

# AN EXAMINATION OF IMPLICIT INTEREST RATES ON DEMAND DEPOSITS

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## I. INTRODUCTION

This article focuses on various ways that the implicit rate on demand deposits can be measured, and the effects of using these implicit rates in analyzing the demand for money. The presence of implicit payments on demand deposits is a likely result of the competitive nature of the banking system. Deposits are a primary source of funds that banks can use to earn a market rate of return. Competitive pressures should force banks to offer depositors something in return for the use of transactions balances. Since the payment of explicit interest on transactions accounts was forbidden until the introduction of NOW accounts in 1973, and was regulated prior to the advent of "Super NOW" accounts in 1983, banks were forced to compete for all transactions balances in a nonprice manner. This type of competition continues to occur with respect to demand deposits and smaller NOW accounts. Some ways that this can be done is by remitting service charges, providing cash management services at subsidized rates, and giving preferential treatment on loans to depositors.

Since the competition for deposits by the banking system is likely to result in some form of implicit payment, it is important to incorporate this behavior when studying the demand for money. Omitting the implicit return on demand deposits in a money demand equation is likely to result in misspecification, therefore biasing at least some of the estimated coefficients. Potentially, this bias could be serious enough to substantially affect the ability of the equation to predict future money demand. This could lead to the unwarranted conclusion that the demand for money is unstable and that the Federal Reserve should accommodate shifts in the money demand curve when in fact no shifts have taken place.

Another related area where knowledge of implicit interest payments is of importance is in understanding the effects of deregulation in the banking indus-

try. The relative desirability and growth of new types of accounts, such as "Super NOWs," will depend on the advantages they have over existing accounts. This will involve a comparison between the current implicit payments made on demand deposits and the explicit (as well as any implicit) payments accompanying the new accounts.

In order to analyze implicit interest rates and their effects on money demand, three different estimates of the implicit rates on demand deposits are examined. Specifically, the studies of Startz [12], Barro and Santomero [1], and Klein [8] are reviewed. Each of these articles provides very different methods of arriving at an estimate of implicit rates. Startz uses accounting data to calculate a measure of services remitted, while Barro and Santomero use a private survey to derive a marginal rate of remittance. Klein, on the other hand, assumes that banks costlessly evade regulations and pay a competitive rate. Given the differences in methodology, it is not surprising that the actual estimates differ. However, all three estimates are highly correlated and show movements in the same direction. One may, therefore, have more confidence in the way in which implicit rates have changed than in their actual level.

An analysis of the effects of implicit interest rates on the demand for money is also presented. The rate derived by Barro and Santomero performs especially well. The competitive rate calculated by Klein also seems useful although there exist econometric problems in interpreting its effect.

The paper proceeds as follows. Section II discusses the derivation of each of the three implicit rates and indicates some of the problems with each construction. Section III compares the time series properties of the various rates while section IV discusses the use of implicit rates in studying the demand for money. Section V contains a brief conclusion.

II.  
THE CONSTRUCTION OF IMPLICIT INTEREST RATES  
ON DEMAND DEPOSITS

**Startz's Method: The Use of  
Accounting Data<sup>1</sup>**

In an interesting piece of research Startz constructs two basic measures of the implicit rate on demand deposits. One uses Functional Cost Analysis data, while the other uses the reports of income and condition of all insured commercial banks. It is the latter that will be reviewed here.<sup>2</sup>

Specifically, Startz's measure of implicit interest is composed of those expenses incurred in maintaining a deposit account that are not charged to the customer. Since banks are involved in joint production, it is difficult to allocate expenses in an unambiguous manner. To overcome this problem it is assumed that all noninterest expenses are linearly allocated to demand deposits, time deposits, and loans. Further, each activity is assumed to be independent. Expenses are then allocated by the use of a linear regression of net expenses on demand deposits, time deposits, loans, and a constant, where the coefficient on demand deposits has the interpretation of an implicit rate.<sup>3</sup> The regression is depicted by equation (1)

$$(1) \text{ NETX} = c_0 + r_a \text{DD} + c_T \text{T} + c_L \text{L} + e$$

where NETX are total bank expenses net of service charges, DD are demand deposits, T are time deposits, L are loans, and  $e$  is a stochastic error term. The regression is run on a combined time series/cross section data set for each of the fifty states and the District of Columbia over the years 1973, 1974, and 1975. The coefficients on time deposits and loans are constrained to be constant (a constraint that can not be statistically rejected).

Even though this constraint can not be rejected over the period 1973-75, it seems unlikely that  $C_T$  would be constant over the sample period 1954-68. This is because interest rate ceilings that were imposed on time and savings accounts in 1966 were binding over most of the 1973-74 period. Therefore,

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<sup>1</sup>For another excellent example, see Becker [2].

<sup>2</sup>The method using Functional Cost Analysis data was not examined because over time the data are somewhat incompatible due to changes in the sample of banks participating in the survey, and changes in the way that indirect expenses are allocated.

<sup>3</sup>For a more detailed breakdown of net expenses, see the appendix to Startz [12].

these deposits may have been subject to some implicit payment as well. This would make  $C_T$  higher than when interest rate ceilings were nonbinding or non-existent and consequently would bias the estimates of Startz's implicit rates downward over the early part of the sample.

The implicit rate calculated by Startz, RDDS, is obtained by using the estimated coefficients  $C_T$  and  $C_L$  from the regression depicted in equation (1) to impute some of the noninterest expenses to time deposits and loans. Specifically, the volume of loans on the end of year balance sheets of insured commercial banks is multiplied by  $C_L$  and the amount of time deposits is multiplied by  $C_T$ . The sum of these two components is subtracted from net expenses. The remaining amount of expenses is attributed to demand deposits and is divided by the level of demand deposits yielding an average implicit rate. This slightly overstates the average rate since the constant in equation (1) is not actually zero, but small and positive. The results of this procedure, for the years 1954-68, are reported in column 1 of table I. This implicit rate is seen to be neither zero nor is it the equivalent of a competitive rate.

While Startz's procedure is interesting, it does contain a number of conceptual problems, many of which are pointed out by Rush [10]. The major problems involve the use of accounting data. These data are not conceptually equivalent to measures that are economically important. Specifically the data used by Startz underestimate true economic costs since they omit a normal rate of return as an opportunity cost, giving a downward bias to his implicit rate. This opportunity cost is the cost of attracting capital to the bank.

Another equally important point is that the numbers contained in the report of income and condition are incapable of reflecting the extent to which foregone earnings enter the implicit rate. For instance, if a depositor is charged a lower loan rate based on his average demand deposit balances, this would constitute an implicit payment on these balances, but would not be reflected as an expense on the bank's accounts. Therefore, the bank's foregone earnings will not be allocated as part of an implicit rate on demand deposits. As a practical matter Rush shows that this downward bias is important.

Another problem with Startz's procedure is that it uses average costs and therefore produces an average rate of return. In terms of economic behavior it is a marginal rate that is important. That is, individuals will determine the amount of their money holdings in

Table I

	Startz's Rate	Barro and Santomero's Rate	Klein's Rate	RS	RCP
1954	.85	1.50	1.08	2.87	1.58
1955	.91	1.50	1.61	2.94	2.18
1956	.93	1.50	2.57	3.03	3.31
1957	1.04	1.57	2.96	3.26	3.81
1958	1.06	1.57	1.78	3.38	2.46
1959	1.14	1.59	3.12	3.53	3.97
1960	1.27	1.72	2.98	3.86	3.85
1961	1.20	1.72	2.17	3.90	2.97
1962	1.19	1.72	2.43	4.08	3.26
1963	1.23	1.77	2.66	4.17	3.55
1964	1.15	1.80	3.03	4.18	3.97
1965	1.07	1.93	3.40	4.23	4.38
1966	1.18	2.12	4.40	4.45	5.55
1967	1.22	2.26	3.97	4.67	5.10
1968	1.58	2.42	4.72	4.67	5.90

any particular account based on what the next dollar will earn when placed in that account. Therefore, for Startz's measure of an implicit rate to be useful, the average rate must closely approximate the marginal rate of return on demand deposits. This may not be the case especially with regard to individual demand deposit accounts. In many instances the amount of services provided for an account is not directly related to average balances but to the activity within the account. Banks often provide free processing of checks based on a minimum balance or minimum average balance requirement. For accounts meeting these requirements the amount of free services an individual receives depends upon the amount of checks written, and not on the amount of money on deposit. Therefore, although the average return on demand deposit balances is positive, the marginal return is zero.<sup>4</sup>

<sup>4</sup>As the level of market interest rates changes banks seem to respond by changing minimum and minimum average balance requirements, thus changing the point at which demand deposits in certain types of accounts earn a marginal rate of zero. For instance, a prolonged rise in the level of interest rates would prompt banks to change their minimum balance requirements. A marginal rate of zero would occur at a lower level of balances and individuals would hold less money in a demand deposit

Also, since it is the value placed on services that is important, using cost data brings about another problem. This implicit rate can move for two distinct reasons, each of which has a different implication. In one case the implicit rate could rise because more services are being provided free of charge, while in the second case existing services could become more costly. Only in the first case would the depositor place a greater return on the holding of demand deposits.

