Addressing Puzzles in Monetary Dynamics

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ABSTRACT

There are a number of stylised facts relating to cyclical developments in money and credit aggregates and in interest rates since the start of the new millennium in all the major advanced regions of the world, including the euro area, that are puzzling. There would seem to be a new aspect to the way money has behaved in recent times, namely the acceleration in the growth rate of the money stock that occurred when one would have expected the opposite, i.e., a slowing down in response to the weaker growth as in the US (in the early years of the new millennium) and the slowing growth rate in the euro area (approximately over the same time period). This paper discusses these puzzles in monetary dynamics and proposes some possible explanations, primarily the democratisation of financial markets and sounder money. Furthermore, we discuss the role of uncertainty in money demand and chart its influence on monetary developments in the euro area. We conclude that there is a risk that the traditional effects of rapid growth in money and credit aggregates and low interest rates are merely being postponed and will show up later in an acceleration in the pace of aggregate demand which will not be matched by a corresponding increase in the capacity of the economy to supply goods and services and may therefore translate into accelerating inflation.

1. Introduction

There are a number of stylised facts relating to cyclical developments in money and credit aggregates and in interest rates since the start of the new millennium in all the major advanced regions of the world, including the euro area, that are puzzling. Even in broad contour terms, they do not seem to conform to the patterns experienced over previous business cycles.

There would seem to be a new aspect to the way money has behaved in recent times. This is the acceleration in the growth rate of the money stock that occurred when one would have expected the opposite, i.e., a slowing down in response to the weaker growth rate as in the US (in the early years of the new millennium) and the slowing growth rate in the euro area (approximately over the same time period). As pointed out in the ECB Monthly Bulletin for January 2004[1], this unusual behaviour of money would appear to have occurred globally. A slowing money growth rate has been invariably what happened at the onset of all previous cyclical downturns in the US at least since the 1950s. This would seem to indicate *prima facie* that the relationship between money and income is departing from what current orthodoxy in monetary theory predicts.

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1 See Box 1 entitled "Worldwide Trends in Monetary Aggregates Over Recent Years", ECB Monthly Bulletin, January 2004.

The paper first looks at these puzzles. It focuses on the stylised facts using graphical analysis only. It proposes an explanation for the puzzling behaviour. It argues that it lies in the growing importance of financial markets over the last two to three decades along with developments in banking. These have led to growing retail participation in financial markets and to sounder money and have, arguably, given rise to new and possibly dangerously destabilising movements into, and out of, money.

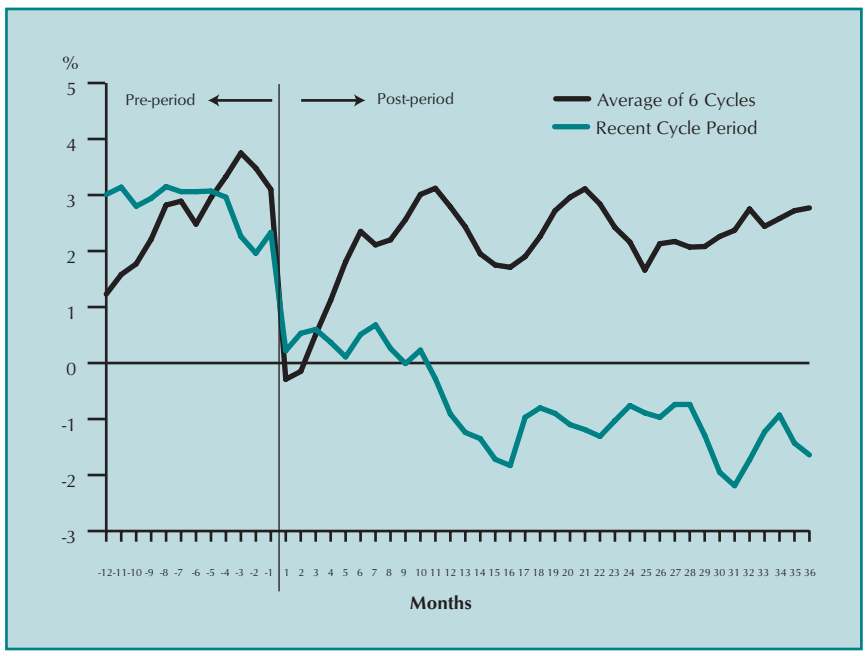
The plan of the paper is as follows. Section 2 of the paper details and addresses the puzzling stylised facts and attempts to address the question as to why behaviour in relation to a number of money, credit and interest rate variables in recent times differs so radically from behaviour during similar cyclical episodes in the past. Section 3 addresses money and uncertainty and discusses briefly buffer stock money. This is the idea that money serves as a store of value across time giving it an important role as a buffer against shocks. This section also looks at the role for measures of uncertainty in money demand functions. Section 4 discusses shocks, uncertainty and money demand and supply whilst reviewing some of the developments that have taken place that may be having an impact on the recent puzzling monetary dynamics, such as growing household participation in financial markets facilitated by financial innovation and sounder money. Section 5 of the paper discusses money and interest rate dynamics and the time-varying motives for holding money and the consequences for interest rates in this new setting. The varying roles of the three classical motives for holding money (i.e., the transactions, the precautionary and the speculative motives) in a context in which uncertainty seems to move in cycles are key to understanding recent developments. Section 6 discusses money disequilibrium resolution while Section 7 attempts to use this same conceptual framework to account for money and credit developments in the euro area since the start of monetary union by examining money's components and counterparts. Section 8 offers some tentative conclusions.

2. Puzzling Behaviour

The first puzzling aspect of behaviour is that, at least since the 1960s, money and credit aggregates have never grown so fast, or so persistently, as they have since the turn of the millennium without having a substantial impact on inflation. Secondly, there has never been an interval of time in this period in which the real rate of interest has been so low for so long in emerging from a recession (US) or, in the case of the euro area, a growth slowdown (see Charts 1 and 2) without also having some adverse effect on inflation[2].

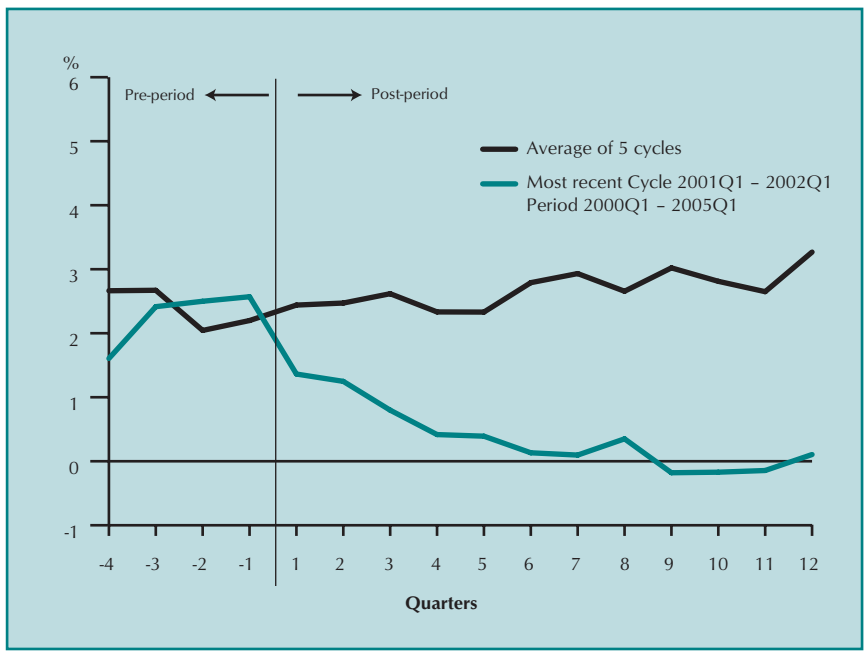
2 The vertical lines in Charts 1 to 4 inclusive represent the full recession period (irrespective of the duration of the recession).

Chart 1: US Real Fed Funds Rate through Business Cycles



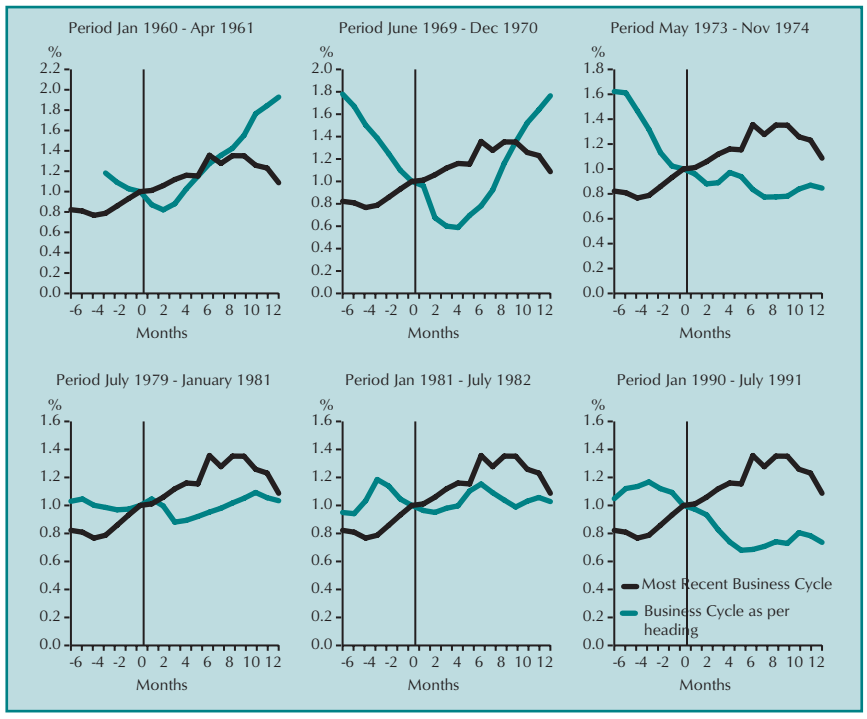
Source: FRED II and authors' calculations.

Chart 2: Euro Area Real Interest Rates through Business Cycles



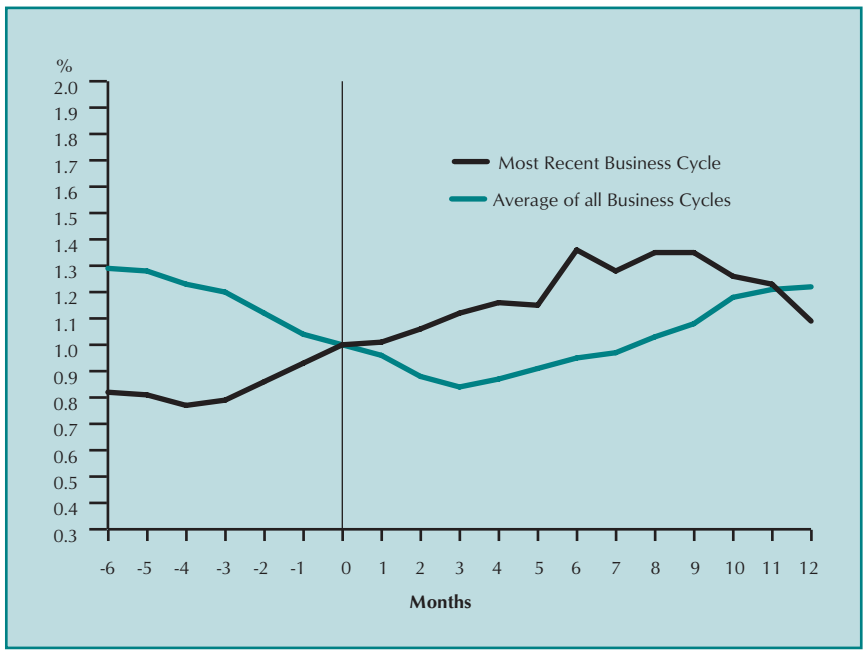
Source: ECB and authors' calculations.

Chart 3: US Money Stock Growth and the US Business Cycles



Source: FRED II and authors' calculations.

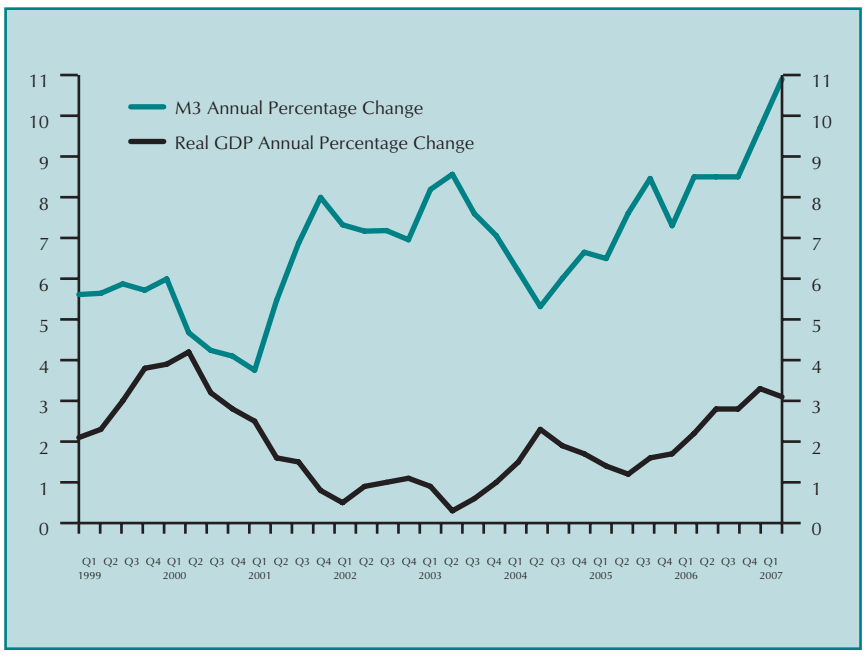
Chart 4: US M2 Money Stock Growth and Business Cycle Averages



Source: FRED II and authors' calculations.

