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Monetary policy is not about interest rates; The liquidity effect and the Fisher Effect

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Abstract. The purpose of this paper is to clarify the relation between money and interest rates. Section 1 examines the empirical validity of Keynes's claims for his liquidity preference theory by looking at the relation between changes in interest rates and changes in the quantity of money. Section 2 considers Irving Fisher's findings. Fisher, whose studies had mostly preceded Keynes, had shown that over any longer-term horizon the relation between money and interest rates was exactly the reverse of Keynes' hypothesis of short-term liquidity preference. A reconciliation is proposed that treats Keynes' theory as a short-term, liquidity effect, and Fisher's results, which incorporate the effect of inflation or inflation expectations, as the longer-term determinant of interest rates. Section 3 applies the resulting combined theory of the relation between money and interest rates to five case studies in recent decades: two from Japan, and one each from the Eurozone, the U.K. and the U.S. The conclusion is that interest rates are a highly misleading guide to the stance of monetary policy; it is invariably better to rely on the growth rate of a broad definition of money when assessing the stance of monetary policy.
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JEL. E52, E58, G14.

1. Introduction

The Discussions about monetary policy are frequently bedevilled by vague terminology. For example, monetary policy is said to be "easy" or "accommodative". This lack of precision arises from the lack of a common criterion by which to assess monetary policy. Most observers, including most professional economists, typically rely on interest rates as their criterion of whether monetary policy is easy, neutral or tight. Consequently, much of the debate among the leading protagonists in recent years has focused on the question of how far interest rates were from the natural or neutral rate, often designated by r*. A minority of observers and economists focus instead on the quantity of money, which can lead to quite a different assessment of the stance of monetary policy.

The problem with reconciling these two viewpoints is that there is no monotonic relation between money and interest rates. In fact, it is possible, at least in the short run, to have rapid money growth coexist with high or low nominal interest rates, or conversely to have low money growth coexist with low or high nominal interest rates.

The purpose of this paper is to clarify the relation between money and interest rates. Section 1 will examine the empirical validity of Keynes's claims

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for his liquidity preference theory by looking at the relation between changes in interest rates and changes in the quantity of money. Section 2 will consider Irving Fisher's findings. Fisher, whose studies had mostly preceded Keynes development of the liquidity preference theory, had shown that over any longer-term horizon the relation between money and interest rates is exactly the reverse of Keynes' short-term relationship. A reconciliation is proposed that treats Keynes' theory as a short-term, liquidity effect, and Fisher's results, which incorporate inflation, as the longer-term determinant of interest rates. Section 3 will apply the resulting combined theory of the relation between money and interest rates to five case studies in recent decades: two from Japan, and one each from the Eurozone, the U.K. and the U.S. The conclusion, in Section 4, is that interest rates are a highly misleading guide to the stance of monetary policy; it is invariably better to rely on the growth rate of a broad definition of money when assessing the stance of monetary policy.

2. Keynes' Liquidity Preference Theory

John Maynard Keynes devised a theory of the demand for money -- which he called liquidity preference theory -- in the 1930s as a hypothesis to explain why monetary policy in the U.S. and U.K. economies was failing to generate a recovery from the Great Depression. Keynes' theory of the demand for money is ingenious, incorporating several types of money-holdings. For example, the demand for non-interest-bearing money in his analysis depends on the interest foregone by not holding bonds or other income-earning assets. He rationalised the demand to hold interest-bearing money such as time deposits as a reward for parting with liquidity, while at the same time he recognised the paradoxical willingness of investors to continue to hold money or liquidity even in conditions of very low bond yields -- hence his term "liquidity preference". In this formulation, the interest rate is the "price" of money.

According to Keynes, the demand for money can be decomposed into three types – Transactions demand (for day-to-day expenses), Precautionary demand (liquidity to cover unforeseen expenditures such as an accident or health emergency) and Speculative demand (to take advantage of future changes in interest rates or bond prices). For this last category, the higher the (money market) rate of interest, the lower the speculative demand for money, and the lower the (money market) rate of interest, the higher the speculative demand for money. Summed together, these three create a typical, downward-sloping demand curve similar to that shown in Figure 1.

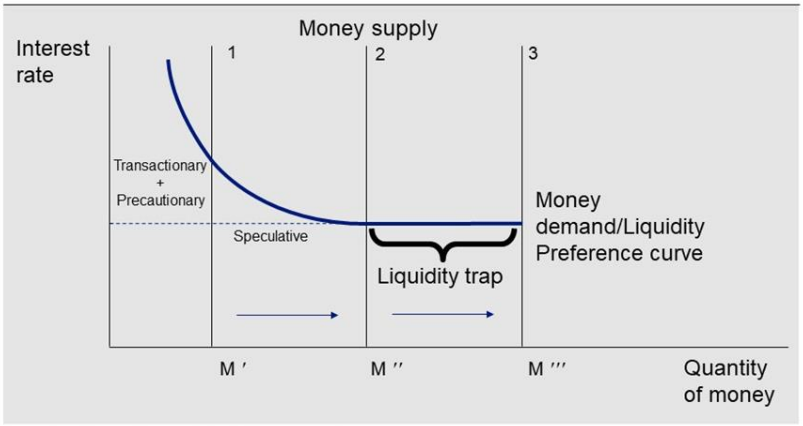


Figure 1. *The Liquidity Preference Function*

Keynes' liquidity preference theory hypothesized that in normal times an increase in the money supply (denoted below by MS) would lead to a fall in interest rates (r), generally followed by higher investment (I) which would then result in higher real income (y) via the multiplier effect and higher inflation (P): ↑MS → ↓r → ↑I → ↑y → ↑P