### **Barro and Santomero's Method: The Construction of a Marginal Remittance Rate**

Another method for constructing implicit rates is employed by Barro and Santomero [1]. By using a private survey the authors are able to obtain the rate at which charges are remitted as a function of

account. One also would expect that measurements of implicit interest rates would rise as well, and that the implicit rate is proxying for this type of behavior. Including an implicit rate might therefore be preferable to omitting it, but it would be better to analyze the relevant factors determining the level of demand deposits directly. Since banks offer a menu of accounts, the optimal procedure would be to analyze each type of account separately. For an example of this, see Boyd [4].

average deposit balances.<sup>5</sup> This rate of remittance can be used to calculate a marginal rate of return on demand deposits since it indicates the rate earned by an extra dollar of demand deposits. Because this rate is a marginal rate and is derived from an actual schedule of remittance it is a valuable contribution to the literature on implicit interest rates.

The implicit rate calculated by Barro and Santomero, RDDBS, is displayed in column 2 of table I. Like Startz's rate, this rate is not zero. Its movement also appears to closely follow the movements in the rate paid on savings and loan shares, RS (column 4, table I). The differential between RS and RDDBS is fairly constant, especially over the latter part of the period when the authors indicate greater confidence in their implicit rate calculations. RDDBS also does not appear to be equivalent to a competitive rate.

A weakness of this approach is that it is limited to accounts in which service charges are remitted as a function of average balances. This practice while common for commercial depositors is not widely used for household accounts. As pointed out by Boyd [4], banks tend to offer an array of accounts that provide services and remit charges in different ways. Some accounts require minimum balances, while others base their remittance of charges on average balances. Some even tie their schedule of services with the holding of funds in other types of accounts.

It may be that the rate calculated by Barro and Santomero is not an exogenous constant from the standpoint of the depositor. The depositor may be able to influence the rate by altering his average balances. (This would be especially true if the remittance rate were nonlinearly related to deposit size.) For instance, once deposit balances have grown to the point where all service charges have been remitted, the return on the next dollar deposited would be zero. However, once a depositor reached this point the bank would presumably reward him in other ways.

<sup>5</sup>Barro and Santomero asked the top 100 commercial banks to provide a time series for the remittance of service charges on various types of demand deposit accounts as a function of average balances. They used the rate information on smaller accounts in the hope of excluding commercial accounts, or at least large commercial accounts. A typical piece of information would be that service charges were remitted at the rate of \$.15 per month per 100 dollars of average balances, which would correspond to a rate of 1.8 percent. This was appropriate for the purposes of their study since they concentrated on household accounts. For an examination of M1 it is necessary to also include a measure of the implicit rate received by businesses, or to study the demand for money by households and businesses separately. Data limitations make it difficult to implement the latter suggestion.

The derived rate of Barro and Santomero also assumes that an account receiving implicit interest through remittance of service charges is receiving only this particular benefit from the bank. If a demand depositor simultaneously received a remittance plus favorable terms on a loan, the terms being based on average deposit size, then the Barro and Santomero measure would understate the true implicit rate. Essentially, one can view the Barro and Santomero rate as the correct marginal rate under the assumption that banks tailor the means of paying an implicit rate to their customers, and that each method roughly yields the same rate. In this context the rate calculated for one type of account would be a reasonable approximation for rates on all types of accounts.

### Klein's Method: A Competitive Rate

The third method examined is a competitive implicit interest rate derived by Klein [8]. Klein reports an implicit rate for M1, but this is easily converted into an implicit rate on demand deposits. The results are displayed in column 3 of table I. Basically Klein assumes that the regulation forbidding explicit interest payments on demand deposits is costlessly evaded. Competitive pressures within the banking industry force banks to offer the equivalent of a competitive rate in order to attract depositors.

Formally, Klein's implicit rate, RDDK, is expressed in equation (2).

$$(2) \quad RDDK = RCP(1 - \frac{r_{DD}}{DD}) + \\ (RCP^w - RDIS^w) \frac{BR}{DD} \frac{r_{DD}}{r_D} + \\ RCP(GDD - r_G) \frac{1}{DD} \frac{r_{DD}}{r_D} - L_D - S_{DD}$$

Defining notation: DD are demand deposits, RCP is the rate of 4-6 month commercial paper,  $r_{DD}$  are reserves held against demand deposits,  $r_D$  are total reserves,  $RCP^w$  is a weighted annual average of the commercial paper rate with the weights being determined by monthly discount window borrowings,  $RDIS^w$  is a similarly weighted average of the discount rate at the Federal Reserve Bank of New York, GDD are government demand deposits,  $r_G$  are reserves held against government demand deposits and are assumed to be the same as the average for ordinary demand deposits,  $L_D$  are expected losses on deposits and are zero for the period 1954-68 examined in this study, and  $S_{DD}$  are average service charges per dollar of demand deposits.

Equation (2) implies that banks remit the short term market rate of interest adjusted for reserves held against demand deposits, plus any subsidies received from discount window borrowings and the holding of government deposits (government deposits receiving a zero rate of interest) minus service charges. With the exception of the last term, Klein's rate may be interpreted as a marginal rate if the level of discount window borrowings permitted and the level of government demand deposits at a bank are related to bank deposit size. Also, this rate is likely to be highly collinear with the commercial paper rate if the reserve ratio ( $\frac{r_{DD}}{DD}$ ), or the remaining terms in equation (2) do not possess sufficient variability.

Klein's rate has certain attractive properties not found in the other two rates. Unlike Startz it doesn't use accounting data and therefore doesn't suffer from the biases inherent in that procedure. Also, Klein's derivation doesn't require any assumptions about the specific way that implicit interest payments are made, or the relationship between various ways of making such payments. It therefore circumvents some problems that potentially affect the Barro and Santomero procedure.

However, Klein's rate is not without problems. For example, the level of services provided by banks to depositors may not adjust continuously with changes in market rates. That is, it may be very costly to make instantaneous adjustments in the level of services provided or the technology for producing services may be such that continuous adjustment is impossible. Banks may only be able to offer a discrete set of services and may require market rates to move by some threshold amount before offering additional services.

The ability to offer a competitive rate that adjusts rapidly may be more of a problem regarding household accounts than it is with respect to corporate accounts. For instance, large corporate customers often use many different services ranging from the extension of credit at favorable terms to sophisticated cash management techniques. The terms at which credit is extended are often related to average demand deposit holdings, while cash management services are paid for by some combination of compensating balances and fees. The method of payment is tailored to each customer and the rate that compensating balances yield is tied to market rates dis-

counted by some portion of the reserve requirement.<sup>6</sup> These rates are usually adjusted monthly making the implicit rate very close to a competitive rate for large corporate customers. It is unclear whether such easy adjustment is possible for depositors who do not use a large array of bank services.