Thirdly, never, over roughly this same time span, has money stock growth accelerated going into, and during, a recession as it did before and during the 2001 recession in the US (see Charts 3 and 4). The euro area equivalent to this behaviour has been a sharp acceleration in money stock growth during its growth slowdown (but not a recession) in the early years of the new millennium (see Chart 5). In Japan in the latter half of the 1990s, amid concern over heightened credit risks and a deteriorating domestic Japanese economy, the pattern was again qualitatively similar. The growth rate of the money stock accelerated as the economic situation deteriorated. Kimura (2001), in reviewing these developments, dubbed this case 'paradoxical'.

Chart 5: Euro Area M3 and Real GDP Annual Percentage Change



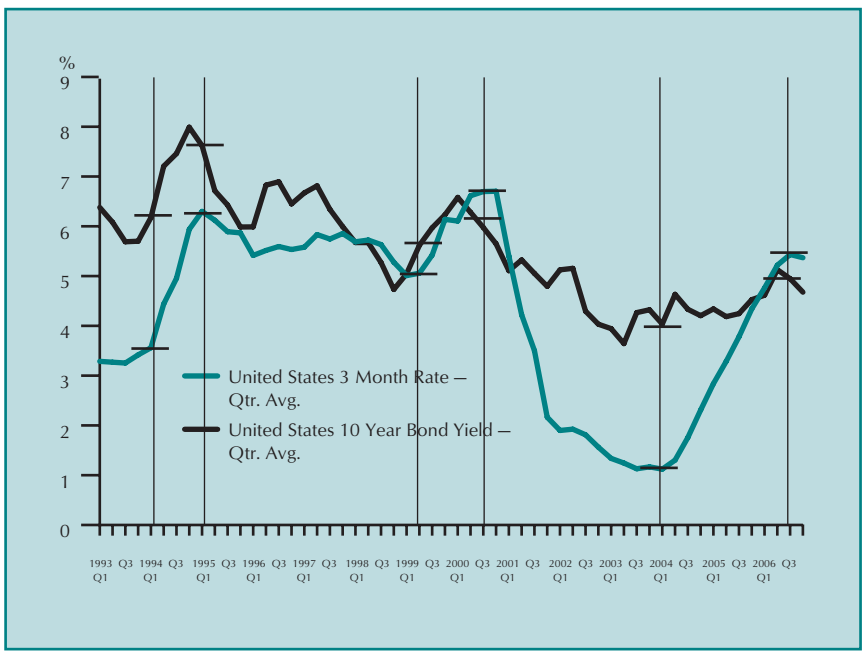
Source: ECB.

Fourthly, never have official interest rates been raised by so much within such a short space of time (in the US Fed's recent tightening phase) with so little effect on long rates (see Chart 6 related to the Greenspan 'conundrum') and with apparently such little effect on the pace of activity in the real economy (see Chart 7). Since 1990, three distinct tightening cycles can be identified in Chart 6, namely those starting in early 1994, in mid-1999 and in April of 2004. The increase in the short rate from the trough to the next peak in the first of these was 319 basis points while the long rate increased by 233 basis points over the same time span, giving an elasticity of the long to the short rate of 0.55[3]. The corresponding figure for the second tightening episode is 0.54. In the tightening cycle that began in April of 2004, the short rate increased by 433 basis points to the next peak in July 2006 while the long rate increased by only 133 basis points over the same period. This corresponds to an elasticity of 0.22, half of the elasticities of the previous two tightenings. A similar puzzle may

3 Taking the levels for the rates of the average of starting and ending points.

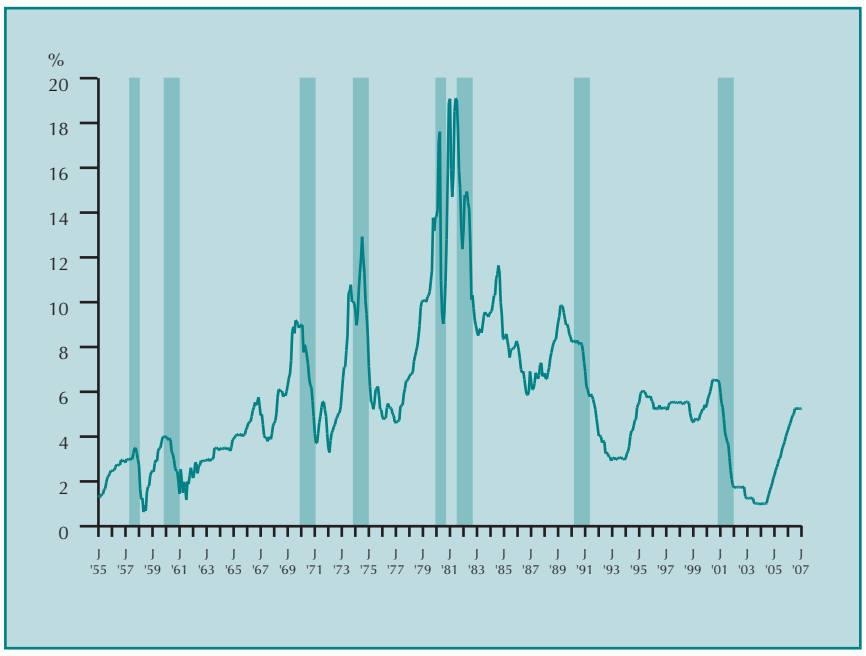
be emerging in the euro area (see Chart 8) but, as yet, it is too early to say. The matching elasticities to those just noted for the US are 0.77, 0.44 and 0.39.

Chart 6: US Short- and Long-term Interest Rates



Source: FRED II and authors' calculations.

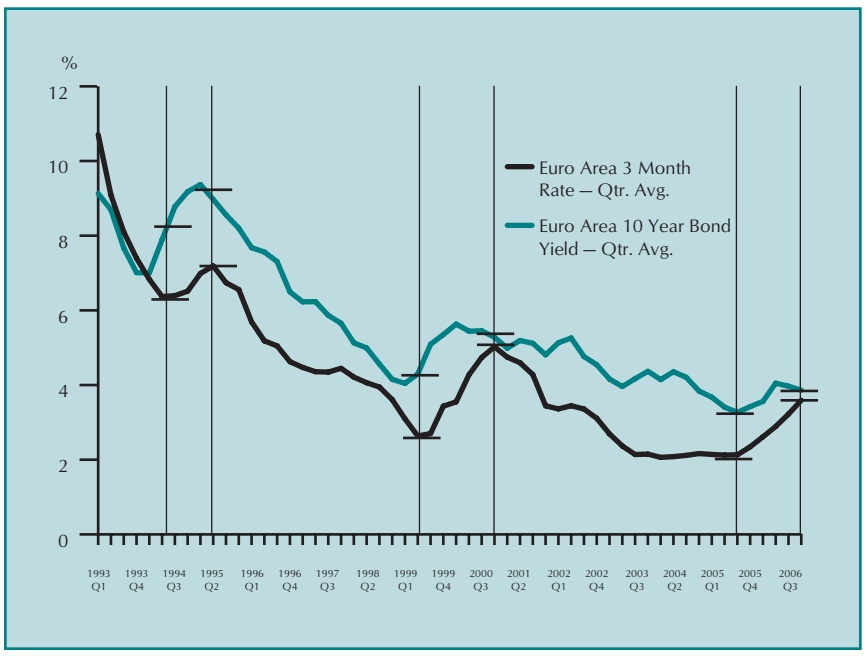
Chart 7: Effective Federal Funds Rate and NBER Recession Periods



Source: FRED II and NBER.

Against the benchmark of past cyclical experience, these are all puzzles. But they are puzzles, which, we argue, are all closely interrelated with one another. We argue, furthermore, that they may all be resolved in the light of at most one or two behavioural changes that have occurred, for the most part, over the last few decades. A similar story line may therefore be capable of throwing light on all of these puzzles.

Chart 8: Euro Area Short- and Long-term Interest Rates



Source: ECB and authors' calculations.

Since rapid money and credit growth and low interest rates are exactly the kind of conditions that produced accelerating inflation in the late 1960s and early 1970s, it is curious why these same conditions do not now seem to be having anything like similar adverse effects. *Prima facie*, there seems to have been some change in monetary dynamics. The corollary of loose monetary policy producing accelerating inflation is tight monetary policy producing a recession. According to the colourful description of Dornbusch (1997), all previous economic recoveries in the US were ''murdered in bed'' by central bank tightening. So it is now puzzling why the current round of unprecedented sharp Fed tightening is not apparently, to date at any rate, having any kind of comparable effect (as noted already in Charts 6 and 7). Is the apparent failure of the recent episodes of very loose monetary policy in the US, the euro area and especially Japan, to produce accelerating inflation related, in some way, to the corollary puzzle of the apparent failure of tight monetary policy (at least in the US[4]) to rein in aggregate demand? More generally, has there been some structural change in these economies that is attenuating the effect of the monetary policy stance on the pace of economic activity and inflation? Can we identify what is the nature of this structural change, if any? These are some of the questions we will be attempting to address in this paper.

It is worth bearing in mind that, at least according to one fairly widely-accepted theory, much of the inflation of the 1970s was attributed to a misunderstanding among policymakers about

4 At time of writing, the ECB had not completed its tightening phase and the Bank of Japan had only increased rates moderately from a level of zero.

supply shocks and their effects on the natural rate of unemployment[5]. The question therefore naturally arises as to whether there could be a similar misunderstanding among policymakers occurring now but in relation to a different area of the economy. Perhaps there has been a structural shift underlying some of the economic processes relevant to monetary policy, which we don't yet fully understand.

The objective of this paper is to suggest one possible explanation for these puzzling developments. It lies in a combination of developments in financial markets (and their globalisation), in developments in the banking industry and in the increasing soundness of money as a store of value, all occurring in a context of shocks that are increasingly global in nature hitting the world economy. These shocks occasionally occur in clusters as in the early years of the new millennium.

There may be implications from the behaviour flagged here for the future pace of economic activity (relative to potential) and consequently for inflation. These implications may be less benign than the current consensus forecasts are implying. This is because the effect of these putative structural changes may be merely to delay the full impact of money, credit and interest rate developments on activity and inflation and not to undermine the long-run money-inflation relationship which is probably the most well documented relationship in economics and which has existed for centuries.

If this is correct, then some of the current conventional thinking — that the failure of rapid money growth to translate into inflation acceleration reflects the growing irrelevance of money — could lead to false and dangerous conclusions about the true stance of monetary policy. Our inferences from the stylised facts here are at best tentative, but it could be the case that all that has changed is the short- to medium-term money-inflation dynamics and not the long-run underlying relationship.

What is undeniable from all past data internationally is that the long-run relationship between money and inflation is very tight. Over the 30-year horizon 1968 to 1998, the correlation coefficient between the monetary base, on the one hand, and inflation on the other across a sample of 116 countries was 0.99. Equally impressive is the lack of any long-run relationship between either narrow or broad money on the one hand and output on the other with respective coefficients of -0.09 and -0.08[6]. Equally impressive is the remarkably strong and stable relationship between money growth and inflation over widely different monetary regimes and time periods going back into the 19th century (for example, see Stark (2007)). Not only is this

5 See Orphanides (2001).
6 Figures quoted in King (2001), then deputy governor, now governor, of the Bank of England.

relationship strong, it shows a consistent lead of money growth over inflation. It holds for all definitions of money and is clearly independent of monetary policy regime since it pertains to very long time periods. For the euro area, it shows that long-run money growth bottomed out just before 2000 and that inflation started to pick up about two years later. A worrying feature is the fact that the level of money that, according to these correlations, drives inflation is already outstanding in the euro area. It cannot now be easily reined in. For the most part, all that the central bank can do, and indeed all it typically aspires to do, through tighter monetary policy, is to reduce the flow supply of new liquidity to the banking system — it rarely aims to reduce the outstanding stock.

Two things are clear therefore. There has undoubtedly been some kind of shift in short-run monetary dynamics as the above puzzles indicate. To the extent that we can make some inferences about this, it seems that this shift has affected the dynamic interaction between money demand and supply in the new financial market setting that has emerged in the last few decades of the past century. However, if there has been no change in the long-run money-inflation dynamics, central banks are now running serious risks that inflation will accelerate beyond the levels consistent with the typical definitions of price stability.

3. Money and Uncertainty

3.1 Buffer Stock Money — Rationale

It is our belief that the theory of money demand that comes closest to throwing light on the puzzling developments in monetary aggregates since the turn of the millennium is the buffer stock approach to money demand. There is an old literature on the buffer stock demand for money, which flourished between the mid-1970s and the end of the 1980s. The micro-foundations for the buffer stock money demand were derived by Miller and Orr (1966) and Akerlof (1973,1979). Other seminal contributions were made by Goodhart (1984), Laidler (1984), Milbourne (1987,1988), Cuthbertson and Taylor (1988, 1989, *inter alia*) and Davidson and Ireland (1987,1988). Tests of the theory can be found in Carr and Darby (1981) and Browne (1989).

According to this literature, there are a few different rationales for the demand for money as a buffer. The mainstream view is that money is more convenient to adjust in the face of shocks than are financial asset holdings. This money adjustment compensates for financial assets adjustment in periods of turbulence in financial markets. Money tends to be held as a temporary abode of purchasing power until other assets can be adjusted in response to economic and financial market developments. From the point of view of the individual, the

money supply is exogenous. Changes in this exogenous supply can result in individuals holding more money balances than they would otherwise hold if they were at their long-run desired money holdings. An apparent instability of money demand when none exists can be rationalised by the buffer stock theory of money demand.

