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WHY DOES THE LEVEL OF HOUSEHOLD DEBT VARY AMONG INDUSTRIAL COUNTRIES? EVIDENCE FROM THE FLOW-OF-FUNDS

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Why does the level of household debt vary among industrial countries? Evidence from the flow-of-funds

Massimo Coletta*, Riccardo De Bonis* and Stefano Piermattei*
(Bank of Italy)

Abstract

In most industrial countries, household debt increased from the 1990s until the financial crisis of 2007-2009 and then stagnated in many cases due to recession and deleveraging. But apart from these common trends, there are substantial differences in national household debt/GDP ratios. This paper studies the determinants of household debt, using a flow-of-funds dataset for 29 countries. The econometric exercises, for the period 1995-2011, yield four main results. First, saving is negatively associated with household debt. Second, debt is greater in the countries with higher per capita GDP and wealth. Third, population growth and life expectancy are often correlated positively with household debt, but the regressions are not robust to the use of different econometric methods. Fourth, considering the institutional framework, the quality of credit registers and of bankruptcy laws relate positively to the level of household debt, while a longer time to resolve insolvencies is associated with lower debt; in contrast country legal origin does not affect the level of household debt.

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1. Introduction

In industrial countries households' financial debt – loans from banks and other intermediaries – has reached unprecedented levels. At the end of 2011 household debt exceeded 130 per cent of GDP in Cyprus and Denmark, 120 per cent in the Netherlands and 110 per cent in Ireland. It was between 90 and 100 per cent of GDP in New Zealand, Portugal, the UK, and Canada and between 80 and 90 per cent in the US, South Korea, Spain and Sweden. The level was much lower in France, Austria and Italy.

In most of these countries, the ratio to GDP was much higher in 2011 than in 1995 (Figure 1); the very few exceptions included Germany and Japan, where household debt has been sluggish in the last few years. Household debt increased from the end of the 1990s until the outbreak of the financial crisis in 2007-08. In many cases the subsequent Great Recession resulted in the stabilization or the reduction of indebtedness. For instance in the US the household debt-to-disposable income ratio decreased from 130 per cent in 2007 to 105 per cent in 2012. The dispersion of household debt across countries increased substantially between 1995 and 2011 (Figure 2; on debt variance see Bertola and Hochguertel, 2007).

Before the subprime crisis and the subsequent financial turmoil and global recession, economists had looked on household debt with benign neglect or seen it as an instrument to smooth the inter-temporal allocation of consumers' resources. Afterwards, however, both academic analysts and international organisations began to point out the risks of excessive private debt (IMF 2012, and OECD 2012).

While there are many national accounts on the evolution of household debt, this paper is the first to study its determinants at the macro level on a large sample of countries – 29 – and for a long time span (from 1995 to 2011). The household debt data in each country are drawn from the annual flow-of-funds accounts. After this introduction, Section 2 summarises the main literature, Section 3 describes our statistics, Section 4 presents the econometric analysis, and Section 5 performs some robustness checks. Section 6 concludes.

2. A look at the literature

We review contributions concerning the factors that may influence household indebtedness in two main areas of the literature: the life cycle hypothesis (see Modigliani 1986 for a summary) and institutional and comparative economics (see Djankow et al. 2003; Shleifer 2008).

Although life cycle theory was developed originally to explain individual saving and consumption, this framework may also help in analysing the variables that affect household debt at the macro level.[1] Household debt may be driven by the objective of smoothing consumption through consumer credit and investing in houses through mortgages, taking into account saving, income and wealth. In addition, producer households and sole proprietorships need credit to finance business activity.

A plausible thesis is that countries with a high household saving rate are likely to have low indebtedness and vice versa, as in the UK and the US. Yet this is not always so, as in Spain, where indebtedness and the propensity to save are both high (see JP Morgan 2013). In the last 15 years the saving/GDP ratio has declined in many industrial countries because of population ageing, realized and unrealized capital gains (wealth effects), slower growth of disposable income, and interest rates lower by comparison with the 1970s and 1980s (see de Serres and Pelgrin, 2003, on the determinants of saving in OECD countries; Lusardi, Skinner and Venti, 2001, on the US; Bassanetti. Rondinelli and Scoccianti, 2012, on Italy). Of course there are also questions of reverse causality and endogeneity: after the financial crisis of 2007-2009 saving rebounded in the countries, such as the US and Spain, where household debt was particularly high (on the US recent experience, see Kennickell, 2012, and Brown et al., 2013). In general, borrowing constraints and capital market imperfections may induce a higher household saving ratio (Guiso, Jappelli and Terlizzese 1992). We deal with this reverse causality issue in Section 4.

Higher per capita GDP – facilitating the repayment of debt – might imply higher household debt. In contrast, the effect of real GDP growth on debt is not certain. One might suppose that both the demand for and the supply of loans are greater when GDP growth is high, but one may also hypothesize that households will demand more credit in the negative phase of the business cycle, in order to smooth consumption. In other words, lower GDP growth might well imply higher household debt. Saving and consumption also depend on wealth, so that households' debt may be affected by their financial and real assets.[2]

The life cycle model also highlights the importance of demographic issues. In this sense the effect of life expectancy on debt is *a priori* ambiguous. On the one hand, longer life expectancy might be associated with greater debt if banks are more willing to lend if people live more. On the other hand, it could imply an older population, hence lower debt, in that the elderly are less likely to

[1] There is little point in attempting to determine the conditions under which aggregate behaviour will exactly mirror the behaviour of some representative consumer (see Deaton and Muellbauer 1980 for a discussion): "It is neither necessary, nor necessarily desirable, that macroeconomic relations should replicate their microeconomic foundations so that exact aggregation is possible" (p.148).

[2] One should take total household wealth into account, including real assets. Unfortunately, long time series on real wealth are only available for a few countries. We return to this issue in Section 4.

want credit. The impact of population growth should be positive, because a growing population corresponds to a higher proportion of younger people.

While these variables captured mostly demand-side factors, there are institutional features capable of influencing household debt on the supply-side, i.e. by affecting the behaviour of financial intermediaries. We focus on four factors. The first is countries' legal origin (see La Porta, Lopez de Silanes, Shleifer and Vishny, 1997), on the supposition that the protection of investors and creditors – one of the determinants of finance – differs according to type of legal system and helps to determine the propensity for private debt. Djankov et al., 2007, found an association between credit to the private sector and the Anglo-Saxon legal origin.

