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Interest Rates, Liquidity Preference, and Endogenous Money in an Alternative Monetary Model[1]

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Introduction

One of the main *collective* contributions[3] of the various heterodox schools of monetary thought, such as circuit theory, Post Keynesian theory, in both its horizontalist and structuralist versions, modern money theory (MMT), and others, has been to stress the importance of the endogeneity of money *via* bank credit creation. This issue was hardly discussed at all in the economics mainstream after Keynes's death, not until the very end of twentieth century and the beginning of the twenty-first. Even then the so-called "new consensus" model, which emerged as the orthodox theory over the turn of the twenty-first century, tended to obscure rather than clarify the issues at stake. This was probably inevitable given that Wicksell (1898), whose own work was a century old by this time, was explicitly or implicitly the inspiration for the new consensus (Woodford 2003). Neo-Wicksellian models are bound to carry a heavy load of intellectual baggage, including the bogus concept of the "natural rate" of interest, and also (fatally, once the idea of endogenous money has been admitted) a failure to recognise that there can be multiple sources of inflation and deflation.

As the above remarks suggest, as soon as the idea of endogenous money has been introduced, the other central issue in monetary theory is then the question of what determines the rate of interest, and specifically the inflation-adjusted or "real" interest rate. The purpose of this

paper is to therefore to explore the interaction between monetary endogeneity and interest rate determination in some detail, using theoretical concepts that have been developed in the "alternative monetary model" (AMM) of Smithin (2013a).

The Myth of the Natural Rate

For two hundred and seventy five years, or more, the bedrock of the mainstream/orthodox approach to the question of interest rate determination has been that the rate of interest is *not* primarily a monetary or financial phenomenon. Instead, it is supposed to be determined by the ubiquitous "real" forces in the economy of "productivity and thrift" (Humphrey 1993). Wicksell (1898, xxv) famously wrote of the "natural rate" interest, and provided a definition. According to Wicksell:

> "This natural rate is roughly the same thing as the real interest of actual business. A more accurate, though rather abstract, criterion is obtained by thinking of it as the rate which would be determined by supply and demand if real capital were lent in kind without the intervention of money"

However, it should immediately be clear from this wording that the idea of the natural rate, influential though it has been throughout the history of economics (in itself, and through its cognates such as the "natural rate of growth" and the "natural rate of unemployment") is untenable. Even in the basic definition, Wicksell invokes an entirely hypothetical world which has no money, but which, nonetheless, supposedly has a fully-fledged market economy presumably conducted by barter. However, in spite of its perennial popularity with those seeking a purely materialist and reductionist explanation of social phenomena, this notion is an absurdity. On a more nuanced understanding of the nature of money and of social ontology (Ingham 2004,

Searle 2010, Wray 2012, Smithin 2013a, 2013b), these are conditions which have never existed in the past, do not exist today, and could not possibly exist in the future. For example, in a widely-read book, *Debt: The First 5000 Years,* and with copious references to the primary literature, the anthropologist David Graeber (2011, 21-41) includes a chapter entitled "The myth of barter". If so, then the concept of a natural rate of interest must also a myth. It is sometimes argued that Wicksell, Menger (1892), and even Adam Smith (1776) in *The Wealth of Nations*[4] were simply making "thought experiments" about exchange, and had no obligation to be historically accurate. But this is clearly *not* so. To put the point as straightforwardly as possible, how *can* there be "actual business", in Wicksell's own unambiguous words, without a money of account and credit creation?

The bogus concept of natural rate is, moreover, far from being a question of historical importance only. The same idea, under different names, has survived in 21st century "micro-based" macroeconomics by various sleights of hand. In the ubiquitous dynamic optimization model, for example, an unobtrusive device that does the trick is the assumption of a constant rate of time preference. This fixes the interest rate for all time! But the argument falls apart as soon as it is allowed that time preference *can* change (Kam 2000, 2005, Smithin 2013).

Keynes, as quoted by Fletcher (1987), had a much more common-sense definition of the rate of interest:

> "[It is] ... (n)othing more than the inverse proportion between a sum of money and what can be obtained for parting with control over that money for a stated period of time"

Moreover, in the *General Theory,* to his credit, (Keynes 1936) explicitly repudiates the notion of the natural rate of interest. Writing about his earlier *Treatise on Money* (1930) Keynes admits:

> "(I)t was a mistake to speak of the natural rate or to suggest…[it]... would yield a unique value for the rate of interest irrespective of the level of employment…I am no longer of the opinion that the concept of the natural rate of interest has anything useful or significant to contribute to our analysis."

This is quite definitive. On this specific issue, and contrary to Leijonhufvud (1981) who later argued at length that Keynes should have adopted an intermediate position, it therefore seems to me that this is a clear advance of the position of the *General Theory* over that of the *Treatise*.[5]

Real and Nominal Interest Rates

In reality there is *no* natural rate. However, the concept of the *real* rate of interest is still important. Technically, in standard economics, the strict definition of the real rate of interest is that is equal to the nominal rate of interest (the percentage actually charged in the market-place), less the expected inflation rate over the period of the loan. In the notation to be used here, this can be written:

(1) $$r = i - p_{+1}$$

where i stands for the nominal rate of interest, r for the real rate of interest, and p_{+1} for the expected inflation rate between the current period and the next.

Also, however, according to the prominent mainstream economist Taylor (1993), for example in his famous short paper about "interest rate rules", we can often use the simple inflation-adjusted interest rate as a "proxy for" (an approximation to) the real interest rate itself. This inflation-adjusted real rate may therefore be simply defined as the nominal interest rate less the *currently observed* inflation rate, or:

(2) $r = i - p$ (approx.)

