C ASSESSING THE FINANCIAL VULNERABILITY OF MORTGAGE-INDEBTED EURO AREA HOUSEHOLDS USING MICRO-LEVEL DATA

From a financial stability viewpoint, the condition of household sector balance sheets can have an important bearing on the credit risks that banks face. As in other mature economies, increasing household sector indebtedness in the euro area over recent years has raised some concerns about sustainability and, as a corollary, creditworthiness. Drawing upon survey information contained in the European Community Household Panel (ECHP) database, this Special Feature highlights some of the characteristics of indebted households in the euro area, and analyses the degree of vulnerability of mortgage-indebted households. The picture that emerges from an analysis of micro data covering euro area households over the period 1994-2001 suggests an overall improvement in resilience. In particular, mortgage debt appeared to be held mostly by high-income households, which tend to have good prospects for servicing debt. Nevertheless, considering the substantial increase in house prices and the significant accumulation of mortgage debt in some Member States after the period covered by the data examined in this Special Feature, continued monitoring of household sector indebtedness is called for.

INTRODUCTION

Against a background of improvements in the ability of larger groups of households to access credit, and as prospects for debt servicing improved in a low interest rate environment, the aggregate indebtedness of euro area households began to swell in the late 1990s.[1] Between 1997 and 2004 the stock of euro area household debt grew at an annual average rate of about 7%, and the debt-to-GDP ratio of the euro area household sector rose from 45% to 55%. With this, concerns about the sustainability of household sector debt and the possible risks posed to the stability of the euro area banking system began to surface.

Significant changes in financial aggregates, such as domestic credit growth, have often served as early-warning indicators of financial crises in mature economies.[2] In the euro area, while aggregate household sector debt rose at a faster pace than disposable income over the past decade, the increase in the debt-to-asset ratio was more muted.[3] Indeed, the ability of households to repay their debts out of liquid financial assets remained comfortable, despite some deterioration. At the same time, as interest rates fell and remained low, the total debt servicing burden – expressed as a ratio of disposable income – also remained broadly stable. Hence, assessments based on macro-level indicators of the risks and vulnerabilities posed by growing euro area household sector debt for financial stability have tended to be fairly sanguine (see sub-section 2.3).

Any analysis of developments in the aggregate indicators of household balance sheet conditions can mask important disparities in financial conditions across different segments of the household sector. For instance, not all households are indebted and, in order to draw accurate conclusions about the sustainability of household sector debt, which has to be repaid out of the income of those holding the debt, it is important to consider the debt ratio of the indebted population only. Moreover, a rise in the aggregate debt-to-income ratio could either be due to a rise in the actual debt ratio of indebted households, or it could merely reflect that the proportion of indebted households has increased. These two developments can have very different implications for financial stability, and can only be disentangled by examining micro data.

1 Household borrowing has increased considerably in a number of developed countries over the past two decades. See G. Debelle (2004), "Household Debt and the Macro-economy", *BIS Quarterly Review*, March.

2 See ECB (2005), "Indicators of financial distress in mature economies", *Financial Stability Review*, June, pp. 126-131.

3 This is a trend shared by many countries, both within and outside the euro area. For a comprehensive survey, see IMF (2005), "Household Balance Sheets", Chapter III, *Global Financial Stability Report*, April.

More generally, the sensitivity of aggregate household balance sheets to changes in disposable income, interest rates or house prices depends crucially on the relative importance and characteristics of different types of indebted households in the total population. Since these characteristics do not tend to be uniformly distributed across, for instance, the income spectrum of the household sector, an analysis based on macro indicators will not be capable of detecting growing pockets of fragility within the sector as they emerge. Hence, when seeking to form a comprehensive view of the risks and vulnerabilities posed by the household sector for financial stability, analysis of micro data can serve to complement macro-based assessments.