Some indirect evidence presented by Rush [10] implies that a competitive implicit rate is not a bad approximation. He compares the relative change in bank profitability between banks in New England States offering NOW accounts (Massachusetts and New Hampshire) with banks in the same region that did not offer these accounts (namely banks in New Jersey, Connecticut, and Vermont). The profitability ratios are examined both before and after the introduction of NOW accounts. If implicit rates are less than competitive, and the explicit payment allowed on NOW accounts is close to a competitive rate, then the profitability of banks offering NOW accounts should decline if implicit payments are less than competitive. If the ratios remain roughly the same, then the evidence favors the hypothesis that implicit rates are competitive. Rush's results can generally be viewed as favoring the hypothesis that implicit rates are competitive.

There are some additional problems that are common to Klein's rate and the estimates in the other two studies. Each estimate attempts to measure the value that depositors place on free services obtained from the bank per additional dollar of deposits. The cost to the bank of providing these services need not be equivalent to the value placed on these services by the depositor. In general the depositor would prefer an explicit payment implying that these rates are biased upward. However, explicit payments are taxed while services not charged for aren't. This factor will bias the implicit rates in the opposite direction. The sum of these offsetting effects is unclear and will depend on individual preferences and marginal tax rates.

### III.

#### A COMPARISON OF THE VARIOUS ESTIMATES OF THE IMPLICIT RATE ON DEMAND DEPOSITS

As indicated in the preceding section all of the various implicit rates contain interesting information, but each suffers from a number of problems. The question then remains, are the problems so large as to make these estimates unproductive. In part this

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<sup>6</sup>For more detail concerning the payment for cash management services, see Simpson [11].

question can only be answered by examining their explanatory power when used in studies of the demand for money. This is done in section IV. However, it may be useful to compare the measures themselves.

The comparison between all three rates is contained in table I and in figure 1. Column 1 of table I contains Startz's rate, RDDS; column 2 contains the marginal rate calculated by Barro and Santomero, RDDBS; column 3 displays the competitive rate derived by Klein, RDDK; column 4 exhibits the average annual dividend rate of shares of savings and loan associations, RS; while column 5 displays the 4-6 month commercial paper rate, RCP. The time period examined is 1954-68 since this is the period over which the various rates overlap. Figure 1 is a graph of each implicit rate allowing for easier comparison.

As can be seen from both table I and figure 1 the levels of the rates are quite different, but the movements of the various rates over time are correlated. The exact correlation is displayed in table II. The information contained in table II indicates that all three rates are highly correlated.

#### IV.

##### THE USE OF IMPLICIT RATES IN THE STUDY OF THE DEMAND FOR MONEY

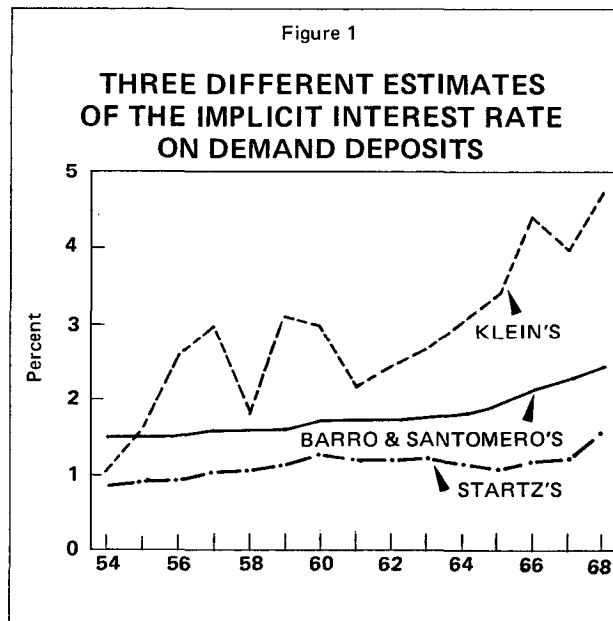
In order to evaluate the usefulness of each of the three proxies, their explanatory power is compared in a demand, for money equation over the period 1954-68. The following equation was estimated using annual data.

$$(3) \ln\left(\frac{M1}{P}\right) = a_0 + a_1 \ln\left(\frac{\text{consumption}}{P}\right) + a_2 (RCP - RDD_i) + a_3 (RS - RDD_i)$$

$i = 1 \text{ to } 4$

where  $RDD_1 = 0$ ,  $RDD_2 = RDDS$ ,  $RDD_3 = RDDBS$ , and  $RDD_4 = RDDK$ . M1 is equal to currency plus demand deposits and P is the GNP deflator. In equation (3) real money demand is expressed as a function of real transactions income, which is approximated by real consumption,<sup>7</sup> and the

<sup>7</sup> Consumption was used as a scale variable since I believe that it is more closely related to transactions income. In Dotsey [6], it is found to be superior to GNP in explaining demand deposit behavior. Also, many studies of money demand use permanent income as a scale variable. Since consumption is closely related to permanent income one may also wish to interpret the equation in terms of permanent income rather than transactions income. For more detail see [6].



opportunity cost of holding money. Two opportunity costs are used since different individuals may have access to different rates. The opportunity costs are expressed as differentials in interest rates and have been entered in semilogarithmic form for the reasons outlined in Friedman and Schwartz [7; p. 265]. Basically, this specification assumes that the absolute level of opportunity costs is important in determining the demand for money balances. This implies that a doubling of the opportunity cost from 1-2 percent would have a smaller effect than the doubling of the opportunity cost from 5-10 percent. In a log linear model both changes would have an equivalent effect.

The results of the four regressions given in equation (3) are contained in table III. The effect of including the implicit rate derived by Barro and Santomero is especially striking. The standard error of the regression declines by 38 percent, while the presence of serial correlation is greatly reduced.

Table II

##### CORRELATION COEFFICIENTS BETWEEN THE VARIOUS IMPLICIT RATES

	RDDS	RDDBS	RDDK
RDDS	1.00	.78	.71
RDDBS	.78	1.00	.85
RDDK	.71	.85	1.00

Given the results of using Barro and Santomero's implicit rate, a possible interpretation of the serial correlation in the regression that omits implicit rates is that the regression is misspecified. The correlation present in the errors occurs because the equation fails to take into consideration an important variable that influences the demand for money.<sup>8</sup>

The implicit interest rate derived by Startz does not seem to be a useful measure in explaining the demand for money. Its addition actually reduces the performance of the regression. On the other hand, Klein's competitive implicit rate improves the demand for money equation slightly. Of interest in this latter case is the large change in the coefficients on the interest rate variables from those in the other three equations. Unfortunately, the manner in which this rate is calculated makes it difficult to evaluate its econometric performance. The derivation of Klein's rate makes the presence of spurious correlation possible, and since these effects are similar to the type of effects expected in theory, it is generally difficult

<sup>8</sup>The regressions also were corrected for first order serial correlation. Although the standard errors are greatly reduced the general message is unchanged.

to discriminate between the two.<sup>9</sup>The nature of the spurious correlation can be seen by examining the first term on the right-hand side of equation (2),  $(1 - \frac{r_{DD}}{DD})$  RCP. If measurement error is involved in obtaining the level of demand deposits then there will exist a positive correlation between  $(1 - \frac{r_{DD}}{DD})$  and DD, and hence M1. For instance, if the measurement of demand deposits is greater than the actual value, then the values of both M1 and  $(1 - \frac{r_{DD}}{DD})$  will be raised. This is indeed regrettable since a competitive rate seems to be a reasonable approximation for an implicit rate, especially with respect to corporate accounts.<sup>10</sup>

<sup>9</sup>For a more detailed discussion, see Carlson and Frew [5]. Friedman and Schwartz [7] also present an interesting discussion in footnote 46, pp. 270-74. Friedman and Schwartz present evidence over a much longer sample period, where they look at data over peaks and troughs of business cycles. Klein's rate more accurately reflects real rather than spurious effects in their money demand equations.

<sup>10</sup>When RS-RDDK is dropped from the third regression, the coefficient on RCP-RDDK drops dramatically, and when RCP-RDDK is eliminated the coefficient on RS-RDDK is insignificantly different from zero.