But, contrary to Taylor, and to Wicksell, it must continue to be stressed that the real rate of interest, on either definition, can take on *any* value. It is not tied down by any natural rate.

Alternative Theories of *Nominal* Interest Determination

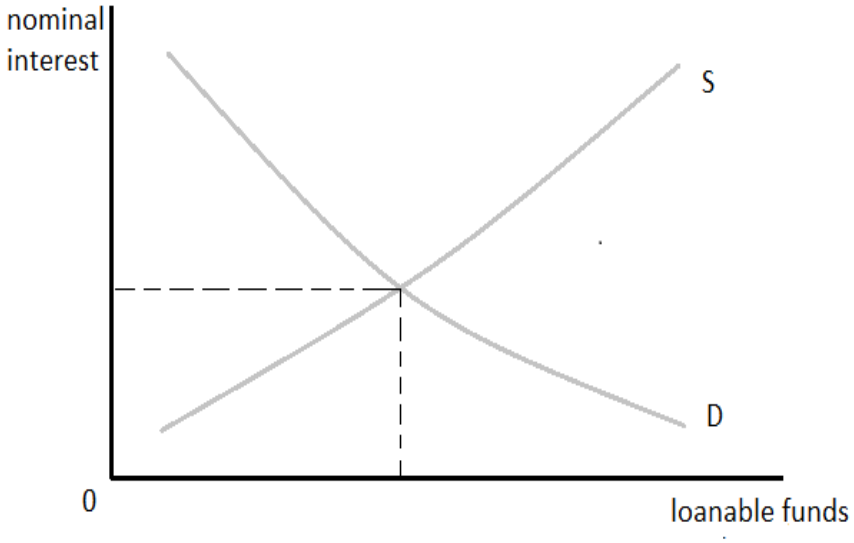
In university level textbooks on money and banking and finance, and in spite of the very well-known distinction between real and nominal interest rates introduced above, discussion about interest rate determination is almost invariably restricted to chapters about how the *nominal* rate is determined. This is a telling omission. Moreover, although, as explained by Hicks (1989, 102), there have been three broad classes of such theories discussed historically, really only one of the three ever makes an appearance in the contemporary classroom. We can identify the three alternative historical theories as (i) loanable funds theory, (ii) liquidity preference theory, and (iii) Post Keynesian horizontalism. It is only the loanable funds theory that ever sees the light of day in current university courses.

(i) Loanable Funds Theory

This was the name originally given to the theory put forward by Dennis Robertson in the 1930s, and, to this day, remains the only theory of interest rates deemed worthy of discussion in the textbooks. Keynes actually seems to have had the better of the argument with Robertson when they were both still living (Fletcher 2001, 2007), but posthumously, at least, Robertson's revenge in the textbook arena has been almost complete. The loanable funds theory simply postulates that

there is a demand by borrowers for the *soi-disant* "loanable funds", denominated in the unit of account, which depends inversely on the nominal interest rate. Also, there is a supply of such funds from lenders that depends positively on the nominal rate. The market interest rate and the total sum lent and borrowed are then supposedly determined by demand and supply equilibrium in the usual way, as illustrated in Figure 1. It is clear that the standard predictions about interest rate behaviour made by economists emerge directly from an analysis of this type.

Figure 1



If there is an increase in the willingness to save, for example (something causing a shift of the supply curve down and to the right), the interest rate will fall. If there is an increase in the willingness to borrow (causing a shift of the demand curve up and to the right) interest rates will rise. And so on.

(ii) Liquidity Preference Theory

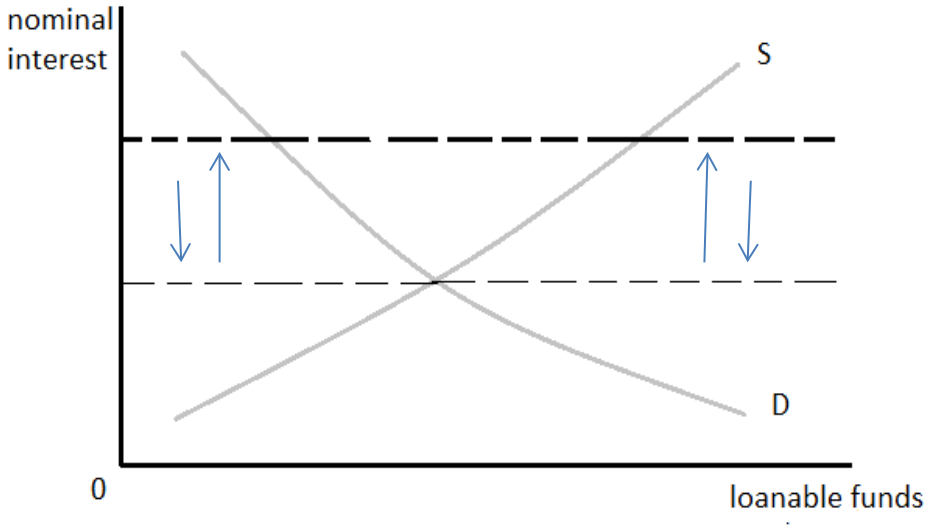
This was the theory put forward by Keynes (1936) in the *General Theory*. It depends one of the basic principles of asset pricing in financial economics, namely that there is an inverse relationship between the price of bonds and current interest rates. The annual "coupon" payment on the bond (as it used to be called) is based on the interest rate prevailing when the bond was first issued. Therefore, if current interest rates rise, the price of the bonds must fall to make the yield competitive and *vice versa*. Keynes would actually have put this point the other round way. Suppose that there is a fall in confidence about the future course of asset prices (a worry that asset prices may fall). This is precisely what Keynes, in the *General Theory*, called an increase in liquidity preference. In his earlier *Treatise on Money* (1930) he had labelled the same phenomenon as "bearishness". Such circumstances imply an *increase* in the demand for money (*i.e*., for *liquidity*), and a sell-off of financial assets (generically called *bonds*) to obtain the money. The price of bonds will *fall* and interest rates will *rise*. In short, an increase in liquidity leads to an increase in the interest rate. A decrease in liquidity preference (an increase in "bullishness") would imply the contrary belief that asset prices are likely to rise. This means a *fall* in the demand for money, an *increase* in the price of bonds, and a *fall* in the interest rate.

