# FLOW-OF-FUNDS ANALYSIS AT THE ECB

# FRAMEWORK AND APPLICATIONS

by Louis Bê Duc
and Gwenaël Le Breton

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In 2009 all ECB
publications
feature a motif
taken from the
€200 banknote.

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**ABSTRACT**

The financial crisis has enhanced the need for close monitoring of financial flows in the economy of the euro area and at the global level focusing, in particular, on the development of financial imbalances and financial intermediation. In this context flow-of-funds analysis appears particularly useful, as flow-of-funds data provide the most comprehensive and consistent set of macro-financial information for all sectors in the economy. This occasional paper presents different uses of flow-of-funds statistics for economic and monetary analysis in the euro area. Flow-of-funds data for the euro area have developed progressively over the past decade. The first data were published in 2001, and fully-fledged quarterly integrated economic and financial accounts by institutional sector have been published since 2007. The paper illustrates how flow-of-funds data enable portfolio shifts between money and other financial assets to be assessed and trends in bank intermediation to be monitored, in particular. Based on data (and first published estimates) on financial wealth over the period 1980-2007, the paper analyses developments in the balance sheet of households and non-financial corporations in euro area countries over the last few decades and looks at financial soundness indicators using flow-of-funds data, namely debt and debt service ratios, and measures of financial wealth. Interactions with housing investment and saving are also analysed. In addition, the paper shows how flow-of-funds data can be used for assessing financial stability. Finally, the paper presents the framework for and use of flow-of-funds projections produced in the context of the Eurosystem staff macroeconomic projection exercises, and reports the outcome of a sensitivity analysis that considers the impact of interest rate changes on the interest payments and receipts of households and non-financial corporations.

Key words: flow of funds; financial account; saving; sector balance sheet; financial projections

JEL: E44, E47, E51

## NON-TECHNICAL SUMMARY

The financial crisis has enhanced the need for close monitoring of financial flows in the economy of the euro area and at the global level. Analysts have focused in particular on: the development of financial imbalances at the sector level; wealth effects; the growth of public debt; and the evolution of financial intermediaries' balance sheets. In this context, analysis of flow-of-funds data offers an important window on developments, as such data provide the most comprehensive and consistent set of macro-financial information for all sectors in the economy and reflect the interrelations between them.

Flow-of-funds data capture financial transactions and financial positions of sectors in the economy. They were first developed in the United States where they have been published by the US Federal Reserve System since 1951 and are used to assess financial developments, their impact on economic activity and the outlook for price developments. Euro area financial account data[1] have been published at an annual frequency since 2002 and at a quarterly frequency since 2007 (partial data were first published as early as 2001). Flow-of-funds analysis at the European Central Bank (ECB) has developed based on this expanding set of data, in addition to available country data, in support of the ECB's economic and monetary analysis.

With regard to the monetary analysis, financial account data help to assess and quantify portfolio shifts between monetary assets and other financial assets. In a simple accounting fashion, developments in money holding can be broken down into: (a) a "credit effect" (the money stock increases in line with increases in total financial assets, driven principally by bank credit); and (b) a "portfolio shift effect" (for a given level of financial asset holdings, the money stock changes according to agents' preference for liquidity). Similarly, on the liability side, bank credit can be compared with the total financing of the non-financial sectors in order to monitor bank intermediation trends.

With regard to the economic analysis, flow-of-funds data are used to assess developments in the financial position of sectors, which may influence their economic behaviour and, ultimately, have an impact on aggregate demand. The paper describes the sharp decline in the financial investment of households in the euro area focusing, in particular, on the effects of inflation on financial investment and saving; the interaction between financial transactions and housing (and the phenomenon of "mortgage equity withdrawal"); and wealth effects. Moreover, different indicators of the debt service burden for the non-financial sectors are derived. While debt ratios have increased sharply for both households and corporations in the euro area since the start of the 1990s, their debt service burden has actually declined owing to the sizeable fall in interest rates brought about by the anchoring of inflation expectations in the euro area. Flow-of-funds data can also be used for assessing financial stability. They provide macro-indicators of financial soundness for the non-financial sectors and the financial system. They provide information on developments in financial patterns as well as linkages across sectors. Nevertheless, they need to be complemented by additional micro-information.

Finally, owing to the comprehensive flow-of-funds framework, these data can be used for exercises involving the organisation of complex information, such as forecasting. The paper describes the flow-of-funds projections produced in the context of the Eurosystem staff macroeconomic projection exercises. These projections help to improve the assessment of the financial income and expenses of the non-financial sectors of the euro area economy and the risks to the baseline projection stemming from financial imbalances. The flow-of-funds framework also enables sensitivity analyses to be performed, which the paper illustrates by assessing the impact on sector balance sheets of a 1 percentage point change in market interest rates.

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1   The term financial account data (in line with the ESA 95) is used as a synonym for flow-of-funds data (which is the term used more commonly in the United States) throughout this paper.

# I INTRODUCTION

The financial crisis has enhanced the need for close monitoring of financial flows in the economy of the euro area and at the global level. Analysts have focused in particular on: the development of financial imbalances at the sector level; wealth effects; the growth of public debt; and the evolution of financial intermediaries' balance sheets. In this context, analysis of flow-of-funds data offers an important window on developments, as such data provide the most comprehensive and consistent set of macro-financial information for all sectors in the economy and reflect the interrelations between them.

Flow-of-funds statistics capture balance sheet positions and all financial transactions according to their type and the economic sectors involved (as purchasers or issuers of financial assets).

Flow-of-funds data were first developed in the United States and have been published by the US Federal Reserve System since 1951 (initially at an annual frequency and since 1957 at a quarterly frequency) and have been progressively incorporated into the data and forecasts analysed by the Federal Open Market Committee.[2]

Partial quarterly financial account data for the euro area non-financial sectors were first published in 2001, followed by the publication of annual financial account data for the euro area in 2002 and complete quarterly sectoral financial account data in 2007.[3] These quarterly sectoral financial account data were included in comprehensive "quarterly integrated sectoral accounts" which comprise both financial and non-financial accounts for all sectors of the economy, including their relations with the rest of the world. The introduction of these quarterly sectoral accounts has naturally widened the scope of the financial account analysis. It allows financial developments to be related to real developments at the sector level (production, operating surplus, consumption, investment and saving). The introduction of quarterly sectoral

accounts has also significantly improved data timeliness (data are available with a four-month lag while annual data have a ten-month lag, although the aim is to reduce this to three months in the future). The analysis described in this paper is largely based on annual financial account data, as its focus is to describe long-term trends. The type of analysis and indicators presented can also be applied to quarterly sectoral data, which are more suited to short-term monitoring and have greatly expanded the scope of the analysis.[4]

This paper describes how flow-of-funds analysis has been used at the European Central Bank (ECB), in support of the economic and monetary analyses that represent the two pillars of the ECB's assessment of the risks to price stability for the purposes of its monetary policy strategy.[5] The economic analysis aims to identify short to medium-term risks to price stability, based on an assessment of cyclical developments and economic shocks. The monetary analysis aims to identify risks to price stability at medium to longer-term horizons, on the basis of an analysis of monetary trends.

The flow-of-funds data can be used to support both types of analysis. In the framework of the monetary analysis, the flow-of-funds data provide insight into various sectors' portfolio choices between money and other financial assets and into their sources of financing. In the context of the economic analysis, they provide insight into developments in the balance sheet of the non-financial sectors (e.g. wealth and debt) which have implications for these sectors' income, spending, and saving decisions, and thus potentially affect aggregate demand and, ultimately, price developments. In addition, this paper shows how flow-of-funds data can be used for the assessment of financial stability.

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2   See Teplin (2001). See also Dawson (1996) for a review of the analytical use of flow-of-funds data since their development.
3   See ECB (2001a; 2002; 2007).
4   The data presented in this paper (for the period since 1999) are based on the integrated sectoral accounts.
5   See ECB (1999).

The remainder of this paper is organised as follows. Section 2 describes the main features of the flow-of-funds framework, the current availability of data and the advantages and limitations of flow-of-funds analysis in support of monetary policy decisions. Section 3 describes the use of flow-of-funds data for monetary analysis, using two case studies: on the one hand the analysis of portfolio shifts between monetary assets and other financial assets and, on the other hand, structural developments in bank intermediation. Section 4 focuses on the development of the non-financial sectors' balance sheet as regards saving and investment, wealth and indebtedness. Section 5 provides some indications concerning the use of flow-of-funds data for assessing financial stability. Section 6 describes the use of the flow-of-funds framework to assess macroeconomic consistency in the context of forecasting exercises and/or scenario analyses. Section 7 concludes.

## 2 THE FLOW-OF-FUNDS FRAMEWORK

### 2.1 TERMINOLOGY AND MAIN PRINCIPLES

The flow-of-funds data present the financial assets and liabilities of all the institutional sectors of the economy and their relations with the rest of the world.[6] In national account terminology they are also called financial accounts, as in the United Nations System of National Accounts (SNA 93) and the European System of Accounts 1995 (ESA 95).[7]

Financial assets are defined as "means of payment … and financial claims which entitle their owners, the creditors, to receive a payment or series of payments without any counter-performance, from other institutional units, the debtors".[8] Each financial asset (owned by the creditor) has a counterpart liability (issued by the debtor), with the exception of monetary gold and special drawing rights. The main financial assets are currency and deposits, debt securities, shares and other equity (including mutual fund shares), loans, insurance technical reserves,[9] and other accounts payable and receivable. In this list, financial assets have been ordered according to their degree of liquidity (i.e. the extent to which they can easily and quickly be exchanged against other means of payment).

The financial accounts include measures of both: (a) stocks (or outstanding amounts), which constitute elements of the balance sheet of each sector; and (b) flows, which reflect changes in the stocks owing to transactions (resulting from a mutual agreement between the institutional units involved), but also valuation effects or the impact of reclassifications.

The institutional sectors group together institutional units (defined as entities – such as individual households or firms – that are characterised by their decision-making autonomy) with other units that display a similar type of economic behaviour. Seven main institutional sectors are defined in the national accounts: non-financial corporations; monetary financial institutions; insurance corporations and pension funds; other financial intermediaries (including in particular investment funds); general government; households; and non-profit institutions serving households. These main sectors can be further split into sub-sectors (for instance, general government may be further split into central government, social security and local government). In addition, the financial relations between domestic sectors and the rest of the world are reported in the rest of the world account.

In the flow-of-funds data for the euro area, financial transactions (or stocks) are only partially consolidated at the sector level. For instance, although inter-company loans are in principle consolidated, they may be netted out at the country level due to the unavailability of detailed data, whereas they are generally not netted out between companies residing in different countries. Also, transactions in securities are generally not consolidated, as the issuing sector of the securities is not always known at the macroeconomic level. This feature also applies to the more recently published integrated accounts data.

Table 1 presents the flow-of-funds structure in a simplified matrix form.

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6  See Mink (2004).
7  See United Nations (1993); Eurostat (1996); and IMF (2000).
8  See Eurostat (1996), § 7.20. According to the ESA 95, financial assets include economic assets which are close to financial claims in nature, such as shares and other equity, and some contingent assets.
9  Insurance technical reserves are defined as "technical provisions of insurance corporations and pension funds against policy holders or beneficiaries on the annual accounts and consolidated accounts of insurance undertakings" (see Eurostat, 1996, Annex 7.1, p. 143).

**Table 1 The flow-of-funds framework**

|  | Financial corporations (MFIs/insurance/OFIs) | General government | Households | Non-financial corporations | Rest of the world |
|---|---|---|---|---|---|
| **Net acquisition of financial assets** |  |  |  |  |  |
| Monetary gold |  |  |  |  |  |
| Deposits and currency |  |  |  |  |  |
| Debt securities |  |  |  |  |  |
| Loans |  |  |  |  |  |
| Shares and other equity |  |  |  |  |  |
| Insurance technical reserves |  |  |  |  |  |
| Other accounts receivable |  |  |  |  |  |
| **Net incurrence of liabilities** |  |  |  |  |  |
| Deposits and currency |  |  |  |  |  |
| Debt securities |  |  |  |  |  |
| Loans |  |  |  |  |  |
| Shares and other equity |  |  |  |  |  |
| Insurance technical reserves |  |  |  |  |  |
| Other accounts payable |  |  |  |  |  |
| **Net lending/net borrowing** |  |  |  |  |  |

Notes: In the official accounts financial corporations are further split between monetary financial institutions (MFIs); insurance corporations and other financial intermediaries (OFIs, including investment funds). Non-profit institution serving households are included in the households sector.