Table III

**REGRESSION RESULTS ON THE  $\ln(\frac{M1}{P})$  1954-1968**

Explanatory Variables	Equation 1	Equation 2	Equation 3	Equation 4
CONSTANT	.10(1.17)	.19(1.19)	.27(6.98)	.23(3.20)
LN (Real Consumption)	.81(6.90)	.60(3.16)	.49(12.86)	.66(7.19)
RS	-.16(-66.04)			
RCP	-.008(-1.25)			
RS - RDDS		-.13(-2.60)		
RCP - RDDS		-.008(-.66)		
RS - RDDBS			-.13(-10.52)	
RCP - RDDBS			-.012(-2.83)	
RS - RDDK				-.063(-5.82)
RCP - RDDK				-.51(-5.76)
S.E.R.	.0138	.0224	.00858	.0137
$R^2$	.86	.64	.95	.87
D.W.	.86	.67	1.81	1.49

t-statistics are in parenthesis.

## V.

### SUMMARY AND COMMENTS ON THE EFFECTS OF DEREGULATION IN THE BANKING INDUSTRY

In this article the value of incorporating an implicit interest rate in money demand analysis has been examined. Specifically, three very different constructions have been investigated. While all three are interesting, the rate derived by Barro and Santomero seems to be the most useful in the context of analyzing the demand for M1. Although additional information on the ways implicit interest is paid by banks is desirable, the results obtained here indicate that this variable merits updating. Klein's rate, although it is probably a good proxy for interest implicitly earned by corporate customers (and may be a good estimate for all depositors) is unfortunately plagued by econometric problems that make interpreting its effect in regression equations difficult. The rate derived by Startz is subject to a number of procedural problems and did not prove to be very useful in explaining the demand for money over the rather short sample period studied in this article.

The general conclusion is that implicit rates, especially the approximation generated by Barro and Santomero are important elements in determining the demand for money. This being the case, these rates will also be important in analyzing the effects of current and future deregulation in the banking industry. A detailed analysis of the effects of deregulation would be somewhat beyond the scope of this study, but a limited discussion is germane to the main thrust of the article.

In order to understand the ways in which deregulation has affected and will affect the behavior of monetary aggregates, in particular M1, it will be necessary to examine the rate of returns that new transactions accounts yield relative to the rates im-

PLICITLY earned by demand deposits. This is because it is this differential that constitutes the opportunity cost of continuing to use a standard demand deposit account. For instance, the 5¼ percent interest rate paid on NOW accounts overstates the relative advantage of using a NOW account, since demand deposits implicitly earn a rate of return greater than zero.<sup>11</sup> Without considering implicit rates it is difficult to understand why all consumer accounts did not switch to NOW accounts almost immediately. For certain types of depositors a NOW account may offer very little if anything beyond that of a regular demand deposit.

Of course, considering only implicit rates in an analysis of the differences between demand deposits and newer types of transactions accounts would be too limiting. There are many characteristics that distinguish one type of account from another. Minimum or average balance requirements would be an example of such a characteristic. It may also be that banks offer different implicit rates to different types of depositors. A deeper understanding of the demand for money may require that different types of accounts be studied separately. Data limitations unfortunately prevent analysis at this level.

The point of this article is not to detract from the importance of other features that determine the behavior of depositors, but to describe the effects that implicit rates have on the demand for money. Although implicit rates are only one aspect that influence the choice between transactions accounts, there are numerous reasons for believing that they are an important aspect that require more attention in investigating the demand for money.

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<sup>11</sup>The analysis assumes that at the margin NOW accounts earn a much smaller implicit rate than standard demand deposit accounts.



## References

1. Barro, Robert J., and Anthony M. Santomero. "Household Money Holdings and the Demand Deposit Rate." *Journal of Money, Credit and Banking*, 4 (May 1972), 397-413.
2. Becker, William E. "Determinants of the United States Currency-Demand Deposit Ratio." *The Journal of Finance*, 30 (March 1975), 57-74.
3. Boughton, J. M. "Subjective Prices and the Demand for Money." Unpublished manuscript, IMF.
4. Boyd, John H. "Household Demand for Checking Account Money." *Journal of Monetary Economics*, 2 (January 1976), 81-98.
5. Carlson, John A., and James R. Frew. "Money Demand Responsiveness to the Rate of Return on Money: A Methodological Critique." *Journal of Political Economy*, 80 (June 1980), 498-607.
6. Dotsey, Michael. "The Effects of Cash Management Practices on the Demand for Demand Deposits." Working Paper Federal Reserve Bank of Richmond, 1983.
7. Friedman, Milton, and Anna J. Schwartz. *Monetary Trends in the United States and the United Kingdom*. University of Chicago Press, 1982.
8. Klein, Benjamin. "Competitive Interest Payments on Bank Deposits and the Long Run Demand for Money." *American Economic Review*, 64 (December 1974), 931-49.
9. Klein, Michael A. "The Implicit Deposit Concept: Issues and Applications." *Economic Review*, Federal Reserve Bank of Richmond (September/October 1978), 3-12.
10. Rush, Mark. "Comment and Further Evidence on Implicit Interest on Demand Deposits." *Journal of Monetary Economics*, 6 (July 1980), 437-51.
11. Simpson, Thomas D. "The Market for Federal Funds and Repurchase Agreements." Staff Studies 106. Washington : Board of Governors of the Federal Reserve System, 1979.
12. Startz, Richard. "Implicit Interest on Demand Deposits." *Journal of Monetary Economics*, 5 (October 1979), 515-34.

# CAN THE CENTRAL BANK PEG REAL INTEREST RATES? A SURVEY OF CLASSICAL AND NEOCLASSICAL OPINION

*Thomas MacGillivray Humphrey*

To suppose that any increased issues of the [Central] Bank can have the effect of permanently lowering the rate of interest . . . is to attribute a power to the circulating medium which it can never possess.

David Ricardo, 1811

I must confess my amazement at finding people censure or praise the [Central] Bank for making the rate of interest high or low, when the Bank has no possible power to make it the one or the other.

John C. Hubbard, 1857

. . . the rate of interest . . . is determined by the general conditions of demand and supply of real capital; these lie outside the Central or any other Bank's control . . .

A. C. Pigou, 1927

. . . monetary policy . . . cannot peg interest rates for more than very limited periods . . .

Milton Friedman, 1968

Among the more contentious issues in the continuing debate over monetary policy is the central bank's ability permanently to peg real interest rates. Does the central bank really possess the power to maintain rates indefinitely at any arbitrary level it chooses? Or is the real rate basically determined by nonmonetary factors such that attempts to hold it below its equilibrium level via excessive monetary growth will simply result in higher rates of inflation and so higher nominal interest rates leaving the real rate undisturbed?

The foregoing questions are no doubt familiar to students of recent and current monetary policy. Not so well-known, perhaps, is what earlier generations of monetary scholars had to say about the feasibility of interest-pegging policies. In an effort partially to offset this deficiency and provide historical perspective, this article examines the opinion of leading

classical (1750-1870) and neoclassical (1870-1936) economists regarding the ability of central banks to control (real) interest rates. It shows that the notion of interest rate pegging had already been thoroughly criticized and largely discredited by the early 1800s. Before doing so, however, it sketches the basic outlines of the classical/neoclassical view in order to demonstrate how individual writers contributed to it.

## **Essentials of the Classical/Neoclassical View**

Essentially the position of the classical and neoclassical schools was that (real) rate pegging is impossible.<sup>1</sup> Like modern monetarists, they contended that the central bank was largely powerless to permanently lower market interest rates and that its attempts to do so would merely raise prices. This conclusion derived from the classical notion that interest rates are basically determined by productivity and thrift or more precisely by the marginal productivity of capital and society's rate of time preference.<sup>2</sup> Since monetary expansion does not affect these real determinants, it cannot permanently alter interest rates. To be sure, classical and neoclassical writers recognized that the monetary authority could temporarily lower its own loan (discount) rate, thereby generating a gap between the latter rate and the going rate of profit on capital (the equilibrium rate of interest). But they argued that this gap inevitably produces price increases that force the bank rate back into equality with the equilibrium

<sup>1</sup>With the notable exceptions of Thornton, Marshall, and Fisher, classical and neoclassical writers typically did not distinguish between real and nominal interest rates. They implicitly assumed the expected rate of inflation to be zero so that the two rates were one and the same.

<sup>2</sup>On classical/neoclassical interest theory see Patinkin [12, pp. 366-72, 630-33].

rate, thus rendering futile any attempts to peg the former rate.