An alternative rationale for holding buffers of money is based on a combination of search theory and irreversible investment theory (see Mizen (1994) for a more in-depth discussion). Individuals may not wish to incur the costs of making a rash portfolio investment decision, which might be very expensive to reverse. They therefore hold idle money balance while searching for attractive investment opportunities.

Much of the theorising is convincing and the empirical results compelling. However, as these references indicate, this strand of the monetary literature goes back some distance in time, but, arguably, the kind of behaviour highlighted by these models is now much more relevant than it was in the past when it was widely seen as making an important contribution to monetary thinking. This is because financial markets have flourished and deepened in the meantime. Household participation in these expanded financial markets has also spread rapidly. While a shock to the financial system would have created a ripple effect in the 1970s or 1980s, in the 2000s this is more likely to have become a tsunami.

The argument for a buffer stock role for money is now even stronger than it was when these theories were attracting the close attention of the profession. But, largely because of these very developments, the rationale for a buffer stock role for money is now not only stronger but also different in important ways from that propounded in this literature. A recent strand of research has focused on looking at the effects of uncertainty on money demand. In the next sub-section we look at these briefly, *inter alia*.

3.2 Incorporating Uncertainty and 'Cheap Leverage' Seriatim in Money Demand

Typically, money demand functions include two main sets of explanatory variables, namely a scale variable and a measure of opportunity cost. The scale variable generally takes the form of real GDP while the measure of opportunity cost is open to some variation. Many of such measures take the form of the spread between a long- and short-term interest rates. However, other models, such as that in Calza *et al* (2001) create a measure of opportunity cost using the spread between a short-term interest rate and a constructed measure of the own rate of return on the euro area M3 monetary aggregate.

A growing school of thought advocates the inclusion of another variable in the model, i.e., one to capture the effects of uncertainty (see, *inter alia*, Greiber and Lemke (2005), Carstensen (2003 and 2006) and Alves *et. al.* (2006)). However, an almost insurmountable problem in examining issues relating to money and uncertainty arises from the fact that the uncertainty in question (technically known as Knightian uncertainty) is, by definition, not easily susceptible to measurement. Knight (1921) originally made the distinction between 'uncertainty' and 'risk'. When one is faced with a situation in which there are a number of alternative outcomes, it is either a situation of 'uncertainty' or one of 'risk'. If there is sufficient experience of similar situations in which decisions had to be taken in the past, then the probabilities of outcomes can be measured. This is then a situation of 'risk'. If comparable experience is not available from the past, then the situation is said to be one of 'uncertainty'. There can be gradations of uncertainty depending on the number, kind and combination of shocks hitting the economy.

In light of the kind of profound changes affecting financial markets and banking along with the wider economy[7] in conjunction with a high incidence of shocks, some of which were of an unprecedented geopolitical nature, it could be said that the early years of the new millennium were ones of uncertainty rather than risk. Shocks to the economy can, in such circumstances, give rise to cycles in confidence/uncertainty and may be key to understanding money stock, credit and market interest rate developments. Although uncertainty cannot be measured, various proxies for it can be examined as potential candidates to capture the effects of uncertainty.

The reasoning behind the inclusion of uncertainty in a money demand model is to capture the effects of market sentiment which leads to a shift in investment typically from longer-term and riskier assets into more liquid money holdings included in monetary aggregates, such as M3 money in the euro area. The influence of uncertainty on money demand in the euro area has been a prime issue for consideration in recent years, particularly since 2001, as M3 growth has been high. The ECB has attributed much of the strong growth in M3 between 2001 and 2003 to what is called ''portfolio shifts'', a term to describe the reallocation of investment portfolios from longer-term riskier assets into shorter-term safer assets which are included in the monetary aggregate M3. This effect is likely to have been larger than previously experienced given that a greater number of households were also beginning to access wider elements of the financial markets, particularly equity markets, throughout the 1990s. In a euro area context in particular, the more traditional

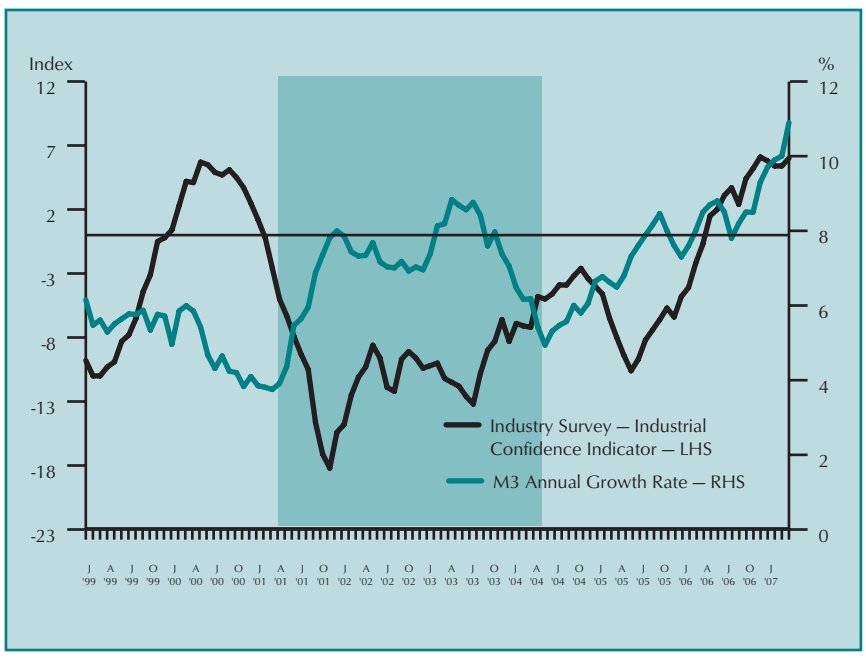
7 Such as real-economy and financial-markets liberalisation, waves of financial innovation, globalisation along with the changing composition of industry.

models of money demand began to show varying signs of instability since 2001 at a time when indicators began pointing towards excess liquidity. In an attempt to find a stable money demand model for the euro area that accounted for this period of portfolio shifts and to explain the build up of excess liquidity, models have been augmented in various ways including the addition of uncertainty proxy variables.

A simple plot of the euro area industrial confidence indicator against the annual rate of growth of the M3 money stock illustrates quite forcefully the potentially important role of uncertainty in money stock determination (see Chart 9). The inverse correlation between money growth and this indicator of industrial confidence, for the period April 2001 to May 2004, is –0.62. For example, the dramatic decline in confidence throughout 2001 is immediately evident as is the doubling in the rate of growth of M3, which accompanied it. It should be clear from this plot alone that any plausible explanation of developments in money has to factor in uncertainty. It is also clear from Chart 10 that an economic sentiment indicator or a consumer confidence indicator are also inversely correlated with money growth. However, the correlation of money growth with the industrial confidence indicator is stronger than for these other indicators, which is not surprising given that the non-financial corporate sector accounted for the bulk of the growth in the money stock during this period.

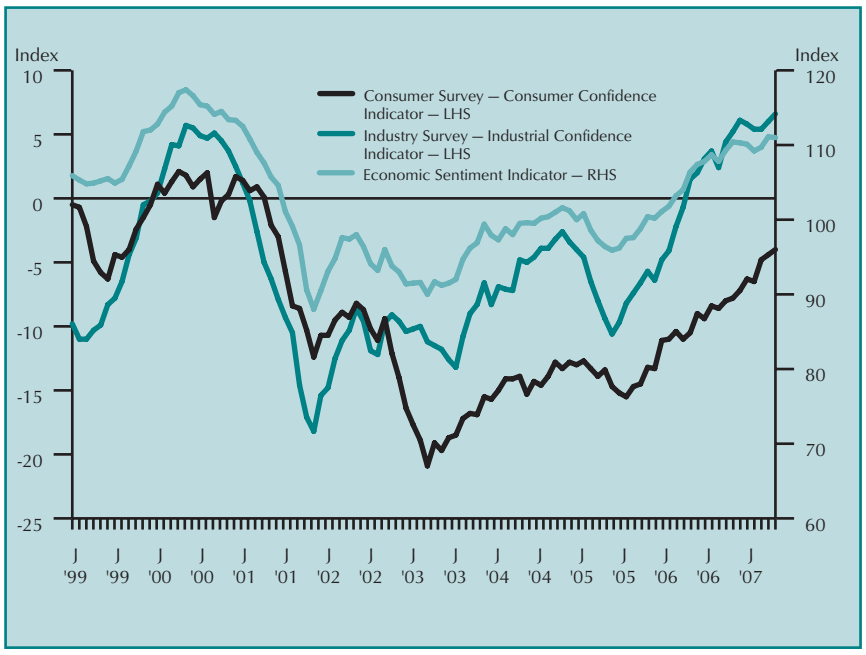
If a comprehensive measure of Knightian uncertainty were available, then it is likely that the correlation in the figure would be even higher. The high correlation for what is no doubt an imperfect proxy for uncertainty is nevertheless impressive.

Chart 9: Euro Area Industrial Confidence and M3 Annual Growth Rate



Source: Eurostat and ECB.

Chart 10: Euro Area Confidence and Sentiment Measures



Source: Eurostat.

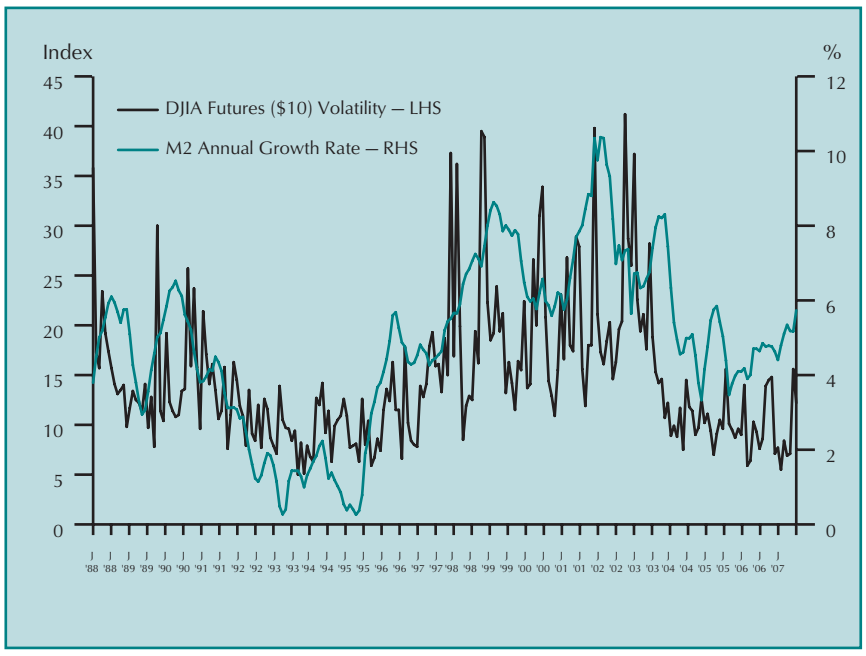
To proxy uncertainty in money demand, three types of variables have been employed: market behaviour, measures of volatility and measures of sentiment. Some money demand models include equity market variables such as price index, turnover or trading volume to capture an element of the financial market transactions demand. Such market behaviour measures, however, also incorporate an implied element of uncertainty, as equity market data are inherently reflective of market sentiment, which is driven by the (lack of) uncertainty. However, such measures are more indicative of the transactions demand for money for longer-term asset trading as each seller of an asset requires a buyer irrespective of market uncertainty and therefore such measures may not fully reveal the level of uncertainty.

A popular indicator of uncertainty is that manifested in stock market behaviour. Chart 11 displays a quite strong long-run positive correlation between money growth in the US (using the conventional M2 money definition) and implied volatility in the Dow Jones Industrial Average (DJIA) of futures share prices. Reductions in volatility reflecting growing positive sentiment tend to be associated with low money growth as the precautionary demand for money wanes, and evidently vice-versa. This same relationship is depicted in Chart 12 with both of these variables subjected to a 12-month moving average, which is designed to bring out the long-run correlation.

Using the same DJIA futures prices as proxy for uncertainty in the euro area as well yields Chart 13. The relationship is not as strong as for the US. It is also noticeable that the previous positive correlation tends to break down, indeed reverse, at the

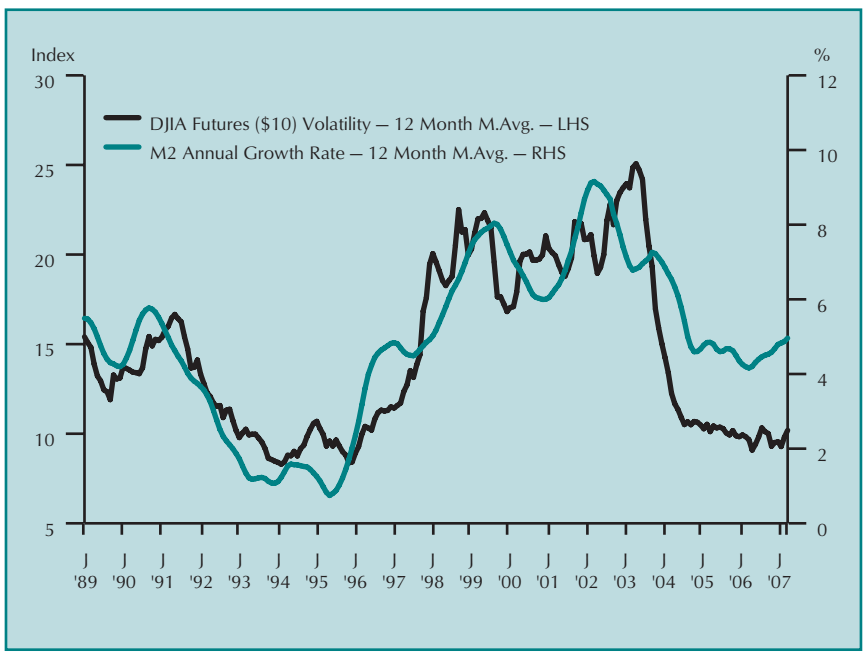
end of the period, which we have identified as one of uncertainty, roughly from April 2001 to May 2004 (recall Chart 9 above). However, this change in the direction of the correlation is consistent with the overall story being related here.