For this purpose, this Special Feature uses survey information from the European Community Household Panel (ECHP) database. The ECHP is a survey based on a standardised questionnaire that involves annual interviewing of a representative panel of households and individuals in the 12 euro area Member States.[4] By late 2005, the results from surveys spanning eight years, running from 1994 to 2001, had become available. A wide range of topics are covered by the questionnaire, such as income statements, health status and educational background, housing conditions, demographics and employment characteristics.[5] In addition, the survey includes an indication of households' own perception of their financial situation, for both owners and tenants. A set of variables describing households' financial situation can also be used to assess financial distress, which could be related to an excessive debt burden, and might provide a measure of default risk.[6]

AN OVERVIEW OF HOUSEHOLD INDEBTEDNESS

Data from the ECHP survey make it feasible to focus the assessment of the financial conditions on indebted households only. Notably, despite a significant increase in the amount of household debt outstanding between 1997 and 2001, the proportion of indebted households in the euro area increased only slightly from 33.6% to 36.4% of the household population over that period (see Table C.1). This contrasts with the situation in the US, where as much as 75.1% of households held at least one type of debt in 2001, up from 71.3% in 1998.[7] The distribution of debt by type – mortgage or non-housing-related debt – remained fairly stable in the euro area over the period covered by the survey. Approximately 21% of euro area households had a mortgage loan in 2001, and another 22% held some type of non-housing-related debt. The share of households carrying both types of debt was however rather small (6.9% in 2001).[8]

Table C.1 Distribution of household debt in the euro area

(% of total)

	1995	1997	1999	2001
mortgage debt	19.1	20.1	20.6	21.2
non-housing debt	14.4	19.3	20.9	22.1
both debt categories	4.3	5.8	6.5	6.9
indebted	29.2	33.6	35.1	36.4
no debt	70.8	66.4	64.9	63.6

Sources: ECHP database and ECB calculations.
Note: Proportions calculated based on population weights.

In order to analyse in more depth the indebtedness situation of households and their

4 The survey also includes Denmark, Sweden and the UK.
5 Despite the rich information content of the database, the short time-span of the coverage and the timeliness of the findings present obvious shortcomings. Furthermore, the ECHP survey does not contain stock variables on households' balance sheet items (outstanding debt, holding of assets, etc).
6 For a complete description of the ECHP database, see Eurostat (2003), "ECHP UDB: Description of Variables – Data Dictionary, Codebook and Differences between Countries and Waves", December. The ECHP has now been discontinued (the last wave was carried out in 2001), and will be replaced by the EU Statistics on Income and Living Conditions (EU-SILC). Unlike the ECHP, the EU-SILC will be harmonised ex post.
7 See A. Aizcorbe, A. Kernickell and K. Moore (2003), "Recent Changes in US Family Finances: Results from the 1998 and 2001 Survey of Consumer Finances", *Federal Reserve Bulletin*, January.
8 As a comparison, in 2001 49.3% of US families held home-secured debt (or other residential property debt), while 45.2% had instalment loans.

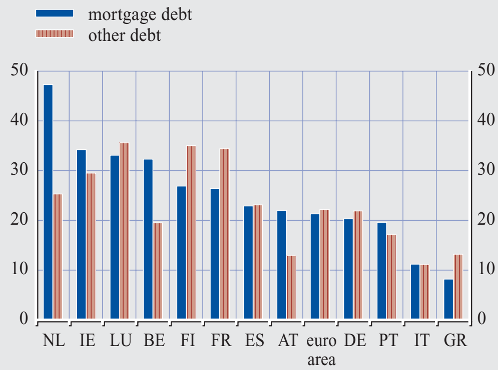
ability to service their debt, the households covered by the survey were divided into five equally sized categories according to their monthly net income.[9] As might be expected, the proportion of indebted households in the euro area has tended to be larger for higher income segments. In 2001, the proportion of indebted households ranged from 15% in the lowest income segment to 53% in the highest. There were also differences in the distribution of indebtedness across income levels for the different categories of debt. The share of mortgage-indebted households rose sharply with income, from 6% in the lowest income category to 37% in the highest category, suggesting that the bulk of mortgage debt was concentrated in the higher income segments. By contrast, non-housing debt tended to be more evenly distributed, at least in the higher income categories. Most of the households with the lowest incomes appeared to have no debt at all, and in those cases where they did, they tended to hold non-housing debt. Households with both types of loans belonged generally to the higher income segments.[10]

