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NUMBER   68

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WARWICK ECONOMIC RESEARCH PAPERS

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May 1975

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should be considered preliminary.

"Wealth, Saving and the Rate of Interest" in the Long Run*

When L. A. Metzler[1] made his famous contribution to the
discussion of whether the rate of interest was a real or a monetary
phenomenon, he engendered a major dispute, which turned upon whether
taxes could be capitalised. This was of great importance to his result
that the interest rate is neither purely real nor purely monetary, but
sensitive or not to a once-for-all monetary expansion according to whether
the expansion was of inside or of outside money; because if taxes are
fully capitalised a reduction in the private sector's ownership of
capital, matched by a reduction in taxes equal to the total return on
that capital, leaves the private sector's wealth unchanged. His result
depended upon there being a change in wealth consequent upon such an
operation. There were many contributions to this debate (e.g. 2, 3, 4,
5, 6), but Metzler focussed his reply[7] on Mundell's critique[8]. He
concluded that, because of the structure of taxes in the U.S.A., (and
because of the inevitable tax structure in modern economies, where so
much of GNP is inevitably almost-non-capitalisable personal income,) his
result holds as an empirical matter.

In the excitement of this debate, another aspect of his paper
was overlooked. This aspect is whether his result holds in the long run,
or whether it describes only a temporary equilibrium.   It is to that
question that this paper is addressed.   The first stage in tackling it
is to set out the diagram which Metzler developed, and which is extremely
useful in this analysis also.

The economy is closed, and has a fixed amount of labour.   Wage
rates move flexibly to clear the labour market.   All factors of production

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except labour are produced, and all production is under constant returns to scale; all relative prices are therefore determined independently of the composition of output, and there is no ambiguity about the concept of a full employment level of output. Private wealth can be held in two forms, non-interest bearing money or equities (all of which are of equal risk). The central bank can buy and sell this common stock, which is the only non-monetary asset of the banking system.

The society has in the short run a certain amount of capital which yields an income stream; the present value of this stream varies inversely with the interest rate, as shown by the schedule AA in figure 1. A "wealth requirement schedule", WW, can also be constructed. This shows the combination of r (the rate of interest) and W (wealth) at which savings equal investment; as r goes up, investment falls, so W must rise to reduce saving.
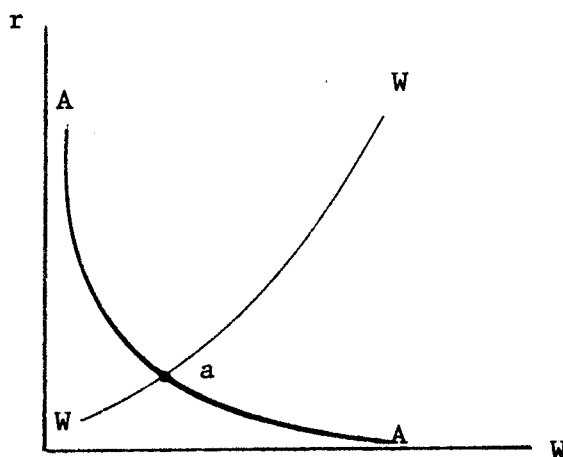

Fig. 1

(This relationship holds even if savings are negatively related to the rate of interest, so long as $|\delta I \, \delta r| > |\delta S \, \delta r|$; it holds a fortiori if savings rise with the interest rate).

Since any excess of W over A can only be supplied by real cash balances, the horizontal difference (above a) between the two schedules

shows the amount of money required fɔr equilibrium at each r. This

schedule, the "money requirements schedule", is shown as MM in figure

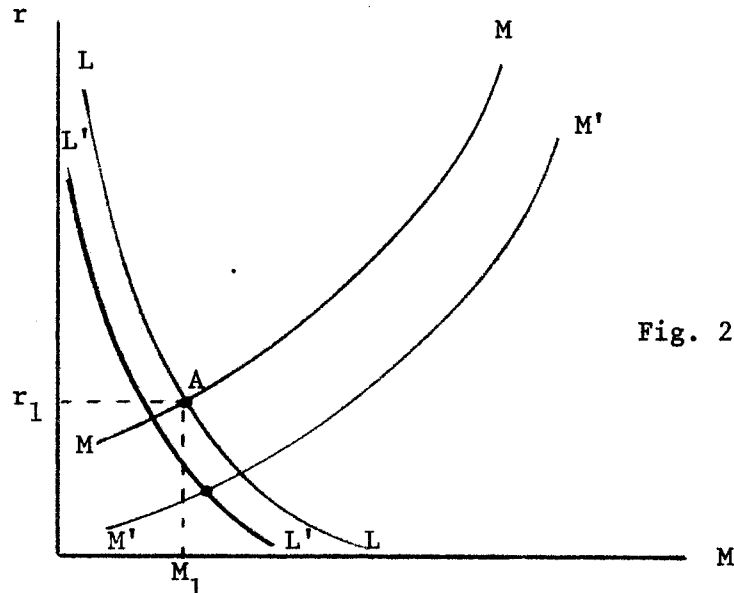2. It is the amount of money required at each r for equilibrium in

