# ARTICLES

# THE EXTERNAL DIMENSION OF MONETARY ANALYSIS

*Monetary analysis, which plays a prominent role in the ECB's monetary policy strategy, helps to identify the medium to longer-term trends in inflation and thereby provides relevant information for policy decisions aimed at the maintenance of price stability. In interpreting monetary developments, it is important to distinguish the "noise" and other transient influences on the monetary data from the underlying trends which contain information on the medium to longer-term inflationary risks both at global and domestic levels.*

*Recent years have been characterised by ample global monetary liquidity, a concept often used to explain the low yields and credit spreads and the coincident rally in a large set of asset prices, such as equity, bond and commodity prices. The impact of global monetary liquidity on international risk premia as well as on commodity prices also has implications for domestic economic analysis, in particular through their direct effects on expected inflation.*

*Moreover, owing to financial developments and globalisation, cross-border capital flows and interlinkages between money and asset prices have also increased. One interpretation of these cross-border capital flows is that they affect money velocity, making the identification of the long-run relationship between money growth and price developments at the domestic level more complex. As regards the euro area, the trend in cross-border portfolio flows has shown a tight co-movement with M3 developments. Therefore, it is important that the analytical framework underpinning the ECB's monetary analysis takes into account the forces driving international portfolio allocation in order to assess the underlying monetary trends signalling medium to long-term inflationary risks.*

*Against this background, monetary analysis would benefit from two types of enhancement along two possible avenues. A first avenue consists of monitoring global monetary liquidity and studying its impact on commodity and global asset prices, as well as its influence on domestic inflation. A second avenue consists of assessing domestic monetary developments by controlling for the effects of capital flows and international asset prices in order to extract the underlying monetary trends. This article explores these avenues and argues that placing money demand in the context of portfolio flows and international asset prices is important to explain euro area M3 dynamics and to measure excess liquidity that can pose risks to price stability.*

## I INTRODUCTION

The ECB's primary objective is to maintain price stability in the euro area over the medium to longer term. In both the theoretical and empirical literature, it is widely recognised that monetary developments contain important information relevant for the assessment of the risks to price stability over that horizon, as the money stock and the price level are closely related in the long run. On this basis, the ECB has assigned a prominent role to money in its monetary policy strategy, with monetary analysis being used, from a medium to longer-term perspective, to cross-check the assessment of short to medium-term risks to price stability obtained from the economic analysis.

In practice, short to medium-run monetary developments are often affected by shocks, which make the identification of the relationship between monetary developments and inflation more complex. As a consequence, the analytical framework underpinning monetary analysis needs to filter out the "noise" and other transient influences on monetary data in order to extract the underlying trends that contain information relevant for medium to longer-term inflationary risks. In this respect, several studies have confirmed that there is a strong relationship

between monetary growth and inflation at low frequencies.[1] In other words, the relationship between money and prices is stronger between the trend-like developments than at frequencies influenced by business cycle fluctuations.

Recent years have been characterised by ample global liquidity, which is often used to explain the low yields and credit spreads and the coincident rally in a large set of asset prices, such as equity, bond and commodity prices. The last decade has also been characterised by financial globalisation and international capital flows, which have affected money velocity.

Developments in cross-border capital flows, international asset prices and global liquidity have rendered monetary analysis more challenging. Against this background, Section 2 discusses in more depth the financial globalisation phenomenon and how some of its effects can be taken into account from a monetary analysis perspective. Section 3 illustrates the global monetary liquidity phenomenon and its implications for the economy. Section 4 describes the links between international capital flows, asset prices and euro area broad aggregate M3 developments, and how the modelling of these interlinkages can help to interpret monetary developments in the euro area. Section 5 concludes.

## 2 FINANCIAL GLOBALISATION

The euro area economy is relatively open to international influences, particularly when compared with the United States and Japan. In 2006, the combined value of imports and exports of goods and services for the euro area was around 42% of gross domestic product (GDP), compared with around 28% and 32% for United States and Japan, respectively. The euro area also accounted for 18% of the value of world exports, compared with approximately 12% for the United States and 6% for Japan.

**Chart I International investment positions: assets and liabilities in the G3 countries**

(as a ratio of nominal GDP)

- 1999
- 2006
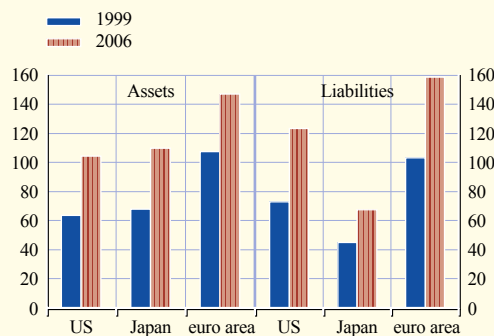


Source: IMF.

From a financial perspective, the average ratios of international investment asset and liability positions to GDP, which represent a frequently used measure of financial openness, exceeded 150% in 2006 for the euro area (also due to the bilateral transactions with the United Kingdom), compared with about 115% for the United States and 90% for Japan (see Chart 1). Furthermore, this ratio has been increasing significantly in recent years.

Developments in international investment positions are a reflection of the expansion in cross-border direct and portfolio investments. The ongoing process of financial globalisation, triggered by financial deregulation, innovation and technological change, has created more possibilities to diversify financial risks globally through holding foreign assets in investment portfolios, thus affecting all facets of the financial system, be they markets, infrastructures, institutions. In the same vein, cross-border merger and acquisition activities of non-financial corporations, a key driver of foreign direct investment, have risen exponentially, as corporations aim to grow globally.

