April 4th 2007

Special Report

Broad money vs. narrow money:
Their respective roles in the determination of asset prices and national income

Since the company was founded in 1989 Lombard Street Research's UK Service has tracked different sectors' money holdings. The relationship between
    i.   pension funds' and insurance companies' money and near-money holdings, and
    ii.   their total assets,
has been monitored every month, as in the long run their money assets and total assets have increased at similar rates. This relationship is part of a network of relationships between,
    i.   money and asset prices,
    ii.   asset price movements and expenditure on goods and services, and
    iii.   money, asset prices, expenditure on goods and services, and the price level of goods and services.
The relevant money aggregate here must be a broadly-defined, all-inclusive measure, for reasons which are summarised on p. 4 and p. 26 of the following paper. Crucially, it makes no sense to see narrow money (particularly, a very narrow measure such as the note issue) as playing any role in the determination of asset prices.

Institutions' money holdings in the UK and the USA

A paper first published as the July/August 2004 issue of Lombard Street Research's *Monthly Economic Review* (and republished in *The Business Economist*) showed that in the 31 years to the end of 2003 the LAPFs' liquid assets (dominated by bank deposits) increased by 83.6 times (or at a compound annual rate of 15.3%) and their total assets by 54.8 times (compound annual rate 13.8%). The ratio of institutions' liquidity to total assets stayed between 3% and 6% nearly all the time.

The accompanying paper (based on research carried out by the author as an associate of the London School of Economics' Financial Markets Group) shows that in the 53 ½ years to Q3 2005 the money assets of the five main types of US long-term savings institution rose by 214.2 times (compound annual rate 10.6%) and their total assets by 187.1 times (compound annual rate 10.3%).

The irrelevance of the monetary base (the old "M0" in the UK)

Cash (i.e., notes) is used in less than 1% of transactions, by value, in both the UK and the USA. Probably about half of the notes in circulation are held in "the black economy", again in both the UK and the USA.

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Introductory remarks: money in the British policy debate

With minor exceptions the quarterly growth rate of a broadly-defined measure of money (such as M4) has been above 2 ½% (i.e., at an annualised rate in the double digits) for over two years. This is the most well-defined period of high money growth in the UK since the late 1980s. (Conditions in late 1996 and 1997 were similar, but less extreme.) As usual in British debates on economic policy, the significance of money supply developments is widely questioned. There are echoes to the early stages of the Heath/Barber boom of the early 1970s and the Lawson boom in the late 1980s, when the Bank of England paid the monetary data little attention in its commentary. In 2005 money data were cited as an influence in some interest rate decisions, but this tendency was less evident last year. The neglect of rapid money growth is remarkable, given that such symptoms of excessive monetary growth as marked asset price inflation have become more obvious in recent quarters.

Money and asset prices in boom and bust

The purpose of this paper is to explain the relationship between money, on the one hand, and asset prices and national income, on the other. Along with his 2005 Institute of Economic Affairs' publication on *Money and Asset Prices in Boom and Bust*, it synthesizes work on which the author has been engaged for over 30 years. The main themes are simple, that the behaviour of money on the broad definitions (i.e., bank deposits) is basic to explaining movements in asset prices, while the determination of asset prices cannot be separated from the determination of national expenditure and income. Under the author's direction between 1989 and 2005, the UK Service of Lombard Street Research regularly tracked the holdings of both money and liquid assets at the UK's pension funds and insurance companies, and showed that the ratio between such money and near-money assets and total assets was relatively stable over periods of many decades. It followed that the extreme fluctuations in financial sector money which accompanied volatility in aggregate money growth were accompanied by similarly extreme fluctuations in asset prices, and these played a pivotal role in wider macroeconomic instability.

Is the USA like the UK?

The author spent part of the early months of 2006 putting together numbers for money assets and total assets at the five main types of US long-term savings institution (from the Federal Reserve's flow-of-funds data), to see whether the world's most important economy behaved in the same way as the UK's. The central conclusion was that, in the 53 ½ year period to the third quarter of 2005, the money assets of these institutions – which dominate asset price determination in the USA – rose by 214.2 times (or at a compound annual rate of 10.6%), whereas their total assets rose by 187.1 times (or at a compound annual rate of 10.3%). The accompanying paper suggests that narrow money plays no role whatsoever in asset price determination and that broad money is far more important in macroeconomic analysis.

1. The "which money?" debate

25 years ago widespread acceptance that inflation 'a monetary phenomenon'.

In the 1970s and 1980s most central bankers said that they accepted Friedman's dictum that inflation "is a monetary phenomenon". More precisely, they followed Friedman and the monetarist school is believing that persistent and significant increases in the price level could not happen unless they were accompanied by increases in the quantity of money at rates above the trend rate of growth in real output. However, non-monetarist and anti-monetarist economists had an awkward question. Which definition of "the quantity of money" was relevant to the key monetarist propositions?

But which quantity of money mattered in the determination of inflation?

The narrow definitions - which in the eyes of some economists consisted only of the monetary base (i.e., notes and coin held by the general public, and banks' vault cash and central bank reserves) - were, and still are, hugely different in size and composition from the broad definitions, which are dominated by bank deposits. It is fair to say not only that monetarists failed to reach a consensus on the relative appropriateness of the different aggregates, but also that the squabbles between competing points of view undermined the credibility of their case. Mr. Anthony Harris of the *Financial Times* compared the debate to that between Big Enders and Little Enders (about the best way to open a boiled egg) in Swift's *Gulliver's Travels.* The ritual repetition of the statement "inflation is a monetary phenomenon" became hollow. By the late 1990s most key personnel in the central banks of the English-speaking world understood it to mean that inflation could be explained by monetary policy (i.e., by interest rate setting) within a so-called "New Keynesian" framework; they did not in fact believe that inflation was caused by excessive growth of the quantity of money, however defined.

Federal Reserve stopped publishing M3 data in early 2006

Interest in the "which money?" debate has been stimulated by the Federal Reserve's decision to stop publication of the M3 monetary aggregate, which took effect on 23rd March 2006. The decision was attributed in the media to the newly-appointed Fed chairman, Professor Ben Bernanke, and has been criticised by some participants in financial markets. One newsletter feared that "all sorts of speculations and conspiracy theories" would run rampant. (1) Another information service – John Williams' Shadow Government Statistics – opined that the decision, relating to "probably the most important statistic published by the US central bank", had been taken "unilaterally and without reasonable explanation". (2) The discontinuance of M3 followed a long period of estrangement from the monetary aggregates at the Federal Reserve and recalled its earlier discontinuance of a "liquidity" aggregate in 1998. (3)

Bernanke himself appears to take an eclectic view of monetary economics, but perhaps favours M1

However, it would be wrong to conclude that Bernanke himself is unsympathetic to monetary interpretations of major macroeconomic events. In the first chapter of his collection of essays on the Great Depression (drawn from an article in the 1995 *Journal of Money, Credit and Banking*), he remarked, "the new gold-standard research allows us to assert with considerable confidence that *monetary factors played an important causal role*". (3) Most of the discussion in Bernanke's

collection related to the M1 measure of money, which he saw as being determined – in accordance with the conventional textbook accounts – as a multiple of the monetary base. A possible deduction is that he views narrow money measures – not broad money – as being of most value in central bank decision-taking.

Issing has favoured M3

Meanwhile Dr. Otmar Issing, formerly the chief economist at the European Central Bank, has strongly defended research on the monetary aggregates. In an article in the *Financial Times* of 15th December 2005 he reiterated the ECB's commitment to a "two pillar" approach, in which adherence to a money supply target was one of the two pillars. In his view, the monetary data serve as a cross-check on inflation forecasts prepared by other methods. Although the ECB – like the Bundesbank before it – has traditionally focussed on the M3 aggregate, Issing said that the work is more wide-ranging. In his words, "Monetary analysis goes beyond focussing exclusively on developments in one particular aggregate – M3 in our case – to encompass a rich assessment of other measures of liquidity, as well as credit and financial flows and asset prices." (4)

Bank of England's position rather unclear, but King sometimes says that 'money matters'

The Bank of England has also staked out a position in the debate. On 26th September 2005 it announced that it would cease publishing data for M0, an aggregate which had started life in 1984. (The rationale is that the proposed payment of interest on banks' reserve balances – which are one component of M0 – would cause a drastic change in the level of these balances and make M0 difficult to interpret.) As the Bank has for many years not given any publicity to the M1 or M2 money measures, and as it scrapped a long-standing M3 series in 1989, it might seem to be as indifferent to monetary quantities as the Federal Reserve. (5) But occasionally its officials claim that money trends do affect decisions. In a surprise part of a statement on 14th June 2005, the Bank's Governor, Mr. Mervyn King, observed the high growth rate of M4 was a constraint on interest rate cuts in the UK. With the publication of the Monetary Policy Committee' subsequent *Minutes*, it seems that the reporting of Mr. King's remarks may have exaggerated the Bank of England's worries about high money growth. According to the *Minutes*, the Bank regards financial sector money as of little relevance to the behaviour of demand or inflation, and monitors a measure of M4 without financial sector balances. Non-financial M4 has been growing at a much more moderate pace than M4 as a whole. The Bank's distrust of financial sector money may run parallel to Fed thinking, since a high proportion of the money balances in the USA's M3 but not in its M2 are undoubtedly held in the financial sector.

2. Broad money rules, OK: a summary

Theme of this paper is that monetary analysis should focus on all-inclusive, broadly defined measure of money

This paper will argue that an all-inclusive, broadly-defined money measure is the most valuable in macroeconomic analysis and will suggest that the Federal Reserve's and the Bank of England's doubts about tracking financial sector money are unjustified. Of course views about the usefulness and appropriateness of an aggregate depend largely on the purpose of the exercise being undertaken. In the following pages it is taken for granted that the main task of monetary analysis is to determine (or, at any rate, to assist in the determination of) the levels of national income and wealth.

There are three main arguments for believing that narrow money is *not* the right one in such monetary analysis,

1. The role of "money transfers" in nullifying a causal role for narrow money in the transmission mechanism from money to asset prices and demand (or, for short, *"the money transfers argument"*),

2. The insignificance of narrow money in asset portfolios and the implausibility of claims that narrow money has a major role in portfolio decisions (or the *"money-in-portfolios argument"*), and

3. The undoubted importance of the demand for certain types of narrow money (particularly high-denomination notes) in the black and/or criminal economies, which are not included in official measures of national expenditure and income (or *"the black money argument"*).

Arguments *against* narrow money will demonstrate case *for* broad money

These arguments may all seem to be negative about narrow money rather than positive for broad money, but in the course of the discussion it will become clear that an all-inclusive, broad money aggregate is the one relevant in the determination of national income and wealth. The first two arguments – the "money transfers" argument and the "money-in-portfolios" argument – are particularly effective in demonstrating the macroeconomic significance of an all-inclusive, broad measure of money. The third argument is not theoretical in nature, but derives its cogency from the facts about money holding in modern industrial economies. In that sense it is contingent on the nature of these economies. It does not apply in some backward economies of today, with only limited banking systems, and did not apply to industrial economies of 100 or 200 years ago (when the issue of notes and coin was a high proportion of the quantity of money).

3. The money transfers argument

View taken on the transmission mechanism basic to attitudes in the 'which money' debate

The view than an analyst takes of the transmission mechanism from money to national income is basic to his or her attitudes towards money aggregates. A flood of articles has been written about the transmission mechanism *of monetary policy* in recent years, but this is a somewhat different subject from the transmission mechanism *from money to the economy*. Indeed, several descriptions of the transmission mechanism of monetary policy have been given in which the quantity of money plays no role at all in the determination of national income. These typically focus on the relationship between the central bank discount rate and the main components of national expenditure, and either do not mention money or mention it only as a variable which is determined *after* national income has been derived by adding up the demand components. (6)

Tradition of thought in which changes in money motivate changes in spending

However, economics does have a tradition of thought in which money plays a central role in national income determination. It starts from the relatively uncontroversial notion that national income and asset values (or "wealth") cannot be in equilibrium unless the demand to hold money balances is equal to the actual quantity of money in existence (i.e., "the money supply"). It then posits an injection of extra money balances, which comes adventitiously from outside the economy. (7) (In the jargon the new money is "exogenous".) If the role of assets is put to one side for the moment, the question becomes, "given that the additional money has disturbed the pre-existing equilibrium, what happens to national income?".