But in the 1930s the yield on bonds and other investable assets fell so low that no matter how low the money market rate of interest, and by implication, no matter how large the stock of money, the demand for investment did not pick up, breaking the causal chain: ↑MS → ↓r → no increase in I, therefore no increase in y and no increase in P.

Liquidity preference theory combined with his multiplier theory for autonomous expenditures won many adherents because together they accomplished two things. First, liquidity preference theory seemed to solve the problem of why monetary policy was failing to restore economic growth and employment in the Depression years. By proposing that at some (low) level of interest rates and investment yields the speculative demand for money holdings encountered a "liquidity trap", Keynes implied that at this lower bound, monetary policy became impotent. Second, the multiplier idea seemed to offer a way out of the monetary and economic impasse of the early 1930s. Keynes's flash of insight was that in these circumstances, another type of policy could be adopted to overcome the liquidity trap. The alternative policy was fiscal spending by the government which could boost aggregate spending in the economy. Government spending, he argued, was a form of autonomous spending that could replace the apparently moribund private sector investment and thereby revive economic growth and employment.

In summary, since monetary policy was in effect disabled by the liquidity trap and therefore unable to restore economic growth, policymakers could turn to fiscal policy, directly injecting the spending that would enable the economy to recover.

The intellectual framework underlying the twin theories of the liquidity trap and fiscal stimulus achieved widespread success both in the years immediately before, during and after the Second World War. This was in part because the years up to 1945 saw large increases in government spending on armaments and warfare along with a resumption of near-full employment in the U.S. and the U.K. Similarly, the post-war years saw a fairly rapid return to near-full employment (albeit with some inflation) in contrast to the high

unemployment and deflation that had persisted in the U.K. after the First World War and in the U.S. after 1929. Consequently, Keynesian concepts of aggregate demand management – led largely by variations in government spending -- became the dominant orthodoxy among academic economists and policy-making practitioners in the post-war western world.

If interest rates and the quantity of money are indeed related in the way described by Keynes's liquidity preference function, then the analysis also implies that countries with high interest rates will be those where the quantity of money has been reduced or its growth rate restricted; and conversely countries with low interest rates will be those where the quantity of money has been substantially increased or its growth has accelerated.

The problem with these implications of the liquidity preference theory is that they are directly contradicted by the "facts on the ground". For no matter where one looks around the world, the opposite relationship holds.

For example, in Figure 2, Argentine interest rates at 70% are among the highest in the world today. The Keynesian liquidity preference function would imply that monetary growth had been exceptionally tight. Yet on the contrary, the reason interest rates have been so high is that Argentina has had a long period of rapid money growth and it has been experiencing high and rising inflation. The reason why interest rates have been so high is that inflation is also very high, reflecting the rapid growth rate of the Argentine money supply over a long period.

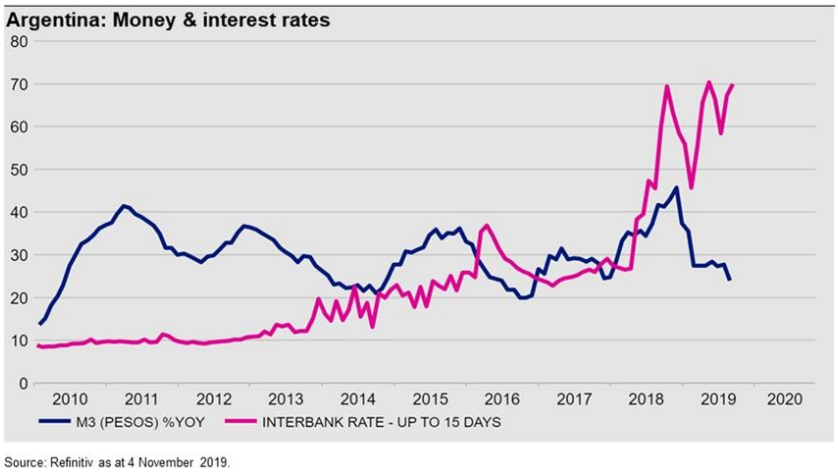


Figure 2. *Argentina*

Conversely, in Figure 3 (which uses the same vertical scale as in Figure 2) interest rates in Switzerland have been amongst the lowest in the world -- virtually zero for most of the past two decades, and even before that. Again, according to diligent students of the liquidity preference theory that should mean that Switzerland has been increasing the quantity of money very rapidly. Yet on the contrary, as the chart shows, the quantity of money in Switzerland has increased only at very modest rates. The reason why interest rates have been so low is that inflation is very low, reflecting the low growth rate of the Swiss money supply over a long period. Other examples of economies in a similar situation to Switzerland are Japan, Germany and the Eurozone more generally.