1 See, for instance, K. Assenmacher-Wesche and S. Gerlach (2007), "Money at low frequencies", Journal of the European Economic Association, Vol. 5(2-3), pp. 534-542; and P. Kugler and S. Kaufmann (2005), "Does money matter for inflation in the euro area?", Oesterreichische Nationalbank Working Papers, No 103.

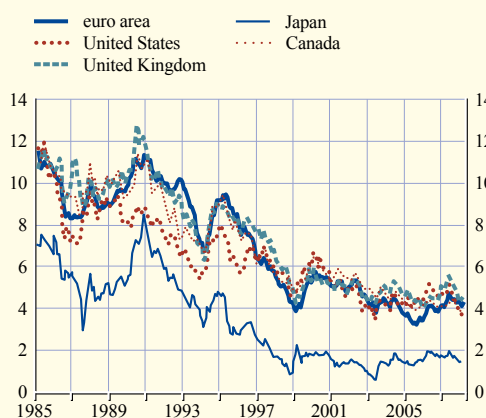**Chart 2 MFI net external assets and M3 growth in the euro area**

(annual flows in EUR billions; annual percentage changes)

▬ MFI net external assets flows (left-hand scale)
····· M3 growth (right-hand scale)
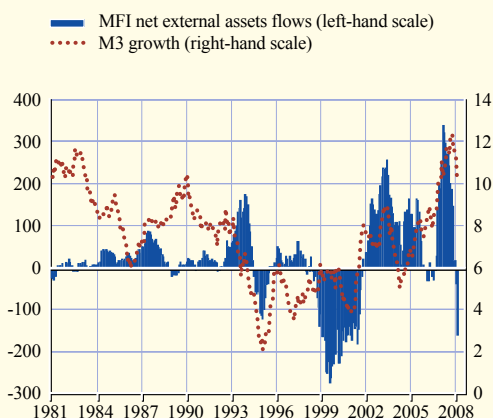


Source: ECB.

**Chart 3 Long-term interest rates in the G5 countries**

(percentages per annum)

▬ euro area          ▬ Japan
····· United States   ····· Canada
▬ ▬ United Kingdom



Sources: BIS, ECB, ECB calculations, IMF.

Financial globalisation creates opportunities to enhance risk-sharing across countries but, at the same time, it has also increased the exposure of national economies to developments in the rest of the world via wealth effects and international capital flows. As global financial integration deepens, portfolio allocation decisions are increasingly determined by developments in expected relative yields worldwide. Should return expectations favour a specific economic area, cross-border capital flows will shift towards that region. One likely consequence of such flows will be an impact on monetary developments through the net external asset position of the banking sector (i.e. the net transactions of the money-holding sector with counterparties in the rest of the world). Cross-border capital flows may alter the amount of funds available to investors in an economy, thus affecting the velocity of money and making the relationship between money growth and price developments at the domestic level more complex.
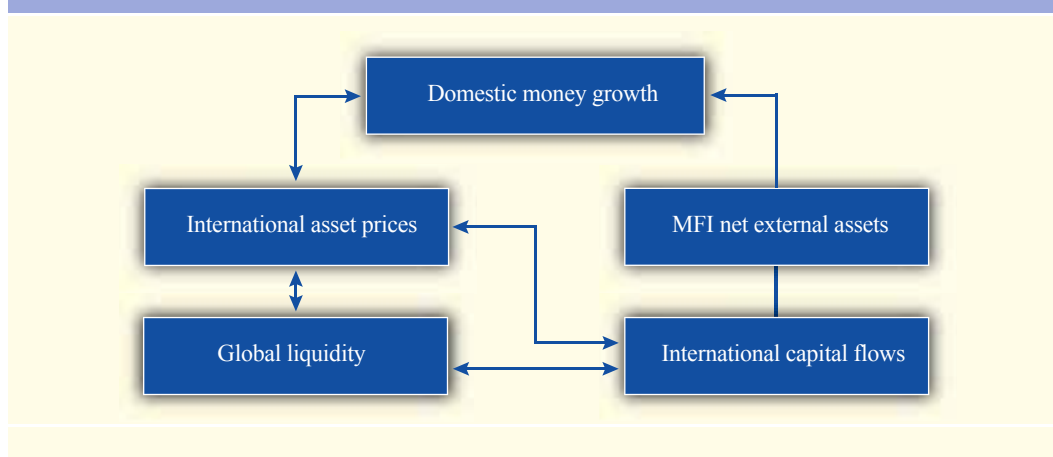
Evidence for the euro area shows that MFI net external assets have been, at least in accounting terms, an important driving force behind euro area monetary dynamics over the past decade. Whereas flows in MFI net external assets in the 1980s and early 1990s remained subdued,

a high degree of co-movement between the annual flows of MFI net external assets and annual M3 growth has been detected in the past seven years (see Chart 2), albeit with exceptions in 2005, at the end of 2007 and in early 2008. Box 1 provides a more detailed explanation of the relationships among international capital flows, MFI net external assets and M3 growth for the euro area.

The general opening-up of economies to international financial markets and financial innovation (e.g. the development of credit risk transfer markets and securitisation) have also influenced the evolution of asset prices, such as long-term interest rates, which have converged to very low levels, particularly since 2000 (see Chart 3). In recent years, short-term interest rates have also been unusually low by historical standards, serving to fuel the growth of global monetary liquidity (i.e. the sum of money for transaction purposes and short-term instruments at the global level).