## 2.2 DATA AVAILABILITY IN THE EURO AREA

The flow-of-funds analysis undertaken at the ECB since 1999 has developed on the basis of a dataset which has been in a constant state of development and refinement, reflecting the relatively recent creation of the euro area and the Eurosystem.[10]

More specifically, the dataset has evolved as follows. From 2001 to March 2007, euro area *quarterly financial accounts for the non-financial sectors* (comprising non-financial corporations, general government and households, including non-profit institutions serving households) were published by the ECB. These were partial statistics, covering only the non-financial sectors, and did not report all the information. As from 2002, *annual financial account data* covering (individual country) financial account data (stocks and flows) for all sectors have been published by Eurostat, with the available time series starting in 1995. Finally, complete *quarterly financial account* data were made available in June 2007 with the publication of the *euro area integrated economic and financial accounts*. The time

series for these integrated accounts starts from the first quarter of 1999. They include both financial account data and non-financial account data, which enables a consistent analysis of sectors to be carried out.[11]

As well as the main financial account statistics, the flow-of-funds analysis also uses other partial financial statistics. These statistics are not based on a homogeneous statistical standard (although they may be, to some extent, consistent with ESA 95 principles) and their classifications and frequency differ from those of the financial accounts. However, they are included in the flow-of-funds analysis in order to fill data gaps and cross-check information. Such partial financial statistics refer in particular to balance sheet statistics for monetary financial institutions (MFIs) and the aggregated balance sheet of euro area investment funds (both reported in Section 2 of the statistical annex of the ECB Monthly Bulletin); securities issues

10 The Eurosystem is composed of the ECB and the central banks of those EU Member States that have adopted the euro as their currency.
11 See Section 3 of the statistical annex of the ECB Monthly Bulletin, entitled "Euro area accounts".

statistics (Section 4 of the statistical annex); external statistics (Section 7 of the statistical annex); and government finance statistics (Section 6 of the statistical annex).

In addition to the main financial account statistics and the above-mentioned other financial statistics for the euro area, the flow-of-funds analysis also draws on national financial account backdata when available. These backdata (which are mainly published at an annual frequency) have the advantage of providing longer time series, even though they may not always be based on the current national accounting standards (ESA 95). Such national statistics have also been used for the analysis presented in this paper in order to obtain a longer view of financial developments in the euro area (as shown in estimates presented in Sections 3 and 4 of this paper).

## 2.3 ADVANTAGES AND LIMITATIONS OF THE FLOW-OF-FUNDS FRAMEWORK

Flow-of-funds statistics are constructed within a unified system. Aside from providing a useful overview for analysis, the unified system allows analysts to exploit various accounting identities that are embedded in it. This serves to develop awareness of the interdependencies between financial variables, and thereby creates the potential for these statistics to support the economic and monetary analyses. As a corollary of their advantage as comprehensive macro-statistics, flow-of-funds data suffer from some limitations: as aggregate data, they do not contain by definition micro or sub-sectoral information; their publication tends to lag other less comprehensive statistics; and they contain information of varying statistical quality.

The main advantage of the flow-of-funds statistics for the economic analysis is that they provide a consistent, homogeneous and comprehensive set of financial information. This permits the analysis of interdependencies between sectors and between financial instruments, as illustrated in later sections of this paper.

This consistency of flow-of-funds data is enshrined in the accounting logic of the national accounts. Any transaction (whether financial or non-financial) is recorded according to the double-entry principle as a use (financial investment or acquisition of financial assets) or as a resource (incurrence of liabilities).[12] For instance, the receipt of an interest payment (resource) by a household from a corporation will be matched by an increase in a bank deposit (financial investment). In practice, since a transaction generally involves two sectors, a "quadruple-entry principle" applies (in the example above, the interest receipt/deposit increase by a household is matched by an interest payment/deposit decrease by a corporation).

Flow-of-funds statistics are homogeneous in the sense that they are based on a defined classification of transactions and on accounting standards (currently the ESA 95 for the European Union). They reconcile information on different sectors derived from different statistical sources and based on different accounting rules.

Flow-of-funds statistics are comprehensive, as they cover, albeit in a simplified way, all sectors of the economy and their relations with the rest of the world. This allows information on different sectors and markets to be cross-checked and reconciled, by making use of different accounting identities: e.g. the identity between the total financial investment and the total incurrence of liabilities in one instrument; and the identity (with the opposite sign) between the sum of financial balances (financial investment minus liabilities) of one sector, and the sum of financial balances of the other domestic sectors and of the rest of the world.

Furthermore, in an integrated set of national accounts (comprising a complete set of financial and non-financial accounts), the balance of financial investment minus liabilities for a given sector is, in principle, equal to the balance of

12  See Eurostat (1996), § 1.50.

saving minus real investment of the sector (both are called net lending/net borrowing in national account terminology). In more qualitative terms, the comprehensive set of financial accounts provides a useful overview of the main financial flows in the economy, as well as the main risks and interdependencies. As Section 6 shows, the flow-of-funds framework is particularly well able to organise information for a wide range of financial projections.

However, such comprehensive macro-financial statistics have some limitations. First, in order to be comprehensive, financial accounts have to be based on a simplified classification of instruments or sectors. Therefore, for the purposes of analysis they generally need to be complemented by additional information. For instance, information on the size of companies and their economic sector are important for the analysis of the corporate sector but are not part of the financial account statistics. Likewise, a breakdown of the household financial position by segments of income or wealth is relevant for an assessment of the financial behaviour of households and their financial risks. In particular, indicators designed for the monitoring of financial stability require more disaggregated information on the level and nature of solvency and liquidity risks borne by sectors than is provided in the financial accounts.[13]

A second and related limitation is that, since flow-of-funds data are by definition organised at the sector level, intra-sector transactions, which could be useful for analytical purposes, are disregarded. For instance, the household sector considered as a whole may have an overall net lending position, however, it comprises categories of households with different net lending and net borrowing positions.

Third, the accounting rules chosen and applied to all sectors for the sake of homogeneity may not be the most appropriate for a specific purpose or sector. For instance, in the national accounts financial instruments are classified according to their initial maturity, while for some purposes a classification based on the residual maturity

would be better. The valuation of assets and liabilities is generally based on their market value, while their face value (the value at which the instrument will be paid off) may for some purposes be more relevant (for instance, in the excessive deficit procedure government debt is calculated on the basis of face value accounting).

Fourth, the construction of these data may entail practical challenges. As a consequence of the comprehensiveness and accounting homogeneity of flow-of-funds statistics, compiling, combining and processing information takes time and the data are only available with some lag, whereas policy-makers need frequent reassessments of the economic situation, involving the use of less comprehensive, but frequent and timely information. However, it should be noted that the aim is to make quarterly sectoral accounts for the euro area available with a delay of only 90 days, which represents a considerable improvement in terms of timeliness and is quite adequate for the needs of monetary analysis.

Moreover, official financial account data for the euro area are available with a relatively limited time span owing to the recent implementation of the ESA 95 and the relatively recent creation of Economic and Monetary Union (EMU) in 1999. However, estimated historical flow-of-funds series may be constructed at the euro area or country level, as this paper illustrates, but with some measurement issues. Finally, the comprehensiveness of flow-of-funds data and the obligation to "fill" all the cells in the flow-of-funds matrix means that the data will necessarily be of varying quality. This heterogeneity may affect the accounting identities embedded in the system. For instance, in the construction of the accounts, there will be an initial statistical discrepancy between the balance of the financial accounts and the balance of the non-financial account, reflecting this unavoidable data heterogeneity and intrinsically weakening the significance and use of this accounting identity.

13 See the survey of household finance and consumption by the European System of Central Banks, ECB Occasional Paper No 100, 2009.

This feature is still unavoidable and inherent to all "aggregate statistics". Similar problems are encountered for instance in balance of payments statistics (the difference between the balance of the capital account and that of the financial accounts). For the purposes of a sound analysis, it should be ensured that such discrepancies are not excessive.

# 3 USING FLOW-OF-FUNDS DATA FOR MONETARY ANALYSIS

Flow-of-funds statistics are naturally relevant to the analysis of an economy where "money matters" for economic and price developments. It is noteworthy that when they were first constructed in the United States in the early 1950s, what are now termed the flow-of-funds statistics were originally labelled "money flows". As Morris Copeland, the main originator of the US flow-of-funds data, wrote: "money flows are sources and dispositions of money. [They are] a balancing account that tells where […] money comes from and where it goes".[14] This section discusses some of the uses of flow-of-funds data in the monetary analysis at the ECB.

Monetary analysis at the ECB includes a comprehensive assessment of the liquidity situation based on information on the components and counterparts of the monetary aggregate M3 (in particular, loans to the private sector). This entails in particular close monitoring of the interdependencies between M3 and its counterparts on the consolidated balance sheet of the MFI sector, in order to assess whether variations in the holding of liquidity are driven by portfolio shifts between money and other financial assets or by credit growth, which may have different implications for price stability.

Against this background, flow-of-funds analysis represents a useful tool for monetary analysis. First, it provides an insight into the importance of portfolio shifts between money and non-monetary financial assets. Second, it offers information on the sources of financing of the non-financial private sector, i.e. whether financing is obtained through a money-creating expansion of bank credit or from other sources.

## 3.1 MONEY IN THE FLOW-OF-FUNDS FRAMEWORK

Money is a financial asset and is therefore included in the financial accounts. However, in many countries, monetary aggregates are compiled following accounting standards which differ from those used to compile the financial accounts. This is also true at the euro area level.

The ECB monetary aggregates are derived from a statistical framework – the consolidated balance sheet of banks (strictly speaking MFIs[15]) – which differs in various respects from the financial account framework.

To understand these differences, it is first useful to consider that money is defined on the basis of three characteristics: the nature of the financial asset; the sector issuing that asset; and the sectors holding that asset. The ECB defines broad money as the liquid assets[16] issued by the euro area MFI sector that are held by the euro area money-holding sectors (the non-financial sectors and financial corporations which do not issue money). However, such monetary assets cannot be fully identified within the current euro area flow-of-funds dataset, for the following reasons.[17]

In terms of instruments, in the current national account standards (SNA 93 and ESA 95), transferable deposits (immediately convertible into currency) and other deposits (such as time deposits or saving deposits) are not split further according to their duration, while ECB monetary aggregates exclude some long-term deposits (those redeemable at notice above three months and those with an initial maturity of above two years). Second, debt securities with an initial maturity of up to two years are included in the ECB's definition of monetary aggregates, whereas the ESA 95 category "short-term debt securities" refers de facto to instruments with an initial maturity of up to one year (the definition of short-term instruments is actually vague in the national account standards, and may include instruments with a maturity of

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14 See Copeland (1949, 1952).
15 The MFI sector consists of credit institutions, money market funds and, for the issuance of some liquid deposits, central government.
16 The degree of "moneyness" of instruments is generally defined by their degree of liquidity, taking into account the transaction costs and the type of instrument (see ECB, 1999).
17 See Mink (2004).

two years or even five years).[18] Money market fund shares, which are included in the ECB monetary aggregates, are not explicitly defined in the ESA 95. However, they can be identified as money market fund shares issued by the MFI sector.

In terms of sectors, financial account data do not always permit the identification of the counterpart sector ("who-to-whom" information) that would enable monetary aggregates to be derived according to the ECB definition. For instance, it is not always possible within the flow-of-funds framework to identify whether the debt securities held by households are issued by banks (and are therefore included in money) or by non-banks or non-residents (not included in money).

Admittedly, the above-mentioned differences should not be overstated. The SNA 93 recommends the setting-up of matching tables between monetary statistics and financial account statistics. The forthcoming revision of the SNA standards may further improve the identification of money within the financial accounts. Moreover, the national account standards do not prevent the compilation of further who-to-whom information. MFI balance sheet data already include a breakdown by sector of the holding of monetary assets, with the exception of most debt securities and money market fund shares. Money holding by sector is already presented as a fully consistent "memo item" in the integrated euro area accounts.

## 3.2 PORTFOLIO SHIFTS BETWEEN MONEY AND OTHER FINANCIAL ASSETS

As an example of the use of flow-of-funds data for monetary analysis, we present a simple case study on the assessment of portfolio shifts between money and other financial assets. The use of flow-of-funds data and of their accounting identities is straightforward in this context. As money is part of the financial assets held by the money-holding sectors, and as flow-of-funds data comprise all financial assets broken down by sector, shifts between money and non-monetary financial assets can be derived

by combining monetary statistics and financial account statistics.

In the early 2000s the ECB monetary analysis had to interpret the strong growth of money holding in the euro area between mid-2001 and late 2003. The growth of money flows during this period is mainly explained on the basis of portfolio shifts, i.e. a reallocation of assets from securities (with long maturities) into money in the portfolio of the money-holding sectors, prompted by the exceptional geopolitical and financial market uncertainties prevailing at the time.[19] The persistence of high levels of excess liquidity after mid-2003 has been explained by the fact that agents were still relatively risk averse and by the increasing role of credit growth in an environment of low interest rates.

Variations in money holding by agents can be broken down into changes in the total financial assets held by agents and changes in the share of liquid assets within this total amount. This distinction is admittedly only an accounting one and does not fully portray the economic behaviour of agents in determining the various elements composing their total wealth (financial versus non-financial assets and liquid versus illiquid financial assets). Nonetheless, it may help to distinguish the main drivers of money growth and single out exceptional portfolio shifts into money.

Typically, the rise in the overall stock of financial assets of the money-holding sector stems mainly from the growth of bank credit. This can be shown by a breakdown of the main sources of changes in the financial assets held by the money-holding sector:

18 According to the ESA 95 manual, "innovations in financial markets have diminished the usefulness of a short-term/long-term distinction for financial assets and liabilities. […]. Maturity distinction is recognised as a secondary classification criterion when relevant. Short-term financial assets (liabilities) are financial assets (liabilities) whose original maturity is normally one year or less, and in exceptional cases two years at the maximum (in certain cases, securities other than shares issued by the general government sector with a maturity up to five years may be classified as short-term)" (ESA 95, § 5.22); (see Eurostat, 1996).
19 See Fischer et al. (2006).