Second, the strength of legal rights – the degree to which collateral and bankruptcy laws protect borrowers and lenders – may facilitate lending. Traditionally bankruptcy laws were introduced to manage the defaults of non financial corporations. More recently many European countries, such as France, Germany and the UK, introduced judicial debt settlement procedures for households. This subject is complicated by the differences in legal structures. Italy only enacted a consumer bankruptcy law in 2012.[3]

A third potential factor is the quality of credit information available through public or private credit registers. Jappelli, Pagano and Di Maggio (2010) observe that financial intermediaries share information on the creditworthiness of their borrowers and find a positive effect of private and public registry coverage on the household debt-to-GDP ratio.

Fourth, inefficient recovery procedures in the event of debtor insolvency may make banks more reluctant to lend. Judicial efficiency differs across countries and may impact on access to credit. Considering the significant differences in this parameter across Italian regions, Casolaro, Gambacorta and Guiso (2005) show that lengthier trials – and limited informal enforcement through social trust – can constrain the supply of loans to households.[4]

In recent years household debt has become a policy issue. Until the financial crisis of 2007-2008 the growth of household debt was an important component of the "Great Moderation" interpretation of the course of many economies.[5] Financial innovation played a key role, extending the range of loan contracts. Probably the main financial innovation influencing mortgages was the

[3] D'Alessio and Iezzi (2013) discuss the methodological issues affecting the definition and measurement of overindebtedness in Italy. In South Korea, which has one of the highest household debt ratios of any OECD country – in March 2013 the government launched a "National Happiness Fund" to reduce and to restructure the outstanding debt of delinquent borrowers.

[4] Religious, cultural and social norms may also influence individual attitudes to debt (Guiso, Sapienza and Zingales, 2003). Also, fiscal factors may come into play, as through substantial tax deductibility of interest payments (in the Netherlands household debt reached around 130 per cent of GDP because interest payments on mortgages are fully deductible).

[5] Here we draw on De Bonis, Fano and Sbano (2013).

mortgage equity withdrawal mechanism (see Bank of England, 2003; Greenspan, 2005; and Greenspan and Kennedy, 2007). The sub-prime crisis in the US, with the attendant macroeconomic instability induced in part by the high household indebtedness in many countries, implied abandoning the thesis of positive correlation between economic growth and household debt. Cyprus, Greece, the Netherlands, Portugal, Ireland, and Spain are the countries where household debt increased the most beginning in the later 1990s (Figure 1), and these countries were also hit by the financial crisis in the wake of the Lehman Brothers collapse (September 2008) or by the euro-area sovereign debt crisis started in 2009-2010.

Koo (2011 and 2012) observes that the world economy is in a balance-sheet recession analogous to that of Japan in the 1990s: in the years to come, despite very low interest rates, in the industrial countries the private sector will continue to minimize debt. The IMF noted that, historically, the growth of household debt in the run-up to a bust corresponds to weak growth in the years that follow (IMF, 2012). Moreover, when private debt levels are high, recessions are typically longer and deeper; the large costs associated with high-debt recessions make policies to prevent excessive debt build-up advisable (OECD, 2012).

Therefore, central banks and international organizations have put strict monitoring of household (and corporate) debt onto the policy agenda. Private debt is among the indicators monitored by the European Commission Macroeconomic Imbalances Procedure (European Commission, 2011 and 2012), and there are government policies to deal with private debt distress.[6] The most extreme academic positions treat debt in the same way as pollution. That is, it imposes costs on other agents that the borrowers themselves fail to take into account (Jeanne and Korinek, 2010), while a tax on debt would produce better allocation of resources (Bianchi and Mendoza, 2010). Although we do not share this extreme, negative judgment, we do think that studying the determinants of household debt will prove fruitful.

To sum up, we expect that debt should be negatively linked to household saving and possibly positively to per capita GDP and wealth. The impact of GDP growth and life expectancy on debt is not easy to determine ex ante, but faster population growth should have a positive effect. Turning to institutional variables, the Anglo-Saxon legal system should be associated with a higher ratio of household debt to GDP. We also expect a positive correlation between household debt and the quality of credit registers and bankruptcy law, while lengthier insolvency resolution procedures should diminish the household debt ratio.

In the following Section we summarise the statistics used in the econometric exercises.

[6] On these subjects, see European Commission (2008), Observatoire du Crédit et de l'Endettement (2011), and Liu and Rosenberg (2013).

3. The data

In the regressions our sample consists of 29 countries: 26 members of the European Union plus Japan, South Korea and the US over the period 1995 to 2011. We start from 1995 as in that year the European System of Accounts was introduced leading to a harmonized definition of household debt for most of the countries in our sample.

In the econometric exercises the dependent variable is the ratio of households' financial debt (loans from banks and other financial intermediaries) to GDP. Loans include mortgages, consumer credit and other loans, such as leasing and factoring, and credit to sole proprietorships. The data on financial debt are taken from the annual flow-of-funds figures. Data are available from 1995 on for the entire sample with the exception of Bulgaria (2000), Ireland (2001), Latvia (1996), Luxembourg (2006), Malta (2004), Romania (1998), Slovenia (2001) and South Korea (2002). The household sector includes non-profit institutions serving households. Financial debt is at current values. Households' other liabilities, mostly trade debts, are not considered as their determinants are different from those of financial debt and their measurement varies from country to country. GDP is at current values. For robustness, we also run regressions in which the dependent variable is the ratio of household debt to disposable income.

Turning to independent variables, the numerator for the saving/GDP ratio is gross saving.[7] Other covariates include the real GDP growth rate and per capita GDP. We also take population growth into account, using the rate of natural population change, i.e. net of migration, and life expectancy at birth. The sources of the national accounts data – i.e. gross saving, GDP and population – and of life expectancy are the online Eurostat database for the 26 European countries and the online OECD statistical database (*OECD.Stat*) for Japan, Korea, and the US. Household financial assets are taken from the flow-of-funds data.