Furthermore, strong growth in global monetary liquidity may have underpinned increases in international asset prices and, more generally, placed downward pressure on returns across a range of asset classes. In the context of rapid liquidity expansion, asset prices may overshoot,

## Chart 4 The external dimension of monetary analysis

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                    ┌─────────────────────────┐
          ┌────────▶│  Domestic money growth  │◀────────┐
          │         └─────────────────────────┘         │
          │                                              │
          ▼                                              │
┌──────────────────────────┐          ┌──────────────────────────┐
│ International asset prices│◀─────────│   MFI net external assets│
└──────────────────────────┘          └──────────────────────────┘
          ▲                                              │
          │                                              │
          ▼                                              ▼
┌──────────────────────────┐          ┌──────────────────────────┐
│     Global liquidity     │◀────────▶│ International capital flows│
└──────────────────────────┘          └──────────────────────────┘
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leading to potentially costly boom-bust cycles, a misallocation of resources and pressures on price developments.[2]

All these mechanisms, which ultimately have an impact on domestic money growth, are illustrated in Chart 4. Against this background, two possible avenues can be envisaged to account for the external dimension of the monetary analysis. A first avenue consists of monitoring global monetary liquidity and studying its impact on commodity, equity and bond prices (i.e. international asset prices), as well as its influence on domestic inflation. The basic principle anchoring monetary policy – namely Milton Friedman's view that "…in the long run, inflation is always and everywhere a monetary phenomenon" – may be more easily demonstrated by analysing liquidity at global level, where cross-border capital flows that can distort monetary developments at national level are internalised within a global aggregate. On this basis, one can then trace how global liquidity may influence the outlook for domestic price stability through its effects on asset and commodity prices in international markets.

A second avenue involves deepening the assessment of domestic monetary developments by controlling for the effects of capital flows and international asset prices, in order to extract the underlying domestic monetary trends and the associated signals about price developments.

These two avenues are not mutually exclusive. On the contrary, they are interlinked. The next two sections discuss several aspects related to each of these two possible avenues.

2  See, for instance, R. Adalid and C. Detken (2007), "Liquidity shocks and asset price boom/bust cycles", ECB Working Paper Series, No 732.

**Box 1**

**THE MONETARY PRESENTATION OF THE EURO AREA BALANCE OF PAYMENTS**

From a statistical perspective, the international influence on euro area monetary developments is reflected in the counterparts of the broad aggregate M3 through the net external asset position of the MFI sector. The latter measures all the transactions of the money-holding sector (i.e. households, non-financial corporations, non-MFI financial intermediaries and general government) with counterparties outside the euro area, to the extent that they are settled via resident banks.[1]

For the euro area, these financial flows (i.e. portfolio investment in equities and debt securities and direct investment) are also recorded in the so-called "monetary presentation of the balance of payments", which establishes a link between the balance of payments and changes in MFI net external assets.[2] The balance of payments is an identity which always sums to zero. For example, assuming that the sum of the current and capital accounts and errors and omissions is equal to zero, a negative balance of the financial transactions by the non-MFI sector (i.e. net outflows attributable to direct and portfolio disinvestment of the non-MFI sector) must be equal to a positive balance of the financial transactions by the MFI sector. This implies a decrease in the flows of the net external assets of the MFI sector (see Table A). Ceteris paribus, the latter then causes a decrease in M3 (see Table B).

An example of how these transactions are recorded can be useful to understand the influence on monetary developments. If a non-MFI resident (e.g. household) of the euro area purchases a bond issued by a non-resident (e.g. US corporation) and the operation is settled through a euro area MFI, the transaction implies net bond outflows in the balance of payments and a decline in the net external assets of the MFI sector, as the euro area bank in charge of the transaction reduces its deposits with the counterpart bank in the United States. Whether this also has an impact on euro area M3 depends on the way in which the household finances the purchase of the bond

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1  Only transactions between, on the one hand, money-holders and, on the other hand, banks and non-residents have a direct impact on the money stock. Any transaction among euro area non-MFIs would only imply a circulation of money within the money-holding sector, with no impact on the total money stock in the euro area. This would be the case, for example, if private transactions were to be financed by an exchange of shares.
2  See also the box entitled "The monetary presentation of the euro area balance of payments" in the June 2003 issue of the Monthly Bulletin.

**Table A Monetary presentation of the euro area balance of payments**

(flows)

|   |   |
|---|---|
|   | Current account |
| + | Capital account |
| + | Balance of financial transactions by the non-MFI sector |
| + | Errors and omissions |
| = | Balance of payments of the non-MFI sector |
| = | - Balance of payments of the MFI sector |
| = | Change in the net external assets of the MFI sector |

**Table B Accounting identity of the euro area MFI balance sheet**

(stocks)

|   |   |
|---|---|
|   | M3 |
| = | Credit to euro area residents |
| + | Net external assets of euro area MFIs |
| - | Longer-term financial liabilities |
| + | Other counterparts |

vis-à-vis its resident bank. If it is financed via a decrease in the deposits that the household holds with its euro area bank, then there will be a downward impact on M3. Conversely, if it is financed via an MFI loan to the household, then, on balance, there will be no impact on M3, but just on the composition of the counterparts of M3.

By the same reasoning, if, for instance, a non-resident purchases a bond from a euro area household and the transaction is settled through a euro area MFI, this implies net bond inflows and an increase in the net external asset position of the MFI sector, as the bank account balance of the non-resident with the euro area MFI (which represents an external liability of the bank) will fall. If the funds raised by the sale of the debt instrument are paid into the bank account of the euro area household (included in the money stock), the overall M3 stock will increase.

Using the monetary presentation of the balance of payments in the context of the monetary analysis can allow, first, developments in MFI net external assets to be linked to transactions in specific asset classes (such as debt securities, equities, etc.) and, second, a distinction to be drawn between transactions made by euro area and non-euro area resident investors. At the same time, it gives an idea of the size of the phenomenon whereby portfolio flows may have an impact on domestic liquidity.