After injection of money, successive spending rounds transfer money between agents, until higher level of expenditure (and usually prices) is in equilibrium with extra money

The answer is simple enough in principle. Agents have an excess supply of money and try to eliminate the excess balances by transactions between themselves (i.e., within a closed circuit of payments). Agent A with too much money (relative to income and wealth) purchases goods and services from another agent B, and so gets rid of the excess. But agent B, the seller of the goods and services to A, in turn has excess money, and purchases goods and services either from A or from another agent C. As all agents have excess money, the value of the transactions in the economy rises and in due course prices increase. The successive rounds of transactions between A, B, C and so on raise the money value of transactions (i.e., national expenditure and income) until the demand to hold money is again equal to the money supply. Assuming that the demand to hold money balances *in real terms* is a function only of *real* variables (as is true, more or less, in all economies) and assuming also that nothing real is affected by the rounds of transactions, the equilibrium value of national income rises in proportion to the money supply. (Notice that – in the successive rounds of transactions – no credit is granted. Although extra money may have entered the economy because of the

No credit involved in this process

growth of bank credit, the adjustment of expenditure and the price level to money has nothing whatever to do with credit.)

Numerous accounts of a transmission mechanism on these lines are available in the literature of monetary economics, from David Hume in the 18th century onwards. A terse but particularly clear statement was

given by Milton Friedman in testimony to the US Congress in 1959. (8) Any one person may think that he or she can control the amount of money in his bank account, but, in Friedman's words,

> For all individuals combined, the appearance that they can control their money balances is an optical illusion. One individual can reduce or increase his money balance only because another or several others are induced to increase or reduce theirs; that is, they do the opposite to what he does. If individuals as a whole were to try to reduce the number of dollars they held, they could not all do so...they would simply be playing a game of musical chairs.

Nevertheless, the game of musical chairs is not futile. While individuals in the aggregate may be

> [f]rustrated is their attempt to reduce the number of dollars they hold [if they all have an excess supply of money], they succeed in achieving an equivalent change in their position, for the rise in money incomes and in prices reduces the ratio of these balances to their income and also the real value of these balances. This process will continue until this ratio and this real value are in accord with their desires.

Process comparable to 'a game of musical chairs', but it has also been called 'the Wicksell process'

In his recent book on *Monetary Theory* Rabin has suggested that the adjustment of expenditure and incomes to money be called "the Wicksell process", as it was given an early and lucid description in Wicksell's 1898 *Interest and Prices*. (9) Wicksell may have been the first economist to see the importance of distinguishing between the adjustment problem at the level of a single individual ("the individual experiment") and at the level of all individuals interacting in a market ("the market experiment"). The distinction between the two types of experiment was elaborated most rigorously in Patinkin's account of the "real balance effect" in his classic *Money, Interest and Prices*, of which the first edition was published in 1955. In a 1963 paper Tobin poked fun at the approach by remarking that "it is the beginning of wisdom in monetary economics to observe that money is like the 'hot potato' of a children's game: one individual may pass it to another, but the group as a whole cannot get rid of it. If the economy and the supply of money are out of adjustment, it is the economy that must do the adjusting". (10)

Fundamental to the 'Wicksell process' is the inability of *individual* agents to change the *aggregate* quantity of money by purchases and sales

Suppose that this version of events – whatever it may be called – is accepted as the preferred description of the transmission mechanism *from money to national income*. What are the implications for the choice of money aggregate? Notice that the key to the power of money over the economy is that – when individuals try to reduce their own money holdings – they do not reduce money holdings in the aggregate. Because of this feature of the process, disequilibrium between money demand and supply can be eliminated only by changes in aggregate spending and so in national income. (11)

Does a narrow-money money aggregate work here? The economy under consideration has three types of "thing" (or category) in it,
- narrow money,
- money balances in an all-inclusive money measure, but not in narrow money, and
- the goods and services that constitute national expenditure and output.

(Remember that assets are being ignored for ease of exposition.) It follows from the assumption of a three-category economy that an individual A with excess narrow money can pursue two courses of action. First, he or she can use the excess to purchases goods and services from B. If B then also has excess money, he can try to get rid of by purchases of goods and services from C. And so on. A game of musical chairs is played in the Friedmanite manner, and expenditure and income adjust until equilibrium between money demand and supply is restored.

But individuals can alter the aggregate quantity of *narrow* money by money-into-money transactions (or 'money transfers')

Alternatively, individual A can transfer money from its narrow-money form to a money balance not in narrow money. For example, money can be transferred from a sight deposit (included in the M1 money measured) to a time deposit (not in M1, but part of a broader measure such as M3 or M4). When an individual does this, his or her excess holding of M1 is reduced, *and so also is the aggregate quantity of M1*. Again, an individual may have too large a note holding relative to his or her expenditure requirements. The excess notes can be deposited with a bank, eliminating the disequilibrium in the individual's money position and, on usual definitions, *the aggregate quantity of narrow money*. (12) In short, when an excess supply of or demand for narrow money is removed by a transfer between money balances (i.e., by money-into-money transactions or "money transfers", for short), the process has no effect on the demand for goods and services, and is without any wider macroeconomic interest. If disequilibrium in narrow money is ended by money transfers, such transfers nullify the causal role that narrow money might have played in the transmission mechanism from money to the economy. (13)

Whether disequilibrium in narrow money is eliminated by money transfers or by transactions in goods is an empirical matter – but, in practice, money transfers seem to be very important

The relative importance of the two ways of eliminating disequilibrium narrow money is an empirical matter. If it were true that people often eliminate an excess supply of or demand for narrow money by purchases of, for example, important items of retail expenditure, it would have some macroeconomic significance. But the reality of the modern world is that most people adjust their narrow money holdings by money transfers which are a routine, dull and uninteresting part of their financial planning (i.e., by frequent switches between notes and bank deposits, and between different types of bank deposit). (14) My weekend spending is not determined by my withdrawal of £100 in notes from the bank late on Friday, and by my possession of an average balance during the weekend of £50. On the contrary, my withdrawal of £100 in notes from the bank late on Friday is determined by my prior decision to spend £100 over the weekend, a decision which reflects numerous other considerations (including, to some extent, the size of my total bank deposit). Indeed, it is not going too far to say that money transfers make narrow money "endogenous". When Kaldor derided claims for the exogeneity of money by asking whether the money supply (in the sense of the note issue) determined Christmas, he was making a good analytical point which the monetarists have never properly answered. (15)

But money transfers cannot nullify the macroeconomic role of an all-inclusive, broadly-defined measure of money.

A distinguishing feature of broad money is that it includes the widest possible range

of monetary assets. The nearest alternative is therefore not a constituent of the money supply. This is crucial. If an individual economic agent...is in monetary disequilibrium, adjustment has to occur through [transactions in goods and services, or in assets]. It cannot take place through money transfers.

Consider a person who has an excess supply of broad money balances. He cannot remove this by switching into another money balance because, by definition, no such balance exists. He has to purchase an asset, a commodity or a service from another economic agent. Similarly, if someone has an excess demand for broad money balances, he cannot eliminate it by a money transfer from another bank account, because his holdings of broad money constitute his entire money balances. He has to sell something if he is to return to equilibrium. (16)

But money transfers cannot alter the aggregate quantity of broad money, by definition

In other words, with an all-inclusive money measure, the traditional account of the transmission mechanism from money to the economy works fine. Whereas narrow money is macroeconomically uninteresting (because it is nowadays largely determined by prior decisions to spend), broad money is of great macroeconomic importance. If an economy is in approximate monetary equilibrium and the quantity of broad money changes abruptly in a short period, the standard account of the transmission mechanism applies. The equilibrium level of national income has been altered, and a sequence of expenditure rounds take place to change national income, and so to restore the equivalence of the demand for money with its supply. (17)

The force of the money transfers argument depends on the analyst's acceptance that the view of the transmission mechanism set out above ("the real balance effect" view, or the view based on the game-of-musical-chairs or "hot potato" stories) is realistic and persuasive in practice. If one believes that the real balance effect is the heart of the transmission mechanism from money to the economy, the money transfers argument is a decisive critique of the claim that it is narrow money which matters to macroeconomic outcomes. Further, whatever the apparent difficulties in interpreting the macroeconomic role of wholesale money balances outside M2 in the USA, the rationale for the Fed's decision to end the M3 aggregate but not the M2 aggregate is far from clear. Since M2 can be changed at little cost by a money-into-money transaction between a balance in M3 but not in M2, the M3 aggregate must logically be at least as important to money-holders' decisions as M2. (18)

Case for ending M3 aggregate, but not M2, in the USA seems unclear

What about a wider measure of liquidity?

An objection to the money transfers argument – made with particular emphasis in the UK's Radcliffe Report of 1959 – arises at this point. Why stop at the broadest possible measure of money? What about near-money liquid assets? Surely – if the causal role of narrow money in expenditure determination can be nullified by money transfers – the macroeconomic significance of an all-inclusive money measure can be similarly nullified by transfers between it and an aggregate including near-money liquid assets (i.e., by money-into-near-monies transactions). There are two answers here.

The first is to note, by analogy with the earlier discussion about M1, that – in a three-category economy with money, near-monies and goods – disequilibrium between the demand to hold broad money and the money

supply can be eliminated in two ways, either by transactions involving money and goods or by transactions between money and near-monies. The macroeconomic significance of the all-inclusive money measure is undermined only if money-into-near-monies transactions are large relative to the macroeconomically much more important money-into-goods transactions. A reasonable conjecture is that in most economies money-into-near-monies transactions are small compared with economically significant transactions. Secondly, even if it were true that money-into-near-monies transactions were enormous relative to other types of transaction, frequent and large divergences in the rate of change of a liquidity and M3 money measure would need to be observed to justify a major switch of policy-makers' attention towards liquidity. If liquidity and M3 grow at much the same rate, a central bank should have sufficient guidance from tracking M3. Appendix one to this paper shows that the growth rates of US M3 and liquidity were very similar between 1960 and 1998. (The data are available in Special Paper no. 166 from the London School of Economics' Financial Markets Group.)