Among the countless other factors that might influence household debt, we consider four institutional variables: origin of the legal system, quality of credit registers, quality of bankruptcy laws and time to resolve insolvencies. The legal origin dummy takes the value 1 in the case of Anglo-Saxon legal systems, 0 otherwise (that is, we aggregate the French, German and Scandinavian variants together).[8] Four sample countries have systems of Anglo-Saxon origin (the US, the UK, Ireland, and Cyprus).

[7] This is preferable for international comparisons in that for some countries estimates for depreciation, in order to compute net saving, are not available. Data coverage on gross saving is not homogeneous: for 21 countries they are available for the entire period 1995-2011, but for others they cover a shorter time span.
[8] See La Porta et al. (1997) and Jappelli, Pagano and Di Maggio (2010).

The availability of more credit information, from either a public registry or a private bureau, might positively influence debt by facilitating lending decisions: according to the World Bank classification, the index ranges from 6 – a high quality of credit registers – to 0. The third variable is the quality of bankruptcy law. In this case the range is from 10 – a very good bankruptcy law, protecting the rights of borrowers and lenders and thus facilitating lending – to 0. The fourth factor is the time to resolve insolvencies: the number of years required to recover debt. As said the World Bank is the source of the data on quality of credit registers, quality of bankruptcy laws and time to resolve insolvencies (http://data.worldbank.org/indicator).

Our panel is unbalanced, in that neither the dependent nor the independent variables are available uniformly for the entire period 1995-2011. Table 1 presents the summary statistics. As the minimum and maximum values show, there are pronounced differences across countries and years both for the household debt ratio and for the explanatory variables. Table 2 gives the correlation matrix. Household debt is correlated positively with saving and per capita GDP and negatively with the GDP growth rate. Both of our demographic variables show a positive correlation, as do legal origin, quality of credit registers and quality of bankruptcy laws, while length of time to resolve insolvencies is negatively correlated.

Now let us turn to multivariate analysis.

4. The econometric results

We use four econometric methods to study the determinants of the household debt/GDP ratio: the random effects estimator (RE), the fixed effects estimator (FE), the Hausman-Taylor estimator (HT) and the Arellano Bond estimator. First let us briefly recite the pros and cons of each.[9]

The RE model assumes that the individual country-specific effect is uncorrelated with the independent variables, while the FE approach posits a correlation between the country effect and the regressors. If the country-specific effect is correlated with the independent variables, the FE and the Hausman-Taylor estimator (HT) overcome this problem of the RE estimator.

In general, compared to the RE and FE estimators, the instrumental variable Hausman-Taylor procedure copes with the problem of inconsistency of estimates generated by measurement errors, omitted variables and possible endogeneity of the regressors (which is a relevant issue here in that saving is one of our covariates). Moreover, since household debt is characterised by high persistence we included the lagged level of the household debt ratio as an independent variable using the instrumental variable - Arellano Bond estimator.

[9] See Greene (2002), Chapter 13, for a complete treatment.

Table 3 presents the baseline results. The signs of the estimated coefficients turned out to be coherent in most of the specifications. The first two regressions use the contemporary level of saving; to allow for the possibility that the causal nexus could instead run from debt to saving, in the HT and AB regressions saving is instrumented using its lagged values. As expected, the saving/GDP ratio is negatively associated with household debt, in all four regressions.

The correlation of the coefficient of the GDP growth rate is also negative and statistically significant, implying that households increase their debt during cyclical downturns. Another possible interpretation is that people reduce indebtedness when their current income increases, in line with the predictions of the life-cycle model. The level of per capita GDP has a positive influence on debt; that is, in richer countries households are more prone to take on debt. The positive correlation between debt and income reappears in household-level data as well (see ECB, 2013). The persistence of household debt is confirmed by the positive coefficient of the lagged value in the AB estimation.

With regard to the demographic variables, life expectancy has mainly a positive effect on the household debt ratio. This is consistent with the idea that people have more incentives for debt if they expect to live longer, again in line with the life-cycle model (for a similar approach, see Davies et al., 2011, and Zinni, 2012). Also, banks may be more inclined to grant credit if people live longer. However, the coefficient turns negative when we include the autoregressive value of the household debt/GDP ratio among the regressors.

Household indebtedness seems to be greater in countries where the population growth rate is higher, in keeping with the thesis that households borrow mainly to buy expensive goods such as durables and housing. Since this is typical of young generations, it is to be expected that countries with faster population growth – hence and a larger proportion of young households – will be characterised by more borrowing.

Finally, while a good many scholars maintain that countries with Anglo-Saxon legal origins tend to have larger financial – and credit – systems (La Porta et al. 1998), in our regressions the coefficients of the legal origin variable are indeed positive, but not statistically significant (one regression finds significance at the 10 per cent level). In fact, household debt is very high also in some countries that do not have an Anglo-Saxon legal system, such as Denmark, the Netherlands, and Portugal.

Specification tests such as the Hausman and Lagrange multiplier suggest the presence of country-specific effects (and hence suggest the use of a panel specification rather then a mere pooled OLS estimation). Specification tests bring out some inconsistencies in the RE and the FE estimators that are dealt with by the Hausman-Taylor and Arellano-Bond estimators (in which the

regressors are instrumented and, as noted, the saving rate is endogenous). In this sense, the HT and the AB estimations of the baseline regression seem to be more reliable.

Household saving and consumption are also influenced by wealth. In fact, wealthier households may have an incentive to take out more debt, as emerges from surveys on household budgets. We accordingly included the ratio of household financial assets to GDP as an additional independent variable. In the HT and AB estimates, wealth and saving are treated as endogenous variables and so instrumented using lagged values. Financial wealth turns out to have a positive and statistically significant correlation with household debt, while the signs and the statistical significance of the other variables are as before (Table 4).

Naturally, household debt is often connected with house purchases. For a few countries we have data on non-financial assets from 1995 to 2010 and so can calculate the ratio of *total* household wealth to GDP. A correlation between debt and total wealth is often found in surveys on individual household budgets. We found that total wealth is indeed associated with household debt, but the coefficients are statistically significant in just two regressions (Table 5). The effect of real assets must be interpreted with caution, as the data cover only eight countries.[10] Whereas the previous regressions had around 400 observations, in that including real assets fewer than 100 are available.