(a) MFI credit to the non-MFI sector, either via bank loans or via the purchase by MFIs of securities issued by non-MFIs.

(b) Non-resident "credit" to non-MFIs, via the issuance by non-MFIs of securities acquired by non-residents and via loans received from non-residents.

(c) Non-financial transactions vis-à-vis MFIs and non-residents, for instance in the form of net interest or dividend receipts or the sale of non-financial assets by the money-holding sector to MFIs and non-residents. These transactions are summarised by the net lending/net borrowing of the money-holding sector as a whole.

MFI credit to the non-MFI sector represented the main source of growth in the financial assets



Chart 1 Money flows between non-MFIs, MFIs and the rest of the world

Notes: The direction of the arrows shows the cash flows from financial transactions (cash flows are received by the borrowing sector from the creditor sector) or from non-financial transactions (cash flows are received by the sector with a net lending position from the sector with a net borrowing position). For illustrative purposes, the figure shows the source and disposal of money by the non-MFI sector. In this example, the money-holding sector has a net lending balance. Transactions between MFIs and the rest of the world (RoW) are disregarded as irrelevant in the context of this example. The expression "RoW credit to non-MFIs" refers to the sum of the purchase by the rest of the world of liabilities issued by non-MFIs and loans by the rest of the world to non-MFIs. (This expression is used by analogy with MFI credit to non-MFIs but does not correspond to balance of payments terminology).

held by the non-MFI private sector from 1997 to 2008, followed by non-resident "credit" to residents, while the net lending of the non-MFI sector played a smaller role.

Therefore, two main sources of changes in the money holdings of non-MFIs can be identified:

• a "credit effect" with the rise in total financial assets of non-MFIs being mainly due to MFI credit and, to a lesser extent, to non-resident credit.

• a "portfolio shift effect" representing the shift between money and non-monetary financial assets in the total financial assets held by non-MFIs.

The following identity formalises this distinction (expressed in terms of outstanding amounts):
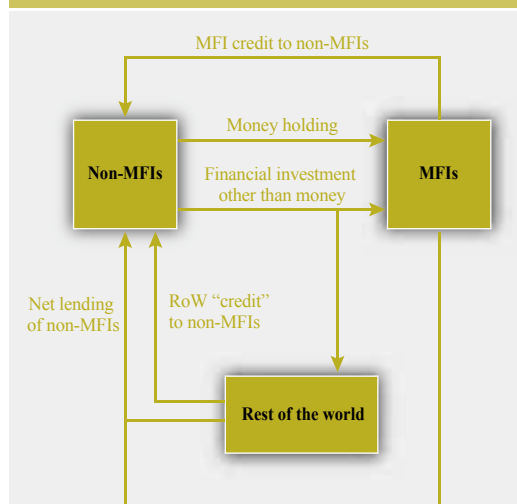
$$M \equiv (M/FA) \times FA \qquad (1)$$

where M stands for money and FA stands for (total) financial assets.

In our terminology, the term FA represents the "credit effect", while the term M/FA represents the "portfolio shift effect".

Chart 2 shows the combination of these two factors behind monetary dynamics since 1997. Several periods can be distinguished. From 1997 to 2001 the positive credit effect (with strong growth in loans to the private sector) was largely compensated by the negative portfolio shift effect, reflecting strong investment by euro area residents abroad, which is not included in money. In 2001 and 2002, however, the ratio of M3 to GDP strongly increased, with an associated rise in liquid holdings in the euro area economy. This corresponded to portfolio shifts from non-monetary securities into money, when, to put it simply, agents repatriated funds (namely foreign equity) into money, against a background of heightened financial market and geopolitical uncertainty.[20] Between 2003 and 2007 money

20 See Bê Duc et al. (2008).

**Chart 2 Contributions of the credit effect and the portfolio shift effect to money growth**

(percentages of GDP)

■ credit effect
▦ portfolio shift effect
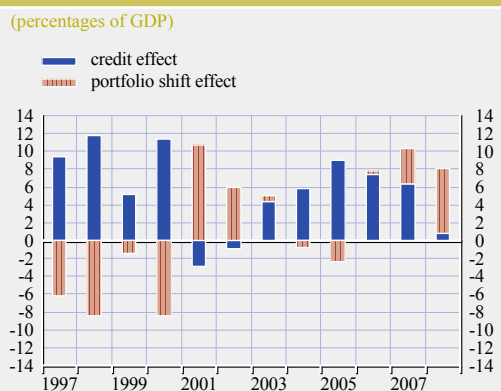


Sources: ECB, Eurostat and authors' calculations.
Note: The credit effect is derived as the change in the ratio of financial assets to GDP. The portfolio shift effect is derived as the change in the ratio of M3 to financial assets.

creation via MFI credit (mainly loans for house purchase) took a prominent role, whereas, since 2007 portfolio shifts into money have regained importance in line with increased uncertainty in financial markets.

The assessment of portfolio shifts between money and other financial assets has been notably improved with the availability of quarterly integrated sector account data since 2007. Financial account data are available with a higher frequency and in a more timely manner (around 120 days, with the aim being to reduce it to 90 days in the future), and allow portfolio shifts to be assessed at the sector level.

### 3.3 BANK INTERMEDIATION

While the analysis of portfolio shifts focused on the asset side of the financial balance sheet of the money-holding sector, the second case study focuses on the liability side and aims to assess intermediation trends – that is development in market financing versus bank financing. In this case too, the comprehensiveness of flow-of-funds data makes them a particularly appropriate tool for assessing such trends. Comparing, for instance, bank loans to debt securities issuance would be insufficient, as this would omit other types of liability, such as non-quoted shares

and inter-company loans. An exhaustive (and homogeneous) set of flow-of-funds data is therefore a better basis for the analysis of trends in bank intermediation.

MFI credit to residents, covering both bank loans and the holding by MFIs of securities issued by non-banks, is the major source of liquidity creation in the economy, but represents only part of the total financing of economic agents. For instance, non-financial corporations may have access to alternative sources of financing via the issuance of debt securities and shares which are purchased by non-residents or other non-financial corporations. This section shows how the contribution of MFIs to the financing of the money-holding sector has evolved since the late 1990s.

Chart 3 (and Table 2) shows the development of the share of MFI loans in total loan financing for households and non-financial corporations (excluding other accounts payable and receivable). It shows a slight decline in this so-called bank intermediation ratio (from 79% in 1995 to 74% in 2007). For a shorter period (from 1999) a similar ratio applying to the whole non-MFI sector (i.e. households and non-financial corporations plus general government, insurance corporations and pension funds, and other financial intermediaries excluding money market funds) shows a very similar trend. This suggests therefore a slight relative decline in loans granted by MFIs compared with those granted by non-MFIs (in particular, inter-company loans, including credit from the rest of the world). More specifically, this decline occurred between 1999 and 2002 and is likely to have been associated with the wave of corporate mergers and acquisitions worldwide during this period.

Chart 4 (with data in Table 2) presents a broader view of bank intermediation, albeit over a shorter time span. It compares MFI credit to non-MFIs with total credit to non-MFIs – i.e. bank loans to non-MFIs plus their holdings of debt securities and shares issued by non-MFIs. This allows the extent to which MFIs

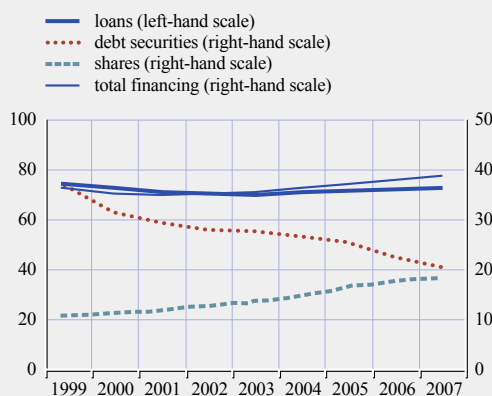**Chart 3 Share of loans granted by MFIs in total loans to non-MFIs**

(percentages)

— loans to households and non-financial corporations
⋯⋯ loans to non-MFIs
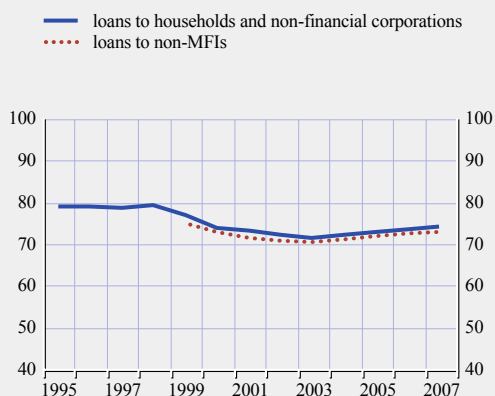
Source: ECB.

**Chart 4 Share of total credit granted by MFIs in the total financing of non-MFIs**

(percentages)

— loans (left-hand scale)
⋯⋯ debt securities (right-hand scale)
--- shares (right-hand scale)
— total financing (right-hand scale)

Source: ECB.
Note: Data are corrected for valuation effects.

contributed to the overall financing of non-MFIs to be assessed.[21] Outstanding stocks are corrected in order to neutralise valuation effects, by adding up financial transactions to the initial stock. Overall, MFI credit represented about 39% of the total financing of non-MFIs in 2007. While MFIs represented about 73% of loans to non-MFIs, they accounted for only about 20% of both outstanding debt securities and shares issued by non-MFI corporations. In particular, a large part of the non-quoted shares

issued by small unincorporated companies are held by the non-MFI sector, while institutional investors (such as insurance corporations and investment funds other than money market funds) and the rest of the world hold a large part

21 For this exercise, total financing excludes other accounts payable and insurance technical reserves because these financial transactions generally relate to non-MFI entities, and also because data quality for other accounts payable does not appear to be comparable with that for securities and loans.

**Table 2 MFI intermediation ratios (share of MFI credit in the financing of non-MFIs)**

(percentages)

| | Loans to households and non-financial corporations | Loans to non-MFIs | Debt securities issued by non-MFIs | Shares issued by non-MFIs | Total financing of non-MFIs |
|---|---|---|---|---|---|
| 1995 | 79 | | | | |
| 1996 | 79 | | | | |
| 1997 | 78 | | | | |
| 1998 | 79 | | | | |
| 1999 | 77 | 75 | 36 | 11 | 36 |
| 2000 | 74 | 73 | 31 | 11 | 35 |
| 2001 | 73 | 71 | 29 | 12 | 35 |
| 2002 | 72 | 71 | 28 | 13 | 35 |
| 2003 | 71 | 70 | 27 | 14 | 35 |
| 2004 | 72 | 71 | 26 | 15 | 36 |
| 2005 | 73 | 72 | 25 | 16 | 37 |
| 2006 | 73 | 72 | 22 | 18 | 38 |
| 2007 | 74 | 73 | 20 | 19 | 39 |

Sources: ECB and Eurostat.
Note: Underlying data refer to "notional" stock derived as initial stock augmented by annual transactions.

of debt securities, especially government bonds, issued by the non-MFI sector.

A slight increase in the MFI intermediation ratio was reported over the period from 1999 to 2007 (from 36% to close to 39%), mainly owing to an increase in the holding of shares by MFIs, whereas the contribution of MFI loans declined slightly (from 75% to 73%) and that of debt securities held by MFIs fell (from 36% to 20%), probably reflecting the relative appetite for euro area government bonds on the part of non-residents after the introduction of the euro.

# 4 ASSESSING SECTORAL BALANCE SHEETS

As a complement to the monetary analysis, the ECB also assesses the risks to price stability on the basis of a thorough economic analysis. In substance, the economic analysis "focuses mainly on the assessment of current economic and financial developments, and the implied short to medium-term risks to price stability from the perspective of the interplay between supply and demand in goods, services and factor markets at those horizons […]".[22]

Economic variables that are the subject of this analysis include (but are not restricted to) output, aggregate demand, fiscal policy, price and cost indicators, exchange rates and global developments, and developments in the financial markets. The financial accounts provide a natural framework for studying the role of financial variables in real activity in the euro area through the "balance sheet positions of euro area sectors". For instance: (a) sectors' earnings are directly affected by the accumulation of financial assets and liabilities (via interest and dividend payments); (b) asset valuation effects may boost confidence and earnings expectations; and (c) over-indebtedness may create financial constraints affecting investment and consumption decisions.

This section will elaborate on the three major aspects of these relationships: the interrelation between financial investment, capital formation and saving; the quantification of wealth effects; and the assessment of sectoral financial positions.

Given the nature and availability of the financial account data as described in Section 2, the analysis is largely descriptive, based on stylised facts and graphical presentation. The purpose is to provide a broad description of the balance sheet positions of sectors and the implications for activity and risks. The analysis is put in a historical perspective, based on a first published estimate of sector financial balance sheets of the euro area (or of the Member States for the pre-EMU period) from 1980 to 2007.