Again, the relative importance of money-into-near-monies transactions, and money-into-goods transactions is an empirical matter

But there is no harm in collecting data on liquid assets and, from time to time, the differences between liquidity and money growth rates may be important in policy-making. A notorious episode of this kind occurred in the UK in 1980. An official regulation which had artificially pushed business outside the banking system – known as "the corset" – was ended. As business flowed away from and back onto bank balance sheets, a clear gap opened up between the growth rates of broad money and liquidity. In the eight quarters to mid-1980, when the corset was in place, the growth rate of liquidity was higher than that of money; in the following six quarters it was lower. (See Chart 1 below.)
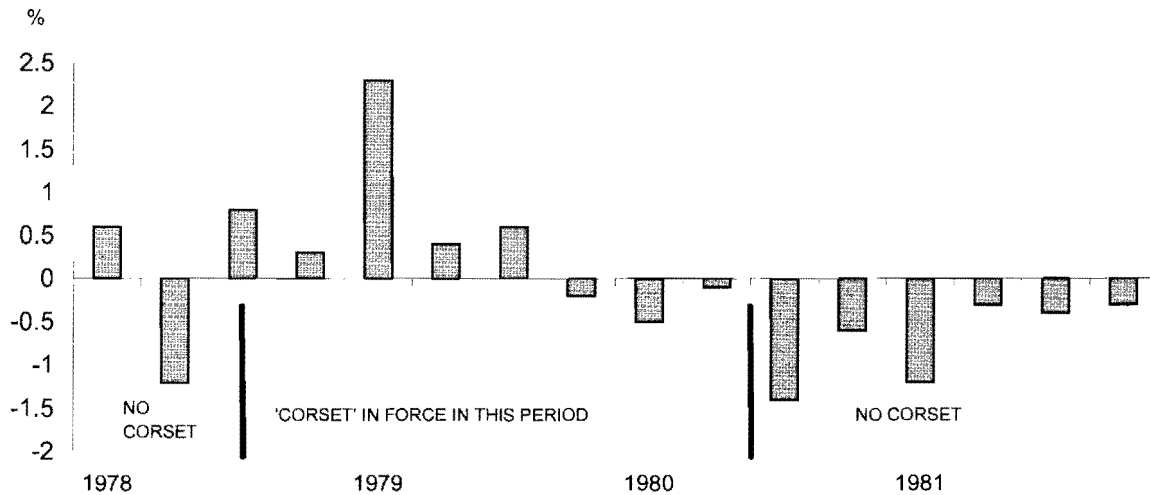
Sometimes useful to cross-check broad money against 'liquidity'

All assets of fixed nominal value (i.e. all money balances) relevant to determination of nominal value of non-money assets and goods

The argument of this section can now be put more concisely, with non-money assets restored to the discussion. An economy consists of assets with a given nominal value, and goods and assets with whose nominal values (i.e., whose prices) vary in the course of transactions. Assets with a given nominal value are conventionally called "money". (19) If the analytical interest lies in understanding how the rates of changes of the prices of goods and non-money assets are determined, it must surely be the entire amount of money – an all-encompassing measure of assets with a given nominal value – that is relevant. At the least, to exclude a particular type of money balance (such as the wholesale money – large time deposits and money market institutional funds – which form part of US M3, but not M2) leaves the analysis incomplete and begs certain questions. Specifically, what are the economic relationships between the excluded and included types of money, and between the excluded types of money on the one hand and goods and non-money assets on the other? The Federal Reserve might argue that it has been unable to find interesting relationships between wholesale money and other macroeconomic variables. The view that US wholesale money is unimportant to macroeconomic outcomes will be disputed shortly, in a review of the attitude towards their money holdings taken by large US financial institutions. But, first, the role of money in portfolios needs to be discussed in general terms.

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Chart 1: How the 'corset' distorted money in the UK, 1978 – 81

Chart shows excess of quarterly % growth of liquidity (i.e. PSL1) over money

The 'corset' penalised the holding of assets on bank balance sheets. So the PSL1 measure of 'liquidity' rose faster while it was in place from mid-1978 to mid 1980, but more slowly in the next six quarters. The return of business to banks may have added 5% to deposits in this six-quarter period, causing a large apparent overshoot on the money target.

%

2.5	
2	
1.5	
1	
0.5	
0	
-0.5	
-1	
-1.5	NO CORSET 'CORSET' IN FORCE IN THIS PERIOD NO CORSET
-2	

1978   1979   1980   1981

The authorities' failure to anticipate the effect of the ending of the corset was embarrassing and affected the reputation of broad money targeting in subsequent UK policy debates. In fact, if the 'corset' effects are removed, money growth was under reasonable control in 1980 and 1981.

4. The "money-in-portfolios" argument in general

Above account focussed on balancing of money against goods – but what about assets?

The above account of the transmission mechanism was largely concerned to show how agents balance their money holdings against their expenditure on goods and services. However, in the real world every economy also has assets (financial securities, houses, land, antiques and so on). It follows that their asset portfolios, as well as their income and expenditure, are relevant to agents' demand to hold money balances. (20)

The economy contains four categories,

- narrow money,
- other money balances (i.e., balances in a broad money measure, but not in narrow money),
- goods and services, and
- non-money assets.

In full equilibrium, equilibrium relationship must hold between all categories in the assumed economy

All money balances – both narrow and non-narrow – have two properties, that their nominal value is certain (or as near as certain, as makes no difference in the short run) and that their nominal value does not change in the course of transactions. By contrast, the future nominal value of goods and services, and assets, is uncertain, and their nominal value can change in the course of transactions. Obviously, in a full general equilibrium, equilibrium relationships between all the categories have to be satisfied. There is an equilibrium relationship between narrow money and non-narrow money, between non-narrow money and expenditure on goods and services, between expenditure on goods and services (or "national income", which is the aggregate value of all goods and services) and asset values (or "national wealth"), and so on.

It may seem reasonable to claim, when starting from an equilibrium, that a change in narrow money alters the equilibrium value of everything else, including asset values. But does this proposition ring true in a modern economy with a sophisticated banking system and large asset portfolios? Two points need to be made.

But money transfer argument against causal role for M0 or M1 in asset price determination

The first is that the money transfers argument applies here again. The nearest alternative to a money balance in narrow money (i.e., notes and coin in the M0 aggregate, and sight deposits in the M1 aggregate) is another money balance, not a non-monetary asset. When agents think about the place of narrow money in their portfolios, they are concerned with the choice between holding wealth in the form of notes rather than sight deposits, or in the form of sight deposits rather than time deposits. In a modern economy with deep capital markets very few agents balance their narrow money holdings against non-monetary assets.

And M0 (i.e., cash) has inordinately high transaction costs in transactions in

Secondly, an important purpose of holding money is to minimise transactions costs. It is true that certain components of broad money – such as large-denomination certificates of deposit – cannot be used in small-scale retail transactions. According to Sir Alan Walters, "one would clearly not count £50,000 negotiable CDs as money; so far as I am aware no one would ever accept such an instrument to pay an outstanding expense". (21) But it is also true that notes are an extremely inconvenient

large assets (houses, ships, blocks of securities etc.)

way of settling debts arising from major capital transactions, such as the purchase of houses, large blocks of commercial property or financial securities. The costs of counting and bundling up notes in such capital transactions are inordinate compared with the cost of making entries in bank statements. This is one reason why the most important participants in capital markets typically have small or negligible holdings of notes, and these notes play no role in portfolio decisions.

So specialists in asset management often hold no notes and coin (i.e., M0) whatsoever

In the UK – where the Office for National Statistics collects data on the currency and money holdings of different sectors – the relevance of these points to the financial sector's demand for money is easily demonstrated. At the end of 2004 the currency holdings of all non-bank financial intermediaries in the UK were a mere £83m. By contrast, the value of all their currency and deposits (including foreign currency deposits, and both sterling and foreign currency deposits outside the UK) was £634,536m., and the value of all their assets was £1,721,539m. In other words, these organizations' total money holdings were over 7,500 times larger and their total assets were more than 20,000 larger than their currency holdings. It seems likely that the bulk of the £83m. of currency was held by minor financial institutions with some retail business, such as some hire purchase companies and pawnbrokers. For all significant financial institutions, and for all the big institutional players in the UK asset markets, note holdings are trifling compared with bank deposits. Wholesale money balances of various kinds were by far the largest type of money balance held by the large, long-term savings institutions. It can be shown that the two most significant categories of UK non-bank financial institution – the pension funds and life insurance companies – had a fairly stable ratio of liquid assets to total assets over the 30 years from the mid-1970s, even though their total assets climbed in the period by over 50 times. (22) (See Chart 2.) Their liquid assets were dominated by wholesale deposits, but also included such items as commercial paper and Treasury bills.

To summarise, in the UK the M0 holdings of financial institutions are tiny relative to the other money balances they hold and their total assets, and have no major bearing on any portfolio decision. If asset price determination and its effect on investment are to be integrated into the analysis of a modern economy, the M0 data do not make any useful contribution to that analysis. The Bank of England's decision to end M0 can therefore be justified by this reasoning as well as by the official argument about the payment of interest on bank reserves.

Sight deposits (i.e., M1) are held by specialists in asset management, but have no major effect on their decisions

What about M1, if a M1 series were again to be monitored by UK policy-makers? The management of the sight and overnight deposits in M1 is not an entirely mechanical exercise in large financial institutions, and sporadically the level of M1 may affect the timing and other execution details in equity and bond transactions. But the level of M1 has no bearing on the substance (i.e., prices and quantities) of such transactions. The relative size of different types of deposit within the overall total of monetary assets is a much less significant influence on returns than either decisions on the relative size of monetary and non-monetary assets or decisions on asset allocation more broadly understood (i.e., the relative
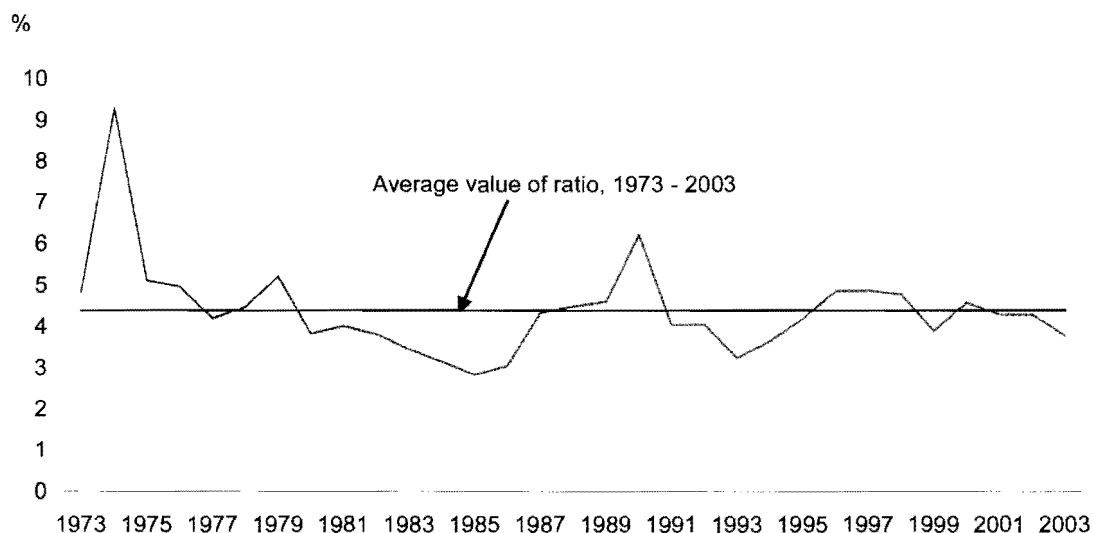
size of holdings of equities, bonds and so on). In his influential 1956 paper on 'The quantity theory of money: a restatement' Friedman – following the lead of Hicks and Keynes – argued that money needed to be analysed as part of wealth portfolios. In his words, "the theory of the demand for money is a special topic in the theory of capital". But it is clear – that as a practical and empirical matter – the theory of the demand for *narrow* money is *not* a special topic in the theory of capital.

The demand to hold broad money is undoubtedly 'a special topic in the theory of capital' (to quote Friedman)

On the other hand, the theory of the demand for broad money is undoubtedly a topic in the theory of capital. The UK evidence suggests a rough-and-ready but persistent relationship – arguably of considerable importance in understanding the course of its disastrous boom-bust cycles in the 1970s and 1980s – between the rates of growth of broad money and money in the hands of financial institutions, and then between the rates of growth of financial sector money and asset price movements. (23) The relatively stable ratio of financial institutions' liquid assets to their total assets – illustrated in Chart 2 – helps in understanding the causal relationships at work. On this basis, the Bank of England should pay attention to financial sector M4 as well as non-financial M4 in its macroeconomic assessments, despite the greater closeness of the link between non-financial M4 and nominal GDP.

Chart 2: The institutional 'liquidity ratio' in the UK, 1973 – 2003

Chart shows ratio of liquid assets to total assets at life assurance companies and pension funds combined

5. The money-in-portfolios argument applied to the US case in recent decades

Is the monetary behaviour of large financial institutions in the USA and the Eurozone similar to that of such institutions in the UK?