As noted in Section 2, household debt may be affected by a number of institutional variables that influence the supply of credit. Efficient collection of information on the borrowers, effective judicial enforcement, and the rapidity of legal proceedings may enhance the screening capability of lenders, reduce the cost of credit recovery in default, and even diminish the probability of insolvency itself. Table 6 reports the results of the panel regression including three indicators as additional regressors: the quality of credit registers, the quality of bankruptcy law and the average time to resolve insolvencies. Since these indicators are available only from 2004, the regression is for 2004-2011.

The signs of these institutional variables have the expected coefficients. The quality of credit registers is correlated positively with the household debt ratio: household debt tends to be high in the countries with top-quality credit registers, i.e. Britain, Japan, South Korea, and the US. But further investigation is needed, as household debt is also very high in Denmark and the Netherlands, where the quality of the credit registers is somewhat lower, and even in Cyprus, where it is among the lowest. The results are consistent and robust with respect to the variables already used in the previous regressions. For instance, the coefficient of saving maintains its negative sign.

[10] See De Bonis, Fano and Sbano (2013) for a comment on recent trends in real household wealth. The random effect model could not be estimated in Table 5 for lack of a sufficient number of degrees of freedom in the between estimator.

The quality of bankruptcy laws too has a positive effect on household debt. Such countries as Italy, Malta, Slovenia, and Greece have poor-quality bankruptcy laws by international standards and also low levels of household debt.

Also as expected the length of time to resolution of insolvencies correlates negatively with the level of household debt: the higher the number of years to resolution, the lower the ratio of debt to GDP. Again, the result is intuitive. Household debt is low in countries such as Bulgaria, the Czech Republic, Estonia, Romania and Slovakia, where it takes three years or more to resolve insolvencies; it is high in countries like Cyprus, Denmark, the Netherlands, and the UK, where insolvencies are settled within a year. Our result tallies with the argument of Casolaro, Gambacorta and Guiso (2005), who observed that the length of trials has a stronger effect on bank credit to household than the strength of lenders' legal protection.

Overall when we include these institutional variables in the regressions, the effect of legal origin on the household debt-to-GDP ratio becomes weaker than that reported in Table 3. This evidence is similar to the result obtained in a cross country regression by Jappelli, Pagano and Di Maggio (2010).

Hausman specification tests yield results in favour of the consistency and efficiency of the RE estimator by comparison with the FE estimator and the HT and AB instrumental variable estimators (Table 6). The fact that the inconsistency of RE and FE estimators in the baseline regression is overcome when additional relevant variables are included suggest that the inconsistency was due to the omission of relevant variables rather than to endogeneity and reverse causality problems (propensity to borrow determining propensity to save). Further investigations – such as Granger causality tests – confirm that households' propensity to save would appear to be predetermined and exogenous with respect to the dynamics of the household debt/GDP ratio, and that the debt ratio depends negatively on the propensity to save.

5. Robustness checks

Household debt and saving are often expressed as a ratio to disposable income. We accordingly run the previous regressions with the debt-to-disposable income ratio as dependent variable and the saving-to-disposable income ratio as the main independent variable. The results broadly confirm our earlier findings (Table 7). Saving maintains the negative association with household debt. The institutional variables confirm their capacity to influence debt, but the coefficient of the quality of credit registers is no longer statistically significant.

A substantial literature divides national financial systems into bank-based and market-based. This approach implies that banks and markets are substitutes. From a different perspective, however, stock market capitalisation may promote banking activity if banks and markets are complementary (Levine and Zervos, 1998; Demirguc-Kunt and Levine, 2001). Proxying the degree of development of financial markets by the ratio of stock market capitalisation to GDP, we find a negative correlation with the household debt ratio (Table 8). This would imply a sort of substitution effect between banks and financial markets: where the stock exchange is more important, banks play a smaller role in the economy and household debt is therefore lower. The other independent variables maintain the signs and the statistical significance of the previous regressions.

Finally, we checked for the effect of lending rates on household debt. In his 1986 Nobel Prize lecture Franco Modigliani presented his "provisional view that saving is largely independent of the interest rate," and one might well imagine that the same scepticism applies to the relationship between interest rates and household debt. The received view, however, is that in the last fifteen years the expansion of household debt depended in part on the fall in borrowing rates. Accordingly, in Table 9 we include the interest rate on the stock of credit to households as an additional independent variable. Using the Eurosystem's harmonized interest rate statistics, we calculated a yearly average rate for each country from 2003 to 2011. The regression refers to the twelve countries belonging to the euro area in 2003 plus Cyprus, Slovenia, Slovakia, and Estonia, which entered subsequently. We were unable to find harmonized indicators of the cost of credit to households for countries outside the area.

The finding is that the interest rate is not statistically significant in explaining the dynamics of household debt. The coefficient of saving maintains its negative sign but is significant only in the Arellano-Bond estimate. This result deserves further study.

6. Conclusion

The paper produces four main results concerning the determinants of household debt as a ratio to GDP in a sample of industrial countries for the period 1995-2011.

First, saving is negatively related to household debt. This result is robust to the use of different econometric methods, different independent variables, and both contemporaneous and lagged values of saving. The only exception is that controlling for the effect of interest rates on household debt, the cost of credit is not significant but in some regressions saving loses its significance.

Second, indebtedness is greater in countries where per capita GDP is greater and where the ratio of household financial (and real) assets to GDP is higher. This jibes with the results generally found by household-level surveys. There is also a negative link between GDP growth and the debt-to-GDP ratio.

Third, population growth and life expectancy have a predominantly positive association with household debt, but the results are not robust across all the regressions.

Fourth, considering institutional frameworks, the quality of credit registers and of bankruptcy law is positively correlated with the volume of household debt, and the length of time required to resolve insolvencies has a negative relation. Legal origin (type of legal system) is not statistically significant in explaining the ratio of household debt to GDP ratio.

We have provided *prima facie* evidence, rather than uncontroversial causality. Further research is needed to scrutinise the connections between household debt, saving and other variables. We plan to extend the analysis to pursue the endogenous links across variables and to consider the effect of house price increases, debt maturity, fiscal arrangements and financial innovation, and the role of banking competition.