The use of flow-of-funds data is appropriate for such analysis owing to their comprehensiveness. Once total financial investment (or financial wealth) is ascertained, more robust conclusions can be drawn than would be possible based on partial data. For instance, total financial assets and liabilities must be taken into account in order to assess the erosion of financial wealth owing to inflation or in order to compare mortgage debt with financial assets.

## 4.1 FINANCIAL INVESTMENT, REAL INVESTMENT AND SAVING

National accounts show the allocation of the disposable income of economic agents (aggregated at the sector level) between consumption and saving. In turn, gross saving is allocated between gross capital formation and financial investment. Using a broader portfolio approach, the different decisions on investment and liabilities can be regarded as taking place simultaneously,[23] as agents allocate their cumulated savings across different types of asset classes, according to differences in returns, risks and liquidity. This section illustrates how flow-of-funds data can help to analyse the interrelation between real investment, financial investment and saving. On the basis of flow-of-funds data available from 1995 and estimates based on national data for the largest euro area countries (Germany, Spain, France and Italy) prior to 1995, it is possible to draw a picture of long-term developments in real and financial investment of the private sector.

### 4.1.1 HOUSEHOLDS
Flow-of-funds data can be used to gain a better understanding of developments in households' saving and investment and, in particular, two key issues: the effect of inflation on the household saving ratio and the interrelation between housing debt, residential investment and house prices.

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22  See ECB (2003).
23  See Tobin (1969).

### Inflation and households' saving

Chart 5 shows the development of the (backward estimated) financial investment and real investment of euro area households since 1980.[24] It shows a sharp decline in households' financial investment as a share of GDP from the start of the 1980s to the mid-1990s, while real investment (capital accumulation, mainly composed of housing) remained broadly stable. This can be largely explained by the disinflation trend over the period considered, which has tended to reduce the volume of financial investment compared with real investment. In periods of high inflation, part of the increase in households' financial investment simply "compensates" for the erosion of the value of financial assets. Typically, in capitalisation schemes where interest receipts are automatically reinvested (as in some mutual fund shares invested in bonds), nominal interest rates incorporate an inflation risk premium to cover the erosion of financial assets. In this case, higher nominal interest rate receipts translate into higher financial investment, leading to a higher ratio of financial investment to GDP.

Different series of financial investment corrected for the erosion of net financial assets by inflation can be constructed. Chart 6 shows

three of these measures. In the first measure, the erosion is derived by multiplying the net stock of financial assets held by households (financial assets minus debt) by the growth rate of the Harmonised Index of Consumer Prices (HICP). A second measure is derived by applying the nominal long-term interest rate to the net stock. This method has the advantage of incorporating the additional risk premium required by the creditor in a period of high inflation, implying uncertainty about future inflation. However, not all assets and liabilities of households bear such long-term market interest rates (some assets bear interest rates fixed in the past which may not correspond to the current inflation rate and therefore may not fully compensate for the erosion of the net financial assets). To account for this, the third measure consists of simply deducting the net interest receipts of households from their financial investment.[25]

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24 Financial investment data from 1995 are based on official annual financial account data (Eurostat). Financial investment prior to 1995 is estimated based on country data on financial accounts and net lending. Real investment figures are based on non-financial accounts data (Eurostat).

25 The last two measures overstate the erosion of financial assets due to inflation, since the nominal interest includes a component which is independent from inflation (the real interest rates corresponding to the normal real return on risk free assets), but these measures are relevant in a study of the dynamics.

**Chart 5 Financial investment and real investment of households**

(percentages of GDP)

— real investment
····· financial investment
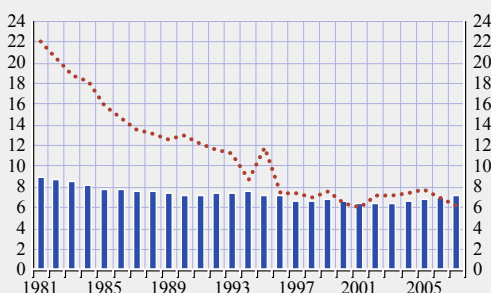
Sources: ECB and Eurostat.
Note: Financial account data prior to 1995 are estimates based on country backdata.

**Chart 6 Financial investment corrected for the erosion of net financial assets by inflation**

(percentages of GDP)

— financial investment
····· financial investment minus inflation times net assets
--- financial investment minus nominal interest rates times net assets
— financial investment minus net interest receipts

Sources: ECB, Eurostat, annual financial accounts and authors' calculations.
Note: Financial account data prior to 1995 are estimates based on country backdata.

Sources: ECB, Eurostat and authors' calculations.
Notes: The saving ratio prior to 1995 is estimated. The erosion of net financial assets by inflation is derived as the HICP inflation rate times interest-bearing net assets.

**Chart 8 Sources of growth in the financial assets of households**

(percentages of GDP)

■ debt (left-hand scale)
▥ net lending (left-hand scale)
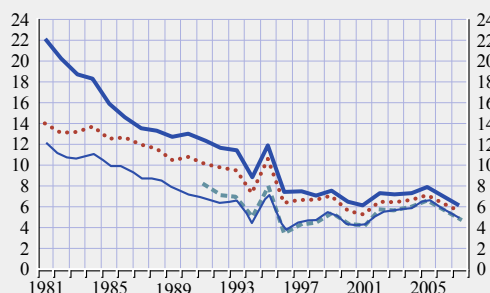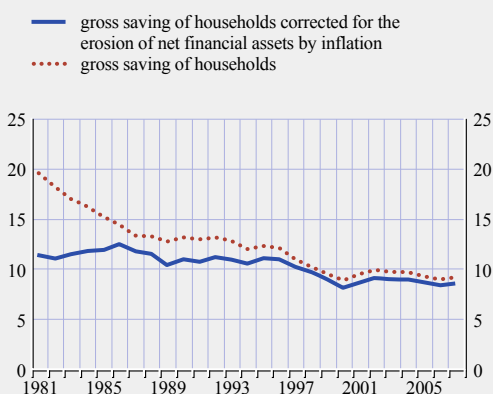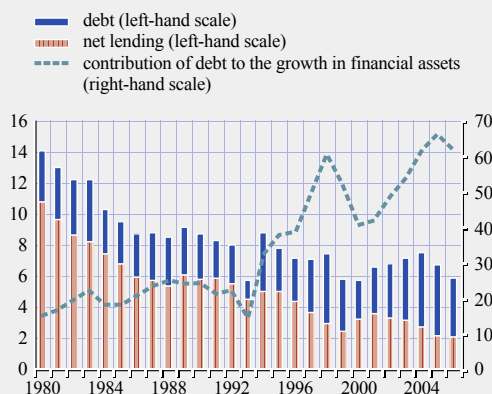┅ contribution of debt to the growth in financial assets
   (right-hand scale)



Sources: ECB and Eurostat.
Note: Financial account data prior to 1995 are estimates based on country backdata.

All three measures suggest that the decline in household financial investment since the start of the 1980s was largely due to the effects of inflation. The same phenomenon also helps to explain the long-term decline in the saving rate of the household sector since the beginning of the 1980s, owing to the reduction in nominal interest receipts (see Chart 7).

**Households' saving, investment and housing**

A second area in which flow-of-funds data can be of use for the analysis of households' saving and investment concerns the impact of housing transactions. From 1999 to 2007 households sharply increased their indebtedness in order to finance house purchases. Most of the transactions took place on the secondary housing market, that is, mainly within the household sector. This resulted in an increase in both debt and financial assets held by the household sector. As shown in Chart 8, debt incurrence contributed more than net lending (the excess of saving over consumption), to the rise in the financial investment of households.[26]

Analysing financial and real investment helps to understand the phenomenon of "mortgage equity withdrawal" (MEW) by households. MEW takes place whenever households extract liquidity

from their housing wealth, and use it for different purposes (to buy consumption goods; to increase financial assets; or to repay loans). MEW can occur through different channels, for instance, whenever a seller of a house does not use the proceeds to buy a new house (the "last-time" seller) or buys a smaller one (the "down-trader"). Households may also borrow more than the value of their housing acquisitions; or take out additional loans on their housing in order to draw on valuation gains.[27] The latter practices are relatively developed in Anglo-Saxon countries, and also in the Netherlands. However, even in these countries, studies indicate that the effect of MEW on consumption appears to be limited.[28]

At the macroeconomic level, the amount of MEW can be gauged by calculating the difference between the mortgage debt taken out

26 Net lending equals the purchase of financial assets minus debt incurrence, so that the purchase of financial assets can be derived as the sum of net lending (the balance of saving minus gross capital formation) and debt incurrence.

27 See Davey (2001) for details on MEW in the United Kingdom.

28 Benito and Power (2004) report that the effect of MEW on consumption is not significant in the United Kingdom, while De Nederlandsche Bank (2003) suggests that it may have been important in the Netherlands in the period from 1999 to 2003. Also, responses to the July 2006 ECB bank lending survey did not suggest that MEW was widely used in euro area countries.

by households (plus additional housing grants or subsidies) and the net housing investment of households.[29] The excess of households' borrowing over their actual housing purchase is a "net equity withdrawal" by households, which is used for other purposes. However, caution should be used in the interpretation of this measure. In fact, the bulk of mortgage loans appear to have been used to finance transactions on the secondary market (that is, households buying existing houses, mainly from other households), while net housing investment only refers to additional housing stock (essentially newly built houses and those bought from other sectors, such as corporations or insurance companies).[30] Therefore, the measure of MEW covers both "active" MEW (liquidity deliberately extracted to be spent on consumption goods or to build up financial assets) and "passive" MEW, for instance temporary hoarding of cash by the sellers of housing in the secondary market before they make a new acquisition.

Looking at national account figures in the euro area, the steady growth of the housing debt of the euro area household sector over recent years has indeed been accompanied by an increase in their financial assets, but has only been accompanied by a weak recovery in gross capital formation. The growth of household debt also contrasted with subdued development in consumption, suggesting that the "active" channel of MEW for consumption purposes does not seem to play an important role in the euro area as a whole.

The question then arises of why the sellers of housing tend on average to keep their wealth in the form of financial assets rather than using it for consumption or to acquire another house. This could reflect an increase in the proportion of last-time sellers investing in financial assets to finance their retirement and the future cost of care in old age. However, in the absence of more accurate micro-information, the most obvious answer is that sellers of housing (who invest the proceeds in financial assets) temporarily hoard the proceeds from their sales in the form of financial assets before making a new acquisition. Moreover, even if last-time

sellers (typically older households retiring) and down-traders (selling bigger houses to buy smaller ones) have to repay existing loans, these should normally be smaller than the new loans taken out by new buyers, owing to the rise in housing prices over time.[31] Transactions on the secondary market necessarily entail the constitution of a fluctuating volume of financial assets at an aggregate level due to lags between sales and new acquisitions. This volume will logically increase with a rise in housing transactions and/or in property prices. In addition, the current context of low interest rates may reduce the incentive for housing sellers to use the proceeds to repay other loans, as an alternative to hoarding financial assets. Distributional effects may also arise, as some last-time sellers or down-traders are simply not indebted, or are only marginally indebted. Overall, flow-of-funds data suggest that the contemporaneous rise in housing debt, housing prices and financial assets of households in recent years seems to mainly reflect a phenomenon of nominal expansion in a growing property market.

The use of flow-of-funds data provides a more accurate insight into the interaction between mortgage debt and financial assets than can be obtained from less comprehensive data. Microeconomic surveys fail to gauge the extent of MEW, while some macroeconomic, but partial, measures would lead to false conclusions. For instance, comparing housing investment and new mortgage debt would entirely omit financial flows stemming from transactions on the secondary market which are not reported in macroeconomic data. By contrast, comparing households' total increase in indebtedness, which is mainly for the purpose of house purchase, to the increase in total financial investment of households leads to a very robust conclusion. As loans have been taken out to finance house purchases mainly on the

29 See for instance the calculation by the Bank of England (statistics section of its website). See also Debelle (2004).
30 This second component (housing bought from other sectors) is, however, in net terms relatively small. Available data on sectors' non-financial wealth suggest that most housing wealth is held by households.
31 See Broadbent (2005).

**Chart 9 Financial and real investment of non-financial corporations**
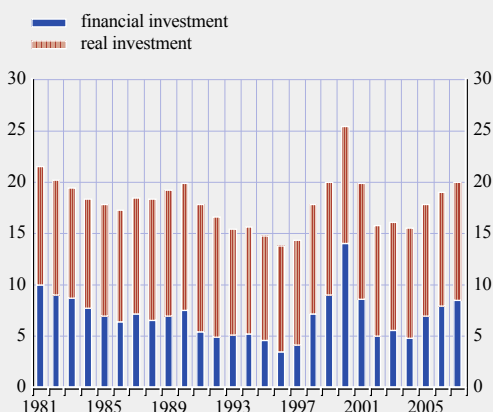
(percentages of GDP)

■ financial investment
▦ real investment



Sources: ECB, Eurostat, annual financial accounts and authors' calculations.
Note: Financial account data prior to 1995 are estimates based on country backdata.

secondary market, it is no surprise that the total financial investment of households, being the sellers of most housing on the secondary market, has increased. Flow-of-funds data allow the story to be told in a straightforward and simple way, whereas less comprehensive data would not.