### 3 GLOBAL MONETARY LIQUIDITY: ISSUES, DEVELOPMENTS AND IMPLICATIONS FOR ASSET AND CONSUMER PRICES

Monetary liquidity allows economic agents to settle their transactions using money. Prima facie, one would measure monetary liquidity by the amount of money agents possess. More generally, monetary liquidity is defined in quantitative terms on the basis of monetary and financial aggregates such as M3, which includes cash and bank deposits held for transaction purposes as well as a variety of short-term savings instruments. An environment of high monetary liquidity could affect consumer prices, if it is spent on goods and services, and, if invested, the risk-taking behaviour of market participants by temporarily distorting the pricing of risks, leading to an accumulation of financial imbalances and thus increasing the probability of a boom-bust cycle in financial markets. When looking at the major currency areas, except for Japan, strong money growth has been observed in each of them since the turn of the century (see Chart 5), following the extended period of low short and long-term interest rates.

However, when constructing a global monetary liquidity measure, several issues ought to be considered.[3] First, different measures of money can be used. On the one hand, narrow monetary aggregates, which comprise banknotes and coins and highly liquid deposits such as overnight deposits, are more homogeneous across economies, although they can be volatile at times. On the other hand, broad monetary aggregates are less volatile, as they include less liquid deposits and marketable instruments and therefore internalise important substitution processes between different monetary assets. However, they are less homogeneous across countries and thus less easy to interpret.

Second, in terms of aggregation methods, a common currency denomination has to be chosen. Theoretically, the usefulness of the global liquidity measure depends on the exchange rate regime adopted by the contributing countries. More precisely, the relationship between global measures of money and prices may be more likely to be found in countries which have historically been, and are still, characterised by a fixed exchange rate regime. In terms of aggregation procedures, the issue of whether market exchange rates or purchasing power exchange rates (i.e. the exchange

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3   For a discussion of these aspects, see also the box entitled "Worldwide trends in monetary aggregates: some conceptual issues" in the November 2006 issue of the Monthly Bulletin.

**Chart 5 Broad money growth in the G5 countries**

(annual percentage changes)

— euro area          — Japan
····· United States    ····· Canada
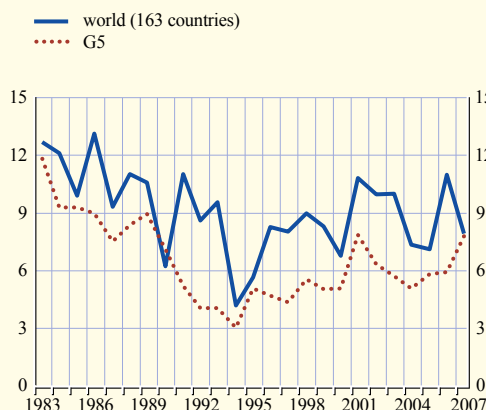--- United Kingdom
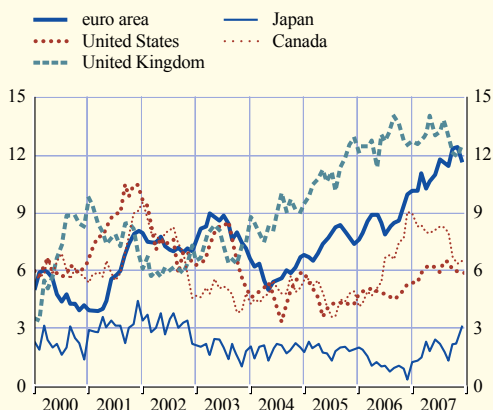


Sources: BIS, ECB, ECB calculations.
Note: The broad monetary aggregates used in the construction of the global money measure are: M3 for the euro area, M2 for the United States, M2+CD for Japan, M4 for the United Kingdom and M2+ for Canada.

**Chart 6 Broad money growth in the G5 countries and in the world**

(annual percentage changes)

— world (163 countries)
····· G5



Source: IMF World Economic Outlook.
Note: The monetary aggregate measures are converted using purchasing power parity exchange rates.

rates that equalise the purchasing power of different currencies, given the prices of goods and services in the corresponding economies) should be used also becomes important.[4] Using purchasing power parity exchange rates helps to mitigate the impact of the exchange rate on the dynamics of the monetary aggregate and the associated liquidity measure turns out to be less volatile. However, the drawback is that it tends to overestimate the weight of fast-growing economies over time.

Third, the geographical coverage may vary according to whether only the main industrialised countries or also the emerging market economies are considered. Including the liquidity of fast-growing emerging markets in the global measure serves the assessment of recent developments in asset and commodity prices. However, adopting such a broad geographical coverage limits the meaningfulness of the time series from an historical perspective given the lack of long runs of data for some emerging markets and, therefore, the comparability of the associated global liquidity measures over time.

A global measure including the main industrialised countries is a possible compromise for measuring the liquidity situation worldwide.

In fact, a comparison of a measure of global money growth for the five large industrial economies (i.e. the United States, the euro area, Japan, the United Kingdom and Canada, henceforth denoted as the G5) with a similar measure for 163 countries representing the world (see Chart 6) shows that the longer-term pattern is broadly similar. More precisely, the aggregated broad money stock rose rapidly in the late 1980s, before exhibiting a rather sharp deceleration, although amid higher volatility in the mid-1990s. Since the mid-1990s, an ongoing strengthening in global liquidity growth has been recorded.