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Figure 1. Ratio of household financial debt to GDP ratio (percentages)

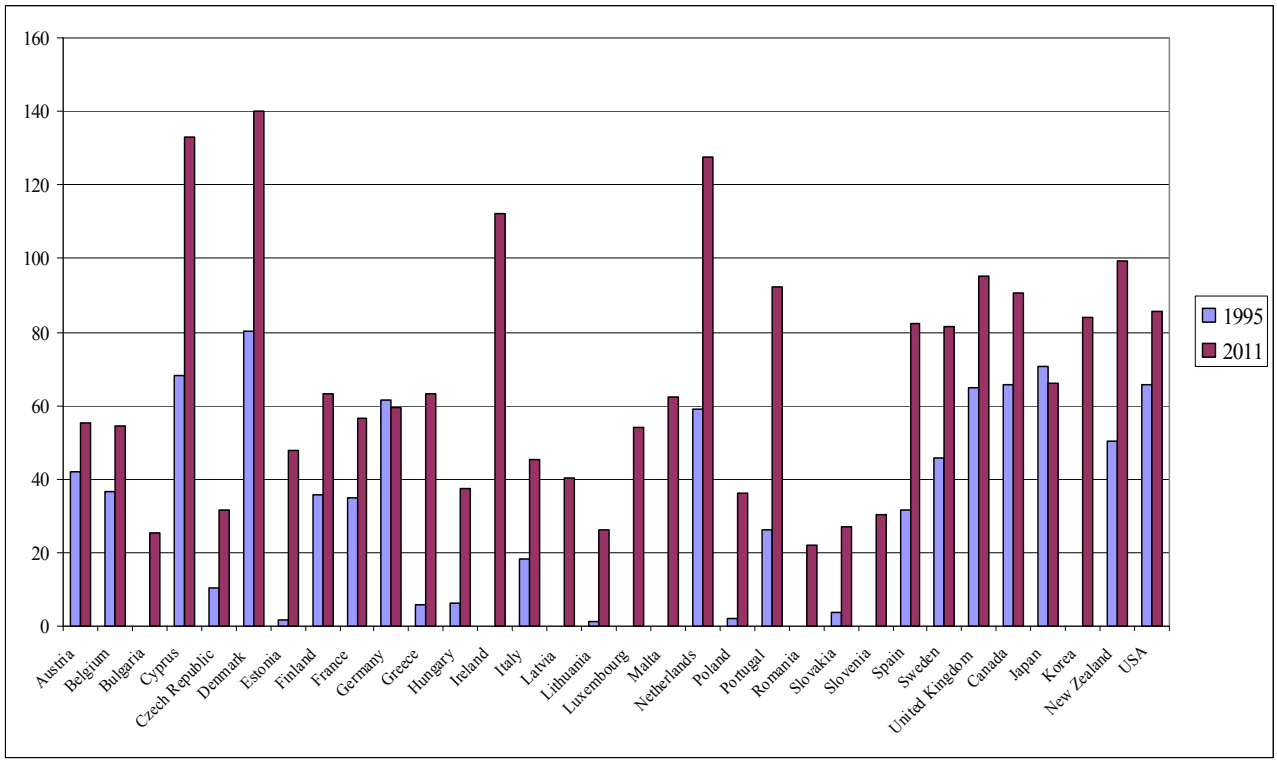

Figure 2. Standard deviation of Household Financial Debt/GDP ratio between countries

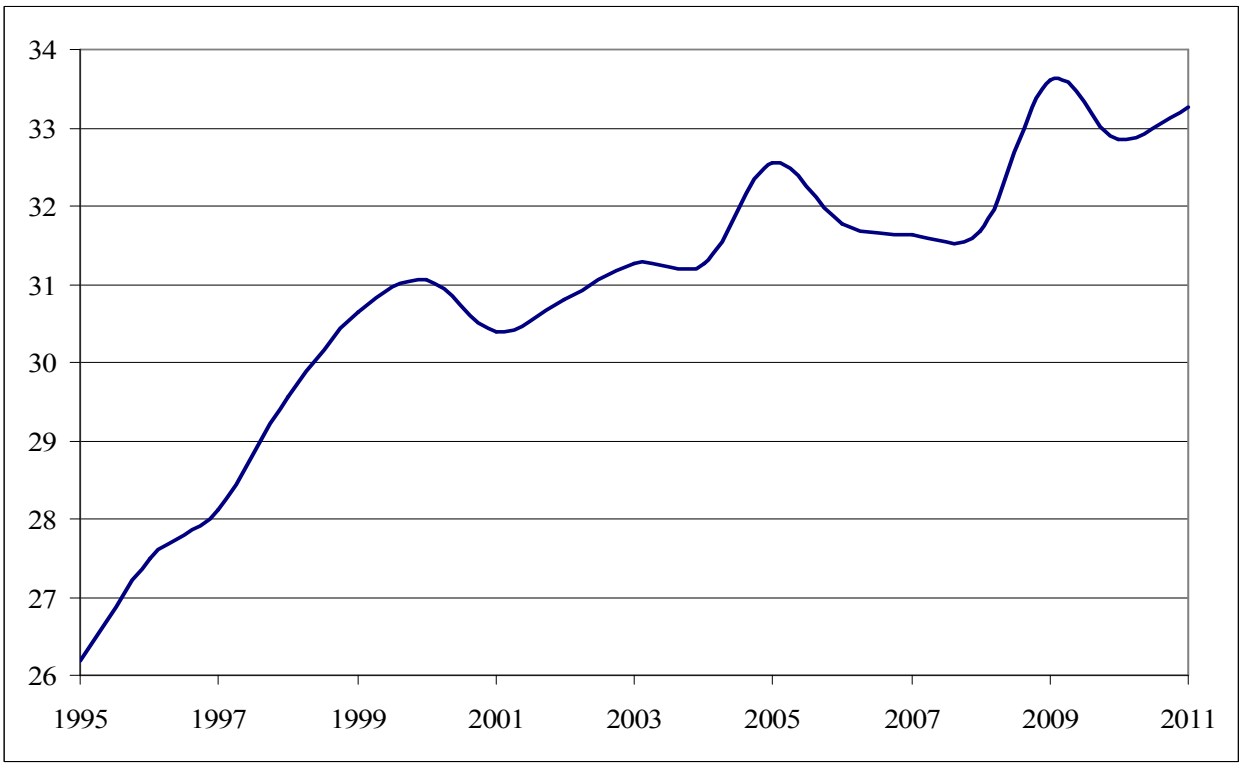

Table 1 Summary statistics. Data refer to the period 1995-2011. Financial debt is made up of loans granted by banks and other financial intermediaries to households. Loans include mortgages, consumer credit and other loans to households, e.g. leasing, factoring and credit to sole proprietorships. Population growth rate is the natural rate of population change. Life expectancy is at birth. The saving-to-GDP ratio takes into account gross saving as numerator. Household financial assets take into account all the financial wealth according to flow-of-funds definition. Legal origin is a dummy which takes value 1 if the country is characterized by an English legal system. The quality of credit registers and the quality of bankruptcy laws are indexes that range, respectively, from 1 to 6 and from 1 to 10. Time to resolve insolvencies is the number of years required to recover debt. For the list of sources see Section 3.