Considering patterns over time, the share of mortgage-indebted households increased somewhat between 1997 and 2001, especially for the mid-income categories, while it decreased slightly for the highest income category. The proportion of households holding non-housing debt, however, increased somewhat more over the same period (see Table C.1). In the four highest income categories, the proportion of households carrying non-housing debt increased by 3 to 4%.[11]

Within the euro area, the proportion of indebted households, as well as the stock of debt, varies to a wide degree across countries. At one extreme, only about 10% of the total number of households in Italy and Greece carried mortgage debt in 2001; at the other, almost every second household in the Netherlands had a mortgage loan (see Chart C.1). Analysis at the country level shows that between 1994 and 2001, no significant changes occurred in euro area

Chart C.1 Proportion of indebted households across euro area countries

(2001, % of total)



Sources: ECHP database and ECB calculations.

countries in the debt composition across income categories, including those which experienced comparatively high growth in debt over the period.

FINANCIAL CHARACTERISTICS OF MORTGAGE-INDEBTED HOUSEHOLDS

Lending for house purchase is of particular relevance to the banking sector, as it represents the bulk of bank lending to households in the euro area and it has expanded the most rapidly in recent years. Mortgage lending accounted for 69% of the outstanding amount of loans to households in the second quarter of 2005, up from 59% in 1998. The other loan categories – consumer credit and other lending – are mostly unsecured, which might imply an additional element of risk for the banks. However, these categories only represented 13% and 18%

9 The grouping of households, and the calculation of the statistics presented, was conducted by applying population weights to the country samples. The aggregate results for the euro area were produced using country weights based on population size.
10 These qualitative findings for the euro area broadly mirror those found in the 1998-2001 US Survey of Consumer Finances. The distribution of home-secured loans in the US is also skewed towards the higher income segments, while the percentage of families with instalment loans appears to be more evenly distributed.
11 The proportion of households with non-housing debt in the lowest income category – representing a group likely to be more sensitive to variations in unemployment and interest rates – only increased by 1% over the same period.

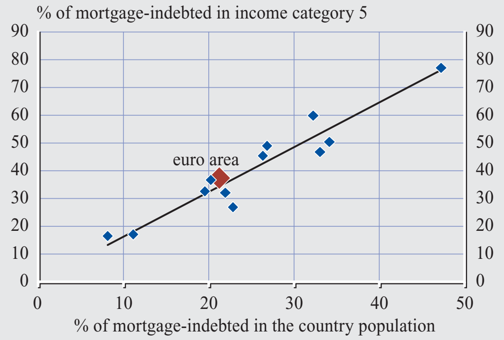
respectively of the total volume of credit outstanding in the second quarter of 2005, decreasing from 16% and 25% respectively in 1998. Moreover, the average amount of an individual loan for house purchase is substantially higher than in the other loan categories. Therefore, the rest of this Special Feature will focus on the financial situation of households carrying mortgage debt, the sustainability of which bears the strongest implications for financial stability.

In terms of financial resources, mortgage-indebted households tended to have a higher average level of income than the total population. These households also tended to report a better ability to save, regardless of their income level. On the other hand, mortgage borrowers had a lower average capital income than the household sector in total, and were less likely to possess a holiday home. The households in the highest income segment, however, represent an exception, reporting significantly higher capital income on average, and having an above-average income from rental activities.

