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

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> 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.[1] 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.[2] 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

[1] 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.

[2] 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 slipt 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-l 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-l 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-l 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 transcience 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 temporary[3] 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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[3] 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-l 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 interestmoney 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 regarding 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.

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