**Chart 10 Financing gap and financing of non-financial corporations**

(percentages of GDP)

■ financing gap of non-financial corporations
▦ liabilities of non-financial corporations
--- liabilities minus financing gap
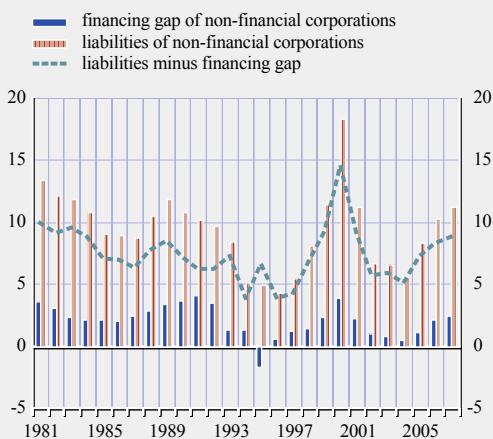


Sources: ECB and authors' estimations.
Notes: The financing gap (or net borrowing) is equal to the difference between gross capital expenditure and gross saving. Data prior to 1995 are estimated.

**4.1.2 NON-FINANCIAL CORPORATIONS**

The exceptional rise in the financial investment of non-financial corporations in the period from 1998 to 2001 corresponded to a wave of mergers and acquisitions, and especially acquisitions of foreign firms by euro area companies. As can be seen from Chart 9, financial investment underwent a strong increase in 1999-2001 with the surge in corporate acquisitions in that period, while real investment has been much more stable over the same period. Financial acquisitions by non-financial corporations were mainly financed through the issuance of debt and equity, so that the difference between external financing and the financing gap increased to very high levels (see Chart 10).

**4.2 WEALTH EFFECTS**

Changes in the valuation of real and financial wealth of agents may modify their propensity to consume or invest. This section attempts to quantify possible wealth effects with regard to households at the euro area level, based on the non-financial and financial accounts. The purpose of this evaluation is not to re-examine the propensity to consume out of wealth in the euro area,[32] but, taking it as a given based on the results of recent studies, to quantify developments in the wealth effect with regard to households in recent years. This evaluation differs from previous studies, as it focuses on the euro area as a whole and from a medium-term perspective (28 years of data).

Chart 11 shows the development of financial wealth and housing wealth from 1980 to 2005.[33] First, it signals continuing growth in the ratio of total wealth to disposable income over the period, from nearly 4 times in 1980 to around 7 times in 2007. In particular, households' holdings of equity have significantly increased, partly owing to strong valuation effects in the 1990s. Among shares, households have increasingly favoured the purchase of mutual

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32 See Altissimo et al. (2005).
33 Housing wealth series are based on ECB estimates (see ECB, 2006b).

fund shares in the last decade, at the expense of direct holdings. By contrast, households' holdings of deposits and currency as well as debt securities have tended to decline in relative terms, as households have diversified their investment towards more profitable financial assets. Households' investment in insurance products remained relatively sizeable over the whole period.

Chart 12 suggests that in 2007 households' financial wealth in the euro area (as a percentage of GDP) was clearly lower than in the United States, the United Kingdom and Japan. However, housing wealth accounted for a larger part of households' wealth than in the United States and Japan. Differences with the United States could be explained by the greater importance of pay-as-you-go public pension schemes in the euro area, leading to the accumulation of lower levels of financial assets by euro area households. Moreover, a larger proportion of households' financial wealth in the United States is composed of shares, which benefit in the long run from higher valuation increases. However, the higher net lending of euro area households compared with the United States in recent years, resulting from higher

saving rates, has tended to reduce the difference in the financial wealth of households between the two areas.[34] Furthermore, when households' debt is deducted, the net wealth of households thus derived is much higher in the euro area than in the United States, as a percentage of GDP, and comparable to that in the United Kingdom and Japan.

The literature agrees on the existence of a positive correlation between the wealth of households and their consumption, although its impact is difficult to ascertain accurately. This effect is likely to be greater insofar as it is perceived by households to be lasting, or as the assets held are more liquid and can be used for consumption. In the case of housing wealth, an increase may not have an immediate impact on owner-occupier households, although in some countries they may be able to cash in on the rise in the value of their houses through mortgage equity withdrawal. Conversely, a rise in housing prices may push up rents, therefore having a negative effect on the disposable income of tenants. Rising house prices may also encourage future buyers to save in order to afford higher

34  See ECB (2004a).

Chart 11 Households' wealth in the euro area

(percentages of disposable income)
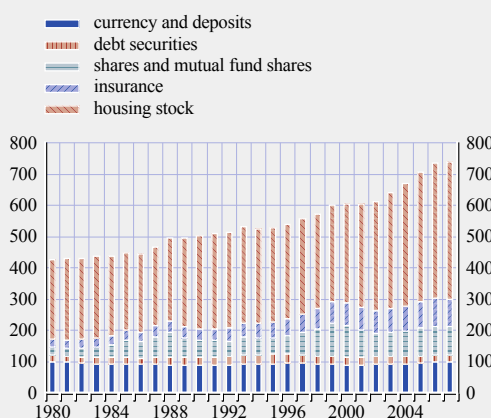

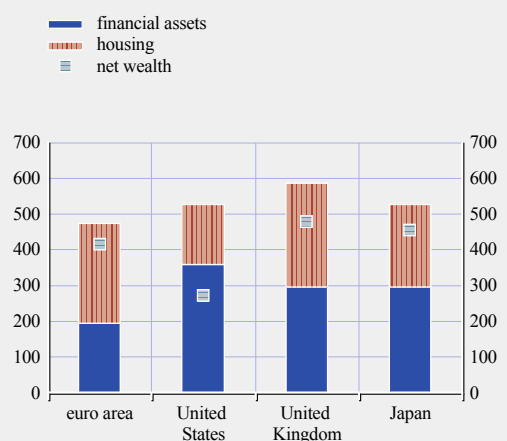
Sources: ECB, Eurostat and authors' estimations.
Notes: Prior to 1995, financial account data are estimated. Housing stock is an ECB estimation.

Chart 12 Households' wealth in some industrialised countries in 2007

(percentages of GDP)



Sources: ECB, Eurostat, OECD and ECB calculations.
Notes: Housing stock for the euro area is an ECB estimation. For Japan, the housing stock refers to 2006.

potential down payments or repayment flows, therefore decreasing their spending on consumption. Analysis carried out with regard to the United States generally concludes that housing valuation gains had a positive wealth effect on consumer spending in the 1990s.[35]

Estimations of the marginal propensity to consume (MPC) out of wealth are surrounded by considerable uncertainty.[36] Nevertheless, the elasticity of consumption to wealth is likely to have increased as a consequence of a higher ratio of wealth to consumption, as implied by the following equation:

$$E_{c/w} = [\Delta C / C] / [\Delta W / W] = MPC_{c/w} \times [W / C] \quad (2)$$

Where $E_{c/w}$ is the elasticity of consumption to wealth, $MPC_{c/w}$ the marginal propensity to consume out of wealth, $C$ the level of consumption and $W$ the level of wealth.

We are assuming a constant MPC of 3% of wealth, which corresponds approximately to the weighted average of estimates of the MPC out of wealth from several recent studies based on euro area data, as reported in Altissimo et al. (2005). Applying this figure to the development of the stock of households' wealth, the elasticity of consumption to wealth is found to have steadily increased since the start of the 1980s (see Chart 13). Other assumptions lead to the same conclusion.
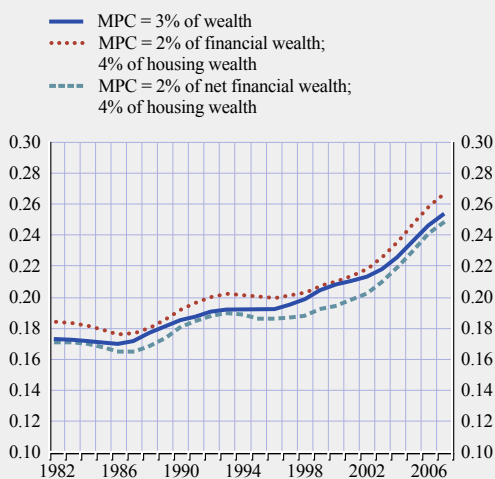
## 4.3   SECTORAL INDEBTEDNESS

Flow-of-funds data are used in the regular monitoring by the ECB of the financial position of non-financial sectors. Such monitoring is reflected notably in the quarterly issues of the ECB Monthly Bulletin and in the ECB Financial Stability Review. Nonetheless, this section describes the main indicators used for the monitoring of the financial position of households and non-financial corporations.

### 4.3.1 HOUSEHOLDS
Chart 14 shows the long-term developments in household sector debt as percentages of

**Chart 13 Elasticity of households' consumption to wealth assuming various constant MPCs**

(percentages of disposable income)



- MPC = 3% of wealth
- MPC = 2% of financial wealth; 4% of housing wealth
- MPC = 2% of net financial wealth; 4% of housing wealth

Sources: ECB and authors' estimations.

disposable income, financial wealth and total wealth of the sector in the euro area. While the ratio of debt to disposable income has increased steadily since the early 1980s, the rise in the ratio of debt to financial assets has been much smaller. This reflects the fact that the bulk of households' debt has been used to acquire housing from other households and, to a lesser extent, to invest in new housing, for consumption or to purchase housing from other sectors. When households buy housing from other households, either it is financed by the sale of financial assets and the overall stock of financial assets held by households remains constant, or it is financed by debt and the stock of financial assets increases by the same magnitude as the debt incurred. The ratio of debt to total wealth of households is derived from the ratio of debt to financial assets by adding up housing wealth in the denominator. In that case, the ratio is unchanged even if households borrow to invest in new housing or to purchase housing from other sectors. This

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35 See for instance Maki and Palumbo (2001) and Dynan and Maki (2001).
36 For a review of different studies on wealth effects, see Altissimo et al. (2005). The studies were published from 1998 to 2005.

## Chart 14 Households' leverage ratios

(percentages)

- debt to disposable income (left-hand scale)
- debt to financial assets (right-hand scale)
- debt to total wealth (right-hand scale)



Sources: ECB, Eurostat and authors' calculations.
Note: Financial account data prior to 1995 are estimated.

estimated to have fluctuated between 9% and 10%, reflecting diverging trends: an increase in the sector's indebtedness and, therefore, in reimbursement flows,[37] and a long-term decline in interest rates (and consequently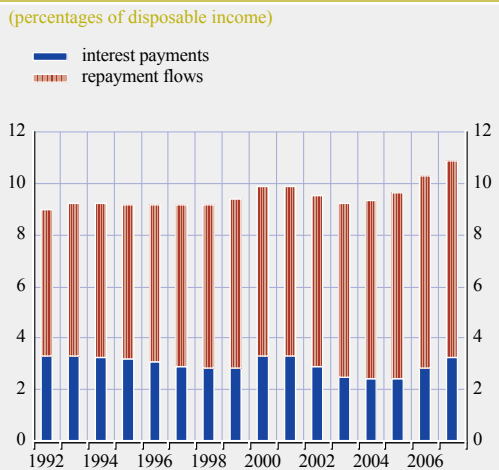 in interest payments). However, in 2007, the latest year for which data are available, the debt service burden of households is estimated to have risen to 11% of disposable income. This reflects both the continuous rise in households' debt and the increase in interest rates.

Households' net interest receipts have declined steadily since the start of the 1990s, owing to the structural decline in interest rates.[38] Chart 16 suggests that, corrected for the erosion of their financial assets owing to inflation, households' net interest receipts started to decline only in 1995. In the early 1990s the reduction in households' net interest receipts was more than

ratio has been remarkably stable since 1980 (between 11% and 13%), which is in line with the fact that households borrow mainly for house purchase, either through the secondary market or through investment in new housing.

As illustrated in Chart 15, over the period between 1991 and 2006 the total debt servicing burden of the euro area household sector is

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[37] The estimation of the rise in the repayment obligation accompanying the rise in debt is based on the assumption that the duration of mortgage loans remains stable. However, in some countries, the lengthening of the loan duration has had the effect of reducing the ratio of annual repayments to total loans, thus partly or fully offsetting the effect of the rise in the debt level on repayment flows.

[38] From 1995 interest payments and receipts are calculated net of FISIM (financial intermediation services indirectly measured).

## Chart 15 Total debt servicing burden of the household sector

(percentages of disposable income)

- interest payments
- repayment flows



Sources: ECB and ECB calculations.

## Chart 16 Households' net interest receipts
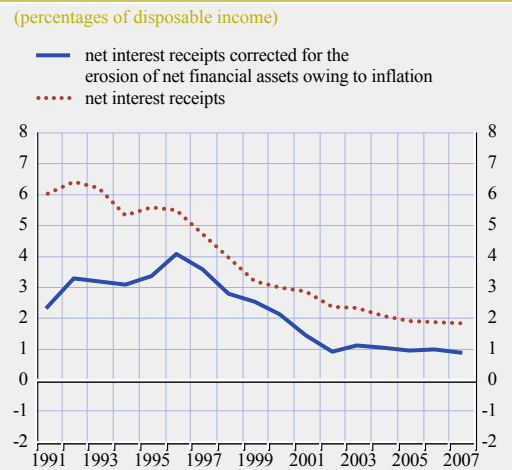
(percentages of disposable income)

- net interest receipts corrected for the erosion of net financial assets owing to inflation
- net interest receipts



Sources: ECB and Eurostat.
Notes: Financial account data prior to 1995 are estimated. Erosion owing to inflation refers to the HICP inflation rate applied to net financial assets.