Another point to be noted is that, by construction, these monetary aggregates only capture the liquid holdings of the resident money-holding sectors in each country. Therefore, cross-border "hot money" (such as deposits, cash, etc.), which is likely to reflect more the speculative short-term arbitrage transactions and may be useful for the analysis of global asset price developments, is not included in the global measures considered above, since for each

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4  See also the box entitled "Measuring world growth: do weights matter?" in the June 2006 issue of the Monthly Bulletin.

national aggregate such hot money is treated as a non-resident holding.

All these measurement issues and the fact that no single measure of global liquidity has yet been identified have held back the development of the literature on this topic. Therefore, it remains a challenging task to evaluate the impact of global money on commodity and asset prices, as well as its influence on domestic inflation.

From a central banking perspective, the key issue is to understand how global liquidity can ultimately influence domestic price stability. Specifically, it is important to understand the channels through which global liquidity can affect price developments in one country, such as by having an impact on international commodity prices, by influencing risk and term premia in international asset markets and by affecting domestic monetary developments.

In the long run, under a flexible exchange rate regime, the effects of global liquidity on domestic inflation can be overcome by active domestic monetary policy. As pointed out by Woodford (2007), global developments could affect domestic inflation in the shorter term, but should not "impair in any substantial way the ability of central banks to control domestic inflation through national monetary policy […]. It remains appropriate for central banks to be assigned responsibility for stabilizing a suitably chosen index of domestic prices, despite continuing changes in the real economy, whether domestic or foreign in origin".[5]

In the shorter term, global liquidity can affect asset prices and, therefore, indirectly, domestic conditions via wealth effects and international capital flows. Moreover, global liquidity may affect international commodity prices and the prices of these commodities − used as intermediate inputs in production processes − can affect domestic prices of some goods, thereby influencing the terms of trade.

Whether terms-of-trade developments exert a positive or negative pressure on aggregate inflation in the short run will depend on their net effect on aggregate supply and demand. On the one hand, for a given level of aggregate demand, an adverse permanent terms-of-trade shock reduces potential output, so that the resulting positive output gap causes an upward pressure on inflation. On the other hand, a negative aggregate demand effect would materialise if a permanent commodity price shock impinges on individuals' wealth via its impact on current and expected future income. For a given potential output growth, the negative wealth effect would give rise to excess aggregate supply, thereby leading to downward pressure on domestic inflation.

Overall, it is not straightforward to disentangle empirically the different effects on asset and consumer price inflation. Preliminary empirical evidence suggests that shocks to global liquidity (stemming, for example, from financial innovation, abolition of controls on international capital movements or changes in macroeconomic policy) may influence the outlook for asset and commodity prices as well as for domestic inflation.[6] During the boom phase of asset price cycles, shocks to domestic monetary liquidity have played a role in driving housing prices across OECD countries.[7] There is also some empirical evidence that excessive liquidity, when imbalances are growing in the boom

5  M. Woodford (2007), "Globalization and monetary control", NBER Working Paper Series, No 13329.

6  See M. Ciccarelli and B. Mojon (2005), "Global inflation", ECB Working Paper Series, No 537, and F. Browne and D. Cronin (2007), "Commodity prices, money and inflation", ECB Working Paper Series, No 738. Other studies have investigated the issue concerning the effects of global liquidity on global/domestic inflation and output: J. Sousa and A. Zaghini (2004), "Monetary policy shocks in the euro area and global liquidity spillovers", ECB Working Paper Series, No 309; R. Rüffer and L. Stracca (2007), "What is global excess liquidity, and does it matter?", ECB Working Paper Series, No 696; and finally C. E. V. Borio and A. Filardo (2007), "Globalisation and inflation: New cross-country evidence on the global determinants of domestic inflation", BIS Working Papers, No 227.

7  See C. Detken and F. Smets (2004), "Asset price booms and monetary policy", ECB Working Paper Series, No 364, also published in H. Siebert (ed.), "Macroeconomic Policies in the World Economy", Springer, Berlin, 2004; R. Adalid and C. Detken (2007), op. cit; and C. Goodhart and B. Hofmann (2008), "House prices, money, credit and the macroeconomy", ECB Working Paper Series, No 888. With regard to the effects of an accommodative monetary policy on housing prices in the euro area and in the United States, see also C. Greiber and R. Setzer (2007), "Money and housing – Evidence for the euro area and the US", Deutsche Bundesbank Discussion Paper, No 12/2007.

phase, is an indicator of the depth of the following recession in economic activity during the subsequent bust phase, thereby exacerbating the financial crisis. Should these results be corroborated by further analysis, then excess global liquidity could act as an additional signal for inflationary developments and financial imbalances.

## 4 THE LINK BETWEEN INTERNATIONAL CAPITAL FLOWS, MFI NET EXTERNAL ASSETS AND EURO AREA M3 DYNAMICS

Globalisation of financial markets has increased the share of global wealth invested outside investors' home jurisdictions. The associated cross-border capital flows can influence systematically domestic monetary developments. In the presence of expectations of higher risk-adjusted returns relative to a specific economic area, international portfolios are reallocated, generating cross-border transactions towards such a region. In a closed economy, if a domestic household sells a bond or equity to another household, there is no impact on the overall money stock, as money simply circulates within the money-holding sector. Conversely, transactions between resident MFIs and non-residents typically have an impact on money holdings. More precisely, as regards the euro area, external transactions (be they direct investment or portfolio flows into equities and/or debt securities) by euro area resident non-MFIs and non-euro area residents have a direct impact on the external assets and liabilities of the MFI sector, to the extent that they are settled via resident banks (for details see Box 1).