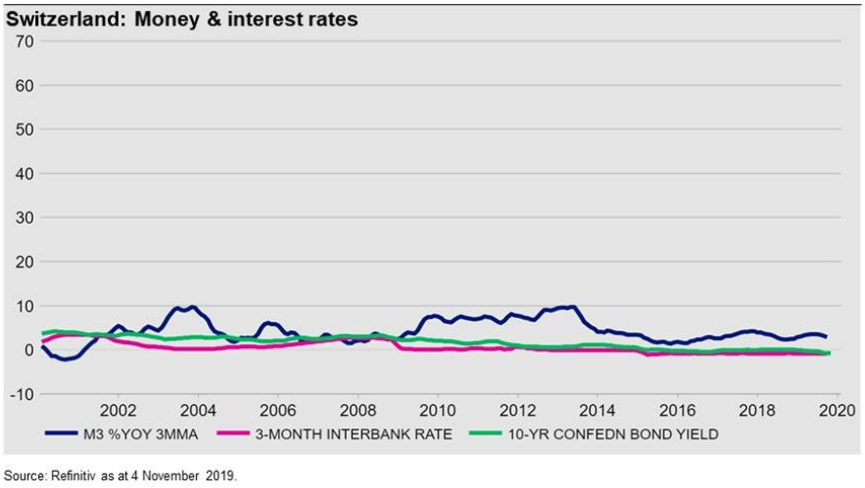


Figure 3. *Switzerland*

As the examples of Argentina and Switzerland demonstrate, empirical experience in the real world does not support the implications of Keynes' liquidity preference theory. The downwards-sloping liquidity preference function is simply not consistent with the facts.

Equally important, the foundations of the liquidity preference framework are questionable on theoretical grounds. One of the most basic analytical tools of the economics profession is the supply-demand diagram in which, for any commodity, the quantity is typically shown on the horizontal axis and the price is shown on the vertical axis. In the case of the liquidity preference diagram the quantity of money is shown on the horizontal axis, but on the vertical axis the "price" shown is an interest rate.

The problem is that interest rates are not the price of money; the price or value of money is whatever has to be given up to obtain it. For example, the diagram would make sense if the vertical axis showed either the domestic or foreign purchasing power of the units of money on the horizontal axis. In the first case it would be reasonable if the vertical axis showed the value of money in terms of domestic purchasing power relative to a basket of goods or an overall price index. (In this case the axis would show 1/P or the inverse of the price level where P is the aggregate price level.) Alternatively, in the second case the vertical axis could show an exchange rate since the price of a unit of currency such as the British pound can be expressed in terms of another currency such as the U.S. dollar. Conceptually the two cases are equivalent; the holder of money is giving up a certain amount of domestic or foreign purchasing power in exchange for holding either a basket of goods and services or different units of currency in preference to the money he or she previously held.

However, in the Keynesian liquidity preference diagram the scale on the vertical axis is always an interest rate, not the value or price of money. But interest rates -- normally expressed in annual percentage rates -- are the price of credit or the price of renting money for a period of time, not the price or value of money itself. In effect the liquidity preference diagram is conveying the idea that, other things equal, the higher the cost of credit (the interest rate) the less individuals and firms will wish to borrow, and conversely the lower the cost of credit the more they will wish to borrow. Insofar as that goes, provided credit was the quantity on the horizontal scale, the diagram could

have some practical applications. However, credit is not money; the demand for credit (and hence interest rates) can be high or low irrespective of the quantity of money.

In the past decade since the Global Financial Crisis (GFC) of 2008-09, money growth rates in the developed world have been almost universally low, while interest rates have also been very low. In other words, the advanced economies have experienced tight money (in the sense of low growth rates of money) but low rates. Conversely, Argentina, Venezuela and Turkey have experienced very easy money (in the sense of rapid money growth) with very high interest rates. In short, the entire edifice of liquidity preference theory, its application to money (instead of credit) and its extension to monetary policy is therefore constructed on unsound foundations.

Both the empirical shortcomings of the liquidity preference hypothesis and the weakness of its theoretical foundations are reasons why monetarists have long emphasised that interest rates are a very unreliable measure of the stance of monetary policy. There can be high interest rates under conditions of rapid money growth or under conditions of slow money growth; equally, there can be low interest rates under conditions of slow money growth or rapid money growth.

Economics therefore needs a better theory of the relation between money and interest rates.