(percentages of disposable income)

- gross interest payments corrected for the
  erosion of debt owing to inflation
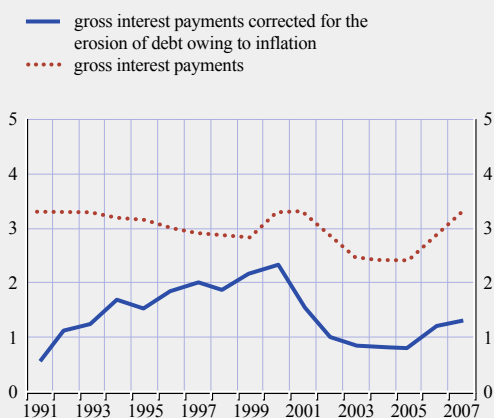- gross interest payments

Sources: ECB and Eurostat.
Notes: Financial account data prior to 1995 are estimated. Erosion owing to inflation refers to the HICP inflation rate applied to households' debt.

Chart 18 Leverage ratios of non-financial
corporations

(percentages)

- debt to financial assets
- debt to net worth
- debt to GDP
- debt to equity

Sources: ECB, Eurostat and authors' estimations.
Note: Prior to 1995 debt and leverage ratios are authors' estimations. Net worth is understood here as the sum of financial and non-financial assets minus debt (which differs from the ESA 95 definition).

compensated by the reduction in the erosion of households' financial assets owing to inflation.[39] Likewise, gross interest payments corrected for the erosion of debt owing to inflation only started to decline in 2000, before increasing again from 2005 in conjunction with the rise in both debt and interest rates (see Chart 17).

### 4.3.2 NON-FINANCIAL CORPORATIONS

Excessive corporate indebtedness is likely to increase the vulnerability of firms in the event of a shock and may impair their repayment capacity. Several leverage ratios can be monitored, such as debt to GDP, debt to earnings (operating surplus), debt to assets and debt to net worth (see Chart 18 and Table 3).

The debt of non-financial corporations as a percentage of GDP has increased to unprecedented level since the mid-1990s, owing to the financing of major mergers and acquisitions in a context of historically low interest rates. By contrast, as a percentage of financial assets or equity, corporate leverage ratios effectively declined during the 1990s, confirming the use of debt by companies to finance corporate acquisitions, and the substantial rise in equity valuation over the period. The ratio of debt to equity of non-financial corporations

may in theory be used as an alternative to debt to net worth,[40] since, in a perfect and transparent market, the value of shares would represent the evaluation by the market of the net worth of companies (defined as the difference between total wealth and debt).[41] However, no such co-movement between the two variables has been apparent based on aggregate financial accounts. While the ratio of debt to equity has decreased since the start of the 1980s, the ratio of debt to net worth has been much more stable over the period.

39 The erosion of households' net financial assets owing to inflation is calculated as the HICP rate of growth times the sum of the assets bearing interest (deposits; debt securities; mutual fund shares investing in interest-bearing assets; and insurance reserves) minus debt.

40 This applies when net worth is defined as the sum of financial assets and non-financial assets minus debt (according to the US flow-of-funds definition) and not as the sum of financial and non-financial assets minus all (debt and shares) liabilities (according to the ESA 95 definition).

41 Note that this definition of net worth (applied in the US flow-of-funds data) differs from the definition used in the euro area financial accounts. In the latter (which comply with the ESA 95), net worth is defined as the difference between total assets and total liabilities (including shares) of the sectors. In the US flow-of-funds data, direct investment in US companies is also deducted from net worth. The net worth used in US flow-of-funds data corresponds therefore to the net worth of companies owned by US residents. See the Board of Governors of the Federal Reserve System (2001).

**Table 3 Non-financial corporations' leverage ratios (based on balance sheet figures)**

(according to the ESA 95, unless otherwise indicated)

| Assets | | Liabilities | |
|---|---|---|---|
| D | Non-financial assets | A | Shares and other equity |
| E | Shares and other equity | B | Debt |
| F | Financial assets other than equity and other accounts receivable | C | Other accounts payable |
| G | Other accounts receivable | | |

| Indicators | Definition (cf. Table 1) |
|---|---|
| Gross debt | B |
| Net debt | B-(F+E+G-C) |
| Debt to financial assets | B/(F+E+G-C) |
| Debt to equity | B/A |
| Net financial position | (E+F)-(A+B)+(G-C) |
| Net worth (ESA 95 definition) | (E+F)-(A+B)+(G-C)+D |
| Net worth (US flow-of-funds definition) | (E+F)-B+(G-C)+D |

Notes: Unless otherwise indicated, these indicators are typically used in the flow-of-funds analysis at the ECB, but other definitions of items may of course be envisaged. For instance, accounts payable may be added to debt, whereas, in the current ECB analysis, the net result of other accounts receivable minus other accounts payable is usually added to financial assets partly owing to data quality issues (the quality of the data on other accounts payable/receivable is more variable than data on other items). In the ECB analysis, debt includes pension fund reserves included in the liabilities of non-financial corporations (a relatively minor item).

Indicators of debt service capacity, such as the ratio of debt service payments to income, a macro-level equivalent of the ratio of interest expenses to earnings, help to measure the

adequacy of cash flow, or the risk that firms may be unable to meet required payments out of their income.[42] A comprehensive approach to debt servicing should account for net flows of interest payment/receipts and also for the effects of erosion owing to inflation on the real value of net interest-bearing assets. The decline in nominal interest rates (and, consequently, in interest payments) in European countries since the start of the 1990s has been accompanied by a corresponding reduction in the (estimated) erosion of net assets/net debt owing to inflation (see Chart 19) so that overall the decline in the net interest payment burden of corporations has been limited during this period.

**Chart 19 Ratio of the net interest payment burden of non-financial corporations to GDP**

(percentages)



— net interest payments corrected for the erosion of net financial assets owing to inflation
···· net interest payments
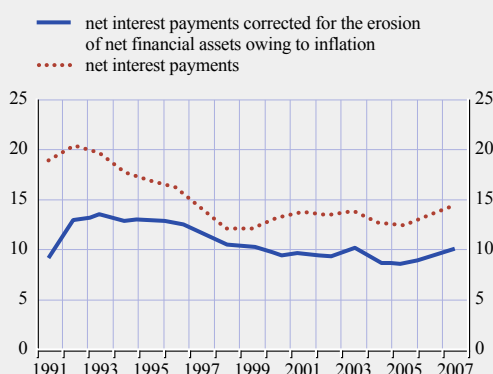
Sources: ECB and Eurostat.
Notes: Prior to 1995 interest payments are ECB estimates based on national data. Erosion owing to inflation refers to the HICP inflation rate applied to net financial assets bearing interest.

42 See also Bê Duc et al. (2005).

# 5 ASSESSING FINANCIAL STABILITY

Financial system stability "requires that the principal components of the system – including financial institutions, markets and infrastructures – are jointly capable of absorbing adverse disturbances. It also requires that the financial system facilitates a smooth and efficient reallocation of financial resources from savers to investors, that financial risk is assessed and priced accurately, and that risks are efficiently managed".[43]

According to this definition, financial stability does not depend on the situation of the sector of financial institutions alone, but on the financial system as a whole, encompassing markets (i.e. transactions between counterparts for each type of instrument traded) and infrastructures (the environment in which transactions take place, linking together market participants, such as the payment systems infrastructure).

In line with this, financial supervision has increasingly relied on a forward-looking assessment of the soundness of the financial system in order to identify potential vulnerabilities at an early stage.[44] This entails not only micro-prudential analysis, concentrating on individual financial institutions, but also a macro-prudential dimension, whereby the overall soundness and vulnerability of the financial system is assessed through qualitative and quantitative monitoring of macroeconomic variables. Analytical tools and concepts have been developed by international organisations, such as the financial soundness indicators of the International Monetary Fund (IMF).

The set of macro-prudential indicators (MPIs) monitored by the ECB[45] can be divided into three sub-categories: indicators of the banking sector's financial health, indicators of external factors (such as the financial fragility of non-financial sectors) and contagion indicators. MPIs in the first category are essentially derived using the existing prudential supervision data collection systems, but also rely on EU harmonised macroeconomic monetary statistics for the assessment of the risk concentration of the banking sector. Contagion indicators aim to capture the interbank market linkages between banks from different countries at the aggregated level. General information on concentrations, major market players and volumes of interbank deposits and liabilities is included; detailed information on connections between individual banks would ideally be required. Financial account statistics are the main source used to compile financial fragility indicators for the non-financial sectors.

Such analysis is relevant because of the link between the financial health of the non-financial sectors and the risks borne by financial corporations. The quality of financial institutions' loan portfolios is directly dependent on the financial condition of the non-financial borrowers (non-financial corporations and households). Therefore, the monitoring of the debt servicing ability and the sustainability of the indebtedness positions of the non-financial sectors is crucial to identify at an early stage any build-up in vulnerability. The flow-of-funds data are used in the regular monitoring of the financial position of non-financial sectors in the bi-annual ECB Financial Stability Review. In particular, indicators of the sustainability of the debt of the non-financial sectors are monitored, such as the sector's gross indebtedness, relative to the sector's income or to GDP, or the debt servicing ratios (interest payments as a ratio of income), as it is widely acknowledged that an excessive growth in debt accumulation of the non-financial sectors may signal future financial distress of banks. Such indicators are detailed in Section 4.3 (see in particular Charts 14, 15, 18 and 19).

The flow-of-funds framework can also be useful for the financial stability analysis by helping to monitor developments over time in financial patterns, which can potentially have a bearing on financial system stability by laying the foundations for future vulnerabilities.

43  See ECB (2006a).
44  See IMF (2004).
45  See Mörttinen et al. (2005).

A change in the pattern of financial intermediation towards or away from the MFI sector (as shown by the total assets of MFIs relative to non-MFIs, or the importance of bank lending compared with the market financing of companies) has important implications for the financial sector. For instance, a shift of corporate financing from MFI loans to securities, or a shift of households' financial assets from MFI deposits to direct holdings of bonds and shares, and/or indirect holdings via life and pension funds and other financial intermediaries (mutual funds) would have an effect on the balance sheet of the financial sector and implications for the market risk borne by the non-financial sectors. For instance, the development in the composition of households' wealth in the euro area (see Chart 11 in Section 4.2) shows an increasing proportion of shares and housing in recent years, partly driven by valuation effects, which may raise the sensitivity of households' balance sheet to variations in market prices.

Flow-of-funds analysis may reveal specific developments in financial innovation that potentially have implications for financial stability (for instance, an increase in securitisation operations can be revealed through a rise in loans granted by other financial intermediaries, together with an increase in debt securities issued by corporations).

Finally, the flow-of-funds framework can be used to assess the vulnerability of the financial sector to large shocks and the degree of systemic risk. Under the flow-of-funds framework, which relates all sectors at the aggregated level, it is possible to identify not only financial income flows across sectors (dividends and interest payments), but also cross-sector risks and potential channels of crisis diffusion based on stress scenarios. Such use of the flow-of-funds framework for financial stability assessment has so far not been developed to any great extent at the ECB, as it would require further who-to-whom information, especially on securities holdings.

Despite the useful information they provide, flow-of-funds statistics do not suffice for a robust macro-prudential analysis.

First, as indicated in Section 1, the usefulness of flow-of-funds statistics for financial stability analysis lies in the fact that they are comprehensive and aggregated statistics. However, they obviously need to be complemented by further information on the nature of risks, the quality of assets, the exchange rate risks, the size of borrowers and the mechanism for transferring risks across entities, as embedded for instance in some derivatives products or in insurance contracts. Moreover, the aggregation of the main economic sectors into broad categories means that intra-sector transactions and risks are overlooked. For instance, a rise in households' debt (mainly for house purchase purposes) may be matched by a rise in the financial assets of households (last-time sellers of housing), but this relatively balanced picture at the aggregated level may conceal growing imbalances at the sub-sector level. Likewise, a large volume of inter-MFI transactions will result in an increase in the assets and liability of MFIs without much significant effect on the degree of risks generated by the sector as a whole. Another limitation of aggregated data is that they overlook composition or distribution effects, which may be very important for detecting the nature of risks in the economy, e.g. to what extent risks are concentrated among a limited number of institutions; to what extent excessive borrowing is concentrated among a certain class of household, etc. In addition, flow-of-funds statistics, as part of the national accounts, report data on resident units. This means that branches and subsidiaries are treated as reporting institutions in the country where they are located, whereas consolidated reporting of branches may be preferred for assessing the risks effectively borne worldwide by resident MFIs.[46] Finally, flow-of-funds data are based on

46 See Mink and Silva (2003).

the ESA 95 national account standards, in which assets and liabilities are valued at the market price (or an approximation), whereas other valuation methods may be deemed more suitable for the assessment of financial stability. For instance, the distinction between the bank portfolio (at historical prices) and the trade portfolio (at the market value, depending on the time horizon or investment strategy of the investor), may be considered more appropriate for supervisory purposes.