What about the money-holding patterns of financial institutions in the USA and the Eurozone? Is it the case that in the USA and the Eurozone, as in the UK, the long-run growth rates of financial institutions' money holdings and assets are similar? And, if such similarity is found, what are the implications for the Fed's decision to discontinue M3? A large body of information on the asset holdings of the USA's financial institutions is contained in the Federal Reserve's flow-of-funds data. Data on their holdings of money and near-monies are part of the material, and invite analysis of their attitudes towards the holding of money and liquid assets. With most of the series starting in 1952, they throw insights into behaviour over an unusually long period by the standards of most macroeconomic analysis. Moreover, there is no doubt that the financial sector is the principal holder of the wholesale money balances in the M3 aggregate which the Federal Reserve has stopped estimating.

Weaknesses of US flow-of-funds data for the analysis to be undertaken

However, the historical data compiled in the USA are not altogether satisfactory. The exact size of the different forms of money *held by the financial sector in aggregate* cannot be readily identified from published sources, in contrast to the ready availability of similar information in other industrial countries. In the USA's flow-of-funds data figures are given of banks' total liabilities in the form of large time deposits and institutional money funds, but a split of these types of money *by holder* is not given. Further, data are not presented consistently for all types of financial institution. As the methods of asset categorisation vary so much from one table to the next, it is not easy to make comparisons between the money-holding behaviour of different types of institution. Open market paper, such as one-month and three-month commercial paper, illustrates the problem. Data for holdings of such paper by state and local government pension funds are included, but comparable data for the holdings of the more important private pension funds are not. Sometimes the omissions are very frustrating. For example, no information is given on mutual funds' holdings of bank deposits at all, even though they undoubtedly do have bank accounts and mutual funds are now the largest type of long-term savings institution.

Five types of institution covered by analysis

Several types of non-bank financial institution are covered. The discussion here concentrates on those which have substantial long-term assets (such as quoted equities), i.e.,

- private pension funds,
- state and local government employee retirement funds,
- life insurance companies,
- property-casualty insurance companies, and
- mutual funds.

And they were crucial to American asset

At the end of 2005 these institutions held in aggregate total assets of almost $19,000b., a sum over 50% larger than the USA's GDP. They undoubtedly played a critical – perhaps even a dominant – role in
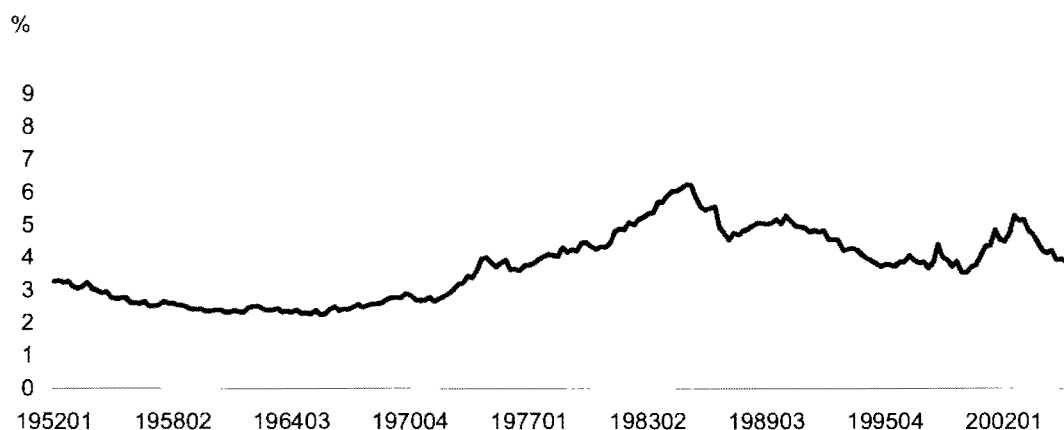
price determination

In 53 years their total assets rose 187.1 times and money assets 214.2 times

American asset price determination. At the end of the first quarter of 1952 the total assets of these five categories of institution were $99.7b. Between that date and the third quarter of 2005 their total assets increased by 187.1 times, with a compound annual rate of increase of 10.3%. In the same period their money assets (or, at any rate, assets identifiable as monetary in form from the flow-of-funds data) increased from $3.3b. to $699.6b., which is by 214.2 times, with a compound annual rate of increase of 10.6%. So while both total assets and money holdings increased by roughly 200 times, the ratio between money and assets changed by just under 15% (i.e., at a compound annual rate of about ¼%).

While suggestive, do these facts establish a case for believing that US financial institutions' money holdings have a powerful influence on the nominal value of their assets? A great deal of further analysis would no doubt be needed to persuade sceptics of money's significance. Chart 3 shows the ratio of the five types of financial institutions' money holdings (again, insofar as these could be identified from the flow-of-funds data) to their total assets over the 1952 – 2005 period, using quarterly data. It is clear that the ratio varied considerably at times, despite changing little in the whole period. Critics of the monetary approach to asset price determination might say that Chart 3 on the USA's long-term savings sector is less persuasive than Chart 2 for the UK's life offices and pension funds.

In an OLS time-trend equation for the US institutional money/assets ratio, the coefficient on the time variable took a value of 0.012 with a t statistic of over 14. (The r^2 was 0.50. See Appendix 2 of Special Paper no.166 of the London School of Economics' FMG.) Inspection of Chart 3 shows that the high values of the institutions' money/assets ratio came predominantly in the second half of the period, particularly in the 1980s,

Chart 3: Money / assets ratio of five types of large US long-term savings institution, 1952 Q1 to 2005 Q3
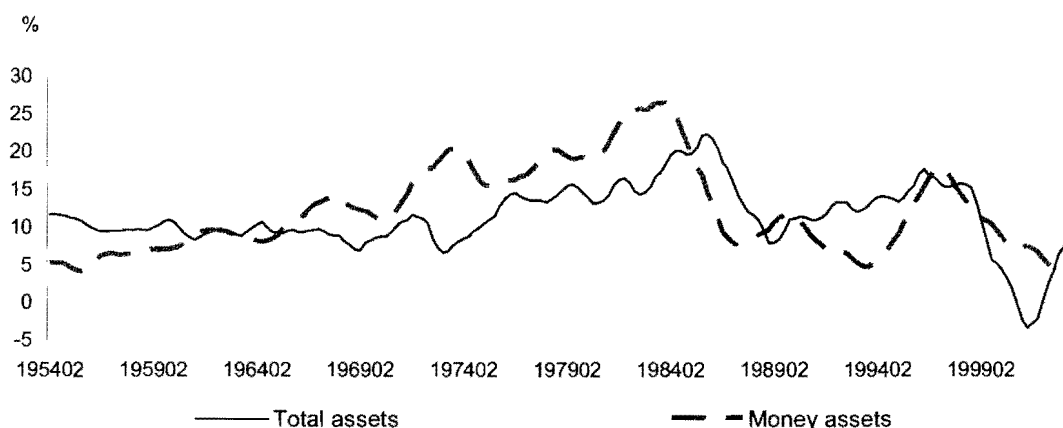
a decade which was characterised by high real interest rates. Since virtually all the institutions' money balances were interest-bearing, the high real rates may have made money attractive to hold and raised the desired money/assets ratio. A real interest rate term was added as an independent variable to the time-trend equation, but added little to the equation's explanatory power and was not itself of any clear significance. (The t statistic on the regression coefficient was just under 3.) The addition of a yield curve term – justified on the basis that a high excess of long rates over short should reduce institutions' money/assets ratio – also did not improve the fit of the equation. (The regression coefficient on the yield curve term, which should have been negative, had the wrong sign. The results are reported in Appendix 3 of Special Paper no. 166 of the London School of Economics' FMG.)

Relationship between institutions' total assets and money assets holds over the medium term (i.e., two or three years), not in the short run

If the annual rates of change of institutions' assets are regressed on those for their money holdings, the resulting equation is far from convincing, with a r^2 of 0.076, a value of 0.27 for the regression coefficient and a t statistic on the regression coefficient of just above four. However, an argument could be made that both institutional money holdings and asset prices are extremely volatile series, while the desired ratio between them is a plaything of investors' confidence in the short term. If so, the relationship between changes in institutional money and asset prices is likely to be medium-term and imprecise in nature. Chart 4 shows the results of taking three-year moving averages of the annual rates of change. Not surprisingly, the statistical outcome is much more satisfactory. The r^2 rises to 0.23, the value of the regression coefficient to 0.35 and the t statistic on the regression coefficient to 7.76. (Again, the detailed results are reported in Appendix 2.) The correct interpretation here seems to be that brief periods (of, say, one or two quarters) of particularly high or low institutional money growth have little meaning

Chart 4: Growth rates of leading US financial institutions' total assets and money assets, 1953 – 2005

Three year moving averages of annual rates, quarterly data

for asset prices, but – if particularly high or low money growth rates persist for two or three years – an effect on asset prices is very likely.

Role of changes in arguments in financial institutions' money demand function

Sceptics may still deny the relevance of financial institutions' money balances to asset price determination. The subject is certainly difficult. Even if financial institutions' demand-for- money is characterised by long-run stability, the institutional money/assets ratio is likely to alter in response to large shifts in the arguments in that function. Particularly important are changes in the attractiveness of money relative to other assets, as, for example, banks pay interest on an increasing proportion of their liabilities and real interest rates fluctuate. Moreover, frequent changes in the institutional framework disturb the clarity of the underlying relationships. The impact of institutional change is evident in a review of the money/asset ratios at the level of each of the five types of institution taken individually, but space constraints prohibit detailed discussion. (24)

Evidence of importance of M3 to asset price determination argues that Federal Reserve wrong to discontinue the series

Two final points may be added. First, a high proportion of the money balances held by the five types of long-run savings institutions analysed here forms part of M3, but not of M2. The thesis here is that wholesale money balances held by the institutions have played an important role in asset price determination and need to be monitored for their significance in the transmission mechanism from money to the economy. By discontinuing the publication of the M3 series, the Federal Reserve is sending a message that it does not regard these wholesale money balances as relevant to macroeconomic analysis. Given the apparent fact of the long-run similarity of the rates of growth of institutions' money and their asset totals, that view is surely wrong.

Money-based versus credit-based theories of the determination of asset prices in general

Secondly, modern macroeconomics does not appear to have a well-organized and widely-accepted theory of the determination of the nominal value of asset prices in general. A common view at present is that asset price bubbles are largely to be attributed to excessive growth of "credit". In work carried out under the auspices of the International Monetary Fund and the World Bank, and discussed at recent academic conferences, the relationship between asset prices and bank lending (or "domestic credit expansion") was tested in a number of countries and was found to meet standard tests of statistical significance in several instances. (25) However, a very high correlation often prevails between, on the one hand, bank lending and DCE (which is invariably a measure of credit *extended by the banking system*), and, on the other, money supply growth. Tests of the relationship between bank credit and asset prices may therefore not discriminate between credit-based and monetary views of asset price determination. One way of meeting this difficulty is to examine the relationship between *non-bank* credit (such as credit in the form of new bond issuance) and asset prices, since there is generally no correlation between non-bank credit and money growth. To the author's knowledge no economist has identified a robust relationship between the rates of change on non-bank credit and asset prices or proposed a theory in which non-bank credit could have an effect on the overall level of asset prices.

Most long-term savings institutions do *not* borrow from banks at all

An even more compelling objection to a credit-based theory of asset prices is that in most leading industrial nations the long-term savings institutions do not borrow at all. (This is certainly true of the five categories of financial institution in the USA discussed here.) Yet in most nations these institutions usually hold the majority of the outstanding stocks of quoted equities and bonds, and their transactions largely determine the prices of these assets. Bank lending to the real estate sector is significant in most nations, and it may sometimes be possible to find correlations between either aggregate bank lending or lending specifically to real estate investors and real estate prices. However, it is easy to cite historical examples in which the growth of bank credit to the private sector has been negligible or even negative, but rapid increases in the quantity of money – due to purchases of government securities by the banks – have been accompanied by rapid increases in asset prices. (26) While this is a large subject, the view that the quantity of money is pivotal in determining the general level of asset prices is easier to reconcile with certain well-established features of modern economies than the credit-based argument.