3. Fisher's Theory of Interest

Besides Keynes, another economist who was puzzling over monetary and financial developments in the 1930s was Irving Fisher, the famous American economist who had taught for many years at Yale University. One reason why he was re-examining his theories was that he had been caught out by his rash pronouncement, nine days before the stock market crash of October 1929, that stock prices had "reached what looks like a permanently high plateau."

In his book, The Theory of Interest (1930), Irving Fisher took a much more empirical approach than Keynes to the relationship between money, interest rates and prices. Having collected data for British and other prices and interest rates during the century from 1820 to 1924, Fisher came to a very different conclusion compared with the relationship postulated by Keynes in his liquidity preference function.

"Furthermore, the results and other evidence indicate that, over long periods at least, interest rates follow price movements. The reverse, which some writers have asserted, seems to find little support. Experiments, made with United States short term interest rates, to test the alternative hypothesis of distributed influence of interest rate changes instead of price changes, gave results of negligible significance. Our investigations thus corroborate convincingly the theory that a direct relation exists between inflation and interest rates, the price changes usually preceding and determining like changes in interest rates."

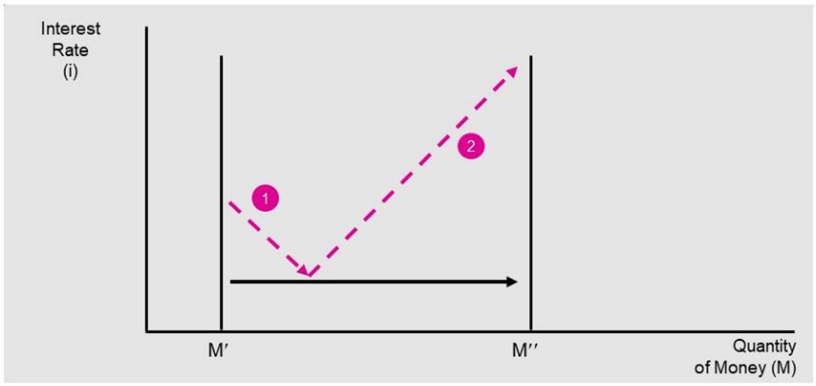
The conclusion of Fisher's analysis was simple: "These highly significant correlations seem to establish definitely that over long periods of time high or low interest rates follow high or low prices by about one year."

As a life-long student of the equation of exchange (MV=PT), Fisher attributed changes in the overall price level to changes in the stock of money. Implicitly, high prices (or inflation) followed from rapid money growth; low

prices (disinflation or deflation) followed from low money growth. In turn, this meant that the true or longer term, more permanent relationship between money, inflation and interest rates is precisely the opposite to the one postulated by Keynes' theoretical liquidity preference curve. How can the two theories be reconciled?

Turning to the theoretical side of the analysis, Fisher did not dismiss the idea that easier money (i.e. faster money growth) initially drove interest rates lower. However, in contrast to Keynes's theory of liquidity preference which implied there was a monotonic relation between money and interest rates, Fisher – and later Friedman -- hypothesized the impact of money growth on interest rates as a two-stage process. If the growth of money doubled, for example from 5% p.a. to 10% p.a., and the higher money growth rate persisted (for a year or more), interest rates would initially fall. However, later, as the economy strengthened and the demand for loans increased, inflation expectations and inflation would both increase and interest rates would rise.

In practical terms, the first effect of easy money (i.e. faster money growth) was to lower nominal interest rates (Keynes' liquidity effect); the second and more permanent effect (of faster money growth) was to raise interest rates (the Fisher effect). This relationship is shown in Figure 4.

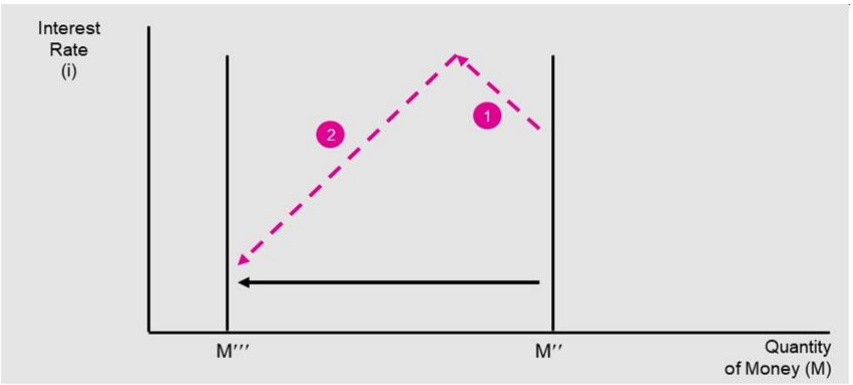


Source: Invesco as at November 2019.