Chart 11: DJIA Volatility and US M2 Annual Growth Rate



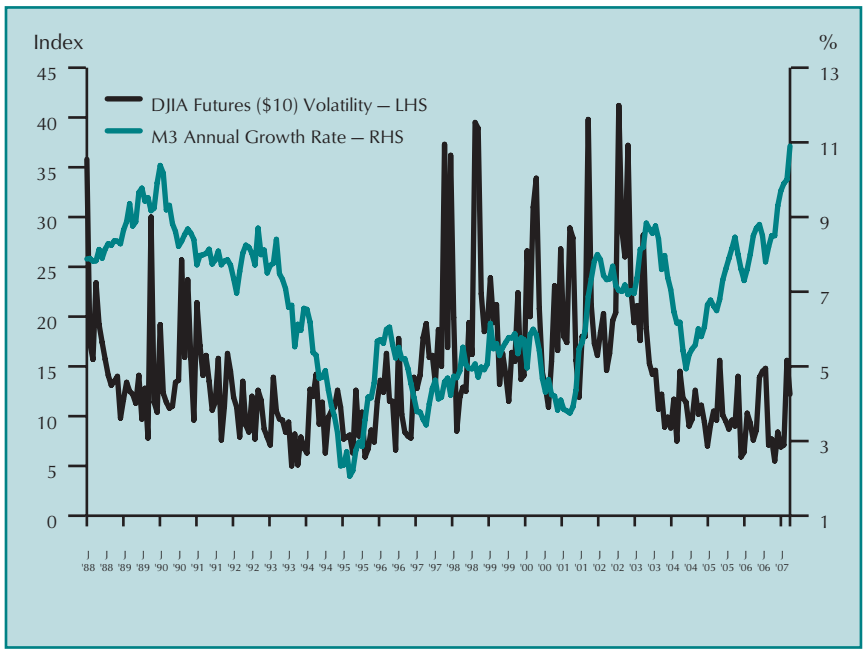
Source: Chicago Board of Trade and FRED II.

Chart 12: DJIA Volatility and US M2 Annual Growth Rate — 12 Month Moving Averages



Source: Chicago and Board of Trade, FRED II and authors' calculations.

Chart 13: DJIA Volatility and Euro Area M3 Annual Growth Rate



Source: Chicago Board of Trade and ECB.

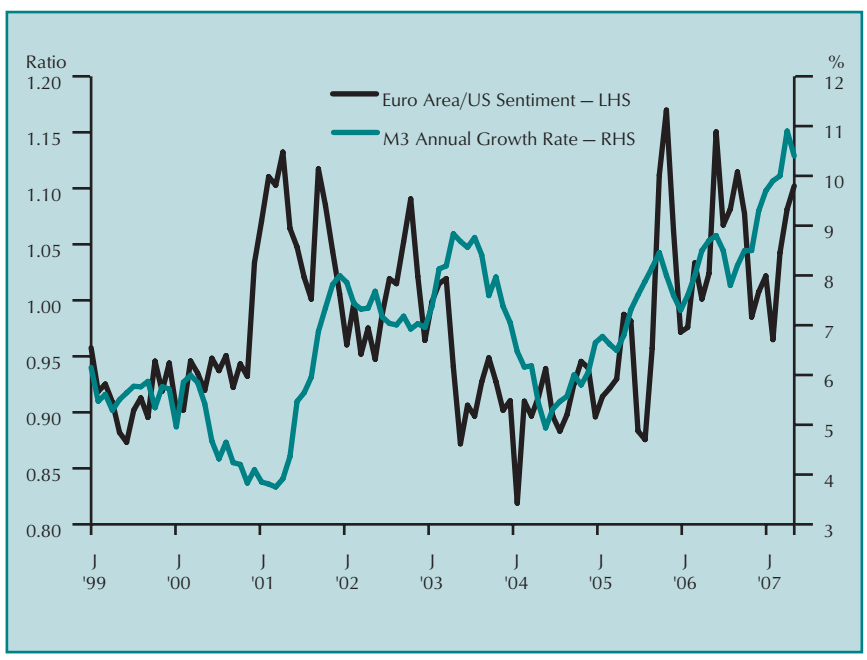
It is likely that different arguments in the money demand function may be relevant over different time spans. It is likely that, in so-called normal periods, money demand is driven by the standard arguments one tends to find in typical demand for money specifications, i.e., income and interest rates. In periods of uncertainty, it will tend to be dominated by negative sentiment about the economy (as illustrated above in Chart 9). The transition between an environment of uncertainty and one of restored confidence is a gradual one. Complex monetary dynamics can also occur during this transition.

Although confidence may have been returning to financial markets as reflected in increasing asset prices after April 2004, central banks may have been reluctant to tighten monetary policy too abruptly given the continuing sluggish real economy and the ongoing threat of deflation (recall Charts 1 to 5 above, all of which would support this kind of story). With such a configuration of factors, a new driving force of money may take over from uncertainty. This is the attraction of cheap leverage in a context of reviving financial markets. Loan growth begins to accelerate as investors begin to see the prospects of significant gains from asset price appreciation. In this phase, loan growth begins to take over from 'portfolio shifts' as a new driving force inflating monetary aggregates (see Section 7 of the paper below where this issue is discussed in more detail and Chart 19 therein). The new emerging generic determinant of money growth is therefore the expected gross return on a range of asset prices relative to the cost of leveraged funding for market participants[8].

8 Of course, deriving empirical counterparts for these variables to use in demand for money studies poses fairly obvious problems.

It is our interpretation that the rapid growth in the euro area money stock between early 2001 and early 2004 does not constitute a disequilibrium or an overhang. This is because it was being voluntarily held in the then prevailing environment of uncertainty. The overhang (in the sense of money balances that people no longer want to hold) only emerges at the end of this period of uncertainty. If, at this point, potential investors realise that the 'wall of money' that will be released by the inevitable process of dishoarding following the attenuation of uncertainty is likely to precipitate a generalised 'search for yield', they will be all the more determined to maximise their leverage to avail of perceived rich pickings in financial markets while benefiting from low borrowing costs. The money/stock market volatility correlation gets reversed and becomes negative as the rapid growth in credit now boosts money stock growth while the economy and confidence recover. Another notable feature of the measure of volatility in Charts 11 and 13 is its very low level, which has persisted over roughly the last three years. This would have encouraged even more widespread leveraged participation in asset markets.

Chart 14: Euro Area/US Sentiment and M3 Annual Growth Rate



Source: Eurostat, FRED II, ECB and authors' calculations.

Another feature not addressed in the research and which may be an explanatory component is that of uncertainty outside the euro area. While uncertainty inside the euro area will determine, in principle, how agents will allocate their portfolio between long- and short-term assets, the relative uncertainty between the euro area and external markets will determine whether residents allocate their money in the euro area or in such external markets. Equally, such measures of relative uncertainty will determine whether finance from external markets will be reallocated into the euro area. This will also be partially determined by the rate

of return on offer and the cost of finance and this could be an explanatory factor behind investment inflows into the euro area in recent years. With financial innovation enabling an increasing global financial market and with derivatives and synthetic instruments increasingly allowing positions in markets to be taken without the actual trading out or transfer of notional amounts, it is a moot point whether the driving forces of money demand are exclusively domestic and, accordingly, a measure of relative uncertainty may be more appropriate than a purely domestic measure (see Chart 14).

4. Shocks, Uncertainty and Money Demand and Supply

4.1 Relative Yields on Money in Different States of Nature

The conventional wisdom has it that all other financial assets dominate money in terms of yield or return. This is inspired by the observation that a significant proportion of the total money stock does not attract an explicit rate of return or, where it does attract a return, it tends to be fairly small relative to market rates of return on competing asset classes. This, on the face of it, looks like a fairly plausible statement. Although it may be true on average over time, it is not a correct statement in all circumstances (or, technically, in all ''states of nature''). In periods of heightened uncertainty, following a major shock, or a combination of shocks to the economy, the expected short-term, or even the expected short- to medium-term, return on financial assets may be negative, and indeed substantially so, in nominal terms. Since the rate of return on money cannot be negative in nominal terms[9], then, in such circumstances, the yield on money will tend to dominate that on all other financial assets[10]. Substitution into money and out of financial assets in periods of financial turbulence reflects, in part at least, a desperate attempt by both individuals and firms to preserve financial wealth. This rush to the safe haven of money will tend to be especially in evidence following periods when financial wealth has been boosted by an asset price boom.

Therefore, an economic environment of prolonged or pervasive uncertainty can have unusually large effects on peoples' desire to hold money balances. There are many reasons for this and they all derive from the many roles which classical monetary theory ascribes to money, namely medium of transactions, unit of account and store of value, which, in turn, determine the three dominant motives for holding money. These are the transactions, precautionary, and speculative motives. Traditional money demand functions tend to focus mainly on money as a

9 Abstracting from banks' failure to honour convertibility of deposits into cash because of either illiquidity or insolvency problems.

10 It is noteworthy that one of the four selection criteria proposed by the EMI and accepted by the ECB Governing Council for bank liabilities to be included in the money stock is capital certainty.

transactions medium and therefore on the transactions motive for holding money to the neglect of the precautionary and speculative motives. In circumstances where these two latter motives might be expected to be to the fore, i.e., ones of heightened uncertainty, traditional transactions-based approaches to the demand for money will fail to account for monetary developments.

But the role of money as a store of value enhances its attractiveness and peoples' willingness to hold it for both precautionary and speculative reasons. Money is a good store of value (indeed, it may be the only credible and reliable one) in stressed financial conditions. Therefore, the precautionary demand for money is likely to increase and possibly substantially in such conditions. Stressed financial circumstances may also promote the speculative motivation for holding money. This is because the collapse in financial asset prices (typically the reason for the uncertainty) may lead investors to believe that there will be good investment opportunities available in financial markets once the uncertainty dissipates and confidence returns to markets. It may make sense (as suggested by one of the theoretical rationales for buffer stock money) for agents to hold additional money balances in portfolios so as to be in a position of avail of such opportunities when they arise. Indeed, in periods of financial stress there may be an additional source of transactions demand stemming from increased turnover in financial markets necessitating additional money balances to mediate these financial market transactions. This could account for the very rapid growth in deposit holdings by OFIs.[11]

All of the above factors have been in play for some time. It therefore cannot by itself be an explanation for the type of new monetary dynamics, which have been and are now impinging on monetary growth in the euro area and elsewhere. What is relatively new and fits the bill of contributing to an explanation of these dynamics, are basically two phenomena, the growing democratisation of financial markets and sounder money.

4.2 Growing Retail Involvement in Financial Markets

There have been considerable developments in financial markets since the mid-1990s that have corresponded to a period of increased financial market participation by wider segments of the money-holding sector, particularly households. Such a period of financial innovation has also corresponded to a period of strong

11 An 'Other Financial Institution' (OFI) is defined as a corporation or quasi-corporation other than an insurance corporation and pension fund that is engaged mainly in financial intermediation by incurring liabilities in forms other than currency, deposits and/or close substitutes for deposits from institutional entities other than MFIs, in particular those engaged primarily in long-term financing, such as corporations engaged in financial leasing, financial vehicle corporations created to be holders of securitised assets, financial holding corporations, dealers in securities and derivatives (when dealing for their own account), venture capital corporations and development capital companies.

money growth across many economies. The question then arises as to whether there is a causality running across these trends. If there is, intuition suggests that such causality runs from financial innovation and increased market participation to money growth.

First, historical trends illustrate that there have been many previous episodes of strong money growth that have not corresponded to a period of notable financial innovation nor with any notable degree of increased financial market participation by wider elements of the money holding sector. While this suggests that financial innovation in itself does not cause all episodes of strong money growth, the number of periods of strong money growth does tend to suggest that reverse causation from money to financial innovation is not present.

Secondly, examination of the method in which many new financial market products are transacted and settled also suggests that they may be partly accounting for the strong growth in money holdings. Derivatives and synthetic products in particular may be having an impact in this regard. Derivatives products allow a position to be taken in a financial market, be it for hedging or speculative purposes, without actually purchasing a conventional financial product to the value of the nominal exposure.

For example, an equity index futures derivatives contract to a notional value of US$1 million could be agreed between two parties whereby one party agrees to buy US$1 million worth of an index at value Y at time T (e.g., agreeing to buy 1,000 units of an index at $1,000 per unit). In this case, a contract with a notional value of US$1 million would not actually result in US$1 million worth of equities changing hands but the difference in price times the number of units would be the actual cash amount to change hands. While the price of derivatives contracts are fixed on day of contract and payment is not made until later, parties involved in the contract will have to put up a margin in the form of cash (or sometimes Treasury bills) to demonstrate they have the liquid resources to honour the contract. In addition, futures contracts in particular can be marked-to-market whereby each day any profits or losses on the contracts are calculated and discharged and a new position is, in effect, opened up the next day. It is easily apparent that while the actual amounts that are discharged in settlement of derivatives contracts are much smaller than the notional contract amount, the settlement process and the often unlimited potential exposure necessitates that the parties involved in the contract have significantly larger cash balances on hand than the usual netting amount in order to be in a position to clear potentially higher losses. In essence, derivatives contracts allow a position to be taken in a financial market while holding a significant

amount of the contract value on deposit. This illustrates how this form of financial innovation and increased financial market participation has had the corollary effect of contributing to strong money growth.