Narrow money – on any definition – cannot be relevant to asset price determination

At any rate, it is clear that narrow money cannot be relevant to asset price determination. In the USA – as in the UK and other industrial nations – many of the organizations most active in financial markets do not hold meaningful amounts of narrow money, in the form of notes, at all. The Federal Reserve's flow-of-funds data simply do not refer to the note holdings of non-bank financial institutions. In a modern economy notes are not used in large capital transactions and play virtually no role in the balance-sheet decisions of substantial financial institutions. These institutions may hold narrow money in the form of sight deposits, but it is striking that sight deposits are usually very small compared with both time deposits and such assets as security repurchase agreements and open market paper. To repeat, if Friedman was right to claim that "the theory of the demand for money is a special topic in the theory of capital", the demand for *narrow* money is emphatically *not* a special topic in the theory of capital. The relevant money aggregate must be an all-inclusive, broadly-defined one.

6. The money-in-portfolios argument applied to the Eurozone since the mid-1990s
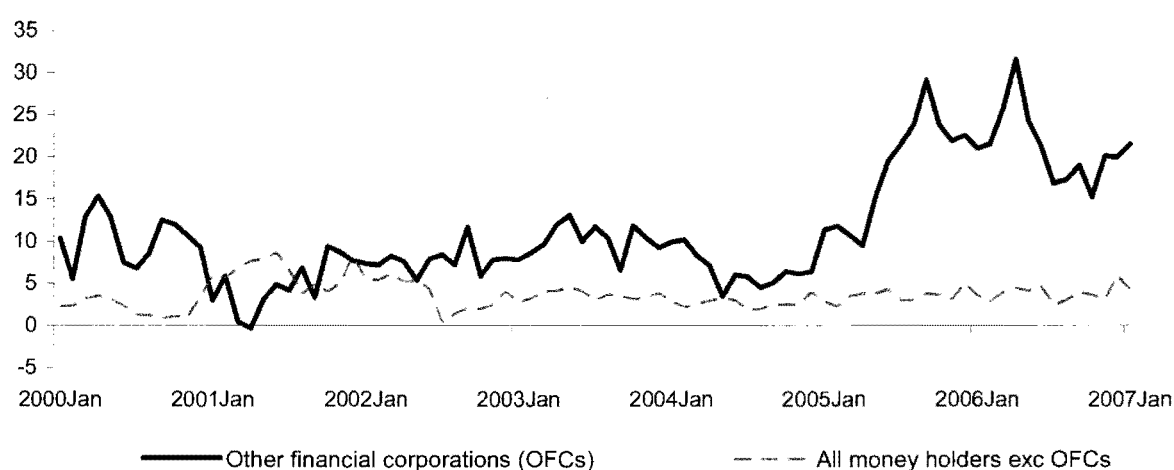
Shortness of Eurozone data series an impediment to drawing strong conclusions

Since the euro has been in existence only since 1999, Eurozone data series are not yet long enough to justify strong conclusions about agents' behaviour. But already some interesting features are emerging from statistics on different sector's money holdings, which have been compiled from the fourth quarter of 1997. These statistics refer to deposits held by the household sector, non-financial corporations, insurance companies and pension funds, and "other" non-monetary financial corporations (i.e., "other" than insurance companies and pension funds). Chart 5 and Table 1 show the growth rates of different sectors' deposits in the seven years to January 2007, and also the levels of their deposits at the start and end of the period, and the standard deviation of the different sectors' deposit growth rates.

But a salient feature of Eurozone sectoral money data is marked volatility and financial sector money, as in the UK

A salient feature is the rapid growth and marked volatility of the deposits held by other non-monetary financial corporations (ONMFCs). The average growth rate of these deposits was almost double that of total deposits, while the standard deviation of their growth rates was over four times that of the standard deviation of the growth rate of total deposits. A fair surmise is that the apparent breakdown in the stability of the Eurozone demand-for-broad-money function since 1997 can be largely attributed – in arithmetical terms – to the behaviour of the ONMFC deposits. (27) In behavioural terms the ONMFC deposits are – like deposits held by "other (i.e., non-bank) financial institutions" in the UK and the financial sector in the USA – particularly relevant to asset price determination. While it is still early days to be talking with confidence about the character of the monetary transmission mechanism in the

Chart 5: Growth rates of deposits – the instability of financial sector money in the Eurozone

Eurozone, financial sector deposits appear to be as troublesome to monetary policy-makers and analysts in the Eurozone as in the USA and the UK. (For most of the 1980s and 1990s the behaviour of deposits held by "other [i.e., non-insurance company and pension fund], other [i.e., non-bank] financial institutions" in the UK was difficult to understand, with a high and markedly volatile growth rate. The OOFIs' monetary antics were a continual source of puzzlement to Bank of England officials.)

and the ECB is preparing the data

At any rate, in the Eurozone – unlike the USA – the data are readily available for the financial sector as a whole.

Table 1: Sectoral money balances in the Eurozone

	Bank deposits (b. of euros) held by:				
	Households	Companies (i.e., non-financial corporations)	Life insurance and pension funds	Other non-monetary corporations	Total
Level at Jan 1999	2,550	648	78	297	3,573
Level at Jan 2007	3,848	1,230	156	702	5,936
% of total at Jan 2007	64.8	20.7	2.6	11.8	
Compound annual growth rate % 1999 - 2007	5.3	8.3	8.9	11.4	6.6
Standard deviation of annual growth rates	1.90	2.68	7.01	6.74	1.63

Source: European Central Bank website

Note: The data being analysed are monthly.

7. The black money argument: the UK

But aren't cash and sight deposits the 'money' for spending?

Defenders of the macroeconomic role of narrow money might protest that, for the majority of economic agents, their cash and sight deposits are the types of money most immediately available for spending. Who, then, are the big holders of narrow money? The question is answered for the UK in this section and for the USA in the next.

Analysis can be carried out on M0 holders in the UK

Data on the sector breakdown of currency holdings – and so on the M0 aggregate – are available in the UK, but a series for M1 has not been widely publicised since the 1980s. Much of the rest of this section is therefore concerned with the composition of M0 ownership in the UK. (M0 consists of currency held by both banks and non-banks, and bankers' operational deposits at the Bank of England. Bankers' operational deposits were tiny at the time and are ignored.) The discussion deals with the situation at mid-2003, for which good data have been published. The selection of this date has no special significance.

In mid-2003 M0 was £38.9b. before seasonal adjustment and the total of all currency held in the economy was £39.1b. (So we are talking about essentially the same thing.) The three holders of currency were,

	£b
- Households and non-profit institutions	29.6
- Financial corporations	5.5
- Non-financial corporations	4.0
	39.1

What were the motives here? Of the £5.5b. held by financial corporations, £5.4b. was in the hands of bank and building societies. They needed to keep cash in their tills to meet deposit withdrawals. As already discussed, less than £0.1b. was held by non-monetary financial institutions. Retail stores were much the most important non-financial corporate holders of currency. Plainly, both the banks' and retailers' demands for currency were legitimate and straightforward.

Average cash holding per UK adult in 2003 was almost £650

But what is to be said about the £29.6b. held by "households and non-profit institutions"? In mid-2003 the population of the UK was roughly 60 million, with 22% under the age of 17 (and so presumably still minors in financial affairs). The adult and money-bearing population of the UK was therefore about 47 million. It follows that the average cash holding per adult was *almost £650*.

A major puzzle implied by this finding

A serious problem immediately arises. It is known that the average withdrawal from cash machines is about £50. (The data are published every year in the page on 'Cash dispensers/automated teller machines: usage' in *The Annual Abstract of Banking Statistics*, published by the British Bankers' Association.) Now people would be rather silly to make a withdrawal if they already have sufficient cash for their expenditures. Surely their cash is instead at its maximum after a withdrawal, is then

Discrepancy between M0 holding behaviour and cash withdrawal behaviour

depleted and is at its minimum just before the next withdrawal, and so on. By implication, the average cash holding of the people who use cash machines is *about £30 (i.e., a bit more than half the average withdrawal)*. It is possible that the average cash withdrawal of people who draw cash over the counter is much higher, with the cash demands of small cash-intensive unincorporated businesses (corner groceries, newsagents, farms, cafes, etc.) being worth special mention. However, to reach an average figure of *almost £650* for legitimate use among the British people at large seems incredible. Even if one were to scale up the £30-per-head figure by three times (i.e., to *£100 per head*) and multiply by 47 million, the implied currency holding of the British household sector would be £4.7b., far less than the £29.6b. that is known (from the official data) to be held within the sector.

M0 must be held largely in 'the black economy'

Who, then, can be responsible between the average cash holding per head of £650 implied by official numbers and the £30 - £100 per head implied by information on cash withdrawals from ATMs (and indeed common observation)? Who holds these very large amounts of cash? One answer is that cash is held disproportionately in the black economy, where it has the advantage that ownership can be concealed until the bearer decides to make a payment. The following types of individual are to be mentioned,

- criminals who don't want their wealth known to the authorities at all,
- drug-dealers and prostitutes whose customers pay mostly in cash, and do not want the transactions recorded,
- taxi drivers and building sub-contractors whom it is legal to pay in cash, but who do not disclose all their income details to the tax authorities, and
- social security claimants who would lose entitlement to benefit (under means-testing rules) if the tax and social security authorities could identify a significant money holding (as they can if it is held in a bank account).

Economic significance of the black economy is for discussion, but UK's M0 cannot have much relevance to the legitimate economy on which most analysis focuses

The economic significance of these behaviours is controversial. Several estimates for the UK are that "the black economy" is of the order of 10% of GDP. (28) In fact, some of the standard techniques of measuring, or attempting to measure, the black economy are based on the assumption that cash is its medium of exchange. Without delving into these matters further, it seems clear that a high proportion of the currency issue is held in the black economy. If the black economy were indeed 10% of the UK's GDP, it would not be in the least surprising if black-economy operators of various kinds held half or more of the almost £30b. of currency in households' hands in mid-2003. (The author's view is that the black economy is quite small, at perhaps 2% - 3% of GDP [i.e., £25b. - £35b.], but this would still not be inconsistent with cash holdings by black-economy operators of the £15b. - £25b. order.) At any rate, there is not much doubt that a big chunk of M0 – perhaps as much of a half of it – is held and used outside the formal economy. A case can be made that it therefore has no relevance for the analysis and prediction of GDP, which is the sum of legitimate expenditures and outputs. The good correlation between M0 and retail sales is well-attested, which may argue that M0

should still be taken seriously. But the explanation may lie partly with the importance of retailers themselves as holders of cash, while it is plausible that the value of retail sales is correlated with the value of items purchased in the black market (or "the informal economy" or "the underground economy", or whatever one wants to call it). Whether in the circumstances M0 should be regarded as an important monetary aggregate is perhaps a matter of taste.

Table 2: Relative sizes of currency in circulation, M1, M2 and M3 in the UK at end of 2006

All figures in table in £b.

Currency in circulation	**_40.8_**	40.8	40.8	40.8
Overnight deposits		795.2	795.2	795.2
		_M1 = 836.0_		
Deposits with maturity up to 2 years			119.3	119.3
Deposits redeemable at up to 3 months			435.2	435.2
			_M2 = 1,390.5_	
Money market fund shares etc				67.1
Repurchase agreement				141.7
				_M3=1,599.3_

Currency as proportion of M3   2.6%
M1 as proportion of M3   52.3%
M2 as proportion of M3   86.9%

Currency is used in less than 1% of transactions by value.

Note: These data have been prepared by the Bank of England to comply with harmonisation requirements arising from the legislation (i.e., the EU regulation) that created the single European currency.