A closer investigation of the components of MFI net external assets since 1999 indicates that net flows of foreign direct investment have been negative and mainly disconnected from M3 dynamics, whereas cross-border portfolio investment flows (in equities and debt securities) show a tight co-movement with M3 developments (see Chart 7). Therefore, the analysis of cross-border portfolio transactions, including the behaviour of euro area investors abroad vis-à-vis foreign investors, may shed

**Chart 7 Net portfolio flows and M3 growth in the euro area**

(annual flows in EUR billions; annual percentage changes)



— net portfolio investment flows (left-hand scale)
····· M3 growth (right-hand scale)
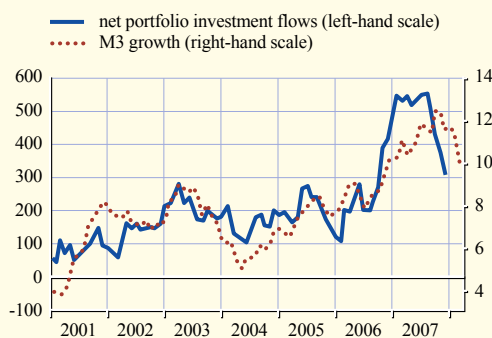
Source: ECB.

some light on why monetary developments at times cannot be fully explained by traditional money demand determinants, such as output and interest rates.

Five key periods have characterised the net inflows in cross-border portfolio investment in the euro area since the start of Stage Three of EMU.

Between 1999 and mid-2001, the significant decline in the net external assets of the MFI sector reflected euro area non-MFI residents' building-up of large holdings of foreign shares, following strong merger and acquisition activities undertaken by euro area residents, partly in the context of the "new economy" boom in the United States.

From mid-2001 up to mid-2003, in an environment of heightened financial market and geopolitical uncertainty and a search for safer returns,[8] the euro area money-holding sector reallocated its portfolios from domestic and foreign equity holdings to domestic money holdings, while the pattern of foreign portfolio investment in the euro area was relatively stable.

[8] This period coincided with the strong decline in the stock market indices during 2001, the terrorist attacks on 11 September 2001, the accounting scandals in the United States in 2002, the subsequent geopolitical uncertainties in the Middle East and the war in Iraq. The period 2001-2003 was, therefore, characterised by an extraordinary preference for liquid and safe financial assets by euro area residents.

One consequence of this reallocation was a repatriation of funds previously invested in foreign equities. This led to the accumulation of capital flows from residents and/or non-residents in the euro area, so that the resulting portfolio shifts affected monetary dynamics, as argued by the ECB on several occasions.[9] Annual M3 growth increased strongly, driven by a large increase in the net external assets of the MFI sector.

Subsequently, from the summer of 2003 to mid-2004, net portfolio inflows gradually declined. In particular, in the summer of 2003 – amid expectations of capital losses as a result of a sharp rise in long-term bond yields – major disinvestment by non-residents of euro area bonds and notes stopped the positive trend in net portfolio flows. Net portfolio inflows declined up to June 2004, mainly because of weak economic growth in the euro area relative to developments in other economic regions. The gradual decline of annual net capital inflows and the associated decrease in MFI net external assets helped to dampen M3 growth.

The fourth period, from mid-2004 to mid-2007, saw a rebound, with a strong rise in net inflows in portfolio investment associated with an increase in net purchases of euro area portfolio securities by non-euro area residents. Market survey data indicated a renewed interest in euro area equity securities among foreign investors, with one of the key reasons cited being that euro area equities were seen as being attractively priced in relative terms. Growing evidence of an improving economic outlook in the euro area since the beginning of 2005 may have been a key factor underlying these investment strategies. During this period, annual flows into M3, after levelling off briefly, continued to strengthen also due to the stimulative impact on the economy of the low level of interest rates.

The fifth period, from mid-2007 up to April 2008, has been characterised by a downward trend in net portfolio inflows partly due to the financial turmoil that occurred from the summer of 2007, though the net annual inflow remains sizeable.[10] M3 growth mirrored the pattern of annual portfolio flows.

Overall, it can be asserted that external transactions and, more precisely, transactions in portfolio investment, have co-moved with monetary dynamics in the euro area in the last eight years. Hence, understanding the factors behind developments in portfolio flows can help to improve monetary analysis.

Notwithstanding this help, identifying the determinants of portfolio flows remains difficult because portfolio managers' decisions are based on expectations of future returns, which obviously might differ from ex post return realisations.

A recent analytical study shows that it is possible to codify and quantify the implications of cross-border portfolio flows and international asset prices for monetary developments in the euro area within a money demand framework (see Box 2). This turns out to be important to explain euro area M3 dynamics in the period 1980-2008. In particular, euro area M3 and euro area and US equity and bond prices are interlinked and any disequilibria in these three markets (namely, euro area money, euro area and US assets) trigger corrective responses in the other two markets. Moreover, given that asset prices are available in a timely manner, a real-time assessment of inflationary risks remains feasible. The empirical evidence for the euro area suggests that placing money demand in the context of portfolio flows and international asset prices is important to measure excess liquidity that can pose direct risks to price stability.

9 See, for instance, the box entitled "External capital flows and domestic monetary dynamics in the euro area" in the February 2005 issue of the Monthly Bulletin and the box entitled "Recent developments in MFI net external assets" in the July 2005 issue of the Monthly Bulletin.
10 For an analysis of net external assets and international investment, see the box entitled "Recent developments in MFI net external assets" in the July 2005 issue of the Monthly Bulletin and the box entitled "MFI net external assets and their impact on monetary developments" in the ECB's Annual Report 2007.