The mechanism whereby a position can be taken in a financial market without actually buying a physical commodity or share certificate or currency is not confined to derivatives products. Synthetic debt instruments also enable similar netting of profit and loss positions at the redemption date of contracts on a range of underlying asset classes from mortgage books to junk bonds. Such synthetic arrangements, for example credit default swaps or total return swaps, are contained in synthetic debt instruments known as collateralised debt obligations (CDOs) and collateralised loan obligations (CLOs). In the case of a CDO containing a total return swap on junk bonds for example, such a synthetic instrument within a CDO would provide a return (loss) to the noteholders to the degree that the yield on the junk bond is higher (lower) than that contracted to in the swap. Similar synthetic instruments can be used to purchase the return on a portfolio of mortgages from a bank, but with the mortgages remaining on the balance sheet of the bank. Special purpose vehicles[12] (SPV), the entities that issue such types of asset-backed debt instruments, issue notes in the CDO programme. By entering into synthetic arrangements, the SPV does not have to physically purchase bonds or mortgage books but enters into credit return agreements whereby the return or loss of the underlying asset determines whether the bond noteholders will receive a profit or suffer a loss. Similar to the derivatives arrangement outlined above, the SPV, or other parties entering into these contracts, needs to maintain a fairly liquid cash or bond balance in order to net out the positions of the synthetic contracts it has entered into. This has further contributed to the growth rate in money, particularly when viewed in the context of deposits by OFIs at MFIs.

Other financial innovations and financial market products which have seen a considerable increase in participation from wider segments of the money holding sector include mutual funds. These funds typically sell units of a wider fund to investors and may contain equities, bonds, property, cash or a combination of these. These funds require a stock of liquid funds to be held in order to be in a position to meet the demand for unit redemptions. As the volume of investment in such types of funds increases, then the amount of liquid funds needed to service regular redemptions or withdrawals from the funds rises commensurately. To the extent that a range of these funds are managed funds, further liquid balances need to be maintained in order to carry out the transactions that enable the portfolio of

12 These come under the category of Other Financial Institutions (OFIs).

the fund to be altered in line with its managed strategy. An extension of the mutual funds model but with an investment portfolio of derivative and synthetic instruments such as those outlined above is hedge funds. These can also operate on a unit style investment basis. Further developments have seen the more recent creation of funds of hedge funds, which enable smaller ticket investors to buy units of a fund that invests in hedge funds, thereby adding another layer of transactions that require cash balances to be held to meet unit redemptions and portfolio management.

Securitisation transactions have also contributed to the growth rate of money. Without a securitisation of mortgages for example, a bank issues a loan which is repaid gradually over time and as the money is returned to the bank it lends it back out again. Securitisation, however, allows the bank to sell the mortgages off its balance sheet and lend out the receipts to the mortgage market straight away. These loans are initially deposited by the loan recipient and then by a builder or house seller in the short term. The SPV which purchases the mortgage portfolio and issues the mortgage-backed bonds uses the initial receipts from selling notes in the bonds to purchase the mortgage book from a bank. It only recovers the value of the mortgages over the actual life of the mortgage. Over this period, the SPV will have to make coupon payments to noteholders at regular intervals. The SPV will therefore have to maintain a cash balance from which to draw funds to service these payments. Typically, SPVs will also enter into interest rate swap contracts to hedge themselves as the margin for profit is relatively tight between the rate at which the mortgages are issued and the rate at which they issue the bonds. These interest rate derivatives, as shown, further necessitate a cash balance to be held over the life of the contract. Again, these activities largely represent those of the OFIs sector and may account to a large degree for the rapid growth in deposit holdings by this sector.

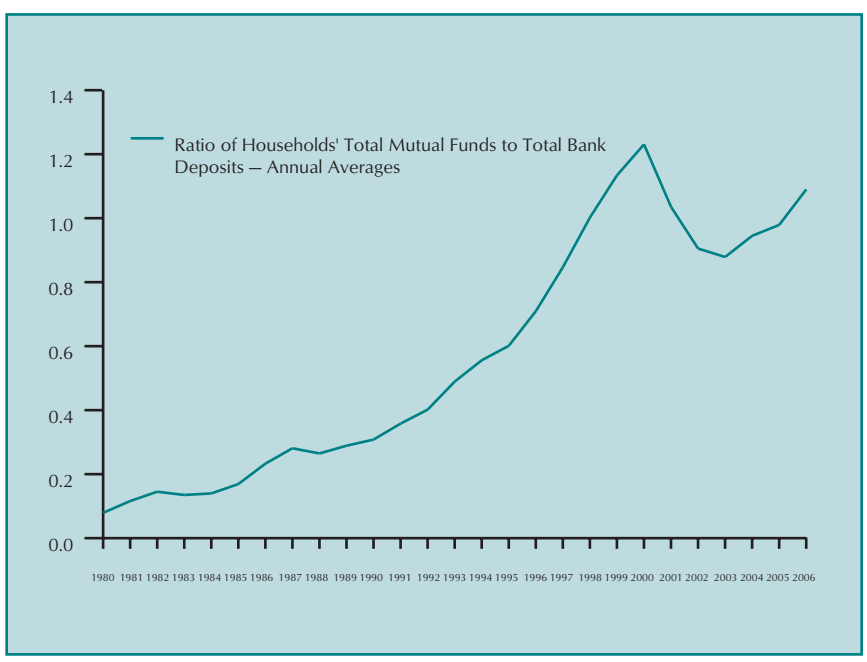
While the dominant focus on the financial products outlined above is deeply rooted in the more riskier elements of financial markets and the nature of some of these products restricts them to large and more riskier market participants, it can be seen that they are largely settled and played out in the liquid money markets. It would appear, therefore, that increased participation in these products has contributed to the strong growth rate of money. In essence, the financial market democratisation that has taken place has led to both easier and cheaper access to financial markets particularly for the household sector. This increased access to the financial markets is evidenced by a number of trends.

It is evident that financial markets have evolved very rapidly both domestically in most advanced industrial countries as well as

internationally. Although still remaining fairly limited, stock ownership has increased significantly in advanced industrial countries. Only a comparatively small proportion of the overall population hold equities as part of their portfolios. While stock ownership has increased very substantially in the US since 1989, household stock market participation as a percentage of all households was still only half (49 per cent to be precise) in 1998, where this figure includes both direct and indirect holdings. The corresponding figures for the UK, Germany, France, Italy and the Netherlands were 31 per cent, 23 per cent, 26 per cent, 8 per cent, and 24 per cent, respectively[13].

One of the most salient developments over the last few decades has been the predominance of institutional investors. Insurance companies, pension funds and mutual funds have grown substantially in relative importance, with the result that deposits as a percentage of gross financial assets has fallen in most countries. Chart 15 illustrates the ratio of households' total mutual funds to total bank deposits in the US between 1952 and 2006. This ratio has seen a remarkable increase, from about 0.2 in the mid-1980s to about 1.3 in 2000. Although the ratio declined slightly during the subsequent period of uncertainty, it has since risen again to almost 1.2.

Chart 15: Ratio of US Households' Total Mutual Funds to Total Bank Deposits



Source: US Board of Governors Flow of Funds.

All the available data clearly point to a progressive democratisation of financial markets[14]. Household participation in wider financial markets has increased steadily and has accelerated since the start of the 1990s. This is the new element on the economic landscape that is having major episodic effects

13 See Maddaloni *et al*, (2006).
14 There is little reason to doubt but that the ageing of populations will intensify this process as pension assets rise.

on money growth. Financial markets democratisation is having two effects. First, it is causing the ratio of money (dominated by bank deposits) to fall as a proportion of financial assets. But this trend is intermittently interrupted by massive substitution out of financial assets and into bank deposits as investors rush to the safe haven of bank deposits in turbulent market conditions. This is essentially the reason why the cyclical behaviour of money and interest rates is different this time round.

4.3 Sounder Money

Two major changes to the institutional scenery affecting financial markets, banking and money provide the background to the argument in the paper. The first is the progressive democratisation of financial markets just noted. This has been accompanied by another equally important trend at least from the point of view being propounded here, namely that towards sounder money. A whole range of regulatory, as well as deregulatory, measures pertaining to banking, as well as ongoing financial innovation, have served to make banks safer over the last ten to twenty years and have, accordingly, tended to reduce the riskiness of these deposit liabilities as financial assets to hold. Since these comprise the bulk of the money stock, this development has helped to underpin the trend towards sounder money. Although these developments are important in enhancing the acceptability of bank deposits as stores of value and as transactions media, they can have unintended side effects for asset prices in periods of financial turbulence.

It is probably not an exaggeration to say that money, as an asset, is now safer than at any time in the past. A fairly elaborate legal and regulatory infrastructure has been put in place in all advanced industrial countries to support the role of banks in the economy but, more specifically, the role of bank deposits as transactions media or a financial asset. A number of distinct aspects of support for bank deposits can be identified.

The first is long-standing arrangements reflected in a combination of provisions relating to the legal redeemability of bank deposits in terms of central bank money and laws of legal tender that apply to the latter. Central bank money at the retail level is par value, a status conferred on it by the law of legal tender, which denotes money (notes and coin[15]) that a creditor is obliged by law to take in cancellation of a debt arising from a transaction if tendered by a purchaser. Since the law of the land can enforce this obligation at any moment in time, the nominal par value of notes and coin is maintained over time. Since bank deposits are legally redeemable in terms of notes and coin, legal tender laws effectively confer the same constancy of purchasing power on bank deposits. In other words, legal tender (although it does not

15 There may be separate maximum limits to the total values of both notes and coin that a creditor is obliged in law to take in a transaction. These limits vary across countries.

apply directly to bank deposits[16]) helps, when combined with statutory redeemability, to confer par value status on bank deposits and, being par value, bank deposits are not exposed to market or interest rate risk. Of course, if the deposit-issuing bank defaults, it will not be in a position to respect its statutory redeemability obligation *vis-à-vis* depositors exposing the latter to default risk. However, there have also been big reductions in the vulnerability of US banks to default over recent decades. Although these measures have been in place for a very long time, regulatory and other developments have helped to underpin their credibility.

A factor that has assisted banks in this respect is liquidity-related regulation. Reserve requirements have been reduced over time and this has helped to reduce the cost base for banks. Despite this reduction, banks nevertheless remain in a good position to access central bank money, via both easier access to the primary market as well as cheap access to a deep and efficient secondary market, and use their accounts at the central bank to acquire notes and coin enabling them to facilitate customers who wish to redeem bank deposits. Enabling banks to deliver more easily on their legal redeemability obligations has also helped to bolster the par value nature of bank deposits.

Another bulwark supporting deposits, which is designed to tackle uncertainty arising from the risk of default, is the prudentially inspired set of regulations surrounding the banking industry, summarised in the term ''the safety net''. These regulations, which have both the objective and the effect of bolstering the par value status of deposits, have also been reinforced in recent years culminating in the introduction of Basle 2 capital adequacy ratios.

Other measures of supervision and regulation, as well as deregulation, have also, arguably, contributed to the soundness of US banks. On the deregulatory front in relation to the US banking system, for example, the decision to repeal previous regulations, i.e., the McFadden and more recently the Glass-Steagel Acts, is also no doubt making a contribution to the stability and soundness of the banking industry in the US by allowing greater portfolio diversification both by region and product range. By enabling banks to diversify risks, it helps to render their balance sheets less vulnerable to idiosyncratic shocks. Banks should, on balance, be sounder as a result.

Another very relevant aspect of regulation to the current discussion relates to deposit insurance. This is compulsory for a business wishing to hold a bank charter. These insurance schemes typically insure the full capital value of deposits up to

16 Legal tender laws do apply to bank deposits in the Netherlands.

fairly generous amounts. This is especially so for the US where coverage has increased over time and now stands at $100,000. Add to this the scope for the same depositor to have a number of deposits insured and this can amount to almost blanket insurance coverage. Except for Italy, the coverage of deposit insurance schemes in Europe tends to be significantly less generous.[17] These schemes were established in the late 1970s, or during the 1980s or in the first half of the 1990s for the most part. They transfer the risk of default losses from depositors to either the government or some private market institution that absorbs the risk at a price. Depositors then receive a guarantee with respect to the capital value of their deposits along with a typically fairly low rate of interest depending on the type of deposit. This substitutes for the bank having to pay the depositor a variable credit risk premium. Deposit insurance can, and almost certainly has at times, contributed to weakness in the banking system by removing the incentive of the depositor to monitor bank performance and to withdraw funds from the bank if the bank is deemed to be pursuing unwise loan underwriting policies. Nevertheless, the deposit guarantee makes deposits much more attractive as an asset from the perspective of the individual depositor. When combined with all the other benign developments affecting the robustness of the US banking system, depositors probably feel more assured about the negative moral hazard implications of deposit insurance.

In addition to the reductions in default risk, banks in many countries, but more especially in the US, have been reducing their exposure to remaining loan default risk by selling this risk to other financial institutions, apparently insurance companies for the most part. The use of credit derivatives and securitisation to offload loan risk has grown exponentially in recent years. Between the mid-1990s and 2003, the return on equity was higher than at any time in the previous thirty years. A significant fraction of this improved performance is attributable to structural innovations especially more effective risk management, which emerged as a distinct bank discipline in the 1990s[18].