Figure 4. *The Relation between Money and Interest Rates after Monetary Acceleration*

Conversely, if the growth rate of money halved, for example, and the lower money growth rate persisted for at least a year, interest rates would initially rise as money markets tightened (see Figure 5). Later, as the economy weakened and the demand for loans declined, inflation would decrease, and interest rates would also fall. In short, given a sustained deceleration of monetary growth, the first effect was higher interest rates but the second and more permanent effect was for inflation and interest rates to fall. One key implication, frequently insisted upon by Friedman, of these opposite effects of the Keynesian liquidity effect and the Fisher inflation effect on interest rates is that interest rates cannot be relied on as a guide to the stance of monetary policy; it is better to rely on money growth in judging monetary policy. For example, the fact that interest rates are extremely low in so many economies today [in 2019] does not constitute evidence that monetary policies are easy; interest rates could be low as the second stage result of a prior tight money, not as the first stage result of a faster money growth rate. In my view, both Keynes's liquidity preference theory and Fisher's assessment of the lagged

impact of inflation on interest rates must be integrated to convey the true relationship between money, interest rates and inflation.

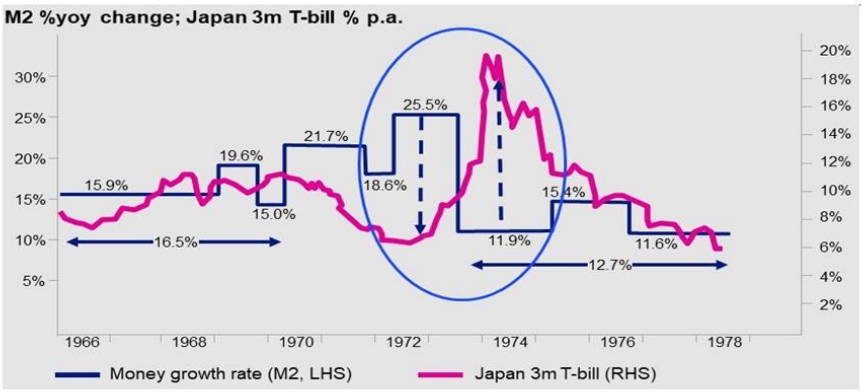


Source: Invesco as at November 2019.

Figure 5. *The Relation between Money and Interest Rates after Monetary Deceleration*

4. Case Studies

Early in my research career I examined the relationship between money growth and interest rates in Japan in the 1960s and 1970s. As shown in the area depicted by the oval in Figure 6



Source: John Greenwood, Invesco. For illustrative purposes only.

Figure 6. *Money Growth and Interest Rates in Japan, 1966-78*

(which is drawn from my original hand-plotted chart), when money growth accelerated, as in 1972-73, from an average of 18.6% p.a. to an average of 25.5% p.a. interest rates initially fell until roughly the end of 1972 – in line with the liquidity effect in Keynes' theory of liquidity preference; but then subsequently, in 1973 as the economy strengthened and inflation increased, interest rates also increased – exactly as predicted by Fisher.

Conversely, when money growth was brought down from 25.5% p.a. in 1972-73 to 11.9% from late 1973 onwards, the initial effect was to push interest rates even higher as one would expect from the downwards-sloping liquidity preference function. However, as the economy subsequently slumped and inflation fell, interest rates declined from a peak of close to 20% ultimately to around 6% by 1978 conforming to the results one would expect from Fisher's inflation effect.

A similar two-stage process was seen after the bursting of Japan's notorious asset price bubble of the late 1980s (see Figure 7). The Bank of Japan started tightening monetary policy from May 1989, raising the official policy rate or overnight call rate from 2.5% to 6.0% by August 1990. Thanks to the availability of overdraft facilities for many companies, M2 only started slowing dramatically in the last quarter of 1990 and the early months of 1991, pushing short-term interbank rates to 8.4%. The equity market peaked in December 1989 and real estate prices peaked about a year later. However, the Bank of Japan continued raising interest rates through August 1990 and did not start to lower them until July 1991.

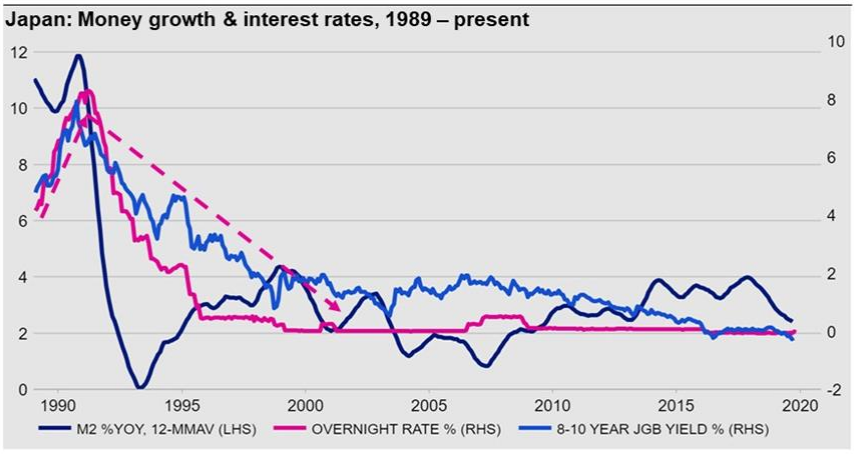


Figure 7. *Money and Interest Rates during and after Japan's Asset Bubble of 1985-90*

In the early 1990s, as money growth tightened, the initial effect was to push interbank interest rates higher – as shown by the pink line and the first dashed arrow in Figure 7. However, as economic growth weakened and the demand for credit fell, inflation and subsequently interest rates also fell sharply, as indicated by the second dashed arrow.