As for the mechanism or channels through which this reaction occurs, classical/neoclassical economists specified two, both involving the demand for and supply of loanable funds and both assuming that new money enters the economy through the loan market. According to the first, a rise in the money supply temporarily depresses loan rates via an expansion in loan supply. At the same time, the monetary increase generates an excess aggregate demand for goods in the commodity market and so raises prices. And since with rising prices more loans are required to finance a given real quantity of business investment projects, it follows that loan demands increase. Assuming prices rise in proportion to the money stock, loan demands would rise in proportion to loan supply, thereby restoring loan rates to their original level, the going profit rate on capital. According to the second mechanism, this effect works chiefly through loan supply. In particular, as prices rise, more cash is needed for hand-to-hand circulation. There occurs a cash drain from the banks that diminishes bank reserves. To protect reserves from depletion, banks (including the central bank) raise their loan rates, or what is the same thing, contract their loan supply. Either way the result is the same: interest rates return to their former level and only prices change. Since this self-correcting mechanism works automatically to restore real yields to their equilibrium level, it follows that the central bank is powerless to peg those rates.

Classical/neoclassical monetary theorists recognized only one situation in which the central bank could permanently lower real interest rates. This was the famous “forced saving” case in which inflationary monetary policy could, because of a lag in the adjustment of wages to prices, transfer real income from labor to capital thereby encouraging fixed capital investment. The resulting higher rate of capital formation lowers the marginal productivity of capital and thus lowers equilibrium interest rates. This case, however, was treated as a mere curiosum, a minor exception to the rule that central banks are incapable of permanently influencing interest rates. For the most part, classical and neoclassical writers stressed the powerlessness of central banks to peg interest rates. This is especially evident in the work of Hume, Smith, Thornton, Ricardo, and Mill—all of whom

saw the interest rate as a real variable immune to monetary manipulation.

### **David Hume (1711-1776)**

Hume was the earliest British classical economist to present the essentials of the proposition that interest rates are immune to monetary control. He argued (1) that the equilibrium rate is a real rather than a monetary magnitude, (2) that one-time monetary injections may temporarily lower the market rate below its equilibrium level, (3) that the same monetary injections will raise prices, and (4) that the resulting price increases, via their effect on loan demands, will reverse the fall in the market rate and restore it to its initial level, thereby frustrating all attempts at interest rate control.

Regarding the first point, he declared that the equilibrium real interest rate is invariant with respect to the size of the money stock. “It is in vain,” he said, “to look for the cause of the [permanent] fall or rise of interest in the greater or less quantity of gold and silver” in circulation. [6, pp. 48-9] Monetary expansion, he said, does not alter the real characteristics of the economy. It affects neither capital’s productivity nor society’s rate of time preference; therefore it has no effect on the equilibrium rate. It merely inflates equiproportionally both the equilibrium nominal return to capital and the money value of capital itself, leaving their ratio—the rate of profit and hence the equilibrium rate of interest—undisturbed.

Money having chiefly a fictitious [i.e., nominal] value, the greater or less plenty of it is of no consequence . . . . The same interest, in all cases, bears the same proportion to the [capital] sum. And if you lent me so much labour and so many commodities; by receiving five per cent, you always receive proportional labour and commodities, however represented . . . [6, p. 48]

It follows that “the rate of interest . . . is not derived from the quantity” of money but rather from the real forces of productivity and thrift. Thus, if we

. . . suppose, that, by miracle every man in Great Britain should have five pounds slipped into his pocket in one night; this would much more than double the whole money that is at present in the kingdom; yet there would not . . . be . . . any variation in the interest . . . . That [i.e., a fall in interest] depends upon another principle; and must proceed from an encrease of industry and frugality, of arts and commerce. [6, p. 51]

Having described the invariance of the interest rate with respect to monetary changes after all adjustments have occurred, Hume then described its be-

havior during the transitory adjustment period. With respect to the self-correcting mechanism that restores market rates to equilibrium after a monetary shock, he argued as follows: New money typically enters the circulation by way of loan. The resulting expansion of loan supply relative to loan demand temporarily lowers market rates. But the new money also puts upward pressure on prices. And since with rising prices more loans are needed to finance the same level of real activity, it follows that loan demands rise. The rise in loan demands reverses the initial fall in market rates and restores them to their preexisting levels thereby frustrating attempts to keep them low. That is, assuming that the new money is initially concentrated in the hands of lenders,

The encrease of lenders above the borrowers sinks the interest; and so much the faster, if those, who have acquired those large sums, find . . . no method of employing their money but by lending it at interest. But after this new mass of gold and silver has been digested, and has circulated through the whole state, affairs will soon return to their former situation . . . . The whole money may still be in the state, and make itself felt by the encrease of prices: But . . . [the resulting rise in loan demand ensures that] the disproportion between the borrowers and lenders is the same as formerly, and consequently the high interest returns. [6, p. 58]

It follows that expansionary monetary policy would have no lasting effect on interest rates.

### **Adam Smith ( 1723-1 790)**

Like Hume, Smith was instrumental in establishing some key components of the proposition that central banks cannot control interest rates. These components included (1) the concept of the interest rate as a real variable determined by productivity and thrift, (2) the notion that the equilibrium interest rate reflects the real profit rate on capital and not the abundance or scarcity of money, and (3) an explicit denial that money growth lowers interest rates. David Ricardo summarized Smith's views succinctly.

It has been shewn incontrovertibly by that able Writer, Dr. Adam Smith, that the rate of interest for money is regulated by the rate of profits on that part of capital only which does not consist of circulating medium, and that those profits are not regulated but are wholly independent of the greater or lesser quantity of money which may be employed for the purposes of circulation; that the increase of circulating medium will increase the prices of all commodities, but will not lower the rate of interest. [15, pp. 25-6, quoted in 5, p. 105]

In support of the proposition that money growth does not affect interest rates, Smith, according to Ricardo, noted "that the discovery of the mines in America, which so greatly increased the quantity of money, did not lessen the interest for the use of it; the rate of interest being regulated by the profits on the employment of capital," and not by the quantity of money "used to circulate its produce." [17, p. 33]

### **Henry Thornton ( 1760-1 815)**

The next economist to be considered is Henry Thornton, the greatest of all classical monetary theorists, whose work unfortunately is not well-known. He made seminal contributions to the theory of the lender of last resort, to the analysis of velocity and the demand for money, to the theory of the transmission mechanism linking money to nominal income, to the Fisherine distinction between real and nominal interest rates, to the purchasing power parity theory of exchange rates, to the monetary approach to balance of payments and exchange rate analysis, to the classical theory of international transfers, and to the monetarist criticism of the real bills doctrine. Most important, he constructed the basic analytical model used by classical and neoclassical economists to demonstrate the futility of policies aimed at interest rate control.

His model consisted of three elements. First was the distinction between the market (loan) rate of interest and the expected rate of profit on new capital investment-this latter rate defined as the equilibrium to which the loan rate tends to conform. Second was a loanable funds theory of interest rates according to which the market rate is determined by loan demand and supply. Of these two determinants, Thornton defined loan demand as the nominal value of capital goods financed by borrowing and loan supply as the sum of saving plus new money issued by way of loan. A monetary expansion, he noted, would increase loan supply and temporarily lower the market rate. The third element of Thornton's model was an adjustment mechanism that worked to restore the market rate to its equilibrium level following a monetary shock. Consisting of a causal chain running from money to prices to loan demand to market rates, this mechanism, he argued, acts to reverse interest rate movements caused by changes in the monetary component of loan supply. Using his model,

Thornton was able to show that any divergence between the two rates owing to increases in the money supply would be short-lived: such divergences would automatically set in motion a process of rising prices and increasing loan demands that would bid the loan rate into equality with the equilibrium rate, thereby frustrating all attempts at pegging.