These developments should promote stability of the banking system since they facilitate a more optimal allocation of risk across the whole economy. Since the banking system seems to be net sellers of credit risk, especially in the US, the total amount of bank loan portfolio risk has probably fallen. This is also clearly another factor supporting the safety of bank deposits. Partly on account of this, banks in the US are now prudentially sounder than they have been for some time.

The bottom line with respect to the health of the US banking system is probably best summarised by the FDIC Quarterly

17 See Garcia (1999) for fuller discussion of deposit insurance system features in EU countries.
18 See Schuermann (2004).

Banking Profile. This notes that the number of problem institutions is down from almost 1,500 in 1990 to 114 (during the 2001 recession) and 53 in the first six months of 2007. The value of problem assets is down from $640 billion to $21 billion over the same time period.

All of the above developments supporting the safety of deposits have been strengthened systematically over time. An exception is redeemability, which has been in force for a very long time. The variance of the return on money, although always quite low, has become progressively lower over time with the result that it is now virtually capital certain. Accordingly, the attractiveness of money as a safe haven has been enhanced over time making it an even more attractive asset to hold in periods of heightened uncertainty. This also means that the status of money as an asset is also stronger especially in periods of heightened uncertainty. We would therefore expect the safe haven role of money to have been significantly enhanced by these measures and would, accordingly, expect the demand for money as a store of value to increase and possibly quite substantially in periods of financial stress.

5. Money and Interest Rate Dynamics in a New Setting

5.1 Time-Varying Motives for Holding Money and Consequences for Interest Rates

The taxonomy in Table 1 illustrates the time-varying motives for holding money and how these are likely to differ between normal and financially distressed periods. If, as might be expected, the effects of the precautionary and speculative motives for holding money, along with the enhanced transactions motive generated by the quickening pace of financial market transactions, are sufficiently strong, then they can collectively more than compensate for the reduction in the transactions demand for money coming from any cyclical or post-shock slowing of the real economy. In the wake of any such event, giving rise to widespread uncertainty, money demand could increase substantially and money growth could accelerate even as output growth slows.

Given the kind of uncertain conditions that prevailed in many economies in the first three to four years of the new millennium, these types of motives for holding money would have been to the fore. We would therefore have expected to see an acceleration in the growth rate of money — exactly what was observed. This is the first time in recent history that money stock growth behaved in this way (recall Charts 3 and 4). However, most standard attempts to estimate money demand functions tend to focus exclusively on the transactions motive with modest inference to opportunity cost and pay little or no attention to this

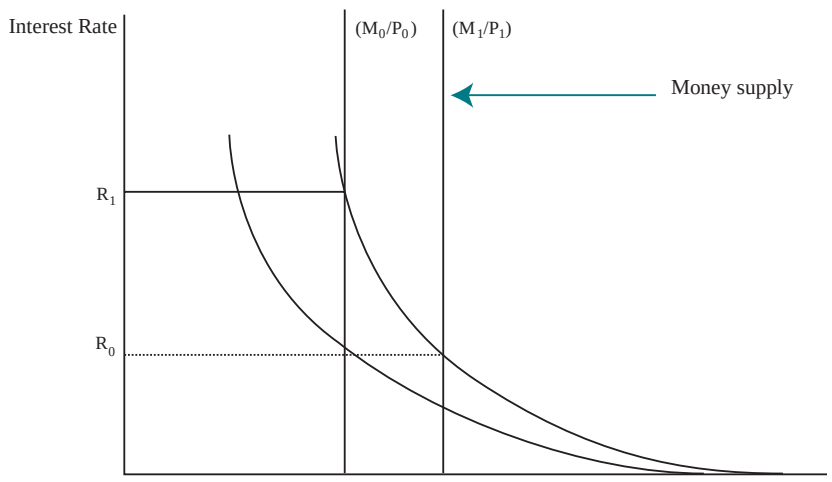
phenomenon. They would therefore find it difficult to account for what happened to money growth in the early years of the new millennium.

Table 1: Demand for Money According to Motive Under Normal and Stressed Financial Market Conditions

	In Normal Times	In Periods of Financial Distress
Transactions Demand in Real Economy	Normal Level (as determined by standard demand for money function)	Relatively Low (as real economy slows)
Transactions Demand in Financial Markets	Relatively Low (but subject to trend growth with financial market deepening)	Relatively High (as volume of transactions in financial markets increases sharply)
Precautionary Demand	Low	High
Speculative Demand	Low	High

In periods of pervasive uncertainty like that which existed in the wake of the dotcom bubble, not only does objective risk and uncertainty increase sharply, people's aversion to risk or uncertainty is also likely to increase. Such periods are likely to see a general aversion to holding any marked-to-market assets except those that are issued by governments and are of very short maturity, such as short-dated treasury bills.

Figure 1: Shocks, Liquidity Performance and Interest Rates



Consider the situation of a financial system shock, as illustrated in Figure 1. This will typically have two types of effects. The first of these effects impacts on money and financial markets. The uncertainty ensuing from the shock causes heightened liquidity preference. In other words, there is a large increase (upward shift) in the demand for money. This increase in demand can

come from all of the motives for holding money, i.e., the transactions, precautionary and speculative noted above. In the circumstances of a financial system shock, the most important of those is probably the precautionary motive. Investors substitute into money, which provides a secure store of value and therefore a safe haven from the turmoil in financial markets in circumstances of uncertainty. The transactions and speculative demand for money may also be prominent in such circumstances, the former because turbulence may result in more market churning and the latter because investors may want to hold more money for speculative motives. The shift in preference for liquidity could be substantial. For a fixed real money stock (M_0/P_0), the interest rate is driven up from R_0 to R_1.

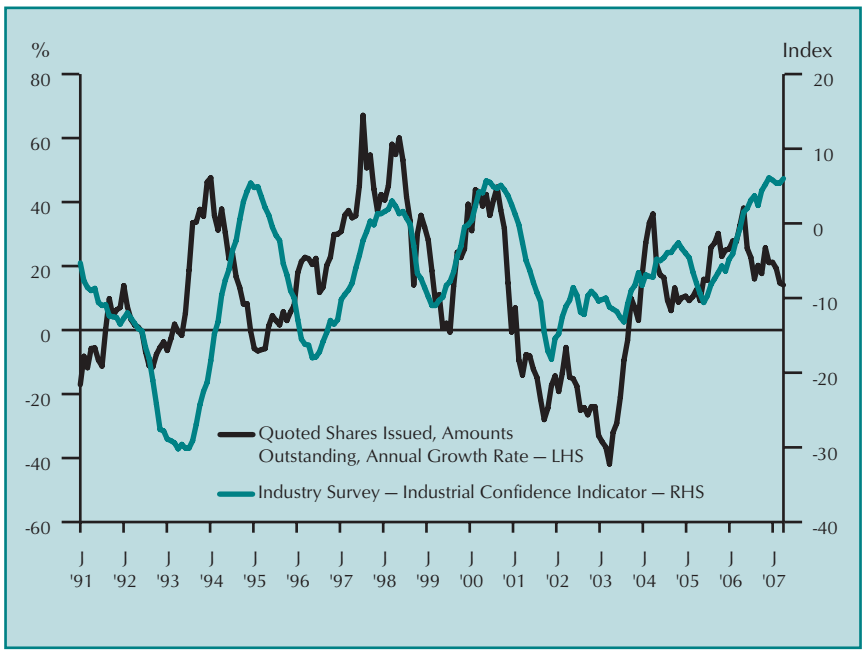
There is also a second effect of the shock to the financial system. This is a negative impact on investment and possibly also consumption expenditures. The uncertainty generated by the shock discourages firms from taking the kind of long-term perspective needed for investments with typically long gestation periods and also dents consumer confidence. The overall effect is to slow the pace of economic activity.

It is therefore clear that an uncertainty-inducing adverse shock (or, as happened in the early years of the new millennium, a simultaneous cluster of adverse shocks) can result in a perverse reaction of the interest rate. While circumstances are calling for a reduction in interest rates because of the likely damage to economic activity coming from the shock, people's preference for liquidity is instead driving interest rates in the wrong direction. Any such increase in interest rates would, of course, exacerbate the initial negative reaction of investment to the shock. The direction in which the interest rate is pushed, mainly by the liquidity preference of financial market participants, is therefore opposite to that required by the real economy. Indeed, since the interest rate is the cornerstone of asset prices, an increase in interest rates is likely to cause other asset prices to fall as well, thereby increasing funding costs more generally. Liquidity preference prevents what would otherwise be a self-correcting mechanism (a fall in interest rates following the initial shock to the financial system) from operating. In other words, financial and money markets react perversely relative to the needs of the real economy and, because of a combination of the developments in financial markets and those supporting the soundness of money, this perverse effect is likely to be exacerbated.

Other knock-on effects coming from heightened liquidity preference can reinforce these adverse effects on the real economy. One such effect is that new and seasoned offerings on securities markets tend to dry up completely following major

shocks, making it virtually impossible for firms to raise capital on the open market and driving them back into the bank loan market putting upward pressure on interest rates (see Chart 16). Heightened liquidity preference will also tend to change the composition of banks' liabilities in favour of more liquid shorter-maturity deposits, which, for any given prior level of maturity transformation, will manifest itself in a reduced willingness of banks to lend (albeit mitigated somewhat by their ability to securitise their loan products). In extreme cases, this could result in what's known as a credit crunch. Excluding this extreme case, we would still be confronted with a situation in which an increased demand for loans is met with a reduced bank willingness (ability) to lend thereby placing further upward pressure on rate of interest.

Chart 16: Annual Growth Rate in Quoted Shares Issued by Euro Area Residents and Industrial Confidence Indicator



Source: ECB and Eurostat.

In the absence of any kind of a monetary policy reaction, there are therefore a number of effects, all reinforcing each other, which stem from liquidity preference following a major shock, or combination of shocks, and which drive the economy away from its initial pre-shock equilibrium. In other words, the economy could, and most likely would, be confronted with a dangerous development whereby falling investment and consumption lead to falling incomes and increasing unemployment. This would tend to drive liquidity preference and interest rates even higher, which, in turn, would exacerbate the conjunctural situation in the real economy. Although this type of effect has long been present in market economies, Keynes being the first to bring it to notice, the contention here is that its strength has been reinforced by new developments in financial and money markets.

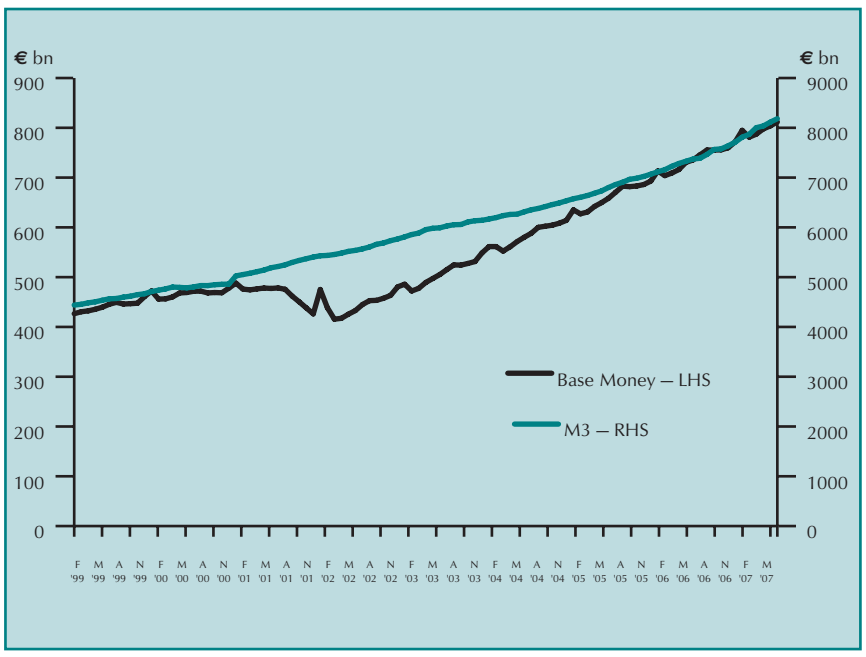
5.2 Money Supply Response

With such an unacceptable vista in the offing, the central bank typically steps in to obviate any such adverse and damaging development. Knowing that this type of financial and money market reaction would occur, it acts pre-emptively. It provides sufficient liquidity into the economy to head off any incipient tendency for the interest rate to increase and to maintain it at least at its original level (R_0 in Figure 1 above). Indeed, it may deem it wise to push rates lower than this as insurance against the dampening effect of pervasive uncertainty. This reaction is probably typified by the following quote from the former Fed Chairman, Alan Greenspan, speaking in the context of periods of liquidity crises: ''Such crises are precipitated by the efforts of market participants to convert illiquid assets into cash. When confronted with uncertainty, especially Knightian uncertainty, human beings invariably attempt to disengage from medium- to long-term commitments in favour of safety and liquidity. Because economies, of necessity, are net long — that is, have net real assets — attempts to flee these assets cause prices of equity assets to fall, in some cases dramatically . . . The immediate response on the part of the central bank to such financial implosions must be to inject large quantities of liquidity . . .''[19]. What Greenspan is talking about here is a general loosening of the stance of monetary policy and not the type of temporary lending associated with lender of last resort to individual institutions. The results of research carried out by Rudebusch (2005) support this view of monetary policy with the residuals from a Taylor Rule estimation highly correlated with period of financial stress.