Consistent with Keynes's basic worldview, note the appeal to psychological concepts (such as "confidence"), and to genuine uncertainty in the financial markets, as opposed to probabilistic risk. There is also a strong element of "self-fulfilling prophecy" in the argument. Worrying that bond prices may fall actually makes them fall (and interest rates rise). Keynes's opponent Robertson (1940, 25) strongly objected to this on the grounds that, "(t)hus the rate of interest is what it is because it is expected to become other than it is ... [but] ... "there is nothing left to tell us *why* it is what is" (emphasis added). Robertson is clearly looking for some sort of

sheet anchor for the rate of interest, similar to the old natural rate, but there is no such thing in Keynes.

It seems clear therefore that the liquidity preference theory in the *GT* was Keynes's attempt to break with *both* the natural rate theory for real rates and the loanable funds theory for nominal rates. According to (Burstein 1995) the overall or underlying (if unarticulated) objective was to provide an alternative "monetary theory of the real rate of interest" (Burstein 1995). Figure 2, however, attempts to provide a graphical illustration of Keynes's argument about nominal rates as actually made in the *General Theory*.

Figure 2



Starting from the putative loanable funds equilibrium, this diagram shows what is supposed to happen in the case of an increase in liquidity preference (an outbreak of bearishness). The increase in liquidity preference causes a sell-off of bonds, and a fall in the price of bonds. Therefore, at least temporarily, there is an increase in the rate of interest. In the

diagram the new (higher) level of interest is shown by the *bold* broken line.

The same graph, however, also shows how difficult it is to provide a general evaluation of the accuracy of the theory, as presented in the *General Theory*. There is no doubt that Keynes's ideas about financial markets had great heuristic value in the turbulent environment of the 1930s, and continue to do so to this day (as will be demonstrated later). From the point of view of technical economics, however, there was unfortunately a problem with the way in which the theory was explained in the *General Theory*. Although this problem does *not* actually confirm the intuitions of Robertson and other contemporary critics on the matter, it certainly gave the critics plausibility at a crucial juncture in the debate, and was a major factor in leading orthodox economists eventually to repudiate Keynes's ideas.

The point is that the diagram in Figure 2 also illustrates that the interest rate will *not* permanently stay at the new higher value desired/imposed by the "bears". Sooner or later, it will return to the original level, shown by the *fine* broken line. The reason for this is that (specifically in the *General Theory* but not in the earlier *Treatise on Money*) Keynes had conducted his analysis of the demand for money on the assumption that the money supply itself was fixed. This was a theoretical mistake sufficient to undermine the whole basis of the formal theory, no matter how insightful and well informed were Keynes's other observations of real world financial behaviour. The problem is, that in the assumed circumstances, if interest rates do indeed temporarily rise because of an increase in liquidity preference, this is very likely to put deflationary pressure in the economy. That is, output prices are likely to fall. But, notice that a fall in the aggregate price index then increases the *real* value of the (fixed) *nominal* money supply. As P goes down, M/P goes up. This increase in the real value of money of money

holding can ultimately proceed to such an extent as to satisfy the original increase in "liquidity preference" altogether. This would remove the upward pressure on rates, and return the interest rate to its original level.

It so happened that in the decade or so after the publication of the *General Theory*, in 1936, several variants of this argument were stumbled onto by economic orthodoxy, and used as a weapon to challenge the theoretical *bona fides* of Keynesian economics. The general idea came to be known as the "Pigou effect", after Pigou (1943), or the "real balance effect" (Patinkin 1948). It is not quite clear that the point about exogenous *versus* endogenous money and interest rates was ever fully understood by orthodox economics. This is illustrated, for example, by the highly inconclusive argument in Friedman's (1968) famous article in the *American Economic Review* that was supposed to provide the *coup de grace* to Keynesian economics. Nonetheless, there was a genuine theoretical problem with the exposition in the *GT*. The only way it could have been avoided was if the nominal money supply itself had been allowed to fall endogenously as the deflation proceeds. Keynes's omission in this respect thus greatly facilitated the restoration of the loanable funds theory to pride of place in the textbooks, and in academia generally.

3. **Post Keynesian "Horizontalism"**

The name for this last approach derives from Basil Moore's famous book *Horizontalists and Verticalists* (1988). Another work, frequently cited as foundational for this point of view, is Kaldor's *The Scourge of Monetarism* (1982).