Although the ECHP survey does not provide information on amounts, inferences can be made about where debt holdings are concentrated. First, considering both the proportion of mortgage-indebted households and the level of repayment burdens faced, the two highest income categories appeared to be the holders of the bulk of mortgage debt in the euro area. Second, the relationship between the share of mortgage-indebted households in the highest income category and the overall share of mortgage-indebtedness is indeed strongly proportional across individual euro area countries. Chart C.2 illustrates that the larger the proportion of mortgage-indebted households in a given country, the larger the share of mortgage-indebted households in the highest income category. For instance, in the case of the country having the highest proportion of mortgage-indebted (close to 50% of the total population) in 2001, the associated proportion of mortgage-indebted households in income category 5 was as high as 80%.

Chart C.2 Concentration of mortgage-indebted households in the highest income category across euro area countries

(2001, %)



Sources: ECHP database and ECB calculations.

All else being equal, the higher the volatility of household income, the higher is the credit risk likely to be for banks who have extended loans to these households. In this respect, it was notable that the households in the highest income category also displayed the lowest income volatility throughout the sample. At the euro area level, the average volatility of income for the total population was 26%. The corresponding figure for the mortgage-indebted households was 22%, and as low as 16% for the mortgage-indebted households in the highest income category.[12] This pattern proved to hold true for all individual country samples, even if the level of volatility differed to some extent.

Because of the considerable dispersion in the levels of indebtedness across countries within the euro area, the level of mortgage payment burdens differs as well. In 2001, for instance, the average level of mortgage payments to income ranged between slightly more than 14% in Greece to 27% in the Netherlands.[13]

12 The volatility estimates (representing the average one standard deviation in the annual percentage change in household income) were compiled using the panel dimension of the data, tracking individual households between 1996 and 2001.

13 The level of mortgage debt outstanding and the mortgage servicing burden depend, to a large extent, on differences in the national mortgage markets and the domestic tax treatment of mortgage debt.

THE SUSTAINABILITY OF MORTGAGE DEBT

From a financial stability viewpoint, what ultimately matters is the risk that banks face from mortgage lending. In this context, banks face the risk of being confronted with a higher rate of default on mortgage credit than they have set aside in provisions. The key determinant of the probability of such an event is the risk facing individual mortgage-indebted households of being unable to meet their debt servicing obligations.

There are many factors that can determine the financial risks affecting the debt servicing capacity of households. The sources of risk can be systematic or idiosyncratic. Among the systematic sources of risk, there are adverse disturbances at the regional, national or euro area-wide levels (such as changes in unemployment, interest rates or house prices). Idiosyncratic sources of risk (such as illness and divorce) might affect the financial situation of individual households. In the remainder of this Special Feature, the focus will be on shocks triggered by macroeconomic events that are likely to impact banks' balance sheets the most. Financial risks also differ regarding their effect on financial resources (income flows, financial assets or home equity) or financial commitments (interest payments and family-related expenses).

Financial risk only matters to households if they, rather than for instance banks[14], are ultimately exposed to its consequences. Vulnerability is an ex ante measure of this sensitivity, which could be defined as the degree to which households would be able to cope with the adverse effects of a shock, should it crystallise.

All else being equal, the total debt-at-risk of lenders' loan portfolios will have increased if banks have extended credit to vulnerable borrowers, or if an increasing proportion of indebted households become vulnerable. The data allow us to construct several indicators

14 For instance, when mortgages are extended at fixed rates of interest, it will be the bank that extended the loan, rather than the borrower, which ultimately faces interest rate risk.