Variable		Mean	Std. Dev.	Min.	Max.	N
Household Financial Debt	overall	50.93	32.66	0.83	145.51	N=495
(millions of national currency	between		29.43	10.60	109.11	n = 32
over GDP in national currency)	within		14.28	8.244	89.37	T-bar = 15.46
GDP Growth Rate	overall	2.82	3.43	-17.7	11.7	N= 533
(% change)	between		1.19	0.80	5.12	n = 32
	within		3.22	-19.12	9.77	T-bar = 16.65
GDP per Capita	overall	25071	11032	6182	73912	N=544
(US$ at constant PPPs)	between		10742.90	8771.15	62557.01	n = 32
	within		3116.31	10854.8	36427.41	T-bar = 17
Population Growth Rate	overall	0.62	2.89	-7.0	10.6	N=534
(% change)	between		2.78	-5.24	7.84	n = 32
	within		0.87	-4.77	3.66	T-bar = 16.68
Life Expectancy	overall	77.25	3.22	67.69	83	N=525
(years)	between		2.99	71.60	81.6	n = 32
	within		1.38	72.87	81.68	T-bar = 16.40
Gross Saving Rate	overall	6.01	4.43	-16.89	18.5	N=436
(millions of national currency	between		4.28	-8.16	11.63	n = 29
over GDP in national currency)	within		20.44	104.98	246.18	T-bar =15.45
Household Financial Assets	overall	167.21	86.41	27.80	374.45	N =479
(millions of national currency	between		83.65	49.56	334.72	n =31
over GDP in national currency)	within		0.47	-1.71	4.28	T-bar = 7.59
Legal origin	overall	0.15	0.36	0	1	N=544
(dummy variable)	between		0.37	0	1	n = 32
	within		0	0.15	0.15	T-bar = 17
Quality of credit registers	overall	4.708	1.29	0	6	N=243
(index)	between		1.55	0	6	n = 32
	within		0.44	2.08	5.70	T-bar = 7.59
Quality of bankruptcy laws	overall	7.05	1.962	3	10	N=243
(index)	between		2.04	3	10	n = 32
	within		0.35	4.93	7.93	T-bar = 7.59
Time to resolve insolvencies	overall	2.04	1.36	0	9	N=243
(years)	between		1.26	0	6.75	n = 32
	within		0.47	-1.71	4.28	T-bar = 7.59

Table 2 Correlation matrix. Data refer to the period 1995-2011. For a description of the variables see Table 1. For the list of sources see Section 3.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Household Financial Debt	1,00										
(2)GDP Growth Rate	-0,27	1,00									
(3)GDP per Capita	3,68	-0,13	1,00								
(4) Population Growth Rate	3,91	-0,16	4,31	1,00							
(5) Life Expectancy	3,97	-0,30	4,69	4,48	1,00						
(6) Gross Saving Rate	1,55	-0,29	3,00	2,63	4,31	1,00					
(7) Household Financial Assets	5,10	-0,22	4,03	2,95	4,75	2,65	1,00				
(8) Legal origin	3,43	-0,06	2,31	3,68	1,18	0,01	3,09	1,00			
(9) Quality of credit registers	0,36	-0,09	-0,22	-0,24	-0,02	-0,05	1,35	0,55	1,00		
(10) Quality of bankruptcy laws	1,32	0,79	-0,05	0,54	-0,24	-0,28	-0,04	3,12	0,39	1,00	
(11) Time to resolve insolvencies	-0,54	1,39	-0,47	-0,38	-0,51	-0,33	-0,52	-0,29	-0,11	0,19	1,00

Table 3 Baseline specification. Data refer to the period 1995-2011. The dependent variable is the household debt-to-GDP ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate is treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-0.782***	-0.773***	-0.768***	-0.288***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.000952***	0.00136***	0.00105***	0.000965***
	(0.000)	(0.000)	(0.000)	(0.000)
Population Growth Rate	0.970	1.164*	0.986	0.0195
	(0.093)	(0.050)	(0.088)	(0.917)
Life Expectancy	6.214***	5.816***	6.168***	-0.685***
	(0.000)	(0.000)	(0.000)	(0.000)
Gross Saving Rate	-0.654**	-0.487*	-0.573*	-0.254***
	(0.003)	(0.032)	(0.010)	(0.000)
Legal origin	23.23	omitted	21.80	omitted
	(0.059)		(0.106)	
Household Financial Debt$_{(t-1)}$				0.845***
				(0.000)
Constant	-453.2***	-428.9***	-452.4***	40.59**
	(0.000)	(0.000)	(0.000)	(0.002)
σ fixed effect	21.99	27.41	24.11	
σ random effect	7.622	7.622	7.571	
ρ	0.893	0.928	0.910	
LM test for H_0:OLS, H_1:RE	(0.000)			
Hausman test for H_0:RE, H_1:OLS	(0.000)			
Hausman test for H_0:RE, H_1:FE		(0.029)		
Hausman test for H_0:HT, H_1:RE			(0.503)	
Arellano-Bond AR(1) test				(0.146)
Arellano-Bond AR(2) test				(0.398)
Sargan J test				(1.000)
R^2 within	0.706	0.709		
R^2 between	0.504	0.396		
R^2	0.571	0.500		
Observations	405	405	405	358