The basic idea of horizontalism is simply that, in reality, the central bank actually conducts monetary policy mainly by setting the policy rate of interest (the rate at which

commercial banks can borrow central bank money in the overnight market, in the USA called the "federal funds" market). In practice, the central bank usually accommodates the demand for bank reserves at this rate. The given setting of the policy rate is then thought simply to feed through to interest rates in general. Ultimately the argument is that the supplies of *both* credit and money become infinitely elastic at the market rate thus established. For example, let i_0 be the nominal policy rate of the central bank and i_L stand for the nominal commercial bank lending rate. Similarly let i_D stand for the commercial bank deposit rate. The commercial bank deposit rate is usually a "mark-down" from the policy-rate.[6] Therefore, we can write:

(4) $$i_D = m_1 i_0 , \qquad 0 < m_1 < 1$$

Thus, if m_0 stands for the mark-*up* between commercial bank deposit and lending rates:

(5) $$i_L = m_0 + m_1 i_0, \qquad m_0 > 0$$

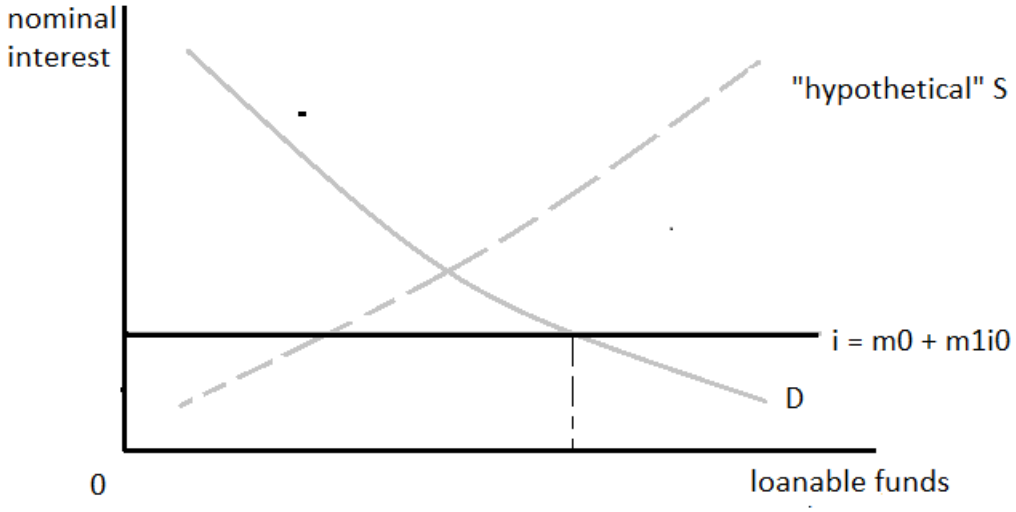
The expression in equation (5) therefore explains commercial bank nominal lending rates. Furthermore, as i_L must be "competitive" with the general rate of interest on loanable funds, i, we can write $i_L = i$, and:

(6) $$i = m_0 + m_1 i_0,$$

The supply curves of both money and credit become horizontal lines at this rate. Figure 3 shows how this view might be graphed in the loanable funds diagram. The total amount of lending is "demand-determined" along the horizontal supply curve and the same would be true of the quantity of money in an alternative money demand and supply diagram. As suggested the term "horizontalism" was originally associated with certain members of the "Post Keynesian" school of economics in the 1980s and 1990s. However, other Post Keynesians of the time were actually more concerned with the preservation of Keynes's insights about liquidity preference.

This latter group came to be known as structuralists. Hence, there was a vigorous series of debates between "structuralists" and "horizontalists" during the 1980s and 1990s.

Figure 3



An important question is, therefore, whether or not it is possible to reconcile these two Post Keynesian positions in any way? I would say that the answer is yes, and that the key to the reconciliation (again) is the treatment of endogenous money.

Demand for Money I: Textbook Theory of the Demand for Money

In the textbook macroeconomics of the second half of the twentieth century Keynes's original expression "liquidity preference" gradually lost much of its meaning. It came to be used merely as a synonym for the demand for money rather, than specifically as an alternative theory of interest rate determination. The well-known journal article by Tobin (1958) was very influential, in a negative sort of way, in this respect.

Tobin's stochastic theory of money demand was fairly complicated, and made a number of strong and, frankly, unwarranted assumptions about the applicability of statistical probability theory to the problem. The most typical textbook theory, however, was more straightforward. It simply argued that the demand for real money balances (M/P) depends positively on real income Y[+], and negatively on the nominal interest rate i[-].

(7) $$M/P = L(Y, i), \qquad L_Y > 0, \; L_i < 0$$

This formulation tries to combine the notion of a "transactions demand" for money with that of a "speculative demand", where both terms are originally due to Keynes. In spite of this, in a strange twist to the historical narrative of the development of economic thought, the approach was actually common to the (so-called) "Keynesians" and (so-called) "monetarists" during the famous debates between these two schools in the mid-twentieth century (Leeson 2003a, 2003b; Smithin 2004). Students of the period were "led to believe" that there was somehow a great theoretical divide between the two groups (in reality, they were all mainstream economists), but their approach to the theory of money demand was identical.

The most significant thing about the shared theory was that, in order to bring in the interest rate argument, it had to assume that money is *not* interest-bearing. Money is taken to consist of only notes and coins plus any non-interest-bearing bank deposits. However, in an era in which almost all money does consists of bank deposits, of all types, all of which do potentially bear interest, there is really no justification for this. Hicks (1989, 103-04) put the point this way:

> We are well on the way to a credit economy in which any money that does not bear interest has become no more than small change or petty cash. It is surely as least a tolerable simplification to which an economic theorist is accustomed to take it that this has already happened.