Source: Bank of England *Bankstats*

8. The black money argument: the USA

Dollar notes (i.e., M0, if the USA had such a measure) held all over the world

A salient feature of the USA's currency issue is that almost half of it is held by non-US citizens, predominantly outside the USA itself. The latest US flow-of-funds dataset contain a line 22 in Table L.204 (on 'Checkable deposits and currency') which gives a number for the currency holdings of the "rest of the world". At the end of 2004 it was $332.7b. According to the money stock press release, the total amount of currency in issue in December 2004 was $702.4b. Non-US-held dollar notes are of course put to a wide variety of uses around the world, notably in assisting legitimate retail transactions in societies suffering from rampant inflation. However, the incidence of hyperinflation (or even milder "galloping inflation" of over 50% a year) is much less common today than 10 or 20 years ago, and still the rest of the world's currency holdings continue to climb. There can be little doubt that a high proportion is held in the black economies of numerous societies. In particular, US dollar notes are the principal media of exchange in international narcotics trade, although of course hard evidence is elusive. (29)

Average holding of notes per adult similar in the USA and the UK

What about note holding in the USA itself? The flow-of-funds data have a figure for vault cash held by the commercial banks ($41.5b. at the end of 2004), but the holdings of the various kinds of non-bank agent are not published. If the foreign holdings and vault cash are deducted from the $702.4b. total, the total held by non-banks comes to just over $330b. at the end of 2004. With the USA's adult population at about 230 million, the implied average holding per non-bank individual was just under $1,500. With some of the non-bank holding in corporate hands (such as in the retail sector), a reasonable guesstimate is that the average holding of US adults in their own hands may have been somewhat more than $1,000, surprisingly similar to the UK figure.

About 10% of US families do not have bank account while – as in the UK – note holding behaviour apparently inconsistent with note withdrawal behaviour, implying large 'black economy' note holdings

According to a recent article in the *Federal Reserve Bulletin*, the proportion of US families without a transaction account (which would normally be at a bank) fell to 10.6% in 2004. (30) These were, overwhelmingly, families on low incomes whose assets were too small to justify the retention of a bank account. Given their modest overall wealth, it seems unlikely that an average note holding of much above $1,000 per person (and of $2,000 per household) could have been common in this tenth of the USA's population. Further, as in the UK, the average levels of cash withdrawals from banks and ATMs point to an average note holding of well beneath $1,000 for those people with bank accounts. (The average ATM withdrawal in 2003 was $85.) (31) A reasonable deduction is that in the USA a large part of the dollar note issue is held by outright criminals or by groups on the borderline between the legitimate and criminal economies. It is therefore difficult to see how the USA's monetary base by itself can have much relevance to macroeconomic conditions. (Whether it has relevance because of its bearing on the size of banks' deposit liabilities is a different subject.)
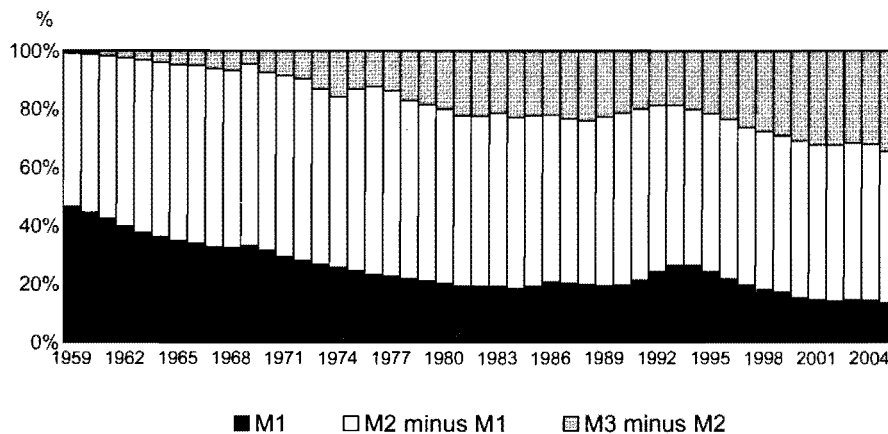
What about M1, data for which continues to be published by the Federal

Reserve? Many economists still believe that M1 is the most useful measure of money in the USA and, as noted at the outset, Bernanke referred to it in his work on the Great Depression. (32) However, an important objection is that M1 is now very small compared with both M2 and M3. Historically, balances inside M1 were larger than non-M1 balances in wider measures of money. When the quantitative significance of sight deposits was combined with the view that time deposits outside M1 were "not available to spend immediately", a focus on M1 seemed valid. But M1 now represents only slightly above 20% of M2, while M3 is almost 7 ½ times as large as M1. Banks' increasing tendency to pay interest on deposits (particularly on time deposits) has led to agents' holding their monetary wealth in balances outside M1. (See Chart 6.) It is difficult to believe that M1 should still receive the preponderance of macroeconomic attention and comment.

M1 now quite small compared with total money balances in the USA

Chart 6: Changing size of M1, M2 minus M1 and M3 minus M2 in the USA, 1953 – 2005

Chart shows size of M3 constituents as % of M3

■ M1   □ M2 minus M1   ▨ M3 minus M2

9. Summary and conclusion

Broad money, not narrow money, matters

The points made in this paper together constitute a powerful argument for believing that broad money – not narrow money – is the important aggregate for macroeconomic analysis. To summarise,

1. because of the ease of transferring money between different types of money (i.e., of making money-into-money transactions), it is unlikely that narrow money plays a significant causal role in motivating expenditure decisions (i.e., money-into-goods-and-services transactions) or portfolio adjustments (i.e., money-into-assets transactions), whereas excess or deficient holdings of broad money are eliminated by macroeconomically interesting portfolio adjustments and/or decisions to spend on goods and services,

2. narrow money does not have a significant position in asset portfolios and it is difficult to believe that, for example, the note issue has any bearing on the portfolio adjustments which determine asset prices in a modern economy, whereas a large body of evidence can be assembled (for the UK, the USA and no doubt elsewhere) that the levels and changes in broad money influence the levels and changes in asset prices, and

3. narrow money – and especially the very narrow concept of the monetary base (i.e., M0 in the UK) – is held disproportionately in the black economy and in that sense is of limited relevance to economic developments in the formal economy.

Money balances in US M3 (but not in the US M2) important in financial sector and influence asset prices

Should the Federal Reserve have discontinued the publication of the M3 series? The money balances inside M3 but not M2 are characteristically held by financial institutions. The argument of this paper has been that financial institutions' non-M2 M3 holdings are particularly relevant to the determination of asset prices. A case can be made that, since asset prices are important to cyclical fluctuations in the US economy, so also must be the non-M2 M3 balances involved in asset price determination. As the determination of the general level of asset prices is at present a highly contentious area of macroeconomics, further research is clearly needed. The Federal Reserve should consider preparing data on the money supply holdings of the US economy's different sectors (i.e., the householder, corporate and financial sectors), in order better to understand these sectors' monetary behaviour. The Bank of England has been preparing such data for over 40 years. Arguably, the data have shown several interesting patterns which throw vital insights into the transmission mechanism from money to the economy. As noted above,

Better sectoral money data would be useful in USA

the ECB has also started to assemble such information for the Eurozone. Although the ECB's statistical series are relatively short, they suggest that the monetary behaviour of the Eurozone's sectors has similarities to that of the UK's. (33)

Broad money is superior to narrow money in macroeconomic analysis. It is striking that virtually all the leading theorists of traditional monetary economics – including such names as Wicksell, Fisher, Keynes, Robertson, Hawtrey, Friedman and Johnson – either expressed a clear preference for broad money or discussed the relationship of money to the

Monetary economics has traditionally been concerned with *all* money balances

economy in the context of a macroeconomically important commercial banking sector. (34) The shift since the late 1950s to favouring the base – largely due to the influence of New Classical Economics and particularly of Fama – is a radical intellectual change which seems to have had more impact on American macroeconomists (and perhaps on American central bankers) than on European central bankers. (35) Time will tell whether the ECB does a better job than the Federal Reserve in maintaining low inflation, but most observers accept over the last 30 years the record of the Bundesbank and the ECB has been better.

Notes

(1) *Mish's Global Economic Trend Analysis*, 'A different take on M3', 9th December 2005.

(2) *John Williams' Shadow Government Statistics*, 'Fed abandons M3 without an honest explanation', Issue no. 13B, 23rd November 2005.

(3) Ben S. Bernanke *Essays on the Great Depression* (Princeton, New Jersey: Princeton University Press, 2000), p. 7. The italics are in the original.

(4) Otmar Issing 'Monetary analysis is essential, not old-fashioned' *Financial Times*, 15th December 2005.

(5) Numbers for all of M0, M1, M2, M3 and M4 (as well as such "liquidity" total as PSL1 and PSL2) have been calculated in the UK at one time or another. A fair comment is that the broader aggregates have been more durable than the narrow, with the ending of the publication of a long-standing M3 series in 1989 being the main exception. (See 'Statistical consequences of the conversion of the Abbey national Building Society to a public limited company', pp. 352 – 3, August 1989 issue of *Bank of England Quarterly Bulletin.*) But the Bank of England has now resumed the preparation of M1, M2 and M3 data, and publishes them in the monthly *Bankstats* compilation on its website. The need to prepare the data has arisen from treaty obligations with the European Union, agreed as a by-product of the introduction of the single currency.

(6) For example, a paper on 'One year under "quantitative easing"' by Masaaki Shirakawa was published by the Bank of Japan's Institute for Monetary and Economic Studies in 2002. (IMES Discussion Paper Series 2002-E-3, April 2002) On p. 35 it presented a figure on "The standard transmission mechanism of monetary policy". Arrows connect a box "Change in reserves" to a box "Change in short-term interest rates" to another "Changes in the prices of financial assets (i.e., medium- and long-term interest rates, foreign exchange rates, stock prices, etc.)" and then, both directly and via a box "Change in the behaviour of financial institutions", to the final box "Change in the behaviour of domestic private economic agents, such as firms and households and also overseas economic agents". The approach was similar to that of the paper prepared in 1999 by the Monetary Policy Committee of the Bank of England for the attention of the Treasury Committee of the House of Commons. A vital attribute of macroeconomic equilibrium – that the quantity of money be willingly held at the prevailing levels of asset prices and national income – was ignored in both the Shirawaka paper and the Bank of England paper. Numerous other illustrations could be cited.

(7) In the simple versions of the story nothing material is affected if the change in the money supply is a reduction. The argument proceeds in the same way, but the eventual equilibrium outcome is a fall in the price level rather than an increase.

(8) See Milton Friedman 'Statement on monetary theory and policy', given in Congressional hearings in 1959, reprinted on pp. 136 – 45 of R. James Ball and Peter Boyle (eds.) *Inflation* (Harmondsworth: Penguin, 1969). The quotations are from p. 141.

(9) Alan Rabin *Monetary Theory* (Cheltenham, UK, and Northampton, Maine, USA: Edward Elgar, 2004), pp. 71 – 4.

(10) James Tobin *Essays in Economics* vol. 1 *Macroeconomics* (Amsterdam and New York: North-Holland Publishing, 1971), p. 273. The original paper from which the quote was taken ('Commercial banks as "creators" of money') first appeared in Deane Carson (ed.) *Banking and Monetary Studies* (Homewood, Ill.: Richard D. Irwin, 1963).

(11) Papers were written in the 1970s and early 1980s on "disequilibrium" or "buffer-stock" money, notably by Charles Goodhart and David Laidler, almost as if the problem of eliminating imbalances between the demand for and supply of money were a new topic. (See, for example, 'Disequilibrium money: a note', pp. 254 – 76, in Goodhart *Monetary Theory and Practice: the UK Experience* [London: Macmillan Press, 1984].) However, it can be argued that – at least since Hume's reference in his famous 1752 essay 'Of money' to "the intermediate situation" in which an increase in money has not had its full effect on prices – the working-out of excess or deficient (i.e., disequilibrium) real balances has been the core of the transmission mechanism in monetary economics. (Hume in fact mentioned a quantified real-balance effect in France in "the last year of Louis XIV" when "money was raised by three sevenths, but price augmented only by one", quoting du Tot in *Reflections Politiques*. [David Hume *Essays, Literary, Moral and Political* (London: Ward, Lock & Co., n. d.), pp. 170 – 71.])