Having applied his model to the problem of interest rate control, Thornton mentioned two points largely overlooked by his predecessors. First, he noted that the interest-adjustment mechanism presupposes a metallic monetary system in which gold reserve requirements and convertibility constraints exist to limit money growth. These constraints ensure that loan demands overtake loan supplies so that the market rate returns to its equilibrium level. He noted, however, that no such constraints exist in inconvertible paper regimes. Consequently money, and hence loan supplies, could expand without limit to accommodate loan demands at all rates below the equilibrium profit rate. Given the unlimited elasticity of loan supply, loan demand increases cannot bid up market rates. Therefore, permanent pegging is theoretically possible in this latter case.

While conceding the possibility of pegging under inconvertible paper, Thornton considered it unlikely. Such pegging, he noted, would be accomplished at the cost of ever-rising prices. Assuming the authorities would find this cost intolerable, they would abandon pegging and allow market rates to seek their natural levels. In this case the responsibility for avoiding inflation would provide the constraint necessary for the working of the interest-adjustment mechanism.

Thornton's second point was that interest control policies could be successful if a lowering of the market rate induced a corresponding permanent reduction of the equilibrium profit rate. Here was the first mention of the forced saving doctrine. As stated by Thornton, this doctrine holds that inflationary monetary policy can, because of a lag in the adjustment of wages to prices, redistribute income from labor to capital. Assuming capitalists' propensity to save and invest is higher than workers', this redistribution stimulates capital formation and lowers the marginal productivity of capital and thus the equilibrium rate of interest to the desired market rate. Having stated this doctrine, however, Thornton paid it little attention. He saw it as a trivial exception to the rule that central banks cannot affect interest rates.

## David Ricardo ( 1772-1 823)

Whereas Thornton acknowledged the theoretical possibility of interest-rate pegging in the inconvertible paper and forced saving cases, Ricardo categorically denied that the central bank could permanently control market rates under any circumstances. He said:

I believe . . . that no amount of loans which the Bank might make, and no degree of lowness of interest at which it might choose to lend, would alter the permanent rate of interest in the market. Interest is regulated chiefly by the profits that may be made by the use of capital; it cannot be controlled by any bank [including the central bank], nor by any assemblage of banks. [17, p. 280]

He was even more emphatic on this point in his *Principles of Political Economy and Taxation* (1819):

. . . the interest for money . . . is not regulated by the rate at which the Bank will lend, whether it be 5, 4, or 3 per cent, but by the rate of profit which can be made by the employment of capital, and which is totally independent of the quantity, or of the value of money. Whether a Bank lent one million, ten millions, or a hundred million, they would not permanently alter the market rate of interest; they would alter only the value [i.e., purchasing power] of the money which they thus issued. [14, pp. 363-64]

He reached this conclusion via the following route: The rate of interest is determined by the abundance or scarcity of real capital. Money is not real capital. Hence its quantity cannot affect the interest rate. As he put it in his famous essay on "The High Price of Bullion and Depreciation of Bank Notes" (1811) :

. . . the rate of interest is not regulated by the abundance or scarcity of money, but by the abundance or scarcity of that part of capital not consisting of money . . . . As the increase of bank notes does not add to this species of capital . . . it cannot . . . lower interest. [17, pp. 32, 36]

He conceded, however, that the central bank could temporarily depress interest rates: But he stressed the transience of this effect : no central bank, despite its best efforts, could prevent rates from eventually returning to their real equilibrium levels. Said he:

I do not dispute, that if the Bank were to bring a large additional sum of notes into the market, and offer them on loan, but that they would for a time affect the rate of interest . . . but having done so . . . the notes . . . would [not] be retained unemployed by the borrowers; they would be sent into every market, and would everywhere raise the

prices of commodities, till they were absorbed in the general circulation. It is only during the interval of the issues of the Bank, and their effect on prices, that we should be sensible of an abundance of money; interest would, during that interval, be under its natural level ; but as soon as the additional sum of notes . . . became absorbed in the general circulation, the rate of interest would be high, and new loans would be demanded with as much eagerness as before the additional issues. [17, p. 35]

In short,

Reduction or Increase of the Quantity of Money always ultimately raises or lowers the Price of Commodities; when this is effected, the Rate of Interest will be precisely the same as before; it is only during the Interval, that is, before the Prices are settled at the new Rate, that the Rate of Interest is either raised or lowered. [16, p. 445 quoted in 5, p. 481, n. 17]

Finally, he ridiculed the notion that the central bank can peg interest rates at arbitrarily low levels.

To suppose that any increased issues of the Bank can have the effect of permanently lowering the rate of interest . . . is to attribute a power to the circulating medium which it can never possess. Banks would, if this were possible, become powerful engines indeed. By creating paper money, and lending it at three or two per cent under the present market rate of interest, the Bank would reduce the profits on trade in the same proportion; and if they were sufficiently patriotic to lend their notes at an interest no higher than necessary to pay the expenses of their establishment, profits would be still further reduced; no nation, but by similar means, could enter into competition with us, we should engross the trade of the world. To what absurdities would not such a theory lead us! Profits can only be lowered by a competition of capitals not consisting of circulating medium. As the increase of bank notes does not add to this species of capital, as it neither increases our exportable commodities, our machinery, or our raw materials, it cannot add to our profits nor lower interest. [17, pp. 35-6]

### **John Stuart Mill (1806-1873)**

The last classical economist to be considered is J. S. Mill. His opinion of the central bank's ability to control interest rates via changes in the money stock is summarized in the following passage:

The rate of interest, then, depends essentially and permanently on the comparative amount of real capital offered and demanded in the way of loan; but is subject to temporary disturbances of various sorts from increase and diminution of the circulating medium . . . [9, p. 647]

In other words, the central bank can exercise a tem-

porary<sup>3</sup> but not a permanent influence on interest rates since in the final analysis those rates are determined by real forces.

[H]ow great an error, then, it is to imagine that the rate of interest bears any necessary relation to the quantity or value of money in circulation. An increase of the currency has in itself no [permanent] effect, and is incapable of having any such effect, on the rate of interest . . . . It diminishes indeed the power of money to buy commodities, but not the power of money to buy money [i.e., to command an unchanged rate of interest]. [10, p. 210]

Mill recognized only one exception—the forced saving case—to the rule that central banks cannot control interest rates. Like Thornton, he admitted that an inflation-induced redistribution of real purchasing power from workers to capitalists would permit income to be “converted into capital : and thus, strange as it may appear, the depreciation of the currency, when effected in this way, operates to a certain extent as a forced accumulation” that lowers equilibrium rates. [11, p. 118] But he thought this case to be practically unimportant, ranking it among the “anomalies in the rate of interest, which have not been hitherto brought within the pale of exact science.” [11, p. 114]

In short, Mill's position was much the same as Thornton's. Like Thornton, he believed that, except for the forced saving case, the central bank is largely powerless to maintain market interest rates at any arbitrary level and that its attempts to do so would merely raise prices. This was on the grounds that the equilibrium rate of interest is predominantly a real (nonmonetary) phenomenon determined by productivity and thrift. As such, it is invariant with respect to monetary expansion engineered by the central bank. Thus any attempt to hold market rates below that real equilibrium level via expansionary monetary policy would simply produce a rise in prices and a consequent increase in the demand for

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<sup>3</sup>Mill was quite explicit regarding these transitory effects. A monetary expansion, he noted, can temporarily lower market yields.

An increase . . . of currency issued by banks, tends, while the process continues, to bring down or to keep down the rate of interest. [9, p. 647]

But once the expansion ends (as it must if the authority is to honor its obligation to maintain convertibility and/or price stability) the rate of interest returns to its original level. There it

. . . bears no . . . relation to the quantity . . . of the money in circulation. The permanent amount of the circulating medium, whether great or small, affects only prices; not the rate of interest. [9, p. 645]

loans (as well as a drain on cash reserves) which would force the market rate back to its initial equilibrium level. As viewed by Mill, this rate-equilibrating mechanism would always work provided there existed some absolute constraint (e.g., positive cash reserve ratios, the monetary authority's unwillingness to tolerate inflation forever) on the money stock. Given these conditions, he held that interest pegging was impossible—the essence of the classical view.