Hicks is pointing out that, in principle, a bank deposit is effectively a loan from the depositor to the bank, and that is no reason why it should *not* bear a market determined interest rate. This was written already by 1989. Moreover, the point is not affected by the observation that in a period of low interest rates, in general, such as the present, the interest rate on bank deposits may also fall to a very low level, even possibly actually to zero before allowing for convenience yield. This will change as soon as the general level interest rates of has risen sufficiently once again.

Demand for Money 2: The Demand for Commercial Bank Deposits

The quote from Hicks above suggests when we think of broad money in the modern credit economy this consist mostly of bank deposits, which are themselves, in principle, interest-bearing. Therefore it seems that, reverting to the Keynesian terminology once again, we are left with only a "transactions demand" for this type of money. The demand for money function, in this sense, must revert to something like:

(8) $M/P = kY, \qquad 0 < k < 1$

This is simply the old-fashioned Marshallian "cash balances" approach (Marshall 1923). Ironically, the old Marshall theory becomes viable once again in the modern world of electronic money. The term k in equation (8) is actually the famous "Cambridge k" as it used to be called. For present purposes, however, it will be better to choose a symbol other than k.[7] We could perhaps try:

(9) $Md = \psi PY, \qquad 0 < \psi < 1,$

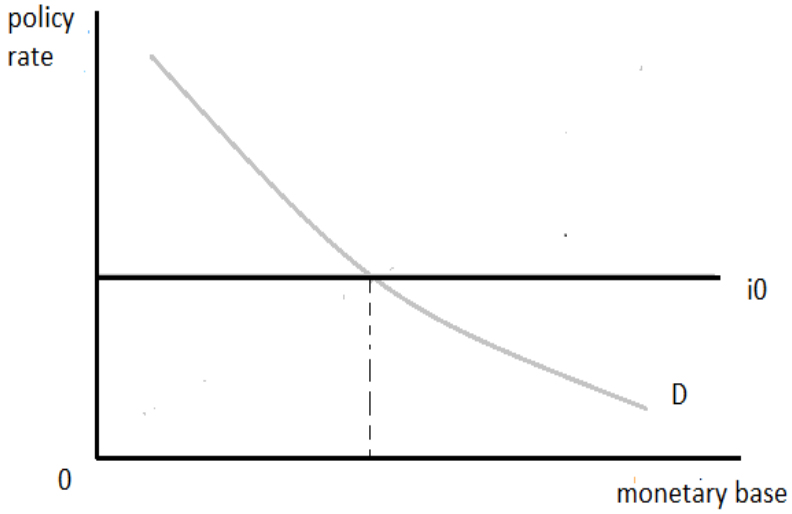
Equation (9) thus states that the demand for nominal money balances held as commercial bank

deposits, is some proportion, ψ, of nominal GDP.

Demand and Supply in the Overnight Market (or "Federal Funds" Market)

Although the overall demand for *interest-bearing* money cannot reasonably be thought to depend on the level of interest rates as such, we can nonetheless still continue to argue that the demand for base money, or bank reserves, does depend negatively on a particular nominal interest rate. Specifically, it will depend upon the central bank "policy rate" of interest.

Figure 4



Why is this? In the first place, much of the monetary base, the currency itself, does *not* bear interest. Moreover, even for that part of the monetary base which is interest-bearing (such as commercial bank deposits at the central bank) the relevant interest rate, the policy rate itself, is effectively set by the central bank. First, the central bank arbitrarily fixes the rate at which they will lend *directly* to the commercial banks (sometimes known as the "bank rate" or "discount

rate"), and also the band between this rate and the central bank deposit rate. The policy rate always comes in somewhere *inside* the narrow band between bank rate and the central bank deposit rate. In point of fact, it comes in at whatever level the central bank wants it to be within the band. There are certainly enough additional financial techniques at the central bank's disposal to achieve these results on a daily basis. In these circumstances, a graphical depiction of the overnight market for central bank money may be shown, very simply, as in Figure 4.

As can be seen, horizontalism does "work" in a quite precise sense, in the analysis, specifically, of the market for federal funds (the American term) or more generally the overnight market. The central bank simply sets the interest rate relevant in that particular market and the actual level of the "monetary base" is demand-determined, that is, by the position of the demand curve given the interest rate.

The Supply of Commercial Bank Deposits and the Viability of the Banking System

Returning now to the case of the demand for and supply of potentially interest-bearing commercial bank deposits, it must also be the case that the *supply* of these deposits is fully endogenous, with the total holdings of such deposits at any time determined by the interaction of both supply and demand. However, because the demand for such deposits is not likely to be interest sensitive, there is no such simple solution to determine the outcome as fixing a particular nominal interest rate. The supply of money (commercial bank deposits), for example, it might be given by an expression such as:

(11) $$Ms = \phi W_{-1} N_{-1}, \qquad 0 < \phi < 1$$

In this formulation the supply of money in existence at any one time is taken to be some multiple of the wage bill (or production costs in general), from last period. In effect, it is assumed that there is a "monetary circuit" which begins as firms borrow the wage bill, to advance to their workers at the start of the production process, and ends one period later as the output is sold and the debts incurred can be paid off.

It is important for the viability of both the banking and the industrial system that the parameter ϕ is larger than one, $\phi > 1$. This *must* be the case in order to solve the "realization problem" and to validate the monetary circuit, $M – C – C' – M'$. It is only in these circumstances that firms *in the aggregate* will be able to realize positive monetary/accounting profits (Seccareccia 1996; Smithin 2003, 2009, 2013a).