(12) Note that, when an individual deposited notes with a bank in the UK, that reduced the number of notes in circulation, but not M0. The reason was that the banks' cash reserves were included in M0. The inclusion of banks' cash reserves in a definition of money was most unusual by international standards. For reasons explained by Irving Fisher early in the 20th century, it was also difficult to justify. (See William J. Barber [ed.] *The Works of Irving Fisher* vol. 5 *Elementary Principles of Economics* [London and Brookfield, Vermont: Pickering & Chatto, 1996, originally published by Macmillan in 1912), p. 178.) Even in the UK no other money aggregate included banks' cash reserves.

(13) As far as the author is aware, the argument that money-into-money transactions can nullify the causal role of a less-than-all-inclusive money aggregate is his own. However, it was clearly anticipated by Irving Fisher in 1912. If cheque payments are ignored, "we may classify exchanges into three groups: the exchange of goods against goods, or barter; the exchange of money against money, or "*changing*" money; and the exchange of money against goods, or *purchase and sale*. Only the last-named species of exchange involves what we call the *circulation* of money." (William J.. Barber [ed.], *The Works of Irving Fisher*, vol. 5, *The Elementary Principles of Economics* [London: Pickering & Chatto, 1997, originally published in 1912], p. 151. Italics are in the original.) See also p. 178 of *Elementary Principles* on the same theme. The point is repeated on p. 34 of Fisher's 1914 *Why is the Dollar Shrinking?* (New York: Macmillan, 1914). (Since writing the first version of this paper the author has become aware of work, at the Federal Reserve Bank of San Francisco in the 1980s, which made a similar point. see for example, John P. Judd and Bharat Trehan *Velocity in the 1980s: an analysis of interactions among monetary components*, Working Paper No. 87-05 July 1987, in the Federal Reserve Bank of San Francisco's Working Paper Series.)

(14) A 1998 Bank of England working paper contained a pie chart on 'Sources of cash in 1997'. It showed that automated teller machines, withdrawals from bank or building society deposits and cash-backs represented 66 per cent of all such sources, with the rest being "state benefits" (presumably mostly from post offices) and employers. In other words, most cash arose from money-into-money transactions. The value of "cash turnover for individuals" was put at £238b. in 1997. This may sound substantial relative to gross domestic product in the year, which was just over £810b. at current market prices. However, both cash turnover and GDP pale into insignificance compared with the value of bank clearings, which was over £36,000b. in 1997. In other words, payments made via bank deposits had a value about 150 times larger than payments made with cash. (See Norbert Janssen 'The demand for M0 in the UK reconsidered: some specification issues', *Working Paper Series* [London: Bank of England], pp. 14 – 5 and any issue of *The Annual Abstract of Banking Statistics* [London: British Bankers' Association] for the value of clearings.)

(15) See pp. 83 – 4 of Nicholas Kaldor 'The new monetarism', pp. 79 – 100, in Christopher Johnson (ed.) *Monetarism and the Keynesians* (London and New York: Pinter Publishers, 1991). Kaldor's paper originally appeared in *Lloyd's Bank Review* in 1970.

(16) See Tim Congdon 'Broad money vs. narrow money' *The Review of Policy Issues* (Sheffield: Sheffield Hallam University), vol. 1, no. 5 (autumn 1995), pp. 13 – 27. The quotation is from p. 21.

(17) Of course the sequence of expenditure rounds, with money passing to and fro between different agents, take time. This is the source of the famous "lags" in the transmission mechanism from money to the economy.

(18) The rationale for retaining M2 is presumably that it has been easier to find stable econometric relationships with this aggregate than with M3. But – as a logical matter – the ease of switches between M2 and M3 argues that the explanation for the greater stability of M2 may be that, by money-into-money transactions, agents reduce excess or increase deficient non-M2 M3 balances when they are not in equilibrium.

(19) The notion of "a given nominal value" is more difficult than it seems. Three points of amplification need to be made. Firstly, the characteristic that the nominal value of money does not change in the course of transactions – unlike the nominal value (i.e., the prices) of goods and assets – is definite enough. Second, "the nominal value" of most bank deposits does however increase over time nowadays (in most countries apart from Japan) because of the addition of interest. The view that the payment of interest reduces the "money"-ness of a deposit has been attributed to Pesek and Saving, but was specifically rejected by, for example, Robertson in his *Lectures on Economic Principles*

(p.14 of volume III). (See footnote [34] below for more on this reference.) As interest-bearing sight deposits have now become common, the point needs to be resolved. Third, banks may fail to pay back deposits as their full nominal value if they have inadequate cash and/or capital, but this difficulty – although fundamental – cannot be pursued here because of lack of space. Monetary economics is not an easy subject.

(20) Two references to the literature may be apposite here. First, what is the bearing of the analysis in the paper on the notion of "Divisia money" (i.e., a so-called "monetary-quantity index" in which notes and coin are taken to be the most "money-like" form of money and so are given a higher weight than sight deposits which in turn are given a higher weight than time deposits) compared with simple-sum money aggregates? The answer depends on the analyst's prior beliefs. In well-known classic works from the 1930s to the 1960s Keynes, Hicks and Friedman insisted that the demand for money needs to be analysed within asset portfolios. If that work is regarded as progress (and the author of this paper does regard it as progress), Divisia indices can be criticised for losing a key insight into the subject. Secondly, protagonists of the "disequilibrium money" school associated with Yeager (and, further back, Clark Warburton) might be expected to be sympathetic to the money transfers argument in this paper, since that argument is intended to put the real balance effect (or "the Wicksell process" or whatever one wants to call it) once again at the heart of monetary economics. (For this tradition of thought, see in particular Leland B. Yeager *The Fluttering Veil: Essays on Monetary Disequilibrium* [Indianapolis: Liberty Fund, 1997].) However, their preference is for narrow money over broad money, although they sometimes claim that the "which money?" debate is not particularly important. (Rabin *Monetary Theory*, p. 122.) Rabin has even claimed – following Yeager – that, "If money broadly defined is in excess demand, money narrowly defined must be in excess demand also." (Rabin *Monetary Theory*, p. 103, and Yeager *Fluttering Veil*, p. 218.) The preference for narrow money (i.e., M1) arises because of the belief that M1 is a stable multiple of the monetary base, which is under the control of the Federal Reserve (in the American context), and it is often accompanied by critiques of the use of the credit-money identity in central banking. (See Robert Greenfield and Yeager 'Money and credit confused', pp. 179 – 95, in Yeager *Fluttering Veil*.) In the author's view the preference for narrow money is a mistake because of the ease of making money transfers between different types of money balance. The process of money supply determination is a large and much debated subject, although – again unlike Yeager and Rabin – the author does not believe that the quantity of money is usefully interpreted nowadays as a multiple of the base. (In this respect he agrees with chapter 10 of the recent book by Bofinger. See pp. 321 – 68 of Peter Bofinger *Monetary Policy* [Oxford: Oxford University Press, 2001].) Bofinger's argument is in a tradition of research associated particularly with Professor Charles Goodhart of the London School of Economics.) It is possible to believe *both* that the quantity of money is not usefully interpreted as a multiple of the base (but is instead better seen as a relatively stable multiple of banks' capital) *and* that, when the demand for money differs from the quantity of money, asset prices and national income change (via the Wicksell process) as agents try to restore monetary equilibrium.

(21) Alan Walters *Britain's Economic Renaissance* (Oxford: Oxford University Press, 1986), pp. 116 – 7.

(22) The data on the relationship between, on the one hand, life offices' and pension funds' holdings of money and liquid assets, and, on the other, their total assets, was regularly tracked at Lombard Street Research, the research company founded by the author in 1989. The data appeared in the official publication, *Financial Statistics*, which had first been published in the early 1960s.

(23) See the author's *Money and Asset Prices in Boom and Bust* (London: Institute of Economic Affairs, 2005), *passim*, but particularly chapter three.

(24) Large differences in the long-run behaviour of the money/asset ratios and liquidity/assets ratio were observed for different types of financial institution. The ratio of liquid assets to total assets in the property and casualty (i.e., non-life, general) insurance sector was almost 10 per cent in 1953, but little more than two per cent at the end of 2005. By contrast, the money/assets ratio of life insurance companies was about 1 ½ per cent in 1953, but over six per cent in the early years of the current century. (The author can be contacted at timcongdon@btinternet.com for further details. The source is the Federal Reserve's flow-of-funds dataset.) Sceptics might say that such large swings in the money/assets and liquidity/assets ratios invalidate the approach. However, the changes in money/asset and liquidity/assets ratio can often be attributed to institutional

innovation and various special influences, implying that the underlying demand to hold money bore a stable relationship to total assets.

(25) A recent book on *Asset Price Bubbles* has several papers on the "credit determines asset prices" theme. (William C. Hunter, George F. Kaufman and Michael Pomerleano [eds.] *Asset Price Bubbles* [Cambridge, Mass., and London, England: MIT Press, 2005].) Santiago Herrera and Guillermo Perry 'Tropical bubbles: asset prices in Latin America, 1980 –2 001', pp. 127 – 62, contains regressions of the relationship between domestic credit and real estate prices in Latin American countries; Caludio Borio and Philip Lowe 'Imbalances or "bubbles"? Implications for monetary and financial stability', pp. 247 – 70, contains a more wide-ranging discussion, including a reference to the USA's experiences in the 1925 – 30 period without any mention of money.

(26) The largest one-year increase in US share prices in the 20th century was in the year to the first quarter of 1934. An "index of common stocks" increased by 70.0 per cent. (Robert J. Gordon [ed.] *The American Business Cycle* [Chicago and London: University of Chicago Press, 1986], p. 804.) In the same period the "loans and discounts" held by member banks of the US Federal Reserve system were falling. In the four years to mid-1936 their loans and discounts declined by 24.4 per cent from $16,587m. to $12,542m., whereas the index of common stocks (1941 – 43 = 100) climbed from 5.08 to 13.58, or by 167.3 per cent. (Ray B. Westerfield *Money, Credit and Banking* [New York: Ronald Press Company], p. 906 and Gordon, *American Business Cycle*, p. 804.) The mid-1930s saw high money supply growth in the USA, as the banks purchased government bonds issued to finance both the budget deficit and the US government's purchases of gold and silver. The favourable effect of debt management operations on asset prices – working via the quantity of money – was obvious. Again, in the Second World War in both the USA and the UK the banks' lending to the private sector fell, but the quantity of money increased (as banks acquired more claims on the government), and both share prices and house prices rose.

(27) The third paper in the European Central Bank's Occasional Paper Series – on 'Estimating the trend of M3 income velocity' by Claus Brand, Dieter Gerdesmeier and Barbara Roffia, and published in May 2002 – concluded "the results presented in this study point to a trend decline in M3 income velocity in the range of ½% to 1%". In practice, the growth rate of M3 in the four years to end-2005 was about three per cent higher than that of Eurozone nominal GDP. See Charles Goodhart 'The ECB and the conduct of monetary policy: Goodhart's Law and lessons from the Eurozone', 2006, mimeo, for a recent discussion.

(28) See Edgar L. Feige 'The UK's unobserved economy: a preliminary assessment', *Economic Affairs*, 1981, and the articles in the June 1999 issue of *The Economic Journal*.

(29) "According to several studies, upward of 90 per cent of paper money in New York, Miami and London, and it is suspected, other major cities, contains trace elements of drugs." Raymond W. Baker *Capitalism's Achilles Heel* (Hoboken, New Jersey: John Wiley & Sons), p. 23.

(30) See p. A15 of Brian K. Bucks, Arthur B. Kennickell and Kevin B. Moore 'Recent changes in US family finances: evidence from the 2001 and 2004 Survey of Consumer Finances', February 2006 issue of *Federal Reserve Bulletin* (Washington: US Federal Reserve).