Japanese money growth, inflation and interest rates (as well as bond yields) have remained low ever since. On the basis of Irving Fisher's analysis, Japan's current low interest rates are not an indication of an easy monetary policy (i.e., rapid money growth), but rather reflect the second stage, lasting effects of a tight monetary policy (i.e., slow money growth). In Irving Fisher's terms, and to repeat, Japan [in 2019] is therefore not in the first stage of an easy money policy; rather – and despite QE (2001-06) and QQE (since 2013) – Japan is still in the second stage of a tight money policy. In these circumstances it is not surprising that Japanese inflation and interest rates have not been able to rise.

The pattern in the eurozone is similar to that in Japan. The ECB normalised interest rates between December 2005 and May 2007 (basically following the Fed's interest rate increases between 2004 and 2006), but M3 continued to accelerate until November 2007 when it peaked at 12.6% year-on-year. Bizarrely, the ECB raised rates to 5.25% in July 2008 (in response to higher oil prices) when M3 growth had already fallen below 10% year-on-year and was about to plunge (based on data for loan growth). The abrupt slowdown in M3 was therefore accompanied by higher rates initially, but in the second half of 2008 and subsequently short-term rates fell dramatically along with M3 growth (see Figure 8). Longer term rates such as the composite euro-area bond

yield shown in Figure 8 took much longer to fall, but they too have ultimately fallen to very low levels. Since June 2014 the ECB rate on its deposit facility has been negative, and since mid-2016 bond yields across much of the eurozone have moved into negative territory.

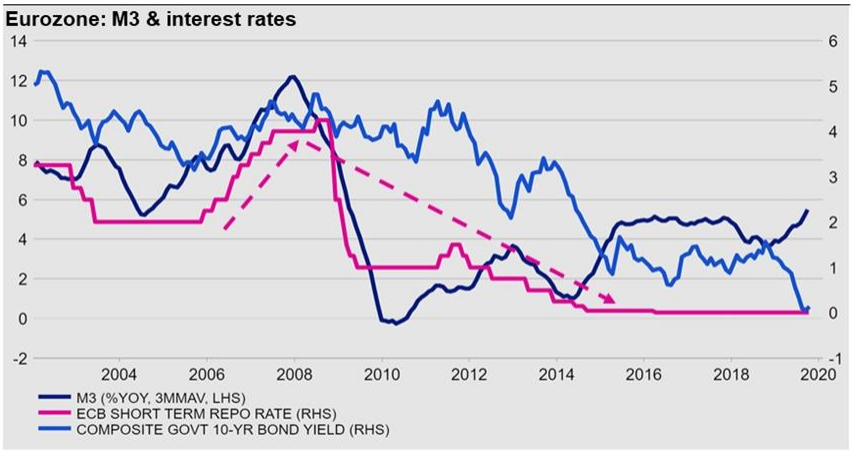


Figure 8. *Money and Interest Rates in the Eurozone before and after the 2008-09 Crisis*

In other words, and consistent with the two-stage pattern of interest rate changes observed in Japan, the first stage effects of tight money in the Euro-area were higher interest rates; the second stage effects were lower interest rates. Given the persistent weakness of Euro-area money and credit growth ever since, a strong case can be made that interest rates and inflation remain low because the eurozone economy is still in the second stage of tight money policy, not the first stage of easy money policy.

In the U.S. and the U.K. the evidence in favor of rates being low today due to easy money rather than as the second stage result of tight money is more mixed as monetary policy has been easier – i.e., monetary growth has been faster in both economies than in either Japan or the Eurozone. While it is true that both the Federal Reserve and the Bank of England have been able to raise rates since December 2015 and November 2017 respectively -- thanks to faster money growth in recent years -- it is nevertheless also true that in both economies (until 2019 in the U.S.), money growth had remained low at around 4% year-on-year, and therefore interest rates could not rise far or rapidly.