**Box 2**

## EURO AREA MONEY DEMAND AND INTERNATIONAL PORTFOLIO ALLOCATION

Over the past decade, cross-border capital flows and interlinkages between money and asset prices have increased owing to financial developments and globalisation. Cross-border capital flows may affect money velocity, making the identification of the long-run relationship between money growth and price developments at the domestic level more complex. The tight co-movement between net portfolio flows and M3 growth observed in the euro area and depicted in Chart 7 in Section 4 is analysed within a money demand framework proposed by De Santis, Favero and Roffia (2008) (hereafter referred to as DFR).[1] As with other money demand models, this approach takes as a starting point that various financial frictions exist. This implies that modelling monetary aggregates is both feasible and relevant to the understanding of macroeconomic dynamics.

The key element of the DFR model is the adoption of a portfolio-balance approach to money demand, which is characterised by two main features. First, in order for transactions to have an impact on aggregate M3, a counterpart sector which is not part of the money-holding sector is needed; in the DFR model, this is the external (i.e. non-resident) money-holding sector. Second, in order to explain portfolio shifts, a set of opportunity cost variables is needed, including domestic and foreign asset returns. In this model, returns on domestic and foreign assets (stocks and long-term bonds), as well as the own rate of return on holding euro area M3, are found to influence money holdings. More precisely, for a given level of risk, portfolio allocation among risky assets depends on the asset returns expected by domestic and foreign agents in excess of the own rate of return on money.

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1 See R. A. De Santis, C. A. Favero and B. Roffia (2008), "Euro area money demand and international portfolio allocation: a contribution to assessing risks to price stability", ECB Working Paper No 926; also presented at the ECB workshop entitled "The external dimension of monetary analysis", Frankfurt am Main, 12-13 December 2007.

**Chart A Earnings/price ratio and ten-year government bond yield in the euro area**

(percent; percentages per annum)

— 10-year government bond yield
···· earnings/price ratio
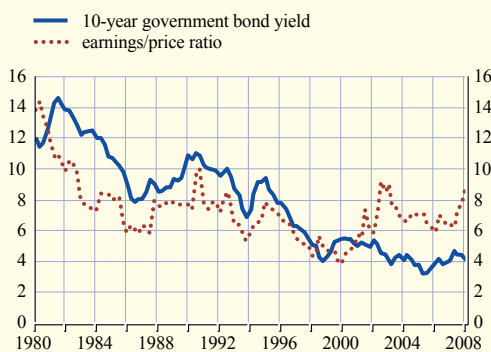


Sources: BIS, Datastream, ECB calculations.

**Chart B Earnings/price ratio and ten-year government bond yield in the United States**

(percent; percentages per annum)

— 10-year government bond yield
···· earnings/price ratio
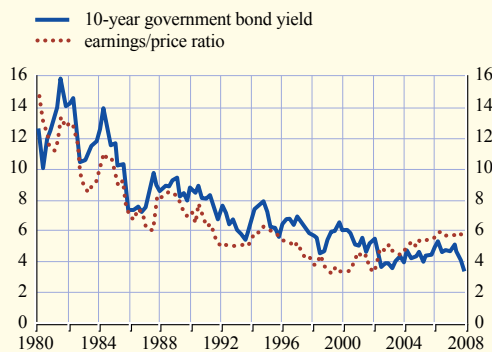


Sources: BIS, Datastream.

Using standard econometric techniques, three long-run relationships can be found.

(i) A euro area money demand equation, which relates the demand for euro area M3 to income/wealth and the relative yields between US and euro area equities and long-term bonds.

(ii) Two relationships between the earnings/price ratios and long-term bond yields for the euro area (including also in this case the own rate of return on M3) and the United States, which capture the equilibrium in the euro area and US asset markets respectively and are a representation of the "FED model" of Lander, Orphanides and Douvogiannis (1997).[2] This model postulates that the earnings/price ratio of a stock index tends to move in the same direction as the long-term government bond yield (see Charts A and B), thus providing a way to predict price movements in the equity market. To close a positive gap between such variables, either equity prices or long-term bond yields, or both, are expected to increase, thereby raising future returns. Chart A above shows that, based on actual data, this gap started increasing in 2001 in the euro area, which actually corresponds to the period in which increasing net portfolio inflows and higher euro area M3 growth were recorded.

**Chart C The residuals of the long-run euro area money demand equation in the DFR model**

(percentages)

Source: De Santis, Favero and Roffia (2008).

The parameters of these three relationships are significant and the system is stable over the sample period from the first quarter of 1980 to the first quarter of 2008 on the basis of standard statistical tests, with the residuals of the three equations being "mean reverting" or, in other words, "stationary".
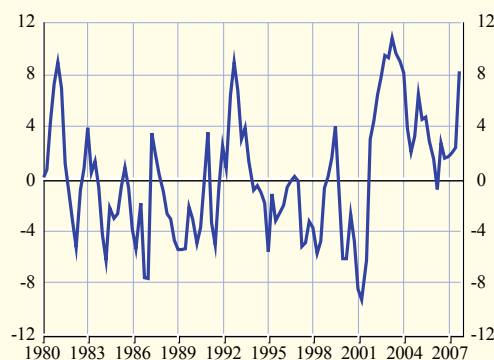
Chart C represents the residuals from the long-run money demand or the so-called "monetary overhang". The series fluctuates around zero, so that all departures of the actual M3 stock from the long-run money demand implied by the model are "corrected" over time. However, as the model consists of a system, these residuals should be understood in the context of the model as a whole, i.e. by also taking into account the potential divergences of earnings/price ratio from bond yields, which can occur in the other two asset markets in the model. In particular, although the model may explain well the long-run evolution of the stock of M3, this does not exclude that there may be indications of risks to price stability stemming from developments in asset markets.