Table C.2 Household risk exposure and vulnerability indicators

trigger event of financial risk	financial variable impacted	vulnerability indicators (quantitative)	threshold of financial distress	vulnerability indicators (subjective) = perception of financial distress	vulnerability indicators (qualitative) = inability to make payment
rise in interest rates	monthly interest rate payment on outstanding mortgage	monthly debt servicing burden-to-income ratio	above 30%	housing costs are a burden	inability to pay mortgage payments
rise in unemployment rate	monthly income	monthly debt service burden-to-income ratio	above 30%	problems making ends meet	inability to pay mortgage payments
		financial margin	below zero		inability to face basic expenses
					inability to pay bills
decrease in house prices (in combination with one of the two other risks)	housing equity (market value of the house)	mortgage debt to housing equity (or net housing equity)	below loan-to-value ratio		

Source: ECB.

that measure the financial strength of households. A set of indicators representing measures of vulnerability, which corresponds to each of the different types of risk discussed, is presented in Table C.2. Each indicator is also associated with a certain threshold that may signal financial distress.

In terms of its ability to capture the different dimensions of risk faced by households, the total debt servicing burden-to-income ratio may have the highest information content for gauging debt-related vulnerability. This is because it can be impacted both by shocks to interest rate payments and to income.[15] Some evidence suggests that households facing debt servicing burdens in excess of 30% of their income might be classified as risky borrowers.[16] This can define a threshold for the total debt servicing burden-to-income ratio in indicating risks of financial distress related to this indicator.

The vulnerability of the household sector to financial strains can also increase in the absence (or because of weaknesses) of risk-reducing elements which could prevent or minimise the loss associated with the occurrence of a particular event. A useful indicator in this respect is the financial margin of mortgage-indebted households, which is defined as the difference between current total monthly income and the reported minimum monthly income necessary to make ends meet. A shock to income caused by deteriorating economic conditions (loss of or decrease in income owing to unemployment) could squeeze this margin to a level that would push households into financial distress, and eventually result in them being unable to meet repayment obligations. A negative financial margin is assumed to indicate financial distress.

For each indicator, the relevance of the above-mentioned associated quantitative threshold of financial distress is tested. For this purpose, two variables were used as proxies for financial distress: one indicating the perception of a high financial burden related to housing costs, and another reporting the household's inability to repay mortgage instalments over the last 12 months. One would expect the proportion of mortgage-indebted households reporting financial distress, as captured by the proxy variables, to increase significantly at, or around, the theoretical thresholds.

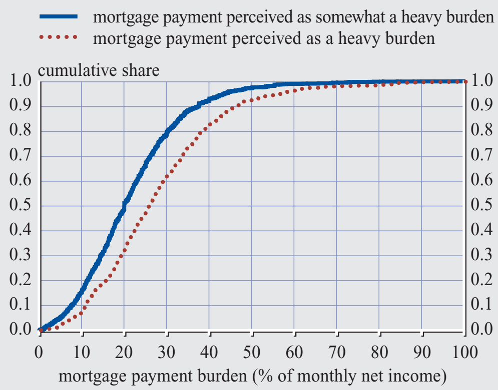
However, there appears to be no straightforward way to quantify the probability of being financially distressed on the basis of respondents' answers. The data do not support the existence of any uniquely defined threshold for financial vulnerability. In terms of the mortgage debt servicing burden, the share of households reporting that mortgage payments are a heavy burden does not significantly increase at the predefined theoretical threshold of 30% (see Chart C.3). As much as 60% of those who declared their mortgage payment to be

15 The impact of a change in interest rates depends among other factors on the interest rate variation regime of the mortgage contract, which varies widely across countries (see ECB (2004), *Financial Stability Review*, December, Box 6).

16 Some research based on individual US household balance sheets has associated the ratio of annual payments of principal and interest on all outstanding debt obligations (consumer and mortgage debt) to annual disposable income. A ratio of higher than 30% was found to be a statistically significant predictor of future household insolvency. See S. A. DeVaney and R. H. Lytton (1995), "Household Insolvency: A Review of Household Debt Repayment, Delinquency, and Bankruptcy", *Financial Services Review*, 4 (2), pp. 137-56.