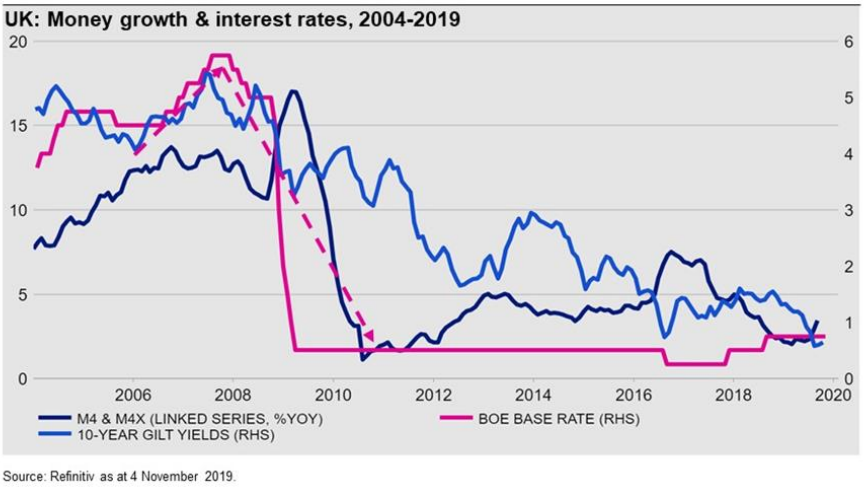
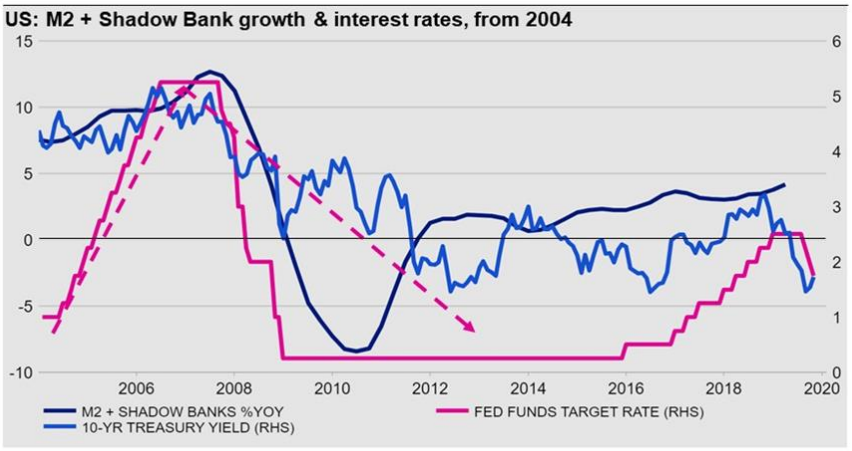


Figure 9. *Money and Interest Rates in the UK before and after the 2008-09 Crisis*

Also, in both the UK and the US the monetary data must be interpreted with care to take account of developments in the large shadow banking sectors in both economies. In Britain the Bank of England steadily raised its Base rate from 4.5% in July 2006 to 5.75% by July 2007 in a "post-normalization" tightening. During these years Bank of England Governor

Mervyn King said at least a couple of times that he was concerned at double-digit M4 growth. The rate rises prompted some slowdown in M4 from 13.8% in August 2007 to 10.3% by June 2008. However, once the intensive phase of the crisis began in September 2008 the rate of M4 growth surged to 17.8% by February 2009, as shown in Figure 9. The explanation is straightforward: the problems in the shadow banking sector caused many holders of the short-term debt of shadow bank institutions to transfer their funds to the relative safety of the banking system.

Turning to the U.S., the Fed did not engage in any "tightening" rate hikes after the normalisation of rates in 2004-06 (the period indicated by the rising red dashed arrow in Figure 10). Partly as a consequence M2 growth accelerated from 4% in 2005-06 to over 6% p.a. in the first half of 2008, but after the onset of the crisis in September 2008 M2 growth surged from 5.5% year-on-year in August 2008 to a peak of 10.3% by January 2009. This was due to the same phenomenon as in the UK -- shifts of funds from the short-term debt instruments issued by shadow banking entities (such as investment banks and mortgage finance companies) to insured deposits in the relatively safe, regulated banking system. In addition, several investment banks applied to become member banks supervised by the Federal Reserve System and having access to its discount window, further adding to deposits in the reported data for M2.



Source: Refinitiv as at 4 November 2019.

Figure 10. *Money and Interest Rates in the US before and after the 2008-09 Crisis*

With the deepening of the crisis in the final quarter of 2008 and from the early months of 2009, U.S. banks began shrinking their loan books and writing off loans, while customers scrambled to de-leverage by repaying borrowings. As a result, M2 slumped to an average increase of only 2% year-on-year during the first half of 2010. Subsequent operations by the Fed (mainly QE2 and QE3 together with Fed support to other credit markets) enabled growth to recover in 2011-14. Even so, since December 2015 the Fed was only been able to raise rates at a far more gradual pace than in previous expansions.

If we consider the quantity of "total money" in the US to consist not only of "money in the banking system" (M2) but also "money in the shadow banking system", we can develop an explanation of the growth of total money and nominal income during this troubled period that is consistent with the two-stage theory of interest rates explained earlier.

Figure 10 shows the year-on-year growth of this concept of "total money" as the dark blue line. As in the U.K., broad money accelerated mildly in 2006-08, before plunging from +12.6% in July 2007 to -8.4% between April and October 2010. During the early part of this period the economy slumped and the demand for credit fell sharply, as did inflation. In the wake of the crisis interest rates – both long and short – fell to their lowest levels in a generation. This fall in rates was consistent with Fisher's second stage of tight money.