the goods market.

Fig. 2

The money market also has to be allowed for. Along MM, since I = S,

the supply of new securities equals the demand. But the market in

existing assets also has to clear. The curve representing how r must

move as the ratio of money to equities rises is LL, representing, as

usual, increasing liquidity preference as the rate of interest falls.

Only one combination of r and M clears both markets - r_1 and M_1, at A.

Metzler[1] shows that if we are in any of the four quadrants defined by

LL and MM in diagram 2, forces are set in motion which move us to A.

It is useful to think of this point as representing a stationery equil-

ibrium, with a constant population and state of technology, and all

investment being replacement investment; or alternatively as a growth

path along which capital (and hence, at a constant interest rate, wealth)

per head is constant.

Now we assume that the monetary authorities are unhappy with

this situation, and wish to increase the rate of investment. It is

assumed, following Metzler, that a purchase of securities by the central

bank reduces private sector wealth. The central bank carries out an

open market operation, and buys some equities from the private sector.

This shifts the AA schedule in figure 2 to the left, and hence the MM

schedule in figure 2 to the right. (Since the wealth requirement for

equilibrium in the goods market is not changed by the operation, and

the amount of wealth in the form of equities falls, the money requirement

for equilibrium must increase). At the same time, LL shifts to the

left. This it does since the desired ratio of equities to money has

not been changed by the operation, but the actual ratio has been reduced

at every r; hence, to maintain the desired ratio the actual money holding

at every r must fall. Hence, as MM shifts to the right and LL to

the left (to e.g. M'M' and L'L' in figure 2) r falls. Metzler

argues that this is a permanent fall.

But the new equilibrium can not be a permanent one. There has

been a fall in r, which must lead to a rise in I, and, as will now be

shown, there has been a fall in W, which must lead to a rise in S.

When the central bank starts to purchase securities, the first effect is

a rise in security prices and a corresponding fall in the rate of interest.

This increases investment, which raises the price level and reduces the

real value of private wealth by reducing the real value of private money

holdings; thus, while the transaction in securities changes merely the

composition of wealth, the effect of that transaction on investment changes

the total of wealth.

The increased savings rate means that the value of the private

sector's holdings of equities starts to rise again; the AA schedule,

having been shifted to the left, starts to shift back to the right. This

shifts the MM schedule (the money requirements schedule) back to the left.

The only way, in a closed economy in which the private sector can reduce its real cash balances is by bidding up the price level. It does so, reduces the real cash balances, and shifts L'L' back towards LL. We thus appear to be converging to the old equilibrium, in a quite straight-forward way.

Unfortunately, there is a complication. The gradually diminishing flow of saving means that, as replacement investment rises, net investment can only be funded at higher and higher interest rates - as the demand for securities falls off, so must their yield rise. This plainly helps the convergence to the old equilibrium. The problem is that, as Mundell[9] has shown, in the presence of the real balance effect inflation lowers the real rate as well as raising the money rate. There thus appears to be the possibility that this force making for a fall in the interest rate will dominate the other making for a rise in the real interest rate, so that investment increases further. Happily, this possibility can be eliminated, because we have a constant nominal money stock and a stable liquidity preference schedule. The contracting real money stock will increase both the savings rate and the interest rate, thus reducing the "inflationary gap". A take-off into self-sustaining inflation as a consequence of a once-for-all open market operation is impossible in this model. It can therefore be seen that, as a consequence of the open market operation, there is, as Metzler described, an increase in the rate of investment; but there is also an increase in the rate of saving, and as a consequence of this we converge to the same level of private sector wealth as before the operation, therefore to the same rate of saving, the same rate of interest, and the same rate of investment. Only when there is no net capital accumulation (or accumulation at a rate equal to the rate of population growth in a non-stationary economy) is the system in full equilibrium. Even with a real balance effect, a once-for-all monetary

expansion has, at most, a temporary e..ect on the rate of interest; in
a model with full price flexibility, the rate of interest is still in
the long run a real phenomenon.