Chart C.3 Perception of housing costs being a heavy burden

(2001)



Sources: ECHP database and ECB calculations.

somewhat a heavy burden in 2001 had a mortgage debt servicing burden ratio less than the euro area average of 23%. The corresponding share for those perceiving mortgage payments as being a heavy burden was lower, but still rather high, at about 40%. Likewise, it does not seem possible to establish a clear relationship between a default on payments and the fact of having a negative financial margin.

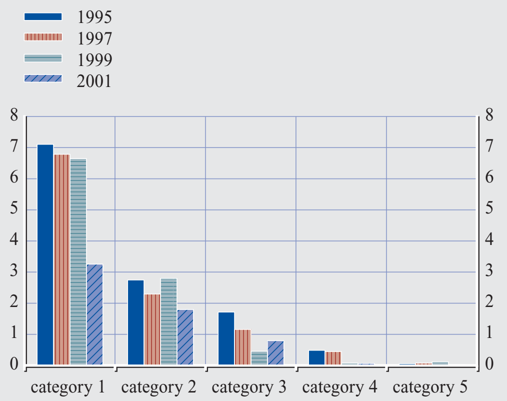
A detailed picture of changes in the vulnerability indicators of mortgage-indebted households across income categories suggests that, notwithstanding the increase in household indebtedness, financial resilience improved somewhat in the euro area as a whole between 1994 and 2001. Both the payment ratio and the financial margin exhibited a stable pattern over the sample period in all five income categories, improving only slightly. On the other hand, the proportion of mortgage-indebted households reporting mortgage payment difficulties fell considerably in the lower and middle income categories. In the third income category, for example, this share fell from 4.8% to 3.3% between 1994 and 2001.

Of particular interest from a financial risk perspective is the category of mortgage-indebted households that are impaired by all three above-mentioned vulnerability characteristics, i.e. those with a mortgage payment burden in excess of 30%, together with a negative financial margin and a reported inability to pay their mortgage. Chart C.4 shows that the proportion of those most vulnerable mortgage borrowers tended to be lower in the higher income categories, and declined throughout the sample period. This proportion was the lowest in the two highest income categories, which accounted for almost 65% of all mortgage-indebted households in 2001 (compared to 6% for the lowest income category). Again, households in these two categories are likely to carry the bulk of outstanding mortgage debt.

Several other variables in the dataset also support the view that financial resilience improved between 1994 and 2001. For instance, the ability to pay for utilities and other loans increased in all income categories. Likewise, households in all income segments reported much better prospects of making ends meet.

Chart C.4 Proportion of vulnerable households among euro area mortgage borrowers across income categories

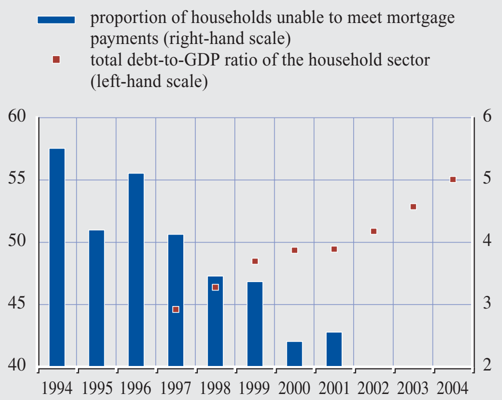
(% of total)



Sources: ECHP database and ECB calculations.
Note: Vulnerable households are defined as having a mortgage payment burden in excess of 30%, a negative financial margin, and a reported inability to pay their mortgage. Germany and Luxembourg have been excluded owing to data limitations.

Chart C.5 Vulnerability of mortgage-indebted households versus the total debt-to-GDP ratio in the euro area

(1994 - 2004, % of total)



Sources: ECHP database and ECB calculations.
Note: The proportion of euro area mortgage-indebted households that reported difficulties in meeting mortgage payments has been calculated excluding Germany and Luxembourg, owing to data limitations.