Overall, flow-of-funds data provide a unique overview contributing to the assessment of major financial risks, the financial interrelation across sectors and the link, at sector level, between financial and non-financial activity. Nevertheless, they need to be complemented, especially in the case of the MFI sector, by additional micro-information (at the individual institution level or at the intra-sector level).

## 6 FLOW-OF-FUNDS PROJECTIONS

The comprehensive structure of flow-of-funds data and their links with the non-financial accounts offer a framework for the analysis of financial interactions, exploiting the underlying accounting identities. For instance, the balance of transactions for a given instrument on the asset side across all sectors should match the balance of transactions on the liability side; the sum of the net lending of the domestic sectors should equal, with the opposite sign, that of the rest of the world; the balance between financial investment and the incurrence of liabilities in the financial accounts should equal the balance between gross saving and gross capital formation in the capital account.

The flow-of-funds matrix is therefore particularly appropriate for assessing the consistency of a rich set of information. Its use in the context of the flow-of-funds projections regularly produced by the ECB provides a good illustration of this. Furthermore, sensitivity tests assessing the impact of changes in economic variables (such as market interest rates) on financing flows and financial positions of the non-financial sectors can be performed, as is illustrated later in this section.

### 6.1 THE FLOW-OF-FUNDS PROJECTION EXERCISE

Flow-of-funds projections have been regularly produced in the context of the quarterly Eurosystem staff macroeconomic projection exercise since mid-2003. These macroeconomic projections for the euro area have been regularly published since 2000 – first on a bi-annual basis, then on a quarterly basis. [47] Within the economic pillar of the ECB's assessment of risks to price stability, for the purposes of its monetary policy strategy, the Eurosystem staff macroeconomic projections play an important role as a tool for aggregating and organising information on current economic developments. There are three main steps in the production of these projections: first, the setting of assumptions underlying the exercise; second, the derivation of macroeconomic projection figures; and finally the preparation of the report for the Governing Council of the ECB. Flow-of-funds projections have been incorporated into the Eurosystem and ECB staff macroeconomic projections since 2003 and are updated at each round of interactions in the process of producing these macroeconomic projections.

These financial projections combine financial variables within an internally consistent system, which is all the more needed as financial flows are characterised by their relatively high volatility compared with real variables. As noted by Brainard and Tobin (1968), "failures to respect some elementary interrelationships (for instance those enforced by balance sheet identities) can result in inadvertent but serious errors of economic inference and of policy".[48]

The purpose of the flow-of-funds projections is to assess the overall plausibility of the resulting projected financial developments, and to cross-check them with the non-financial projections, in order to identify possible risks stemming from the financial side to key macroeconomic variables. The consistency check introduced by the flow-of-funds projections within a broader system of macroeconomic projections covers three main aspects. First, flow-of-funds projections produce net financial positions for each sector of the economy, which can be compared with those derived from the non-financial projections, that is, the balance between saving and investment. Second, the projection of sectors' financial positions is a necessary step for the derivation of financial income (interest payments and receipts, and dividends) across sectors, which represents a component of their disposable income. Third, flow-of-funds projections provide a complete set of balance sheet indicators (for example, debt-to-income ratios or debt servicing ratios), which may usefully contribute to the discussion on consumption, saving and investment behaviour, and to the risk assessment within the forecasting exercise.

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47  See ECB (2001b).
48  See Brainard and Tobin (1968). See also Taylor (1963).

Overall, the flow-of-funds projections can provide a qualitative assessment of the model-based real projections and thus may offer scope for improving them. In particular, risks to the baseline scenario inherent to financial positions could be identified (for instance related to interest rate risks, credit constraints and wealth effects).

The flow-of-funds framework includes projections for the full set of financial transactions (changes in assets and liabilities) and financial balance sheet positions of the main domestic sectors (households, general government, non-financial corporations and financial corporations) and of the rest of the world (with a structure similar to that described in Table 1). The projections of financial variables are derived from assumptions on interest rates, equity prices, exchange rates and housing prices as well as from the projections of non-financial variables (in particular GDP, business investment, consumption, gross operating surplus and price developments).

The ECB flow-of-funds projections combine projections based on econometric models and judgmental or rule-based projections (developments in some instruments are assumed to continue their trend or converge to their past levels). The forecasting procedures are summarised in Table 4.

Projections for key aggregated financial variables are based on partial equations which have been estimated on a quarterly basis for currency and short-term deposits (including repurchase agreements), long-term deposits, loans to non-financial corporations, loans to households, debt securities issued by (financial and non-financial) corporations, shares issued by (financial and non-financial) corporations and insurance technical reserves. The financial projections also cover annual projections for government financial assets and liabilities and for external assets and liabilities, which are fully consistent with respectively the budgetary and current account projections. A preliminary estimate for the current quarter may be derived in some cases from available monthly data, either relying on an auto-regressive integrated moving average (ARIMA) model or on the basis of the available data for the first two months of the quarter.

**Table 4 Projection techniques for the main variables**

| Variables | Forecasting techniques | Input variables |
|---|---|---|
| MFI loans to non-financial corporations | Model | YEN; MIR; INV; GOS; YED; CBY; INFX |
| MFI loans to households | Model | YER; YED; STR; LTR |
| Short-term deposits and currency with MFIs held by non-MFIs | Model | YER; YED; STR; LTR; OWN; OIL |
| Long-term deposits with MFIs held by non-MFIs | Model | YER; YED; STR; LTR |
| Debt securities issued by non-financial corporations | Model | YEN; CEQ; CBY; SMIR; LMIR; M&A_N |
| Debt securities issued by MFIs | Model | YEN; CEQ; BBY; STR; OWN; M&A_F |
| Debt securities issued by financial corporations excluding MFIs | Model | YEN; CEQ; CBY; BBY; SMIR; LMIR; STR; OWN; M&A_F |
| Quoted shares issued by non-financial corporations | Model | YEN; CEQ; CBY; SMIR; LMIR; M&A_N |
| Quoted shares issued by MFIs | Model | YEN; CEQ; BBY; STR; M&A_F |
| Quoted shares issued by financial corporations excluding MFIs | Model | YEN; CEQ; M&A_F |
| Insurance technical reserves | Model | YEN; LTR |
| General government financial account | Model/Judgmental | Net borrowing; debt projections; privatisations; financing structure; financial investment structure |

Notes: STR = short-term market interest rate; LTR = long-term market interest rate; MIR = real retail interest rate on new business on loans to non-financial corporations; (SMIR = short-term bank lending rate; LMIR = long-term bank lending rate); CBY = interest rates on debt securities issued by non-financial corporations; BBY = bank bond yield; OWN = own rate of M2 plus repurchase agreement; OIL = oil price; INV = real business investment; GOS = nominal gross operating surplus; YEN = nominal GDP; YER = real GDP; YED = GDP deflator; M&A_N = annual flows of intra-euro area mergers and acquisitions of non-financial corporations; M&A_F = annual flows of intra-euro area mergers and acquisitions of financial corporations; CEQ = cost of equity issuance; INFX = inflation expectations (inflation expectations five years ahead from Consensus Economics survey data).

Model-based financial projections may be adjusted on a judgemental basis, in order to account for some exceptional factors. For instance, the very strong growth of loans to non-financial corporations at the end of the 1990s to finance mergers and acquisitions has been followed since 2001 by a period of consolidation (owing to repayment flows), which may not be well forecast by traditional loan models, given the exceptional nature of this phenomenon. Moreover, the boom in demand for mortgage loans in recent years may have created a regime shift which may also not be captured easily by models. A judgmental approach is also used for projections of external financial transactions (essentially portfolio and direct investment), taking into account the projection for worldwide GDP growth, equity price expectations and assumptions on interest rates.

The flow-of-funds projections are constructed in three steps: (a) the projection of liabilities; (b) projections of the financial investment of the domestic sectors; and (c) the derivation of the sector net financial balances. Finally, a cross-check with the non-financial balances is necessary.

First, the system incorporates initial model-based projections of the following key variables, mainly on the liability side: loans; debt securities and quoted shares; deposits; and insurance technical reserves. The projection of the overall financial liabilities of general government is derived from the projection of the debt of general government. Other judgmental and rule-based projections are produced for non-quoted shares, mutual fund shares and inter-company loans.

As a second step, projections of the total financial investment of the domestic sectors are derived from the projection of their total liabilities combined with the projection of transactions vis-à-vis the rest of the world. In the absence of more precise information, the structure of the financial investment of sectors is derived from the past structure of each sector's holdings.

Third, the initial net lending/net borrowing position of each sector is derived as the difference between the projection of the financial assets purchased by each sector and the projection of its financial liabilities.

The net lending/net borrowing position of each sector derived from the financial projections is then compared with its accounting equivalent, the net lending/net borrowing position derived from the non-financial projections (as the difference between gross saving and gross capital formation). A discrepancy generally arises between the two, which may lead to an adjustment of either the assumptions or the projections. In principle, either the financial or the non-financial projections could be adjusted. In practice, the financial projections usually bear most of the weight of the adjustment in order to match the constraint imposed on the net lending/net borrowing position by the real projections. Adjusting the balance of the financial accounts instead of the balance of the non-financial accounts was considered to be a more robust approach in the projection exercises, as financial projections are intrinsically more volatile than the non-financial projections.[49] The adjustment method may take different forms. Judgement "add-ons" may be reviewed to take account of initial differences and reduce them. In practice, a more mechanical adjustment procedure is implemented whereby the difference is allocated across financial transactions according to the relative weight of the respective instruments. More sophisticated adjustment techniques may be considered which take account of the relative volatility of each instrument based on available data, or, when sufficient experience is gathered, based on the record of past forecast errors for each variable.

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49 In particular, the scarcity of data on the financial investment of households and non-financial corporations, in particular in securities, currently prevents it from being properly modelled. These investment data are therefore simply extrapolated from past investment behaviour.

Assumptions and non-financial projections may also be revised, especially in three cases. First, when, for the very short-term horizon, financial data may prove to be more timely than data on non-financial variables (data on loans to non-financial corporations precede data on business investment, and data on consumer credit and housing loans precede data on consumption, housing investment and house prices) and thus contain leading indicator information for the development of GDP and its components. Likewise, short-term developments in public debt may in theory be used on occasion to forecast the net borrowing of general government, even though the existence of significant levels of financial investment in some countries may considerably weaken the link between government deficit and debt. Second, the forecasting of financial investment and liabilities of sectors by type of instrument, as well as assumptions on interest rates, allow the interest payments and receipts of the different sectors to be modelled (see the annex), which may justify on occasion the revision of the initial forecast of sectors' disposable income.[50] Third, the projection of sectors' financial positions may help to identify risks related to financial imbalances, which may be used to revise assumptions, judgement and/or non-financial projections.

Ideally, a complete integration between financial and non-financial projections would result from a joint modelling of the main financial and non-financial projections and from greater harmonisation of the accounting frameworks for the two sets of projections. In practice, however, the construction of completely integrated macro-models does not appear to have been very successful in the past, given the heterogeneity of the dataset, and the difficulty encountered in obtaining evidence of linear links between financial and non-financial variables. Nevertheless, further integration between some financial and non-financial variables would contribute to increasing the overall consistency of the exercise.

## 6.2 IMPACT OF A CHANGE IN MARKET INTEREST RATES ON THE DEBT SERVICE BURDEN OF HOUSEHOLDS AND NON-FINANCIAL CORPORATIONS

The flow-of-funds framework can be used to run simulations to assess the sensitivity of the aggregated balance sheet of economic sectors to various economic shocks. This is illustrated by the following mechanical exercise which aims at assessing the impact of a 1 percentage point change in short-term and long-term market interest rates on the interest payments and receipts of households and non-financial corporations in the euro area over a three-year period. This exercise uses an accounting model to derive the interest payments and receipts of households and non-financial corporations (see the annex for a description of the model).

First, it is assumed that a 1 percentage point change in market rates results in a 1 percentage point change in retail bank interest rates and in corporate bond yields (therefore assuming a constant risk premium) over the whole period considered. Second, some information (in particular, regarding the proportion of debt at variable interest rates of non-financial corporations) is estimated based on partial national information. Third, the impact of the change in market interest rates on the non-financial variables (real and nominal GDP, disposable income, private consumption, and business and housing investment) is taken into account using the standard short-term elasticities computed in the framework of the Eurosystem staff macroeconomic projection exercise. As no information on elasticity is available for the gross operating surplus, its ratio to GDP is assumed to remain stable. Ultimately, the interest rate shock will have an impact on the net lending/ net borrowing positions of economic sectors. However, it should be noted that this sensitivity analysis is a partial exercise, as no feedback

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50 Similarly, the forecasting of dividend payments could also be envisaged, but is currently not performed due to the absence of sufficient past data.

| Table 5 Impact of a 1 percentage point increase in market interest rates on the interest payments and receipts of households and non-financial corporations | | | |
|---|---|---|---|
| (households; percentages of disposable income) | | | |
| | Year 1 | Year 2 | Year 3 |
| Interest payments | 0.2 | 0.3 | 0.4 |
| Interest receipts | 1.5 | 1.6 | 1.6 |
| Net interest receipts | 1.3 | 1.3 | 1.3 |
| (non-financial corporations; percentages of gross operating surplus) | | | |
| | Year 1 | Year 2 | Year 3 |
| Interest payments | 3.0 | 3.4 | 3.7 |
| Interest receipts | 1.9 | 2.2 | 2.5 |
| Net interest payments | 1.1 | 1.1 | 1.2 |

on the financial balance sheet (in particular the debt level) and other non-financial variables is factored in.