The idea that the endogenous supply of money depends on firms borrowing to advance the wage bill comes from circuit theory, and circuit theorists such as Graziani (2003, 27), have indeed shown that at the macro level *all* of the wage bill (in this case $W_{-1}N_{-1}$) must effectively be borrowed. This is proved by aggregating the private sector.

However, such a proof only allows for $\phi = 1$, and so there would still be no profit, even in the (extremely unlikely) best case, where the whole of the wage bill is spent on goods and service. To justify the assumption that $\phi > 1$, we must therefore add the observation that most other types of borrowing (*e.g.*, for consumer spending, capital spending, or, even mere financial speculation) are also likely to be conditional, *from the lenders' point of view*, on some measure of the income of the borrowers. At the aggregate level the total wage bill will be a good "proxy" for income (to use the terminology introduced earlier), as the wage share tends to be fairly stable.

It is therefore entirely reasonable to argue that the total amount of borrowing will be some *multiple* of the wage bill. This allows for positive money profits, and makes the system viable.

The "Market" for Commercial Bank Deposits: Liquidity Preference Once More

We have ruled out drawing a demand curve for commercial bank deposits that is negatively related to the nominal rate of interest, but have also asserted that it nonetheless remains true that holdings of bank deposits at any point in time must, by definition, be equal to the supply of bank deposits in existence at that time. Therefore, even with an endogenous supply of money:

(12) $$Md = Ms$$

But, recall the demand function for potentially interest-bearing bank deposits from equation (9). This was $Md = \psi PY$. Therefore, from equations (9) and (11):

(13) $$\psi PY = \phi W_{-1} N_{-1}$$

Given the one-period production lag implicit in the monetary circuit, we can also write;

(14) $$Y = AN_{-1}$$

where A is the "average product of labour", given the time dependent structure of production. Combining equations (12), (13), and (14) then yields the following equation for the aggregate price level:

(15) $$P = [(\phi/\psi)W_{-1}]/A$$

Next take logs of equation (15), and subtract the term lnP_{-1} from both sides. This gives:

(16) $$lnP - lnP_{-1} = ln\phi - ln\psi + lnW_{-1} - lnP_{-1} - lnA$$

which in the lower-case notation, introduced earlier, reduces to:

(17) $$p = p_0 + w_{-1} - a$$

Here, lower-case a is the log of labour productivity, w_{-1} is the log of the lagged average real wage rate, and p is the inflation rate.

Meanwhile, the term p_0 is clearly equal to $ln\phi - ln\psi$, but how should this expression be interpreted? It can now be seen, in fact, to be precisely a measure of the overall state of liquidity preference. When liquidity preference *rises*, p_0 goes down, and *vice versa*. Note that this measure of liquidity preference is relevant to *both* sides of the money and financial markets, whereas Keynes himself had confined the concept to the demand side. In the endogenous money case, liquidity preference involves *both* the overall willingness to borrow on the one hand (illustrated by the term $ln\phi$) and the willingness to hold or absorb money balances on the other (illustrated by the term $ln\psi$).

In equation (17), an increase in liquidity preference or bearishness (negative market sentiment) implies simultaneously a reduced willingness to borrow, and an increased willingness to hold bank deposits. Therefore, it will cause a fall in the p_0 term and, ultimately, in the inflation rate. A reduction in liquidity preference (positive market sentiment) will, on the contrary, mean both a reduced willingness to hold commercial bank deposits, and an increased willingness to borrow in order to acquire securities. The combined effects will increase the p_0 term and, *via* equation (17), the inflation rate.

Thus far, liquidity preference seems to affect only inflation, and we have not yet mentioned the effects of changes in liquidity preference on interest rates, the original point of Keynes's argument. This topic will therefore be taken up in the next section. In the meantime, note that it would already be possible to interpret the supposed effects of the modern policy of

"quantitative easing" in terms of changes in p_0. In its modern usage, the expression quantitative easing implies the purchase of government bonds of *varying* maturities by the central bank, literally in an effort to increase the monetary base. In the context of equation (17), this would bring about an increase in p_0, and hence ultimately the inflation rate, through its impact on the $ln\phi$ term.

Liquidity Preference and the *Real* Rate of Interest

The debate between the horizontalist and structuralist wings of the Post Keynesian school in the 1980s and 1990s, was, as mentioned, essentially about the need to reconcile the notion of endogenous money and the central bank "interest rate operating procedures" of the day (Lavoie and Seccareccia 2004), with the intuitive idea from Keynes that liquidity preference *also* matters for the determination of interest rates. In this section, it will be shown that central bank interest rate policy, endogenous money, and the effect of liquidity preference on the general level of interest rates are entirely compatible.

In the absence of a natural rate, it is important to stress that the central bank can not only set the nominal policy rate, but also, if it has the political will and institutional knowledge, the *real* policy rate as well. The average real rate of interest *actually paid by borrowers*, including business firms making investment, is certainly also much influenced by the level of the real policy rate. In an endogenous money environment, however, it is no contradiction to suggest that liquidity preference considerations *also* influence the effective real rate paid by borrowers.

The shift in emphasis from nominal interest rates to real rates is highly significant. The argument will ultimately be that it is the *real* rate of interest that can be called a "monetary phenomenon", in every sense of the term. There is no "natural rate" of interest, and *no* unique equilibrium level to which the real interest rate will always return. Nonetheless it is the actual level of the real rate, as defined above, that is important for its effects on economic activity. Moreover, when the money supply is endogenous all economic change, from whatever source, *necessarily* has monetary aspects.