Of course it is a different matter if the open market operation
is a continuing one. If every period after its initial operation the
central bank carries out a further open market operation, and impounds the
increase in private sector wealth that accrued in that period, then the
lower rate of interest is sustained, and the economy is held on a path of
a higher rate of capital accumulation. This capital accumulates to the
public sector. It may be questioned whether this process could continue
without breaking down the separation which has been maintained in people's
minds between wealth owned privately, and wealth owned by the public
sector. The analysis of the breakdown of this separation can be pursued
in a way exactly analogous to Mundell's [8] analysis of the short run case;
the conclusions are the same as his.

Perhaps the polar opposite to the case of a continuing open
market operation is the case when the initial operation is reversed, and
capital returned to the private sector. As a consequence of this there
is an increase in private sector wealth, a decrease in saving, and a rise
in the rate of interest. Once the system has settled down, it is back
at the same rates of saving, interest, and investment as before. The
two open market operations (the central bank first buying and then selling
equities) have affected only the time path of capital accumulation.

One matter remains to be considered. It has been shown that
the central bank can only maintain a higher rate of capital accumulation
by a continuing rather than once-for-all rate of monetary expansion; this
conclusion also emerges from Mundell's "Inflation and Real Interest". [9]

The remaining matter is to show the relationship between the two ways of reaching this result. It will be plain if the diagram Mundell uses is set alongside diagrams 1 and 2 above (which were developed by Metzler).

Mundell's diagram is diagram 3.
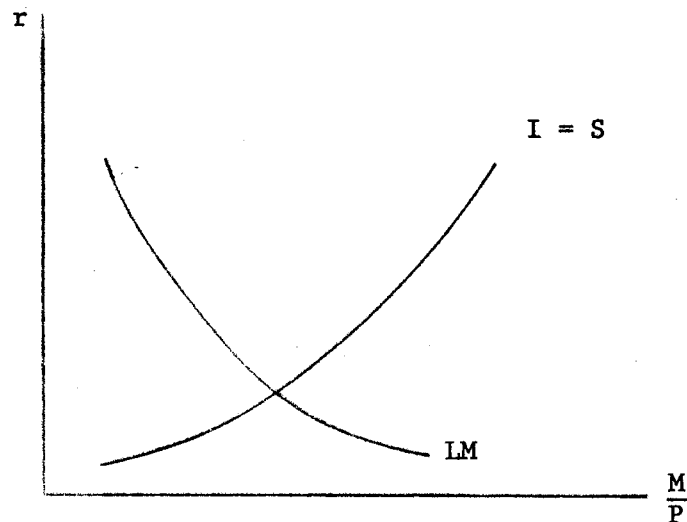
Along I = S we have the locus of interest rates and real cash balances which clear the goods market; it corresponds to MM in figure 2. LM is the locus of interest rates and real cash balances consistent with equilibrium in the money market; it corresponds to - indeed is - the same schedule as LM in figure 2. An inflation in Mundell's analysis is generated by an excessive monetary expansion, and in equilibrium separates the real and money rates by the rate of inflation. This neces-sarily implies a fall in the real rate. This, as in Metzler, raises the rate of investment and by reducing the stock of real cash balances will reduce wealth and increase saving. The one difference is that Mundell does not distinguish, as Metzler does, between an expansion of outside money and one of inside money. He does not do so because if he stands by the assumption in his reference 8 above all taxes are capitalised and so, as emerged from that discussion, the type of monetary expansion does not matter so long as it is sufficient to cause inflation

and thus change the total of private sector wealth.

To conclude, the result of this analysis can be summarised by saying that, in an economy with a real balance effect and perfect price flexibility, the rate of interest is in the long run a real phenomenon, if by that is meant it is insensitive to a once-for-all open market operation. Monetary policy can, however, affect in the long run rates of interest and investment, so long as the policy is of a continuing nature. The essential point of the Metzlerian analysis, that the presence of the real balance effect does fundamentally change the classical system by giving the monetary authorities power over the rate of interest and the rate of investment, still stands.

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