Subsequently the Fed was able to raise rates modestly and slowly between December 2015 and December 2018, but M2 and "total money" growth rates remained very subdued until 2019 when banks' demand for securities aided a resumption of faster money growth. Attempting to normalize or reduce the size of its balance sheet from October 2017, the Fed unintentionally precipitated a brief credit crunch in the repo market in September 2019. In response, the FOMC cut rates three times between August and November 2019.

The conclusion from our two-stage theory of interest rates and from these observations is that attempts by the Fed to pinpoint the appropriate or neutral level of interest rates, or arbitrary adjustments of the size of its balance sheet are misdirected. Yet throughout the years 2015-2018 the Fed was trying to manage interest rates or trying to adjust the size of its balance sheet instead of focusing on delivering the appropriate growth of broad money. In an environment of constrained money growth and still-cautious demand for

credit, a rise in interest rates to levels perceived by FOMC members to be appropriate was virtually impossible. Money growth -- both inside and outside the banking system -- had simply been too low.

At this stage it is again instructive to ask whether, in terms of our two-stage concept of interest rate adjustments, U.S. interest rates currently [in January 2020] reflect the first stage of an easy monetary policy or the second stage of a tight monetary policy?

As discussed above, a strong case can be made that – ever since the recovery from the GFC – U.S. monetary policy had never been "easy" in the sense of allowing rapid money growth despite the long period of exceptionally low interest rates. There had been no vigorous expansion of "money in the banking system" (i.e., M2), nor had there been exuberant growth of "money outside the banking system" (i.e., in the shadow banking system), and consequently the sum of "money in the banking system" plus "money outside the banking system" (what I called "total money") had not shown the rapid growth witnessed in the pre-crisis period. Between 2000 and 2007, the average growth of M2 plus shadow bank money was 9.9% p.a.; between 2012 and 2018 the same aggregate averaged only 2.4% p.a.

On the supply side the slow growth of money (and bank credit) is the result of higher capital requirements, together with enhanced liquidity and loan underwriting standards imposed on banks by Dodd-Frank and Basel III. The sustained weakness of shadow banking activity is also attributable to the new regulations which have limited balance sheet capacity for capital market funding activities such as securitisation and repo financing. On the demand side slow growth of money and bank credit has been partly due to the unwinding of pre-GFC leverage by households and financial firms, and partly due to the Fisher effect – i.e. the resulting lower nominal GDP growth rate.

5. Conclusion

In this paper the stance of monetary policy has been judged by broad money growth, not by interest rates. In this framework, monetary growth becomes the causal variable and interest rates become primarily a symptom of current or prior monetary conditions. According to our two-stage "liquidity effect" and "Fisher effect" concepts, it can plausibly be argued that, following the GFC, the low interest rates, the low nominal GDP growth and the low inflation rates in Japan, the eurozone, the UK and the US are all symptoms associated with the second stage of a tight monetary policy, not the first stages of an easy monetary policy.

The key conclusion is that in order to see a shift to higher interest rates and higher inflation it would be necessary for policymakers in the individual economies to engineer a sustained period of substantially faster growth of broad money – i.e. M2 for Japan, M3 for the euro area, M4x for the UK, or M2 plus shadow bank money for the US – in order to increase nominal GDP and inflation. Only then – according to Fisher's theory -- after some increase in nominal spending and inflation due to faster money growth, would significant rate rises become possible.

Monetary policy is not just about interest rates; it is (broad) money growth that matters for nominal spending and inflation. From a theoretical perspective this means that central bank policies that focus solely on achieving some alleged "neutral" rate of interest will only be successful if by chance they

simultaneously achieve the appropriate growth of broad money. The practical effect of this prescription for central banks whose interest rates are already near or at the zero lower bound is that policy measures should focus exclusively on increasing broad money growth by quantitative measures, not by the further gradual reduction of interest rates. Such policies would include: central bank purchases of securities from non-banks (not from banks), incentivising commercial banks to increase bank credit (by making more loans or by purchasing more securities), or temporarily easing regulations such as capital and liquidity requirements until money growth reached an adequate growth rate.

In this respect, negative interest rates and yield curve control are policy mistakes; they are not a substitute for well-designed policies that ensure faster growth of commercial bank balance sheets or broad money. Recent experience both in Japan and in the euro area shows that these policies can have adverse consequences for the banks and for other parts of the financial system, prolonging the period of low inflation and low interest rates.

In summary, in terms of the two-stage analysis of monetary policy and interest rates that has been developed here from Keynes' liquidity preference function and Fisher's inflation effect, I conclude [as of January 2021] that despite low interest rates, monetary policies in the U.S., the U.K., Japan and the Eurozone are not yet in expansionary mode. With broad money growth lower than is appropriate, inflation remains below the 2% target in all four economies, and mainly for that reason interest rates remain low. Judging the growth of broad money in all four economies from the perspective of Irving Fisher (or Milton Friedman), monetary policy is still in the second stage of a tight money policy, not the first stage of an easy money policy.

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