The picture that emerges with respect to money is of two things happening at the same time. On the demand side, uncertainty is driving what is likely to be, in the circumstances, a huge increase in the demand for money stemming from all three motives for holding money balances while, on the supply side, the central bank is providing central bank money in infinitely elastic amounts at these lower rates of interest to prevent interest rates rising. This elastic supply of central bank money provides the reserves to the commercial banks to allow them to offer bank loans at current or lower rates and possibly better terms. It accordingly supplies inside money in greater amounts to the private non-bank sector of the economy, which wishes to hold these additional amounts at more or less unchanged rates of interest. The accommodating role of the central bank can be seen in the rapid growth in the monetary base (see Charts 17 and 18). These graphs suggest that the growth in outside money (or monetary base) has largely accommodated the demand for inside money (various money aggregates).

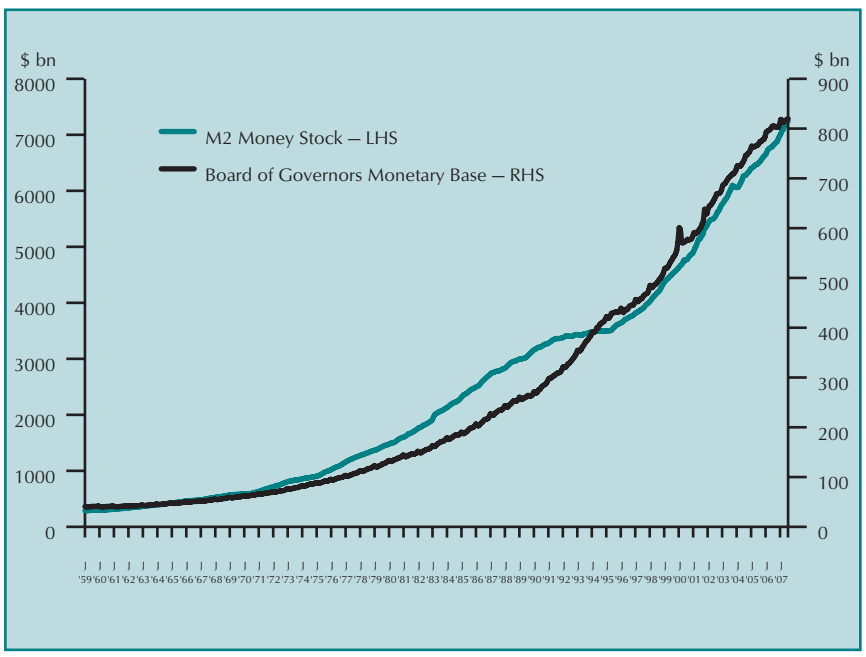
19 Greenspan: ''Risk and Uncertainty in Monetary Policy'', remarks at the American Economic Association, San Diego, California, January 3, 2004.

Chart 17: Euro Area Base Money and M3



Source: ECB.

Chart 18: US Money Stock and Monetary Base



Source: FRED II.

The upshot of this money demand/money supply interaction is a sharp acceleration in the money stock growth. This happened (as we can see for the US from Charts 3 and 4 and for the euro area from Chart 5) even in a situation in which the economy is slowing and probably slowing quite sharply as the prevailing uncertainty dampens household and corporate confidence and weakens actual consumer expenditure and corporate investment. We therefore get an outcome in which the money stock accelerates

as the economy slows. This is exactly what happened in the recent slowdown in the world economy in the first few years of the new century. This pattern (again, see Charts 3, 4 and 5) is also unprecedented in the sense that in previous cyclical downturns money stock growth slowed rather than accelerated as happened in the most recent downturn.

Although velocity was already trended downwards in the lead up to shocks of the early years of the new millennium (no doubt attributable to the long-run decline in inflation and nominal interest rates), the rapid growth in the money stock triggered a new steeper downward trend in velocity, which has continued to this day.

The question naturally arises as to why this particular episode of uncertainty at the turn of the century had this specific effect on money and credit aggregates and interest rates. It begs the question as to why previous episodes of uncertainty did not have similar effects in the past. It is clear that there has been some kind of structural shift in monetary dynamics.

6. Money Disequilibrium Resolution

It has been argued above that the money stock could grow very quickly in periods of turbulence even if the pace of economic activity is slowing. This could happen in a policy setting in which the central bank keeps its policy rate low and meets all demands at this low rate. When the uncertainty, which gave rise to the precautionary and speculative demand for money, dissipates, as it started to do apparently towards the end of 2003, it leaves an excess supply (or overhang) in its wake. Excess supply is a disequilibrium, which has to be resolved. The issue addressed in this section is how is it resolved.

The analysis here is for a closed economy and therefore there is no foreign sector. There are, accordingly, only three sectors, the money-creating sector (MC), the money-holding sector (MH) and the money-neutral sector (MN). According to the EMI/ECB statistical implementation package, the category of monetary financial institutions (MFIs) has been identified so as to encompass those financial institutions, which are deemed to contribute to the *creation of money* in the euro area. The emphasis is added here to underline that this is the sector that adds to, or subtracts from, the nominal money stock. Great care was devoted to including in the MFI sector only those financial institutions whose liabilities could be deemed to be money and to exclude the liabilities of institutions whose liabilities could not be deemed to be money. Notable here, incidentally, is the inclusion of money market funds (MMFs) in the MFI list.

The monthly consolidated balance sheet of the MFI sector provides for a definition of the money-holding sector comprising ''other residents non-MFIs'' (consisting of other financial institutions, insurance companies and pension funds, non-financial corporations and households) or ''other resident non-MFIs plus other general government'' (the latter comprising state government, local authorities and State Security Funds). The ''central government'' is deemed to be included, in principle, in a ''money neutral sector'' and hence excluded from both the money-creating sector[20] and the money holding sector. In short, the MC sector (MH sector) was carefully selected to include only (to exclude) those institutions, which could (could not) be deemed to create money.

In a closed economy, the money-holding sector cannot affect the level of the nominal money stock by engaging in portfolio transactions *vis-à-vis* other counterparties in the money-holding sector. All they can succeed in doing is exchanging the existing level of aggregate money balances between themselves. In any exchange of money for bonds, an entity purchasing bonds has an incipient excess supply of money equal to the market value of the bonds exchanged while the seller of the bonds has an incipient excess demand for money also equal to the market value of the bonds exchanged. Clearly, the aggregate excess demand for money is, by definition, equal to zero. Therefore, portfolio operations conducted by members of the MH sector *vis-à-vis* other members of the MH sector cannot affect the level of the nominal or real money stock outstanding.

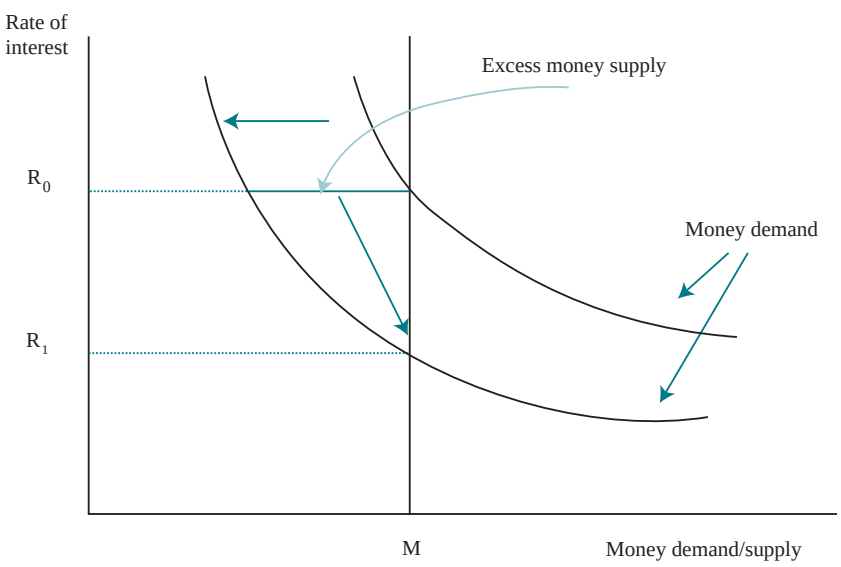
It is also clear from the last section and from basic monetary analysis that one of the most important sources of money creation comes from extending loans to the private sector of the economy. In general, it would not seem to make sense for a borrower to raise a loan and hold the receipts of the loan in an idle bank balance. The purpose of taking out a loan is to engage in some form of expenditure. So the deposit created by the loan ends up as someone else's bank deposit. Therefore, those who hold excess money balances are in general not those who have leveraged themselves in the bank loan market. Accordingly, a contraction of the money stock arising from any such excess money balances will not, in the first instance, typically occur via loan redemption.

However, the portfolio actions in standard demand for money functions involve members of the MH sector engaging in portfolio transactions with other members of the MH sector. All these transactions do is to transfer existing money balances between existing members of the MH sector. Since these money

20 Except for coins, a fact which we ignore in the following analysis.

balances are par value, their value cannot change in the transfer process. It follows that the portfolio behaviour of the MH sector as a whole cannot affect the level of the nominal money stock nor, *a fortiori*, the real money stock[21]. Something else must adjust to restore equilibrium. The case is illustrated in Figure 2 below. Since the money stock is fixed, equilibrium can only be restored, in the face of an excess supply of money, by a fall in the rate of interest.

Figure 2: Excess Money Resolution

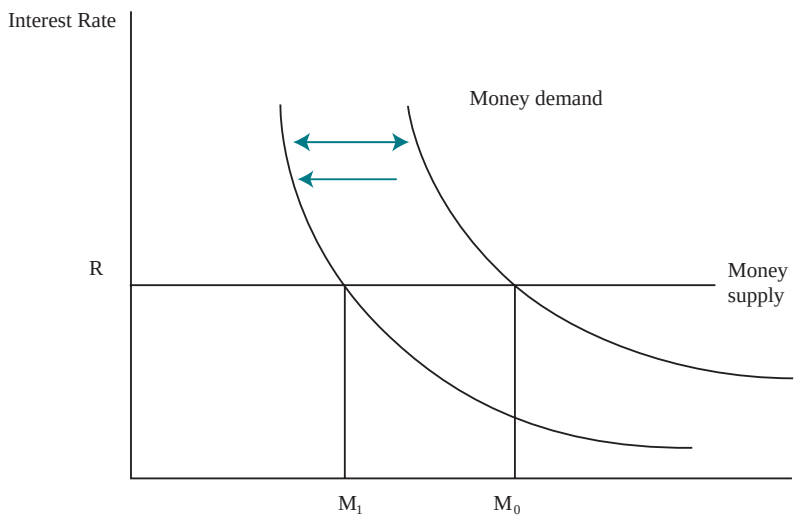


The representation in Figure 3 below is only valid for a rightward shift in the money demand schedule. The central bank sets the interest rate at R — its target level. It has to supply whatever money is demanded at R in order to maintain the rate at this targeted level. Any amount of funds demanded at this level will be supplied to bank counterparties. Abstracting from rationing in the loan market and the portfolio behaviour of the banks, we can characterise the supply of inside money as also being in infinitely elastic supply. Any arbitrarily large rightward shift in money demand will be accommodated completely at the going rate R. The rightward shift in the money demand schedule could be very substantial in a period of severe financial turbulence. For financial stability and other reasons, central banks are especially anxious to accommodate this demand[22]. Otherwise, the interest rate will react perversely and aggravate the uncertainty driving money demand.

21 The only way in which the money stock might shrink, in the closed economy being considered here, is for the MH sector to engage in proprietary portfolio transactions with the MC sector. This rarely if ever happens. Another possibility is if MH sector were to buy government bonds in the primary issue market. In this case, the money would be transferred from the MH sector to the MN sector and would therefore fall. But again this is a relatively rarefied case.

22 Indeed, as indicated by Greenspan in the above quote, they may be proactive in doing so.

Figure 3: Deficiency in Standard Money Demand Approach to Monetary Analysis



However, the uncertainty driving the escalating preference for liquidity inevitably dissipates at some stage. When it does, the demand for money falls. But the nominal money stock does not fall with falling demand. Therefore, unlike in the case of an increase in money demand (which can be accommodated by a *pari passu* increase in supply brought about by largely passive response of the central bank and its monetary policy counterparties, the commercial banks), a fall in the demand for money does not result in a corresponding fall in the stock of money outstanding. In other words, an incipient money disequilibrium caused by an increase in the demand for money is more or less instantaneously corrected by an elastic money supply. By way of contrast, however, a money disequilibrium caused by a reduction in the demand for money is not corrected by some automatic absorption of the surplus, so there is an important assymetry.

Although an individual money holder can reduce his/her money holdings by transacting in the market and purchasing either goods and services or some financial asset, the economy as a whole cannot reduce its nominal money holdings. When individuals conduct so-called 'inside' transactions, all that happens is a transfer of excess money balances from one member of the money-holding sector to another, leaving economy-wide excess money unaffected. The only way excess money can be removed from the economy is if a transaction occurs *vis-à-vis* either the MC sector (i.e., the banking system, including the central bank), the MN sector (i.e., the government) or the foreign sector. A leakage could easily occur through the foreign sector. However, none of these cases would be likely to be of such a size, either individually or collectively, that one

could argue that the configuration in Figure 3 is a faithful representation of reality in the case of a fall in the demand for money.

The traditional monetarist account of how this kind of money disequilibrium is eliminated is a reduction in the real money stock (but no change in the nominal money stock) brought about by an increase in the price level. This, in turn, is the result of money holders endeavouring in the aggregate to offload their surplus money holdings by buying goods and services. The large monetary overhang that is believed to have arisen in the euro area, and indeed globally, has not yet at any rate, shown any signs of being corrected by accelerating inflation. However, an alternative correction mechanism for restoring monetary equilibrium may now be operative. The cost and ease of access to financial markets has improved over the last few decades. There is now likely to be a much broader array of financial and real assets, which can substitute for money (recall the discussion above on the growing democratisation of financial markets). Excess money could therefore drive up asset prices and depress asset yields. The data on asset prices and yields offer strong corroboration for this kind of effect being at work over the last three to four years across the world.