Overall, the analysis suggests that borrowers' vulnerability decreased in all countries where mortgage debt grew rapidly between 1997 and 2001. It should however be emphasised that this analysis does not cover the period from 2001 onwards. This has to be borne in mind when considering the results, since this period has seen the most dramatic growth in mortgage debt (see Chart C.5).

The lack of survey data for the period after 2001 does not allow any conclusions to be drawn about how patterns of household vulnerability have changed since then. Nevertheless, it is possible to highlight a few facts that characterise latest developments.

First, the results from the ECHP data for the period 1994-2001 appear to be broadly in line with a number of country-level studies encompassing more recent data. These studies did not find any major recent deterioration in the financial situation of households, and confirmed – at least in the countries surveyed – that most of the debt still appears to be carried by the highest income households. Analysis of data from the British Household Panel Survey (BHPS) leads to the conclusion that the probability of mortgage payment problems among UK households, and the amount of debt at risk, decreased between 1994 and 2002.[17] In the case of the Netherlands, analysis based on micro-level data is available up to 2004.[18] More updated survey information is also available from Sweden, showing that the resilience of the Swedish household sector remained unchanged between 2001 and 2003.[19] Furthermore, analysis based on the Banca d'Italia survey of household income and wealth (up to 2002) concludes that the largest part of Italian household borrowing is accounted for by wealthier households.[20]

Second, the data show that the most significant changes in the vulnerability indicators discussed here appear to have followed developments in household income that were driven by macroeconomic developments. Following the slowdown in economic activity between 2000 and 2002, euro area growth picked up in the second half of 2003. This development, together with the fact that interest rates continued to decline over the period since 2001,[21] suggests that the payment burden of euro area households has been contained since then.

Third, the most recent accumulation of euro area mortgage debt seems to have taken place in the countries where the financial resilience of the household sector improved between 1994 and 2001.

CONCLUDING REMARKS

The level of household indebtedness in the euro area does not necessarily pose a material risk to financial stability in itself. Households outside the euro area have been able to carry much heavier debt burdens than those in the euro area.[22] The picture emerging from the analysis based on micro data suggests that the rise of household mortgage indebtedness between 1994 and 2001 did not create any major pockets of vulnerability within the euro area household sector over the period. The households most likely to carry most of the debt were those with the highest incomes. In addition, this category of households had sufficient financial margins to cope with an unexpected decrease in income, and held significant wealth buffers. As expected, this category also showed the best ability to cope with the adverse effects of a financial shock, as measured by the vulnerability indicators.

Based on macro indicators, e.g. the estimated debt service burden of the household sector

17 See O. May and M. Tudela (2005), "When Is Mortgage Indebtedness a Financial Burden to British Households? A Dynamic Probit Approach", *Bank of England Working Paper* No 277, October.
18 See De Nederlandsche Bank (2004), "Financial Behaviour of Dutch Households", *Quarterly Bulletin*, September.
19 See Sveriges Riksbank (2005), "Swedish Households' Debt-Servicing Ability 1997-2003", *Financial Stability Report*, 1, May.
20 See Banca d'Italia (2004), *Annual Report 2003*, May.
21 This applies to interest rates at both the short and the long end of the yield curve.
22 See ECB (2005), *Financial Stability Review*, June, Box 6.

(see Chart S37), there is little evidence to support concerns that euro area household sector resilience has deteriorated since 2001 given the decline in interest rates. A rise in interest rates could, however, alter the assessment. Unfortunately, it is not straightforward to extrapolate the results from the micro data beyond the sample period. The distinctive features of the national markets for housing finance in the euro area tend to make comparisons of vulnerability across countries somewhat difficult, especially as increases in house prices and the stock of mortgage debt have accelerated in many Member States since 2001. To the extent that households have been myopic concerning their expectations for future developments in interest rates and income growth, an unanticipated increase in repayment burdens could strain household balance sheet's, ultimately posing credit risks for banks. Against this background, continued monitoring of household sector indebtedness is called for.