(31) See p. 195 of Geoffrey R. Gerdes and Jack K. Walton II 'Trends in the use of payment instruments in the United States', spring 2005 issue of *Federal Reserve Bulletin*. The value of non-cash payments in the USA in 2003 was $66.0 trillion. (See p. 181.) The Gerdes and Walton article does not provide a precise estimate of the value of cash payments. However, it does surmise that the average value of cash payments may have been $5, implying that there were 100 billion cash transactions in 2003, "compared with 81 billion noncash transactions". (p. 196) If that were correct, value of non-cash payments would have been about 130 times larger than the value of cash payments, similar to the 150 ratio in the UK. (See note (14) above.)

(32) The M1 measure of money is favoured, for example, by Allan Meltzer in his recent *A History of the Federal Reserve*, vol. 1 (1913 – 51) (Chicago and London: University of Chicago Press, 2003). See p. 577, where "money growth" is equated with that of M1.

(33) What about Japan? From the Bank of Japan's website the author obtained data on the annual rates of change of deposits and currency held by households, non-financial corporations and financial institutions between 1980 and 2004. The standard deviation of the annual rates of change was 3.29 for households, 5.00 for non-financial

corporations and 9.38 for financial institutions. Is it too early too conclude that the greater volatility of financial sector money is a repetitive feature of modern market economies with deep capital markets?

(34) Wicksell did not endorse a definition of money including all bank deposits, but his discussion of "the cumulative process" in *Lectures on Political Economy* would be incomprehensible if it were not implicitly assumed throughout that the banking system's behaviour could affect the price level, and he explicitly rejected a quantity-theory approach in which money consisted only of metallic money (p. 154 and pp. 190 – 208 of vol. II, *Money*, of Knut Wicksell *Lecture on Political Economy* [London: George Routledge and Sons, 1935]); Fisher explicitly included bank deposits in his "equation of exchange" and noted the effect of "deposit money" on the price level (p. 179 and pp. 186 – 7 of Fisher *Elementary Principles of Economics*); Keynes' approval for broad money measures in a footnote on p. 267 of *The General Theory* was forthright ("As a rule, I shall, as in my *Treatise on Money*, assume that money is co-extensive with deposits."); Robertson was relatively pragmatic, but clearly leaned towards an all-inclusive measure in the *Lectures on Economic Principles* published towards the end of his life ("I am in favour of casting [the net of definition] fairly widely...[F]or the kind of community in which we are most interested, we must included deposits with a bank drawable on by cheque...; and I doubt whether it is convenient to try...to draw line at 'current accounts' (UK) or 'demand deposits' (USA)." Dennis H. Robertson *Lectures on Economic Principles*, vol. III, *Money* [London: Staples Press, 1959, p. 13.); Hawtrey's early work was written before concepts of "money" had stabilised, but he proposed a concept of "the unspent margin" which "could be arrived at by adding up the liabilities of all the banks, or by adding up all the credits held by all their customers, whether depositors or note-holders", and observed that it was the banks' "action, not the [central bank] note issue, which directly affects the value of the monetary unit" (p. 34 and p. 50 Ralph Hawtrey *Currency and Credit* [London: Longmans, 1923]); Friedman and Schwartz said in their *Monetary History* that "currency held by the public and sight *and time deposits*...in commercial banks" (author's italics) is "our concept of money" (p. 630 of *A Monetary History of the United States, 1867 – 1960* (Princeton, New Jersey: Princeton University Press, 1963); and Johnson remarked that "in a modern economy" money is "created by the banking system" (p. 121 of Harry Johnson *Money, Trade and Economic Growth* [London: Allen & Unwin, 1962]). Numerous other references could be given for all these authors. To summarise, the quantity of money in traditional monetary economics was a broadly-defined measure dominated by bank deposits.

(35) The key paper here is Eugene Fama's 'Banking in a theory of finance', pp. 39 – 57, *Journal of Monetary Economics* (North-Holland Publishing Company), vol. 6, 1980, with its claim that – if certain assumptions are met – "banks remain passive intermediaries, with no control over any of the details of a general equilibrium". Fama did not discuss the realism of the assumptions needed for his conclusions, but some economists have taken his work as justifying a focus on the monetary base (or "outside money") in real-world situations. For example, Minford regards the M0 measure of the base as the same thing as "the money supply". (See p. 63 of Patrick Minford 'Optimal monetary policy with endogenous contracts', pp. 63 – 80, of Kent Matthews and Philip Book [eds.] *Issues in Monetary Policy* [Chichester: John Wiley & Sons, 2006.) As shown in footnotes (14) and (31) above, transactions in notes and coin account for less than one per cent of all transactions in the USA and the UK nowadays. (Fama's argument is an application of the Modigliani-Miller theorem to banking, but it follows an earlier tendency – notably, by Patinkin – to say that only changes in outside money [i.e., the monetary base] constituted changes in net private sector wealth and were relevant to the real balance effect.) If large numbers of economists – on the advice of eminent authorities – come to believe that the crucial money aggregate is that used in less than one per cent of transactions, it is perhaps excusable that the monetary transmission mechanism should be deemed "a black box". (Ben Bernanke and Mark Gertler 'Inside the black box: the credit channel of monetary policy transmission', pp. 27 – 48, *Journal of Economic Perspectives* [Minneapolis: American Economic Association, 1995].)

Appendix 1: Liquidity and M3 in the USA, 1959 – 98

For many years the Federal Reserve prepared estimates of a "liquidity" measure in addition to estimates of the monetary aggregates. The data for liquidity were published on a monthly basis, in $b., for 39 years from 1959, but the series was discontinued in 1998. (They remain available on the website of the Federal Reserve Bank of St. Louis, from which the data analysed here were downloaded.) This appendix considers whether the liquidity series diverged significantly from M3 and so might at any stage have given a different message for monetary policy-makers.

The level of liquidity was regressed on the level of M3, to see whether the two series were correlated. As the constituents of M3 were the dominant constituents of liquidity, it was no surprise to discover that the correlation was extremely high.

Level of liquidity = -28.96 + 1.21 Level of M3
$R^2 = 0.9997$
Standard error for intercept term = 3.97
Standard error for regression coefficient = 0.001
t statistic for intercept term = -7.29
t statistic for regression coefficient = 829.57

The % annual rate of change of liquidity was then regressed on the % annual rate of change of M3 in the 1960 – 98 period, since policy-makers would have been monitoring rates of change in their decisions.

Rate of change of liquidity = 1.11 + 0.84 Rate of change of M3
$R^2 = 0.87$
Standard error for intercept term = 0.13
Standard error for regression coefficient = 0.015
t statistic for intercept term =8.52
t statistic for regression coefficient = 56.58

Again, given that the constituents of M3 were the dominant constituents of liquidity, the high values of the correlation coefficient and the t statistic on the regression coefficient were to be expected.

What about the behaviour of the assets in liquidity, but not in M3? Did assets which were "liquid" but not monetary have different behaviour from M3? The level of non-M3 liquid assets was regressed on the level of M3, with the following result.

Level of non-M3 liquidity = -28.96 + 0.21 Level of M3
$R^2 = 0.989$
Standard error for intercept term = 3.97
Standard error for regression coefficient = 0.001
t statistic for intercept term = -7.29
t statistic for regression coefficient = 144.96

Finally, what is the result of regressing the % annual rate of change of non-M3 liquidity on the % annual rate of change of M3 over the 1960 – 98 period?

Rate of change of non-M3 liquidity = 6.58 + 0.08 Rate of change of M3
$R^2 = 0.002$
Standard error for intercept term = 0.74
Standard error for regression coefficient = 0.08
t statistic for intercept term =8.90
t statistic for regression coefficient = 0.97

Plainly the rates of change of non-monetary liquid assets were wholly uncorrelated with the rates of change of M3. Nevertheless, these non-monetary liquid assets were so unimportant relative to the monetary (i.e., M3) assets in the liquidity measure that the rates of change of liquidity and M3 were highly correlated. Policy-makers received little

extra guidance from the liquidity measure. Little was lost by discontinuing the estimation of the liquidity measure.

The data analysed in this appendix for the USA over a period of almost four decades are consistent with the conjecture with the text that "in most economies money-into-near-monies transactions are small compared with economically significant transactions [i.e., money-into-goods or money-into-assets transactions]".

Appendix 2: Money and total assets held by long-term savings institutions in the USA, 1952 – 2005

As explained in the text, series were obtained on a quarterly basis for total assets and money assets held by the five leading types of long-term savings institution in the USA, from the inception of flow-of-funds data in 1952. Also as explained in the text, the data were not presented on a consistent basis for all five types of institution. The following box shows the monetary assets included in the data.

Private pension funds	State and local gov pension funds	Life insurance companies	Property & casualty insurance cos.	Mutual funds
Checkable deposits and currency, time & savings deposits, MMMF shares, and Federal funds and repos	*Checkable deposits, time deposits, MMFs & security RPs*	*Checkable deposits and currency, and MMF shares*	*Checkable deposits and currency, and security RPs*	*Security RPs*

The resulting data – for these institutions' total assets, their money assets and the ratio of their money to total assets – are available from timcongdon@btinternet.com. The data are represented in Chart 3.

A time-trend equation was estimated for the money/assets ratio to obtain the coefficient on the time trend, with the hope of finding a statistically significant value not far from zero. 211 quarters of data were available. (Naively, the idea was to test the hypothesis that "the velocity of circulation of money in the asset transactions of the leading American savings institutions has been stable for over 50 years".)

The results of the OLS time-trend equation are given below:

Value of money/assets ratio (%) = 2.44 + 0.012 Time variable (i.e., no. of quarters from start)

$R^2 = 0.50$
Standard error for intercept term = 0.10
Standard error for regression coefficient = 0.0008
t statistic for intercept term = 23.45
t statistic for regression coefficient = 14.49

So the money/assets ratio had a slight upward trend over time of clear statistical significance.

Inspection of Chart 2 suggests the money/assets ratio was particularly high in the 1980s, when real interest rates on money balances were most attractive. A real interest rate series was calculated, with the three-month Treasury bill rate adjusted by the deflator on personal consumers' expenditure. The addition of this real interest rate to the relationship did not improve the closeness-of-fit of the equation or the statistical significance of the time-trend variable, and the equation is not reported. Another possible explanatory variable was the steepness of the yield curve, given that the

opportunity cost of holding assets in the form of money is greatest when the difference between the rate of interest on money balance and long-dated bond yields is highest. A series was obtained for the excess of the 20-year Treasury bond yield over the three-month Treasury bill rate for the period after 1960, and an equation was estimated with the money/assets ratio a function of time, the real interest rate and the yield curve variable. As the yield curve variable had the wrong sign and also had no explanatory power, the equation is not reported.

Another method of assessing the relationship between the institutions' money holdings and their assets is to regress the rate of change of total assets on the rate of change on money assets. The results of an OLS equation, using quarterly data with annual rates of change from 1953 to 2005, are as follows:

Rate of change of total assets, % = 7.60 + 0.27 Rate of change of money, %

$R^2 = 0.076$
Standard error for intercept term = 0.84
Standard error for regression coefficient = 0.065
t statistic for intercept term = 9.09
t statistic for regression coefficient = 4.14

As argued in the text, the rather poor quality of this equation may reflect the volatility of asset prices and does not necessarily preclude a reliable medium-term relationship between institutional money and assets. Three-year moving averages were estimated of both rates of change. The resulting equation is given here:

Rate of change of total assets, % = 6.99 + 0.35 Rate of change of money, %

$R^2 = 0.23$
Standard error for intercept term = 0.62
Standard error for regression coefficient = 0.046
t statistic for intercept term = 11.23
t statistic for regression coefficient = 7.76.

Whether one regards this as a satisfactory equation is perhaps a matter of taste. The t statistic of almost eight for the regression coefficient on the explanatory variable argues that – over medium-term time horizons of about three years – the rate of change of institutions' money holdings had a significant influence on the rate of change of their total assets.