### **Bankers' Opinion**

The foregoing classical view was not confined to the classical economists themselves. It was also held by influential 19th century British bankers, whose views carried greater weight in financial circles than those of the economists of the time. A prime example is James Morris who, according to Elmer Wood in his scholarly *English Theories of Central Banking Control, 1819-1858*, contended that the central bank “can never keep interest rates unnaturally low for any length of time.” [21, p. 138] The same opinion was voiced by William Cotton who, according to Wood, held that the market rate in any nation “is regulated by the general rate all over the world” such that “if the [Central] Bank were to keep the rate unnaturally low the pressure on it would soon become so great as to require it to raise the rate.” [21, p. 138] Even more emphatic was Samuel Jones Loyd (Lord Overstone) who declared that the directors of the “Bank of England have no more power of raising the rate of discount than you or I have; they must conform” to the rate dictated by real forces. [quoted in 21, p. 139] Perhaps the strongest statement of the central bank's impotence in regard to interest rate control came from J. G. Hubbard (Lord Addington). Said he, “I must confess my amazement at finding people censure or praise the Bank for making the rate of interest high or low, when the Bank has no possible power to make it the one or the other.” [quoted in 21, p. 139] These quotations indicate that the classical view was not restricted to an esoteric circle of academic scholars but rather had achieved a wider recognition by the middle of the 19th century.

### **Neoclassical Views**

Given the widespread acceptance of the classical view, it is hardly surprising to find it repeated in the neoclassical (1870-1936) monetary literature. Indeed, it is a central theme of the writings of such

well-known neoclassical theorists as Eugen von Bohm-Bawerk, Knut Wicksell, Alfred Marshall, Irving Fisher, and Arthur C. Pigou. Like their classical predecessors, these writers contended that the equilibrium rate is a real magnitude to which the market rate normally conforms; that a discrepancy between the two rates will result in a cumulative rise in prices; and that this price increase itself will eliminate the rate disparity by raising loan demands and/or reducing loan supplies, thereby bidding the market rate into equilibrium. The first neoclassical to employ these propositions in a demonstration of the futility of interest-pegging policies was Bohm-Bawerk.

### **Eugen von Bohm-Bawerk (1851-1914)**

Eugen von Bohm-Bawerk, the celebrated Austrian capital theorist and co-founder of the Austrian School of economics, enunciated the neoclassical concept of the interest rate as a real phenomenon immune to monetary control. Said he:

The level of the interest rate prevailing in a country does not in the long run depend on whether that country has a large volume of coins or other types of money, but on whether it is rich in real capital, in stored-up products available for productive investment or for lending. [1, quoted in 7, p. 129]

He admitted, however, that, because monetary injections enter the system via bank loan expansions,

... the stock of money, taking this term quite literally, does exert a certain [temporary] influence on the movements of the interest rate—an influence which, although not profound, is very conspicuous and therefore often overestimated, especially by the layman. [1, quoted in 7, p. 129]

But he insisted that this influence would be short-lived owing to the effect of money on prices and prices on loan demands. In his words:

... the excess quantity of money, to the extent that it pours into the channels of the commodity markets, will in a well-known fashion reduce the purchasing power of money. Money prices of all commodities—and, thus, prices of real capital goods—will rise; and ultimately more units of money than previously will be required to transfer the same amount of real capital goods. Once matters have come to this point, the increased supply of money which initially pressed on the market as excess supply will be completely absorbed by the demand for money capital which rises for the above reason. Eventually the disturbed equilibrium between supply and demand will be restored, and the normal interest rate corresponding to the actual supply of real capital will also be re-established. [1, quoted in 7, pp. 129-30]

Here are the standard ingredients of the neoclassical view: the distinction between equilibrium and market rates, the notion of the former as a real magnitude to which the latter eventually conforms, and the concept of price-induced shifts in loan demand as the equilibrating mechanism that frustrates attempts at interest rate control.

### **Alfred Marshall (1642-1924)**

The foregoing ideas were likewise employed by Alfred Marshall. He concluded that interest rates are independent of the money supply and are therefore resistant to monetary control. More precisely, he contended that the average rate on short-term loans ("the rate of discount") is governed by the average rate on long-term loans which in turn is determined by the profit rate on capital. Since the profit rate itself is determined by the real forces of productivity and thrift, it follows that

. . . the supply of gold [and by implication the stock of paper money as well] exercises no permanent influence over the rate of discount. The average rate of discount permanently is determined by the profitableness of business. All that the influx of gold does is to make a sort of ripple on the surface of the water. The average rate of discount is determined by the average level of interest in my opinion, and that is determined exclusively by the profitableness of business, gold and silver merely acting as counters with regard to it. [8, p. 41]

In line with this reasoning, he concluded that currency injections cannot keep interest rates low. For although

. . . the increase of currency goes . . . to the banking centres; and, therefore, it increases the willingness of lenders to lend in the first instance, and lowers discount . . . it afterwards raises prices, and, therefore, tends to increase discount. This latter movement is cumulative . . . Thus, a fall in the purchasing power of money tends, after a while, to raise the rate of discount as well as the rate of interest on long investments. [8, p. 274]

That is, while increases in the money stock can initially lower market rates and cause them to deviate from the equilibrium rate, such deviations are inherently short-lived. For the resulting cumulative rise in prices and loan demands will invariably restore market rates to their original levels. Since money-induced falls in interest rates are self-reversing in character, it follows that rate-pegging policies will be ineffective.

### **Irving Fisher ( 1867-1 947)**

Irving Fisher, the celebrated American quantity theorist, monetary reformer, and pioneer econometrician, shared Marshall's views on interest rate control. Like Marshall, he denounced the notion that expansionary monetary policy permanently lowers market rates. This notion, he said,

. . . is fallacious, and the fallacy consists in forgetting that plentiful money [by raising prices and thus the loan requirements of borrowers] ultimately raises the demand for loans just as much as it raises the supply, and therefore has just as much tendency to raise interest as to lower it. [3, p. 356]

In short, falls in the interest rate caused by monetary expansion are inherently self-reversing because

The inflation of the currency [raises prices and so the need for borrowing and thus] pulls interest up on the [loan] demand side as hard as it pulls it down on the supply side. [3, pp. 357-58]

The result is an equiproportional rise in loan demand and supply that leaves the interest rate unchanged.

To illustrate, he presented a hypothetical example of a doubling of the money stock in which the following sequence occurs : First, the new money enters the economy through' the loan market, thereby doubling the supply of loans and lowering interest rates. The new money is then spent on the fixed full capacity level of real output, thereby doubling prices. Faced with rising prices, businessmen require double the amount of loans just to finance the same level of real activity. The result is a doubling of the demand for loans that puts upward pressure on interest rates. Noting that the increased loan demand reverses the interest-depressing effect of the initial doubling of loan supply, Fisher concluded that

. . . in the end, doubling the amount of money will not affect the rate of interest. It will simply affect the amount of money lent and borrowed. [3, p. 357]

He also noted that this conclusion, namely "that an inflation of the currency does not affect the rate of interest," [3, p. 359] strictly holds for one-time but not continuous increases in the money stock. For if the inflationary increase is continuous, it will come to be expected and these expectations will be incorporated into nominal rates. In this case, the monetary authority, far from keeping nominal interest rates low, cannot prevent them from exceeding their original level.



### **Knut Wicksell (1851-1926)**

Like Marshall and Fisher, Knut Wicksell asked if there exist “limits . . . which restrict the power of the [central] banks” to peg market rates below their real equilibrium levels. [19, p. 111 quoted in 12, p. 591] Like them he answered in the affirmative. But whereas they appealed to the effect of money-induced price increases on loan demands to explain the futility of interest-pegging policies, he stressed the impact of prices on metallic reserves. More precisely, he argued that the price increases generated when loan rates are arbitrarily held below their natural (equilibrium) levels would, in a metallic monetary system, precipitate internal drains of gold into hand-to-hand circulation, thereby diminishing bank reserves. Said he, “where there are no [bank] notes of small denomination and where metallic money is used in business, then on this assumption [of the continuous rise in prices] the increased demand for gold for internal business would soon empty the bank’s vaults.” [20, p. 189 quoted in 12, p. 591] To protect their reserves from depletion, banks (including the central bank) raise their loan rates, or what is the same thing, contract their loan supply. Either way, rates return to their natural equilibrium levels, contrary to attempts to peg them. In this manner, the need to maintain gold reserves limits the central bank’s influence over interest rates.

