the standard equation derived from the real Chow mechanism if \( \beta = \frac{1}{\alpha} (1-\beta) \) and \( \rho^2 = \frac{1}{\alpha} (1-\beta) \) for \( \beta = 0 \).
13 For a full discussion of the role of inflationary expectations see White (1978).

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" (1985) "New Price Equation for Real Money Demand Equations on Their Heads!" Discussion Paper #466, Queen's University, Kingston, Canada.

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14 The restriction imposed in equation (11) is the null hypothesis that the sum of the coefficients of \( \pi_1 \) and \( \pi_2 \), equals one, as indicated by a statistic. \( \beta \), is accepted.
15 Our criticism of this method of testing causality has also been slurred by Thornton (1985). Again, he correctly points out that the alternative specifications of the short run demand for money cannot be compared statistically. Our argument, however, may be valid when these specifications are compared in a nonparametric fashion (equations (6)) or (9), in his paper or (7) or (6) in our time. It will not be valid when they are nested, as in the case of our equations (10), (13) (14).
16 We note that in view of the institutional similarities between Canada and the U.S. as well as the observed trends in the context of monetary policy in these countries, particularly between the mid '70s and the early '80s, one may not expect a striking difference between the time series in Canada and the U.S. data.
17 F-tests for null hypothesis that regression coefficients are equal in different sample periods for equations (10), (13), (14), are, respectively, as follows: 1973-1974 vs. 1975-1986: 1.61 0.1 4.8; 1973-1980 vs. 1981-1986: 1.84 .76 1.11
The Market For Indexed Financial Instruments

Eva Marikova Leeds*

INTRODUCTION

The virtual nonexistence of price-level adjusted (indexed) financial instruments has puzzled economists for a long time. Because the benefits of indexed instruments seem obvious, their proponents have blamed their paucity on market imperfections or regulatory obstacles. (See, for example, McCulloch (1985).) Their nonexistence, however, follows from an asymmetry in the economy. While individual agents prefer constant real consumption and thus real income, the economy does not naturally supply it, as the real rate of return on physical assets varies over time. If real income and profits are uncertain, then financial instruments, whose cash flow is derived from the underlying real assets, cannot provide a constant real cash flow. This paper represents an attempt to show that the near absence of indexed financial instruments is a response to this uncertainty.

The next section contains a review of the literature that describes the supply and demand for indexed financial instruments. The reason why monetarists favor indexed instruments while others are satisfied with nominal financial instruments is given in section 3. A basic model is used to show why households or firms do not readily supply indexed instruments. The model is extended to demonstrate that indexed instruments in general provide no clear improvement over nominal instruments. The relationship between real rates of interest on nominal and indexed instruments, which bears on the issue of supply and demand, is examined in the fourth section. The last section contains a summary and conclusion.

LITERATURE REVIEW

The focus of this paper is on the use of indexed financial instruments by ultimate borrowers and lenders. Ultimate borrowers are usually firms and households who supply indexed instruments such as mortgages and bonds. Ultimate lenders demanding indexed instruments are typically households saving for retirement. The government supply of indexed instruments as well as the supply and demand for indexed instruments by financial intermediaries is omitted. (Leeds (1989) describes potential problems of duration-mismatched financial intermediaries when they use indexed instruments.)

Economists usually assume that households desire steady real consumption and income and thus demand instruments that enable them to reach that goal. Because the presumption in favor of indexed financial instruments is so strong, only two papers build a model to study it more closely. Fischer (1975) examines the market for indexed bonds most thoroughly. He assumes that the rate of inflation, the real rate on equity and nominal bonds, and the nominal rate on indexed bonds and equity follow a stationary stochastic process. Fischer derives the demand for indexed bonds from consumer's maximization of expected utility of infinite consumption constrained by stochastic income from the above instruments.

* Franklin and Marshall College, Lancaster, PA 17604. 3003. I thank Michael A. Leeds, Jan Krentzi and an anonymous referee for their comments, and John F. Boehmke and James A. Wilson for their data.