To see the force of these arguments, first recall the nominal interest rate equation introduced above. This was simply:

(18) $$i = m_0 + m_1 i_0,$$

This equation states how changes in the nominal policy rate of interest, i_0, by the central are passed through to the general average of nominal lending rates, i. Meanwhile, both the monetary base and the money supply adjusting endogenously, Next, we can again use the device of subtracting the inflation rate, p, from both sides of equation (18). This gives:

(19) $$i - p = m_0 + m_1 i_0 - p$$

Re-arranging, this operation will yield:

(20) $$r = m_0 + m_1 r_0 - (1 - m_1)p$$

Where r_0 is the real (inflation-adjusted) policy rate of interest, that is, the current setting of the nominal policy rate less the *observed* inflation rate.

It has already been pointed out that if central banks are looking for a "monetary policy rule" to follow, then it is entirely feasible for them to set r_0 as a policy target (Smithin 2007). They only have to choose to do so. It was wrong of Milton Friedman (1968, 5), therefore, in the

American Economic Review article previously cited, to have said of the central bank that: "(i)t cannot peg interest rates except for very limited periods". This is not so, even on a charitable interpretation that Friedman was referring to a real rate at this point. The statement is simply not true for this particular definition of the real rate.

If the central bank does follow a real rate rule then equation (20) shows that there is actually a negative relationship between the inflation rate and general level of real rates of interest (similarly defined) in the broader market place. Historically, this kind of relationship was known as the "forced saving effect", or similar, reflecting the idea that so-called "forced" saving, supposedly necessary for there to be more investment, could brought about by higher inflation. As explained by (Smithin 2013a, 185-88) a better term would really have been "forced investment", which is more accurate and somewhat less pejorative. In fact, in the "Austrian" business cycle theory of the 1930s, due to von Mises (1934) and Hayek (1935), the term "overinvestment" was actually used, though, in this case, in an entirely pejorative sense. Later in the twentieth century, this same idea was called the "Mundell/Tobin effect" after Mundell (1963) and Tobin (1965).

In all periods it has been subject to much debate (Hayek 1932, Blanchard and Fischer 1989, Walsh 1998), essentially because it "goes against the grain" of most of the corpus of classical and neoclassical economics (Humphrey 1993, Smithin 2013a). However, we have here shown the existence of the negative relationship in fairly simple way, against which there can hardly be much argument (Kam 2000, 2005; Smithin 2013a). This is an important finding in its own right, whether or not the Mundell-Tobin effect actually does causes "forced" saving or, indeed, has any bearing at all on the ethics of income distribution.[9]

Now recall that the inflation rate p itself depends *via* equation (17) on the p_0 term, which, in turn, measures the state of liquidity preference. Therefore, for example, an *increase* in liquidity preference must cause a *fall* in p_0, then a *fall* in p, and from equation (20) an, *increase* in the real interest rate. In short, an increase in liquidity preference causes the real interest rate to rise (and *vice versa*).

The result therefore turn out to be very similar to Keynes's old arguments about interest rate determination, but with the emphasis shifted to real rather than nominal interest rates, and without the theoretical flaws that Keynes's argument suffered from.

This, therefore, is the solution to the problem of reconciling different views on interest rate determination in the endogenous money environment, such as horizontalism and structuralism. The central bank is certainly in a position to set the real *policy* rate, if it chooses to do so, and the level of the real policy rate also feeds through to affect the average level of real interest rates, in general. However, changes in liquidity preference will also affect the differential between the real policy rate and (say) the real prime lending rate of the commercial banks. There is no contradiction.

A Simple Two-Equation Model of the Real Rate of Interest

It is now possible to put together a simple formal model with two equations which will jointly explain the determination of the real interest rate and the inflation rate. In equilibrium, or the steady state of the system, we have $w = w_{-1} = w_{-2}$ ... *etc.* This gives the following two-equation solution system:[10]

(21) $p = p_0 + w - a$

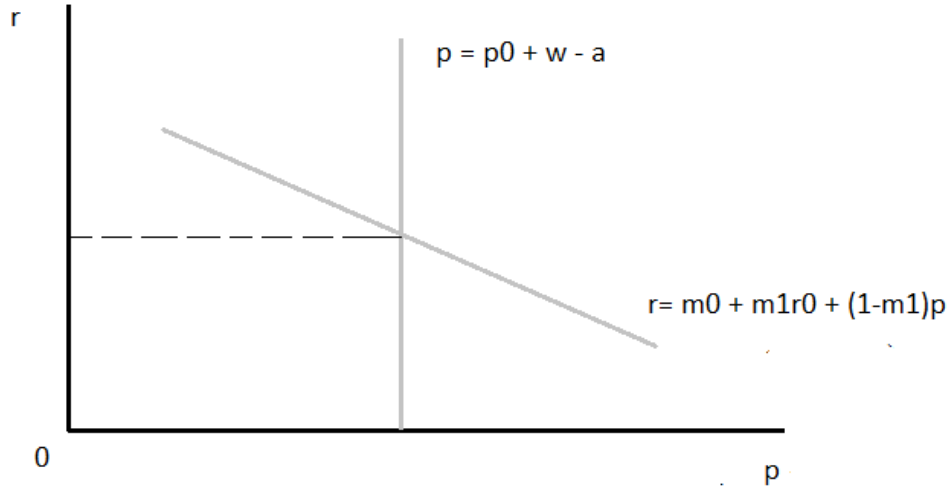
(22) $r = m_0 + m_1 r_0 - (1 - m_1)p$

Therefore solving for real interest rate:

(23) $r = m_0 + m_1 r_0 - (1 - m_1)(p_0 + w - a)$

The solution for inflation is, of course, simply equation (21). The equilibrium is also shown in graphical form in Figure (5):

Figure 5



Both equation (23) and Figure 5 show the main determinants of "*the*" (real) rate of interest as the concept is conventionally understood in macroeconomics (Keynes 1936, 165). The symbol r_0 stands for the real policy rate of the central bank, and it has been already been argued above that if the central bank behaves "sensibly" it will be trying to stabilize that rate at some given level. If the central bank neglects this advice, and does make (or allow) a change in the real policy rate, (the real policy rate is changed deliberately or otherwise) this will affect real interest rates generally in the market place. An increase in the real policy rate, shown by a vertical upward

shift of the downward-sloping line in the diagram, will increase the overall level of real interest rates, and *vice versa*.

However, something like the original Keynesian argument also continues to have relevance. An increase in liquidity preference (a fall in the p_0 term), shown by a shift to the left of the vertical line in the graph, will also increase real interest rates, and *vice versa*.

Another change that will cause the real rate of interest to rise is an increase in labour productivity (in this context, shown by an increase in the term *a*). This will cause the horizontal line in Figure 5 to shift back, and to the left, and raise the real interest rate, and *vice versa*. Arguments to the effect that changes in productivity will cause real interest rate changes are, of course, also not uncommon in the mainstream literature. However, we should be careful to explain exactly what is happening in this particular case, because it involves a quite different mechanism than is postulated in orthodox theory. It involves not only changes in real productivity itself, but also financial considerations. In the two-equation model in (21) and (22), what actually happens, in the case an *improvement* in productivity, is that this first causes a *fall* in the inflation rate, as in equation (21), and then the *fall* in inflation causes a *fall* in interest rates, *via* the Mundell-Tobin effect.

Notice that an increase in real wages with no change in productivity will have the opposite effect to a productivity improvement. It will cause real interest rates to fall. This time the increased wage pressure causes cost-push inflation, and the rise in inflation is what actually causes the real interest rate to rise. Interestingly enough, many years ago Hicks (1982, 65) had also addressed this question of the effect of real wage changes on interest rates and had found it something of a puzzle. He could come up *both* with an argument to the effect that a rise in wages

leads to a fall in interest rates, but also the opposite. He reconciled these two positions, somewhat unconvincingly, by suggesting that the one effect applies in the "short run" and the other in the "long run". In the present case, however, the final answer seems to be definitive. There is a *negative* relationship between real wages and real interest rates.

Conclusion

According to Keynes, capitalism was best described as a monetary production economy (Graziani 2003). In such an economy, the money supply must be an endogenous variable if the system is to function at all, but is not clear that Keynes himself sufficiently recognized this point Smithin 2013a, 2013b). In fact, the money supply is endogenous almost by definition. The central bank sets the policy rate of interest (the rate of interest that must be paid to obtain reserves of base money), and can also easily set the real rate policy rate, simply by adjusting the nominal policy rate for inflation. The level of the real policy rate will then be "passed through", to a greater or lesser extent, to affect real interest rates in general. However, liquidity preference considerations *also* have a considerable effect on the overall level of real interest rates. In an endogenous money environment there is no contradiction between these positions.

Notes

1. I would like to thank Chris Chae and Leo Zalmanowitz for making some useful comments that have improved this paper, and for catching some errors in an early draft. Any remaining errors and omissions are the sole responsibility of the author.

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3. It is necessary to stress this point because of the various claims and counter-claims to academic priority that are currently being made in the literature. See also Smithin (2014).

4. The foundational work on political economy.

5. Of course, on other issues, such as endogenous money itself, it could conversely be argued that the *General Theory* takes a step back. See Smithin (2013c).

6. I think that a main reason why economists have always been so confused about this issue is the habit of using the expression "real" in at least two different senses. One meaning has the connotation of relating to the natural or the physical world, while the other refers simply to the deflation of money values by some kind of price index. These are not the same sort of thing at all.

7. For example, this used to be called the "two for one rule" Rogers and Rymes (2000, 251). In practice, however, the m_1 coefficient tends to be greater than 0.5, though not as high as unity (Kam and Smithin, 2012).

8. This is because, in earlier work by the present author (*e.g.*, Smithin 2013a), the term *k* has consistently been used to mean something else (in fact, the profit mark-up).

9. Smithin (2003, 2010, 2013a) has discussed this question in some detail in a number of different places. If a real rate rule is in place, and as long as the real policy rate is non-negative, the charge of "spoliation" (Sraffa 1932, 223) would not apply.

10. It seems to me that this model has taken the question of the determination of the real interest in financial "equilibrium" (which is *not* the same concept as the natural rate), about as far as it can go. It should be noted, however, that in order to be able to conduct the analysis we have had to presume that central bankers in this economy are be able to "understand" the system, at least to the some extent. (For example they are capable of realizing that they have to pay some attention to the real policy rate and not just the nominal policy rate. It goes without saying that this level of understanding can hardly be guaranteed in practice! There are numerous possible scenarios in which the monetary authorities actively contribute to instability in either direction, and many of these have indeed seemed to play out at various times and place in the historical record. For a formal mathematical discussion of the case of outright instability, see Smithin 2013a, 238-247).

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