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 Regressions with household financial assets. Data refer to the period 1995-2011. The dependent variable is the household debt-to-GDP ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate and the household financial assets are treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-0.844***	-0.823***	-0.821***	-0.324***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.000790***	0.00125***	0.000944***	0.000855***
	(0.001)	(0.000)	(0.000)	(0.000)
Population Growth Rate	1.212*	1.392*	1.228*	0.152
	(0.033)	(0.017)	(0.030)	(0.471)
Life Expectancy	5.367***	4.992***	5.351***	-1.131***
	(0.000)	(0.000)	(0.000)	(0.000)
Gross Saving Rate	-0.778***	-0.556*	-0.658**	-0.323***
	(0.000)	(0.012)	(0.003)	(0.000)
Household Financial Assets	0.101***	0.101***	0.0962***	0.0353***
	(0.000)	(0.000)	(0.000)	(0.000)
Legal origin	13.50	omitted	11.88	omitted
	(0.230)		(0.382)	
Household Financial Debt$_{t-1}$				0.876***
				(0.000)
Constant	-397.7***	-378.5***	-400.2***	
	(0.000)	(0.000)	(0.000)	
σ fixed effect	19.44	26.18	23.95	
σ random effect	7.435	7.435	7.376	
ρ	0.872	0.925	0.913	
LM test for H$_0$:OLS, H$_1$:RE	(0.000)			
Hausman test for H$_0$:RE, H$_1$:OLS	(0.000)			
Hausman test for H$_0$:RE, H$_1$:FE		(0.000)		
Hausman test for H$_0$:HT, H$_1$:RE			(0.025)	
Arellano-Bond AR(1) test				
Arellano-Bond AR(2) test				
Sargan J test				
R^2 within	0.721	0.723		
R^2 between	0.563	0.492		
R^2	0.613	0.572		
Observations	405	405	405	358

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 Regressions with household total assets. Data refer to the period 1995-2010. The dependent variable is the household debt-to-GDP ratio. Household total assets include both financial and real wealth. RE denotes Random effects estimator. FE denotes Fixed Effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate and the household total assets are treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-1.292***	-1.315***	-0.476
	(0.000)	(0.000)	(0.279)
GDP per Capita	0.00154**	0.00161***	0.000612
	(0.001)	(0.000)	(0.303)
Population Growth Rate	6.617***	6.214***	0.604
	(0.000)	(0.000)	(0.909)
Life Expectancy	0.238	0.169	0.873
	(0.814)	(0.866)	(0.919)
Gross Saving Rate	-0.228	-0.247	0.128
	(0.590)	(0.557)	(0.969)
Household Total Assets	0.0621***	0.0626***	0.0472
	(0.000)	(0.000)	(0.268)
Legal origin	omitted	13.78	omitted
		(0.457)	
Household Financial Debt$_{t-1}$			0.326
			(0.682)
Constant	-38.55	-39.02	
	(0.574)	(0.577)	
σ fixed effect	22.18	20.45	
σ random effect	4.818	4.651	
ρ	0.955	0.951	
LM test for H_0:OLS, H_1:RE			
Hausman test for H_0:RE, H_1:OLS			
Hausman test for H_0:RE, H_1:FE	(0.000)		
Hausman test for H_0:HT, H_1:RE		(0.000)	
Arellano-Bond AR(1) test			(0.654)
Arellano-Bond AR(2) test			(0.765)
Sargan J test			(1.000)
R^2 within	0.809		
R^2 between	0.0558		
R^2	0.172		
Observations	95	95	85

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6 Do institutional factors matter? Data refer to the period 2004-2011. The dependent variable is the household debt-to-GDP ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate is treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-0.507***	-0.514***	-0.502***	-0.421***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.000378	0.000533	0.000388	0.000543**
	(0.171)	(0.134)	(0.156)	(0.002)
Population Growth Rate	2.401**	2.486**	2.323**	0.350
	(0.002)	(0.003)	(0.003)	(0.137)
Life Expectancy	4.074***	4.030***	4.155***	-2.113***
	(0.000)	(0.000)	(0.000)	(0.000)
Gross Saving Rate	-0.507*	-0.492*	-0.492*	-0.391**
	(0.014)	(0.022)	(0.019)	(0.001)
Quality of credit registers	2.080*	1.916*	2.083*	0.601
	(0.010)	(0.031)	(0.010)	(0.455)
Quality of bankruptcy laws	3.962***	3.986***	3.933***	2.247
	(0.000)	(0.000)	(0.000)	(0.052)
Time to resolve insolvencies	-1.798**	-1.649*	-1.779**	-1.006*
	(0.007)	(0.018)	(0.008)	(0.108)
Legal origin	18.75	omitted	17.43	omitted
	(0.164)		(0.179)	
Household Financial Debt$_{(t-1)}$				0.803***
				(0.000)
Constant	-303.9***	-302.1***	-310.3***	150.2***
	(0.000)	(0.000)	(0.000)	(0.000)
σ fixed effect	23.87	23.13	22.14	
σ random effect	4.880	4.880	4.775	
ρ	0.960	0.957	0.956	
LM test for H_0:OLS, H_1:RE	(0.000)			
Hausman test for H_0:RE, H_1:OLS	(0.616)			
Hausman test for H_0:RE, H_1:FE		(0.985)		
Hausman test for H_0:HT, H_1:RE			(0.884)	
Arellano-Bond AR(1) test				(0.044)
Arellano-Bond AR(2) test				(0.142)
Sargan J test				(1.000)
R^2 within	0.644	0.644		
R^2 between	0.566	0.519		
R^2	0.554	0.533		
Observations	217	217	217	187