The correction mechanism works as follows. In collectively endeavouring to substitute out of money and into financial assets (which looked increasingly attractive since the return of confidence to markets sometime towards the end of 2003), asset prices are driven up until such time as the expected return on these (i.e., bonds, equity and other financial assets along with real assets) no longer looks sufficiently attractive to money holders for them to continue to seek to substitute out of money. Therefore, endogenous movements in the yields on alternative financial and real assets serve to restore equilibrium to money holdings, although this happens without nominal money holdings falling in the aggregate.

This story contrasts sharply with the conventional rationale (as illustrated in Figure 3 above). This sees money as being purely passive at all times. In this case, a reduction in the demand for money, giving rise to an excess supply, sees equilibrium being re-established with the demand schedule sliding along the infinitely elastic supply schedule leading to an effortless reduction in the money stock. This is the logical implication of approaches based exclusively on demand for money function specifications. However, it does not tell a plausible story in relation to the effects coming from the cycle in uncertainty. A conventional demand for money function is only one part of the story. It cannot account for those periods when uncertainty dissipates and individuals find themselves with much larger money hoards

than they want to continue to hold. The required adjustment process in such circumstances sees causality running from money to financial asset prices.

The standard demand for money function (but augmented to include a measure of uncertainty to illustrate our point), with only bilateral substitution between money and bonds, is specified as follows:

$$M^d = f\ (Y,\ E(R^b),\ UNCT)$$

where Y is the usual income scale variable and $E(R^b)$ is the expected opportunity cost of holding money. A reduction in uncertainty leads to a reduction in the *demand* for money and, assuming a closed economy, an excess supply of money. As argued already, unlike in the case of an excess demand, there is no automatic mechanism for absorbing the surplus. Individuals wishing to restore equilibrium in their money holdings substitute out of money and into bonds. This increases the price of bonds and drives down their yields. This process continues until money holders no longer see any expected gain to be had by substituting further out of money and into bonds. They can, therefore, be persuaded collectively to hold the existing nominal money stock. The point that needs to be stressed here is that the excess supply of money balances cannot be corrected by a fall in the nominal money stock and equilibrium can only be restored by changes in one or more of the arguments in the demand for money function.

The increased level of participation of households in financial markets may now mean that they will attempt to substitute out of money and into a whole spectrum of financial assets rather than just into bonds. The pattern of portfolio substitution becomes multilateral rather than bilateral. A demand for money function under these circumstances would look like the following:

$$M^d = f\ [Y,\ E(R^b),\ E(R^e),\ E(R^c),\ E(R^h),\ E(R^d),\ UNCT]$$

Where the new variables are respectively the expected yields on equities, commodities, housing and derivatives. In such a money demand specification the expected return on an array of financial assets are potential reasons for substitution out of money. Depending on the size of the money excess and the pattern of substitution, most, or possibly all, asset prices could be affected, as could the pace of activity and inflation. Inflation could respond to direct substitution between money and goods and services or indirectly via the effects of money substitution on asset valuation and wealth (driving consumption) and the cost of capital (driving

investment). Most, if not all, of the arguments in the demand for money function adjust in ways that leave money holders content to hold the unchanged nominal stock of money. But, as noted already, this process of re-establishing equilibrium in money holdings can be disruptive and potentially dangerous for financial stability. It could drive asset prices into bubble territory with all the adverse consequences of this for the allocation of resources in the economy and for the economy itself when the bubble bursts.

Conventional demand for money specifications (as depicted in Figure 3) can lead to complacency in central banking circles. This is because, in these formulations, the money stock adjusts downwards completely and instantaneously, and in a completely passive way without any deleterious consequences for the economy, in response to a reduction in liquidity preference. Not only are those who are attempting to reduce money balances collectively failing to do so, but there will almost certainly be others who, with the low (and continuing downward pressure on) interest rates, will want to avail of the reduced cost of bank loans to leverage themselves so as to avail of the improving investment opportunities in financial markets. These will also be adding to the boom conditions in these markets. This situation has already been analysed above in our account of events following the dissipation of uncertainty.

Evidence suggests that, in recent times, prices in most asset classes have become very highly correlated. This is different from five years ago when almost every asset class was uncorrelated with equities. One possible hypothesis is that what is different now is that these correlations are increasingly being driven by a common factor, i.e., excess liquidity. Five years ago there was nothing like the same amount of excess liquidity in the system as there has been since then.

We have already seen an intensive search for yield, which has spread to all financial assets. The recent and current high correlation in the yields across a wide range of asset classes is indicative of a common external cause, i.e., households and corporates endeavouring to offload excess liquidity in a prolonged and persistent search for yield. Apart from the dangers for inflation, there is also the threat to financial stability. This is because another major shock to the system would almost certainly cause liquidity to dry up resulting, this time, in a generalised asset price implosion. The irony is that, no matter how much excess macro liquidity is outstanding, a major shock will cause micro liquidity to evaporate suddenly. This must be a concern in the light of past experience, which saw banking systems being brought down by only partial asset price collapses.

7. What Can Money's Counterparts Tell Us?

We divide events since the start of monetary union into three time spans, which corresponds to different periods in the cycle of confidence (these are summarised in Table 2). The first of these is from the start of stage three of monetary union to March 2001. This was a period of good economic performance in the euro area. It was characterised by rapid credit growth. However, strong capital outflows occurred as euro area non-financial corporates endeavoured to buy into the US high-tech advances (with NFA therefore making a negative contribution to M3 money growth). Investor confidence was also reflected in a relative shift out of shorter-maturity financial assets (i.e., away from those MFI liabilities which are included in the M3 money stock) and into those longer-maturity higher-yielding MFI liabilities not included in the money stock, i.e., NMDLs. Both of these contributed negatively to money growth with the result that money grew much more slowly than credit during this period. These movements are displayed in the left-hand panels of the stacked graphs in Chart 19.

Table 2: Confidence/Uncertainty Cycles in the Euro Area

Confidence	Uncertainty Growing Confidence	
Start Monetary Union March 2001	March 2001 - May 2004	May 2004 - August 2007
• Good economic performance	• Heightened uncertainty	• Returning confidence
• High credit growth	• Low credit growth	• Reduction demand for money
• Capital outflows (mostly M&As buying into US high tech)	• Capital inflows (foreign investment positions liquidated)	• Excess money (overhang) only now (2004/2005)
• Rapid growth of MFIs' long term financial liabilities (LTFLs)	• Low growth of MFIs' NMDLs	• Substitution out of money and into assets (asset price correlation)
• Moderate money growth	• Rapid money demand growth	• But continuing monetary accommodation
	• Accommodating monetary policy (deflation, financial instability, debt deflation)	• Rapid credit growth (cheap leverage to take advantage of financial market opportunities)
	• Rapid growth in money stock (but no risk to inflation)	• Continuing net capital inflows (carry traders)
		• Rapid growth in MFIs' NMDLs
		• Asset price appreciation and wealth effects (cost of capital)
		• Accelerating inflation?

Chart 19: M3 and Loans, Net External Assets and Long-Term Financial Liabilities

Source: ECB.

A period of heightened uncertainty was triggered around March of 2001 when there was a cluster of major shocks occurring in a short space of time. It dented both consumer and producer confidence and slowed bank loan growth (BL). This, according to the above equation, should have slowed money growth in the euro area, *ceteris paribus* (see middle panels of Chart 19). But the opposite is observed — money growth accelerated instead. This came from two sources: capital inflows as euro area residents redeemed foreign investment positions and deposited the funds in money market funds (MMFs) and bank deposits and as they substituted away from the NMDLs of MFIs and towards the shorter-maturity assets on banks balance sheets, which grew rapidly in 2001 and 2002, and which are included in the M3 money stock. This reflects a fairly massive shift to the safe haven store of value afforded by the shorter-maturity assets included in the money stock. This is a perfectly understandable development following the greater grass roots participation in financial markets that occurred roughly over the previous two decades.

During this time period central banks (including the ECB) deliberately maintained a fairly loose stance of monetary policy inspired by worries about deflation, the ensuing possibility of a debt deflation and possible financial instability. Endeavouring to avoid what had happened to Japan in the 1990s presented a very challenging environment for monetary policy at the time. The rapid increase in the demand for money driven by uncertainty and heightened risk aversion was met by a corresponding increase in supply as central banks (including the ECB) relaxed the stance of monetary policy substantially. The upshot was rapid money growth during this period. The story being told here is supported by the impressive inverse correlation between money growth and the industrial confidence indicator as noted already above. This rapid money growth does not indicate an overhang according to the story being told here. This is because, despite its rapid growth rate, it was being willingly held and therefore not an immediate threat to inflation.

The third time span is that starting approximately in May 2004 and continuing up the present (at time of writing, June 2007). It is one of returning confidence and a fall in the demand for money. It was only about at this time that the monetary overhang became a reality. It saw a gradual substitution out of money and into a broad range of financial assets. But, as already argued above, this did not succeed in reducing the money stock or its growth rate since it is likely to have involved portfolio substitution between members of the MH sector. Instead, the continuing loose stance of monetary policy (still no doubt inspired by deflationary concerns) began driving strong credit growth as investors began to take advantage of good investment opportunities in financial markets (amid rebounding confidence)

and cheap leverage and to provide the funding for a gradually recovering euro area economy. Two of the three components of the counterparts of the money stock in the equation above now began to contribute positively to money growth: private sector credit accelerated to quite rapid rates and there were continuing rapid net capital. Money growth was brisk despite substitution out of monetary liabilities and into banks' NMDLs. It is still debatable whether the ensuing asset price inflation and the accompanying positive wealth effects, along with the reduced cost of capital, will drive activity in the euro area economy beyond capacity limits sparking an acceleration in inflation. Many events in this recovery phase have yet to unfold.

8. Conclusions

Developments on the monetary side of the major advanced economic regions of the world since the start of the new millennium present a number of puzzles. To date, the economics profession has not identified all of these puzzles or endeavoured to link them together never mind offer a coherent story for their resolution. This is what this paper sets out to consider. The closest the debate has come to our concerns is in relation to money demand and its undoubted instability in recent years according to conventional specifications. These puzzles could be seen as pieces of a jigsaw. Whether the pieces we have identified fit together to make up a complete picture is not yet clear.

The crux of the argument here is based on the simple and essentially Keynesian proposition that money becomes very valuable as an asset to hold when people are beset by financial anxieties. The core hypothesis in the paper is built on this and the observation that the main reason why monetary dynamics are now different to the past is because money's attractiveness as a store of value in bad states of nature has been significantly enhanced by two generic developments that have occurred since about the 1970s. The first of these is financial innovation and liberalisation, which have triggered a vast democratisation of financial markets as reflected in the growing household involvement in these markets. The second development is that policy measures related to the prudential regulation of banking and developments in the banking industry itself, which has bolstered substantially the soundness of bank deposits, and accordingly the soundness of money, and therefore money's attractiveness as a store of value in adverse circumstances, but only in adverse circumstances.

These developments have made financial assets increasingly more attractive, and money increasingly less attractive, to hold in good times and financial assets less attractive, and money more attractive, to hold in bad times. Bank deposits vary from being an asset which few want to hold in any great quantities in good

time (i.e., most of the time), because of relatively poor yield, to being an extremely valuable asset in bad times because of a relative high yield. The period since the early 1970s has seen trend holdings of financial assets increase substantially at the expense of bank deposits but increasingly with this trend disrupted by sharp increases in money growth when the economy is faced with some financial threat.

The preference for liquidity in bad times leads to an escalation in the demand for money. If this is not accommodated by corresponding supply then the interest rate will be driven in the wrong direction (i.e., upwards) relative to the conjunctural needs of the economy (i.e., downwards). In the new financial market and money landscape, the extent of liquidity preference is likely to be substantial. The extent of the accommodation needed to obviate an increase in interest rates (or to promote a reduction in rates) is correspondingly large — hence the very rapid growth in money in the euro area, in the US and indeed globally during the period of widespread uncertainty in the early years of the new millennium. Somewhat contrary to conventional wisdom, this is not seen as representing a monetary overhang or disequilibrium since all of the increase in the money stock was being held voluntarily.

However, as soon as uncertainty begins to dissipate and the demand for money falls, an overhang is likely to emerge. The timing of the start of this new phase of growing confidence is sometime around the end of 2003 or the beginning of 2004. Endeavouring to offload excess money balances saw spillovers into financial markets and fairly sharp increases across a range of financial and real asset prices. An additional driver of money growth in this current phase is loan growth, which begins to accelerate as investors start to see the prospects of significant gains from asset price appreciation. Loan growth begins to take over from ‘portfolio shifts’ as a new driving force inflating monetary aggregates. The new emerging generic determinant of money growth is therefore the expected gross return on a range of asset prices relative to the cost of leveraged funding for market participants.

However, it remains a debatable point whether the asset price inflation that has already occurred, and the accompanying positive wealth effects, along with the reduced cost of capital, will drive activity in the euro area economy, and indeed globally, beyond the capabilities of the supply side of the economy to deliver sparking an acceleration in inflation. It is too early to say since many events in this recovery phase have yet to unfold.

However, there must be a concern that the effect of the structural changes affecting banking and financial markets may be having the effect of merely delaying the full impact of money,

credit and interest rate developments on activity and inflation and not to undermine the long-run money-inflation relationship which is probably the most well documented relationship in economics and which has existed for centuries. In summary, there is a risk that the traditional effects of rapid growth in money and credit aggregates and low interest rates are merely being postponed and will show up later in an acceleration in the pace of economic activity which will not be matched by a corresponding increase in the capacity of the economy to supply goods and services and may therefore translate into accelerating inflation.

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