On the basis of this model set-up, two main observations are worth making.

(i) Given that asset prices are volatile, this introduces some volatility into the residuals of the money demand, although, at the same time, the latter exhibits a fast reversion to the mean. While confirming the underlying relationship between money and a small number of

2  J. Lander, A. Orphanides and M. Douvogiannis (1997), "Earnings, forecasts and the predictability of stock returns: evidence from trading the S&P", Journal of Portfolio Management, Vol. 23, pp. 24-35.

macroeconomic variables, this model suggests that asset price developments are important determinants of monetary developments.
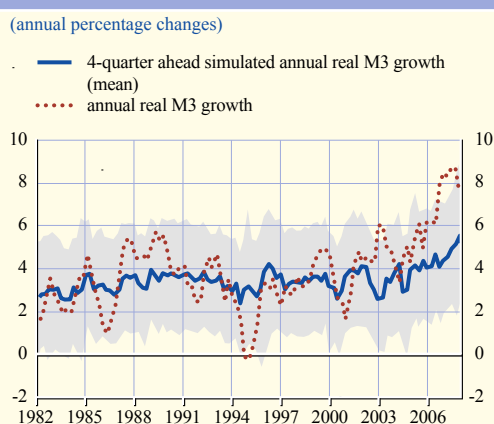
(ii) There are linkages between money and asset price developments which run in both directions, so that disequilibria in any of the three markets encompassed by the model – M3 and euro area/US asset markets – trigger corrective responses in all markets.[3] Thus, this portfolio approach relates monetary developments to asset price dynamics in an international context, offering a link to the growing literature on asset prices and money.

As regards the mechanisms through which these inter-relationships manifest themselves in the model, if the euro area earnings/price ratio is below the euro area long-term bond yield, risk-adjusted excess returns on euro area assets are expected to decline, with the consequences that global investors sell euro area assets to domestic agents and, as a result, euro area M3 growth decreases. If the US earnings/price ratio is below the US long-term government bond yield, euro area M3 growth might also decline, if global investors sell US assets also partly to euro area agents, as a consequence of the decline in expected risk-adjusted excess returns on US assets. The impulse response analysis as well as anecdotal evidence indicate that a rise in euro area and/or US earnings/price ratio above their respective long-term bond yields leads to net portfolio flows into the euro area and to an increase in euro area M3 growth. It is also worth noting that there is a strong co-movement between the USD/EUR exchange rate and the residuals in the asset price equations. Therefore, the inclusion of earnings/price ratios, bond yields and the own rate of return on euro area M3 in the DFR money demand model implicity captures the influence of net portfolio flows and the exchange rate on euro area M3 growth.

All in all, it can be safely argued that placing money demand in the context of international portfolio flows is important to explain euro area M3 dynamics. Moreover, given that asset prices are available in a timely fashion, a real-time assessment of inflationary risks is feasible by comparing actual money growth with model-based simulated values.

Chart D shows the annual M3 growth explained by the developments in the variables included in the model. The results point towards an increasing positive gap between actual real money growth and real money growth fitted by the model in recent years. This gap is statistically significant in explaining euro area HICP developments. An evaluation of the forecasting performance of this indicator for inflation developments over a horizon of six quarters ahead has been carried out following a standard bivariate approach using the

**Chart D Real euro area M3 growth: actual and simulated values with the DFR model**

(annual percentage changes)

——— 4-quarter ahead simulated annual real M3 growth (mean)
·········· annual real M3 growth



Source: De Santis, Favero and Roffia (2008).
Note: The shaded area covers the 95% confidence interval of the 4-quarter ahead simulated annual real M3 growth.

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3 When looking at the short-run dynamics of the system, the impact of the three disequilibria is rather pervasive in the system as many variables react to some or all of the disequilibria.

methodology proposed by Stock and Watson (1999).[4] It turns out that, when running recursive estimates of the equations for the period from the first quarter of 2000 to the first quarter of 2008, the money growth gap indicator based on the DFR model outperforms the univariate model benchmark and exhibits a good performance on the basis of both the mean square forecast errors and bias. As the DFR model is stable, this suggests some increasing risks to price stability in the euro area, particularly over the last couple of years.

4   J. Stock and M. W. Watson (1999), "Forecasting inflation", Journal of Monetary Economics, Vol. 44, pp. 293-335.

## 5   CONCLUDING REMARKS

Monetary analysis aims to identify the underlying trend rate of monetary expansion that robustly signals risks to price stability over the medium to longer term. Therefore, monetary analysis aims to separate this underlying signal from developments linked, for instance, to the increasing influence of financial globalisation on the velocity of money through movements in international asset prices, which can affect international portfolio allocation and, thereby, directly domestic money markets, rendering monetary analysis more challenging at higher frequencies.

At the same time, recent years have also been characterised by a large amount of global liquidity and savings invested in global portfolios, which have strongly affected risk premia across a variety of asset classes. Ultimately, the developments in asset and commodity prices might impinge on domestic consumer prices via wealth and terms-of-trade effects.

Global liquidity, portfolio flows, international asset prices and domestic money growth are all interlinked. In such an environment, monetary analysis requires increasing sophistication by relying on a wider range of analytical tools and models, which can help disentangle empirically the different effects on asset and consumer price inflation. While the long-run relationship between domestic money growth and inflation is undisputed, empirical work on the effects of global liquidity is still in its infancy. The empirical evidence for the euro area suggests that placing money demand in the context of portfolio flows and international asset prices is important to explain euro area M3 dynamics and to measure excess liquidity that can pose direct risks to price stability.