Wicksell of course acknowledged that the gold reserve constraint would not exist in an inconvertible paper regime. In this case, the authority theoretically would be free to peg rates via unlimited money growth. But he contended that in these circumstances another constraint would rule, namely the obligation to maintain price stability. Faced with this responsibility, the authority would be forced to abandon pegging and let interest rates gravitate to their natural equilibrium levels.

Wicksell also acknowledged the forced saving exception discussed earlier in this article. That is, he conceded that pegging would work provided inflation itself generated, via the forced saving route, sufficient capital formation to lower the marginal productivity of capital and thus the natural rate of interest to the target loan rate.

### **Arthur Cecil Pigou (1877-1959)**

Undoubtedly the clearest statement of the proposition that central banks cannot control interest rates

came from the Cambridge economist, A. C. Pigou. According to Pigou, that proposition asserts (1) that real factors determine the equilibrium rate on long-term loans, (2) that interest arbitrage ensures that this long-term rate governs all short-term rates including the central bank’s discount rate, and (3) that this means that even the discount rate is determined by conditions outside the central bank’s control.

The rate of discount is tied up to the rate of interest money rate on long loans; this rate, it is argued, is determined by the general conditions of demand and supply of real capital; these lie outside the Central or any other bank’s control; and, therefore, though, no doubt, on occasions for a little while a strong Central Bank could hold its discount rate above or below the rate for long loans (with due allowance for differences of risk), attempts to do this for any length of time must lead to a transfer of borrowings between the long and short loan markets, and so defeat itself. Hence, it is argued, the Central Bank, despite its apparent autonomy, is in fact merely a medium through which forces wholly external to it work their will. Though, that is to say, in determining the discount rate, the voice is the voice of the bank, the hands are not its hands. [13, p. 251]

This of course is not to deny that the central bank can temporarily lower the discount rate below’ its equilibrium level. But it does mean that the resulting inflationary rise in money, prices, loan demands, and nominal long-term yields will compel the central bank to reverse the rate reduction. It therefore follows that

. . . if the money rate of discount is altered at the volition of the banks, just those associated changes which have been described . . . must take place, and must be carried to the point at which the real rate of discount is equated (with the proper allowances) to the real rate of interest on long loans; this real rate being throughout determined by conditions outside the bankers’ control. [13, p. 253]

In the final analysis, then, the central bank has no choice but to let the discount rate conform to the equilibrium rate. Pigou saw but one exception to this rule, namely the forced saving case.

### **Milton Friedman**

The classical/neoclassical notion of the inability of the central bank to exercise permanent control over interest rates persists today in the work of Milton Friedman. The monetary authority, he says, “cannot peg interest rates for more than very limited periods.” [4, p. 5] To show why this is so, he

distinguishes between the first-round “liquidity” or “portfolio” effect of money growth on interest rates and the subsequent “income and price level” and “price expectation” effects. The liquidity effect refers to the initial fall in interest rates caused by the monetary expansion. This expansion generates an excess supply of money which people attempt to eliminate by purchasing securities, thereby bidding up their prices and lowering their yields. The income and price level effects refer to the expansionary influence of money growth on prices and nominal income, which tend to reverse the initial decline in interest rates. These two effects, of course, correspond to the interest-lowering loan supply and interest-raising loan demand effects stressed by the classical/neoclassical school. Finally, Friedman’s price expectations effect refers to the premium for expected inflation that gets incorporated into nominal rates and raises them above their initial level. Taken together, these effects ensure that real rates inevitably return to their equilibrium levels, regardless of the actions of the monetary authority. Together, they “explain why monetary policy cannot peg interest rates.” [4, p. 7]

### **Concluding Comments**

This article has sampled the opinion of leading classical and neoclassical monetary theorists regard-

ing the central bank’s inability to permanently peg interest rates. In so doing the article has no doubt overlooked other economists who held similar views. For example, nothing was said about Gustav Cassel, who argued that a central bank faced with the responsibility for monetary and price level stability has no choice but to set the bank rate at the exogenously given equilibrium (natural) rate.

Nevertheless, the evidence presented is sufficient to provide strong support for the main contention of the article, namely that a central theme of the classical and neoclassical monetary literature was that the central bank is largely powerless to peg interest rates and that its attempts to do so would merely change the level of prices. Of course the mere dominance of this view throughout 200 years of mainstream monetary theorizing does not establish its validity. But it does raise questions about the origins of the opposing interest-pegging view. For whatever else one may say about that alternative view, one cannot claim that it derives from the economists quoted above. In short, proponents of interest-pegging policies cannot draw support from the mainstream monetary tradition established by classical and neoclassical writers. On the contrary, interest-pegging policies are incompatible with this tradition.

## References

1. Bohm-Bawerk, Eugen v. "Zins," *Handwörterbuch der Staatswissenschaften*, 3rd edition. Jena, 1911.
2. Cassel, Gustav. "The Rate of Interest, the Bank Rate and the Stabilization of Prices." *Quarterly Journal of Economics*, 42 (1927-28), 511-29. Reprinted in *Readings in Monetary Theory*. Edited by F. Lutz and L. Mints. Homewood, Illinois: R. D. Irwin, 1951, pp. 319-33.
3. Fisher, Irving. *Elementary Principles of Economics*. New York: Macmillan, 1912.
4. Friedman, Milton. "The Role of Monetary Policy." *American Economic Review* 58 (March 1968), 1-17.
5. Hollander, Samuel. *The Economics of David Ricardo*. Toronto : University of Toronto Press, 1979.
6. Hume, David. *Writings on Economics*. Edited by Eugene Rotwein. Madison: University of Wisconsin Press, 1956.
7. Lutz, Friedrich A. *The Theory of Interest*. Translated by Claus Wittich. Chicago: Aldine Publishing Co., 1968.
8. Marshall, Alfred. *Official Papers*. London : Macmillan, 1926.
9. Mill, John Stuart. *Principles of Political Economy, With Some of Their Applications to Social Philosophy*. Edited with an introduction by W. J. Ashley. London: Longmans, Greens, and Co., 1909.
10. ———. *Principles of Political Economy, With Some of Their Applications to Social Philosophy*. Vol. 2. From the Fifth London edition. New York: D. Appleton and Co., 1974.
11. ———. *Essays on Some Unsettled Questions of Political Economy* (1844). London School of Economics and Political Science; Series of Reprints of Scarce Works on Political Economy, No. 7. London: London School of Economics and Political Science, 1948.
12. Patinkin, Don. *Money, Interest, and Prices*. 2nd ed. New York: Harper and Row, 1965.
13. Pigou, Arthur Cecil. *Industrial Fluctuations*. London : Macmillan, 1927.
14. Ricardo, David. *On the Principles of Political Economy and Taxation*. As reprinted in Ricardo's *Works and Correspondence*. Vol. 1. Edited by Piero Sraffa. London: Cambridge University Press, 1951.
15. ———. *Pamphlets and Papers, 1808-1811*. As reprinted in Ricardo's *Works and Correspondence*. Vol. 3. Edited by Piero Sraffa. London: Cambridge University Press, 1951.
16. ———. *Speeches and Evidence*. As reprinted in Ricardo's *Works and Correspondence*. Vol. 5. Edited by Piero Sraffa. London: Cambridge University Press, 1952.
17. ———. *Economic Essays by David Ricardo* (1923). Edited with introductory essay and notes by E.C.K. Gonner. New York: A. M. Kelley, 1966.
18. Thornton, Henry. *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain* (1802). Edited with an introduction by F. A. von Hayek. New York: Rinehart and Company, Inc., 1939.
19. Wicksell, Knut. *Interest and Prices* (1898). Translated by R. F. Kahn. London: Macmillan, 1936. Reprinted by A. M. Kelley, New York, 1965.
20. ———. *Lectures on Political Economy*. Vol. 2: Money (1965). Translated by E. Classen. Edited by L. Robbins. London: Routledge and Kegan Paul, 1956.
21. Wood, Elmer. *English Theories of Central Banking Control, 1819-1858*. Cambridge: Harvard University Press, 1939.