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7 Regressions with the debt-to-household disposable income ratio. Data refer to the period 2004-2011. The dependent variable is the household debt-to-disposable income ratio. The saving rate is the saving-to disposable income ratio. RE denotes random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate is treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-0.778***	-0.811***	-0.767***	-0.233***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.00228***	0.00274***	0.00230***	0.00126***
	(0.000)	(0.000)	(0.000)	(0.000)
Population Growth Rate	2.550	2.187	2.449	0.442
	(0.052)	(0.114)	(0.063)	(0.584)
Life Expectancy	6.165***	6.225***	6.317***	-2.122***
	(0.000)	(0.000)	(0.000)	(0.000)
Gross Saving Rate	-0.822***	-0.778***	-0.806***	-0.501***
	(0.000)	(0.000)	(0.000)	(0.000)
Legal origin	10.79	omitted	9.132	omitted
	(0.666)		(0.709)	
Quality of credit registers	2.421	1.983	2.397	0.926
	(0.079)	(0.178)	(0.083)	(0.098)
Quality of bankruptcy laws	7.058***	6.683***	7.026***	2.041*
	(0.000)	(0.000)	(0.000)	(0.014)
Time to resolve insolvencies	-3.332**	-3.042**	-3.282**	-1.212
	(0.003)	(0.009)	(0.004)	(0.381)
Household Financial Debt$_{(t-1)}$				0.769***
				(0.000)
Constant	-493.0***	-502.3***	-505.1***	146.6***
	(0.000)	(0.000)	(0.000)	(0.000)
σ fixed effect	49.52	47.04	46.80	
σ random effect	8.122	8.122	7.951	
ρ	0.974	0.971	0.972	
LM test for H_0:OLS, H_1:RE	(0.000)			
Hausman test for H_0:RE, H_1:OLS	(0.000)			
Hausman test for H_0:RE, H_1:FE		(0.938)		
Hausman test for H_0:HT, H_1:RE			(0.993)	
Arellano-Bond AR(1) test				(0.001)
Arellano-Bond AR(2) test				(0.334)
Sargan J test				(1.000)
R^2 within	0.621	0.623		
R^2 between	0.486	0.455		
R^2	0.504	0.492		
Observations	222	222	222	190

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8 Regressions with stock market capitalization. Data refer to the period 2004-2011. The dependent variable is the household debt-to-GDP ratio. Stock market capitalization is expressed as percentage of GDP. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate is treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-0.463***	-0.485***	-0.460***	-0.440***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.000844**	0.00128**	0.000862**	0.000788***
	(0.005)	(0.001)	(0.004)	(0.000)
Population Growth Rate	2.735***	2.862***	2.686***	0.549
	(0.000)	(0.001)	(0.000)	(0.149)
Life Expectancy	3.859***	3.715***	3.904***	-2.014***
	(0.000)	(0.000)	(0.000)	(0.001)
Gross Saving Rate	-0.591**	-0.589**	-0.580**	-0.475**
	(0.003)	(0.005)	(0.004)	(0.005)
Legal origin	16.89	omitted	15.23	omitted
	(0.222)		(0.270)	
Quality of credit registers	1.739*	1.229	1.735*	0.238
	(0.028)	(0.155)	(0.029)	(0.811)
Quality of bankruptcy laws	4.301***	4.353***	4.283***	2.775*
	(0.000)	(0.000)	(0.000)	(0.025)
Time to resolve insolvencies	-1.726**	-1.510*	-1.707**	-0.659
	(0.008)	(0.024)	(0.009)	(0.536)
Stock Market Capitalization	-0.109***	-0.129***	-0.110***	-0.0578***
	(0.000)	(0.000)	(0.000)	(0.000)
Household Financial Debt$_{t-1}$				0.770***
				(0.000)
Constant	-295.6***	-291.2***	-299.3***	138.0***
	(0.000)	(0.000)	(0.000)	(0.001)
σ fixed effect	24.53	25.36	23.70	
σ random effect	4.687	4.687	4.573	
ρ	0.965	0.967	0.964	
LM test for H$_0$:OLS, H$_1$:RE	(0.000)			
Hausman test for H$_0$:RE, H$_1$:OLS				
Hausman test for H$_0$:RE, H$_1$:FE		(0.768)		
Hausman test for H$_0$:HT, H$_1$:RE			(0.996)	
Arellano-Bond AR(1) test				(0.034)
Arellano-Bond AR(2) test				(0.343)
Sargan J test				(1.000)
R^2 within	0.671	0.674		
R^2 between	0.528	0.444		
R^2	0.534	0.492		
Observations	217	217	217	187

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9 Regressions with interest rates. Data refer to the period 2004-2011. The dependent variable is the household debt-to-disposable income ratio. The interest rate is the average interest rate on outstanding loans to households (end-of-year data; the interest rates are taken from the Eurosystem harmonized statistics). RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor and the Arellano-Bond estimation the saving rate is treated as exogenous. For the definition of independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor	(4) Arellano-Bond
GDP Growth Rate	-0.626***	-0.612***	-0.620***	-0.605***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	-0.000265	-0.000269	-0.000294	0.00109
	(0.526)	(0.652)	(0.460)	(0.053)
Population Growth Rate	3.160**	3.346**	3.036**	2.526*
	(0.005)	(0.008)	(0.007)	(0.034)
Life Expectancy	5.791***	5.947***	5.904***	-2.191**
	(0.000)	(0.000)	(0.000)	(0.006)
Gross Saving Rate	-0.205	-0.117	-0.106	-0.618*
	(0.571)	(0.759)	(0.774)	(0.049)
Legal origin	21.57	omitted	20.92	omitted
	(0.348)		(0.316)	
Quality of credit registers	1.090	0.894	1.159	-0.0439
	(0.438)	(0.557)	(0.411)	(0.974)
Quality of bankruptcy laws	2.414*	2.386	2.384*	0.727
	(0.032)	(0.052)	(0.034)	(0.727)
Time to resolve insolvencies	0.603		0.0585	83.15*
	(0.942)		(0.994)	(0.025)
Household Financial Assets	0.106*	0.0899	0.0934	0.0747*
	(0.019)	(0.072)	(0.051)	(0.012)
Interest Rate	0.546	0.547	0.585	-1.022
	(0.449)	(0.518)	(0.417)	(0.392)
Household Financial Debt$_{t-1}$				0.808***
				(0.000)
Constant	-438.1***	-444.6***	-443.6***	
	(0.000)	(0.000)	(0.000)	
σ fixed effect	26.05	22.06	21.51	
σ random effect	4.780	4.780	4.548	
ρ	0.967	0.955	0.957	
LM test for H$_0$:OLS, H$_1$:RE	(0.000)			
Hausman test for H$_0$:RE, H$_1$:FE		(0.985)		
Hausman test for H$_0$:HT, H$_1$:RE				
R^2 within	0.660	0.661		
R^2 between	0.566	0.502		
R^2	0.512	0.464		
Observations	111	111	111	94

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$