Based on this set of assumptions, a 1 percentage point increase in market interest rates would lead to an increase in the net interest receipts of households of around 1.3 percentage points of disposable income (see Table 5) for the three years ahead. The effect on interest payments would only be progressive (and incomplete) over the period, given the significant proportion of loans bearing fixed interest rates. The impact of a market interest rate increase of 1 percentage point would amount to an increase in the net interest payments of non-financial corporations of around 1.1 percentage points to 1.2 percentage points of the gross operating surplus of the sector.

# 7 CONCLUSION

The flow-of-funds matrix represents a key framework for the analysis of monetary, financial and economic developments and the interrelations between them. This framework proves useful for analysing financial flows, especially at times when the frontier between monetary and non-monetary financial assets may be blurred owing to more active portfolio choices by money holders. Flow-of-funds data allow the financial intermediation process to be tracked, differentiating the roles of banks, other financial intermediaries and market finance. The "compact" form of this framework is also useful for obtaining an overview of these financial linkages, producing consistent forecasts and simplified simulations, and supporting a consistent "story" of economic and financial developments.

Obviously, flow-of-funds data are not the only tool for monitoring financial developments. Data with a greater frequency and offering longer time series are necessary to analyse and forecast more accurately specific financial behaviours of the various sectors. Timely information is crucial for tracking turning points or obtaining advance signals on the financial developments in the economy. Moreover, there is an ever growing need for additional data at the sub-sector level to better track behaviours characterised by non-linearity. However, the flow-of-funds data offer a comprehensive framework encompassing all macro-financial information at the sector level, integrated with the non-financial accounts, and therefore provide a unique overview for the analysis of interactions between the real and financial sides of the economy and the assessment of major risks of financial imbalances.

## AN ACCOUNTING MODEL FOR FORECASTING INTEREST PAYMENTS AND RECEIPTS OF HOUSEHOLDS AND NON-FINANCIAL CORPORATIONS

This annex describes the model used to forecast interest payments and receipts of households and non-financial corporations. These calculations are based on annual financial account data (Eurostat data based on ESA 95 standards since 1995, and based on national estimates from 1980 to 1994), as well as annual non-financial account data (derived from Eurostat data) for interest payments and receipts. ECB MFI balance sheet statistics and ECB securities issues statistics are also used. The growth of debt and financial investment is derived from the flow-of-funds projections.

The baseline short-term and long-term market interest rate assumptions over the forecasting period are consistent with the ECB staff macroeconomic projection exercise assumptions on market interest rates.[51] The spread between retail interest rates and corresponding market interest rates is assumed to be fixed at, or converging to, its long-term average over the projection exercise. Likewise, over the forecasting period, the spread between the corporate bond yield and the government bond yield is assumed to be fixed at, or converging to, its long-term average.

The proportion of loans for house purchase with an initial maturity of above one year at variable interest rates and the duration of loans for house purchase above 20 years are estimated based on information from the European Mortgage Federation and a variety of national sources (national central banks and private institutes).[52] The proportion of loans to non-financial corporations with an initial maturity of above one year is assumed on the basis of internal country estimates.

### 1 REPAYMENTS OF PRINCIPAL

The repayment of principal is calculated only for long-term debt (with a maturity of over one

year). This is justified by the fact that repayment flows are less meaningful for instruments which are implicitly "rolled over" (such as overdrafts or other loans with a very short maturity). Typically, the repayment flows for instruments with a short maturity are disproportionate compared with their outstanding amounts. For instance, annual "repayment flows" for loans with a duration of one month represent by definition 12 times their amount.

Repayments of principal are derived by dividing the outstanding amount of loans within each maturity band by the average duration, which is assumed to be the middle of the band. As an example, the repayment flows on the stock of loans with an initial maturity of between one and five years is assumed to be equal to the outstanding amount divided by (5+1)/2=3. The upper limit of the maturity band of loans of over five years is assumed to be ten years for loans to non-financial corporations and for consumer loans and 20 years for loans to households for house purchase. The resulting estimated average duration of long-term loans is around seven years for loans to non-financial corporations (this is also applied to debt securities); ten years for loans to households for house purchase; and six years for consumer loans and other loans.

### 2 GROSS INTEREST PAYMENTS

### 2.1 INTEREST PAYMENTS ON LONG-TERM DEBT BEARING FIXED INTEREST RATES

For long-term debt with an initial maturity of over one year bearing fixed rates, interest payments are derived by multiplying the interest rates on new business in each category (loans to households for house purchase and non-housing loans – consumer loans and other loans – loans to non-financial corporations and debt securities issued by non-financial corporations) by the

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51 Short-term interest rates correspond to the European overnight index average (EONIA) rate; long-term interest rates correspond to the ten-year government bond yield. Assumptions are based on the interest rates implicit in future prices.
52 See ECB (2004b).

annual gross flows of the corresponding category over a given period of time. The annual gross flows are derived as the sum of the net flows (the "flows" or "transactions" in ECB statistics) and an estimation of the annual repayment of loans (see Section 1 of this annex). The period taken into account for weighting the series of interest rates is equal to the average duration of instruments in the corresponding debt category, as calculated above.

## 2.2 INTEREST PAYMENTS ON SHORT-TERM DEBT AND ON LONG-TERM DEBT BEARING FLOATING INTEREST RATES

The interest payments for short-term loans (with an initial maturity of up to one year) are derived by multiplying the short-term retail interest paid in one year by the corresponding average stock (equal to the average of the stock at the end of the year and the stock at the end of the previous year). To take account of the lagged impact of changes in short-term rates on short-term loans and long-term loans (with an initial maturity of over one year), the average stock in the previous year is given a weighting of one-third and the average stock in the current year is given a weighting of two-thirds in the calculation of the average stock.

The proportion of loans at floating rates is assumed to be stable and equal to 35% for loans for house purchase; 35% for consumer loans; 50% for loans to non-financial corporations and 15% for debt securities issued by non-financial corporations.[53]

## 2.3 INTEREST PAYMENTS ON TOTAL DEBT

An initial forecast of total interest payments is the sum of (a) interest payments on long-term debt bearing fixed interest rates and (b) interest payments on long-term debt bearing variable rates and on short-term debt. This initial forecast of interest payments is multiplied by a correction factor equal to the ratio of effective interest payments to initial forecast of interest payments observed in the last year for which data are available.

## 3 INTEREST RECEIPTS

Interest receipts are derived by applying different interest rates to different categories of financial assets, broken down by type (deposits; debt securities; loans; mutual fund shares bearing interest rates; and insurance technical reserves) and duration (financial assets bearing short-term rates; those bearing floating rates; and long-term rates).

Interest rates on deposits are derived from MFI retail interest rate statistics (MIR) available since January 2003, and backward estimates can be based on retail interest rate statistics for the period prior to 2003. For short-term debt securities and money market fund shares, short-term market interest rates are applied; for long-term debt securities and bond-linked mutual fund shares (estimated), a four-year average of long-term market interest rates is applied. The proportion of long-term debt securities of non-financial corporations bearing floating rates is assumed to be around 20% based on securities issues statistics.

The initial forecast for interest receipts is multiplied by a correction factor equal to the ratio of effective interest receipts to initial forecast of interest receipts in the last year for which data are available.

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53 The assumption for loans for house purchase is based on an ECB estimate (ECB, 2004b). For loans to non-financial corporations it is based on national data (or estimates in the case of some euro area countries). For debt securities, it is based on securities issues statistics. Finally, the proportion of consumer loans is arbitrarily assumed to be equal to the proportion of loans for house purchase bearing variable rates.

## REFERENCES

Altissimo, F., E. Georgiou, T. Sastre, M.T. Valderrama, G. Sterne, M. Stocker, M. Weth, K. Whelan and A. Willman (2005), "Wealth and Asset Price Effects on Economic Activity", ECB Occasional Paper No 29.

Bê Duc, L., G. de Bondt, A. Calza, D. Marqués Ibáñez, A. van Rixtel and S. Scopel (2005), "Financing conditions in the euro area", ECB Occasional Paper No 37.

Bê Duc, L., F. Mayerlen and P. Sola (2008), "The monetary presentation of the euro area balance of payments", ECB Occasional Paper No 96.

Benito, A. and J. Power (2005), "Housing equity and consumption: insights from the Survey of English Housing", Bank of England Quarterly Bulletin, Autumn, pp. 302-308.

Board of Governors of the Federal Reserve System (2001), *Guide to the Flow-of-Funds Accounts*, New York.

Brainard, W.C. and J. Tobin (1968), "Pitfalls in Financial Model Building", *American Economic Review*, May, Vol. 58, No 2, pp. 99-122.

Broadbent, B. (2005), "Mortgage equity withdrawal is a red herring", Goldman Sachs, *European Economics Flash*, issue No 05/32, 6 April.

Copeland, M.A. (1949), "Social Accounting for Money flows", *Accounting Review,* pp. 254-46.

Copeland, M.A. (1952), "A Study of the Moneyflows in the United States", NBER, New York.

Davey, M. (2001), "Mortgage equity withdrawal and consumption", Bank of England Quarterly Bulletin, Spring, pp. 100-103.

Dawson, J.C. (1996), *Flow-of-Funds Analysis, a Handbook for Practitioners*, London.

Debelle, G. (2004), "Household debt and the macroeconomy", Bank of International Settlements Quarterly Review, March, pp. 51-64.

De Nederlandsche Bank (2003), "The Financial behaviour of Dutch households", Quarterly Bulletin, September.

Dynan, K. and D.M. Maki (2001), "Does Stock Market Wealth Matter for Consumption?", Federal Reserve Board Finance and Economics Discussion Series No 23.

European Central Bank (1999), "The stability-oriented monetary policy strategy of the Eurosystem", *Monthly Bulletin*, January, pp. 39-50.

European Central Bank (2001a), "Financing and financial investment of the non-financial sectors in the euro area", *Monthly Bulletin*, May, pp. 75-82.

European Central Bank (2001b), "A guide to Eurosystem Staff Macroeconomic Projection Exercises", June.

European Central Bank (2002), "Saving, financing and investment in the euro area", *Monthly Bulletin*, August, pp. 65-76.

European Central Bank (2003), "The outcome of the ECB's evaluation of its monetary policy strategy", *Monthly Bulletin*, June, pp. 79-92.

European Central Bank (2004a), "Monetary analysis in real time", *Monthly Bulletin*, October, pp. 43-63.

European Central Bank (2004b), "Features of mortgage contracts in the euro area", *Monthly Bulletin*, November, pp. 14-16.

European Central Bank (2006a), *Financial Stability Review*, June.

European Central Bank (2006b), "Estimates of the euro area capital stock", *Monthly Bulletin*, May, pp. 45-47.

European Central Bank (2007), "Recent developments in the household and corporate sectors: information from new quarterly euro area sector accounts", *Monthly Bulletin*, June, pp. 67-69.

Eurosystem Household Finance and Consumption Network (2009), "Survey data on household finance and consumption", ECB Occasional Paper No 100.

Eurostat (1996), European System of Accounts (ESA 95), Luxembourg.

Fischer, B., M. Lenza, H. Pill, and L. Reichlin (2006), "Money and monetary policy: the ECB experience 1999-2006", 4th ECB central banking conference, Frankfurt am Main, 9-10 November 2006.

International Monetary Fund (2000), *Monetary and Financial Statistics Manual*, Washington.

International Monetary Fund (2004), *Compilation Guide on Financial Soundness Indicators*, Washington.

Maki, D.M. and M. Palumbo (2001), "Disentangling the Wealth Effect: A Cohort Analysis of Household Saving in the 1990s", Federal Reserve Board Finance and Economic Discussion Series No 21.

Mink, R. and N. Silva (2003), "The use of financial accounts in assessing financial stability", *OECD Working Party on Financial Statistics*, October.

Mink, R. (2004), "Key Issues in Financial Accounts Statistics", IFC Conference on Central Bank Issues Regarding National and Financial Accounts, Basel, 9-10 September 2004.

Mörttinen, L., P. Poloni, P. Sandars and J. Vesala (2005), "Analysing banking sector conditions: how to use macro-prudential indicators", ECB Occasional Paper No 26, April.

Perozek, M.G. and M.B. Reinsdorf (2002), "Alternative Measures of Personal Saving", Bureau of Economic Analysis, *Survey of Current Business*, Vol. 82, April, pp. 13-24.

Taylor, P. (1963), "Uses of Flow-of-Funds Accounts in the Federal Reserve System", *Journal of Finance*, 18, No 2, May, pp. 249-258.

Teplin, A. (2001), "The US Flow-of-Funds Accounts and their Uses", *Federal Reserve Bulletin*, July, pp. 431-441.

Tobin, J. (1969), "A General Equilibrium Approach to Monetary Theory", *Journal of Money, Credit and Banking*, Vol. 1, No 1, February, pp. 15-29.

United Nations (1993), System of National Accounts, New York.

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