

Household debt: a cross-country analysis

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Abstract

In most countries, household debt increased from the 1990s until the crisis of 2007-2008 and then stagnated due to recessions and deleveraging. But apart from these common trends, there are differences in national household debt/disposable income ratios. This paper studies the determinants of household debt, using a dataset for 33 countries and taking into account both demand-side and supply-side factors. The econometric exercises, covering the period 1995-2013, yield two main results. First, debt is greater in countries with higher per capita GDP and household wealth. Second, the quality of bankruptcy laws relate positively to household debt, while a longer time to resolve insolvencies is associated with lower household debt.

JEL codes: E21, G21, P5.

Keywords: household debt; income; wealth; public debt.

1. Introduction and motivation¹

In many countries households' financial debt – loans from banks and other intermediaries – has reached unprecedented levels. At the end of 2013 household debt exceeded 130 per cent of GDP in Denmark, 120 per cent in Cyprus, 110 per cent in the Netherlands and Australia (Figure 1). It was around 100 per cent in many other countries, such as the UK and Canada.

In most of countries, the ratio to GDP was higher in 2013 than in 1995; the very few exceptions include Germany and Japan, where household debt has been sluggish in the last years. Household debt increased from the half of the 1990s and accelerated in the first years of the New Millennium 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. The dispersion of household debt across countries increased substantially between 1995 and 2013 (Figure 2; on debt variance see Bertola and Hochguertel, 2007).

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¹ We thank Massimiliano Affinito, Luigi Cannari, Luigi Infante, Marco Marinucci, Andrea Mercatanti, and participants at seminars held at the ECB, the 21st Input-Output Conference, and the OECD for useful suggestions on an earlier version. The usual disclaimer applies.

Before the subprime crisis and the subsequent financial turmoil, economists had looked on household debt with benign neglect or seen it as an instrument to smooth the inter-temporal allocation of consumers' resources. 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. Financial innovation played a key role, extending the range of loan contracts. Probably one of the main financial innovations influencing household debt was the 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. Mian and Sufi (2014) think that household debt was the main cause of the Great Recession in the US. Cyprus, Greece, the Netherlands, Portugal, Ireland, and Spain - the countries where household debt increased the most beginning in the first 2000s - were severely hit by the financial crisis in the wake of the Lehman Brothers collapse in September 2008 and/or by the euro-area sovereign debt crisis started in 2009.

In recent years both academic analysts and international organisations began to point out the risks of excessive private debt. Household debt has become a policy issue. 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, 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, 2012a). 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). In its October 2014 World Economic Outlook the IMF also observed that the world recovery remains weak because of the negative legacy of a high household debt overhang.

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). There are many government policies to deal with private debt distress (see European Commission, 2008, L'Observatoire du Cr dit et de l'Endettement, 2011, and Liu and Rosenberg, 2013). 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 view, we do think that studying the determinants of household debt will prove fruitful.

There are many country specific analyses on the recent evolution of household debt.² According to our knowledge this paper is the first to study its determinants at the macro level for a large sample of countries (33) and for a long time span (from 1995 to 2013). The paper that is the nearest to ours is that by Isaksen et al. (2011): these scholars studied the factors influencing household debt for a panel of 17 countries for the period 1995-2010. In comparison with Isaksen et al. (2011) and Zinni (2012), we include in the regressions a wider set of possible determinants of household debt.

After this introduction, Section 2 debates the main variables that may affect household debt, Section 3 describes our statistics, Section 4 presents the econometric analysis, and Section 5 includes some robustness checks. Section 6 concludes.

2. On the possible determinants of household debt

Contributions on the factors that may influence household indebtedness may be classified in two main areas: works that look at demand factors and papers that emphasise the role of supply forces (see Djankow et al., 2003; Shleifer, 2008).

Starting with demand factors, household debt may be driven by the objective of smoothing consumption through consumer credit and investing in houses through mortgages, taking into account income, wealth, demography, and saving. Demand factors may thus be rationalized using the life cycle hypothesis (see Modigliani, 1986 for a summary). In addition, producer households and sole proprietorships need credit to finance business activity.

Higher per capita GDP - facilitating the repayment of debt and perhaps suggesting a more sophisticated financial education - might imply higher household debt. In contrast, the effect of real GDP growth on debt is more uncertain. 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.

Households' debt may be affected not only by flow indicators like income, but also by stock measures like household financial and real wealth. For instance Brandolini et al., 2010, study

² A very incomplete list includes Dynan and Kohn (2007), Kennickell (2012) and Brown et al. (2013) on the US; Crawford and Faruqui (2012) on Canada; JP Morgan (2013) on Spain; Hunt (2015) on New Zealand; Emanuelsson, Melander and Molin (2015) on Sweden; Magri and Pico (2012) on Italy. Debelle (2004) presents a cross-country analysis.

poverty analysing financial and real asset holdings. Surveys on the individual behaviour of households often show a positive linkage between debt and wealth (ECB, 2013).

Demand factors include demography. In this sense the effect of life expectancy on debt is *a priori* ambiguous (see Davies et al., 2010). On the one hand, longer life expectancy might be associated with greater debt if banks are more willing to lend when people live more. On the other hand, a longer life expectancy could imply an older population, hence lower debt, in that the elderly are less likely to want credit.

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). Before the global financial crisis the saving/GDP ratio has declined in many 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 2007-2008 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). In general, borrowing constraints and capital market imperfections may induce a higher household saving ratio (Guiso, Jappelli and Terlizzese, 1992).

While these variables capture demand side factors, there are features capable of influencing household debt on the supply side, i.e. by affecting the behaviour of financial intermediaries. There is a large consensus on the fact that institutions and institutional settings are among the main factors that determine the different models of capitalism (North, 1990, Djankov et al., 2003). We focus on four variables. The first is countries' legal origin, 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 (La Porta, Lopez de Silanes, Shleifer and Vishny, 1997). Djankov et al. (2007) found an association between credit to the private sector and the Anglo-Saxon legal origin in a cross-section on a large number of nations.

Second, the strength of legal rights – the degree to which collateral and bankruptcy laws protect borrowers and lenders – may facilitate lending. Traditionally bankruptcy laws aim to manage the defaults of non financial corporations. More recently many European countries, such as France, Germany, the UK and Italy have introduced judicial debt settlement procedures for households and/or consumer bankruptcy laws. There is a large debate on how to measure household

over-indebtedness, a condition that may favour the insolvency of individuals. D'Alessio and Iezzi (2013) discuss the methodological issues affecting the definition of over-indebtedness in Italy. In South Korea, which has one of the highest household debt ratios of any OECD country, in 2013 the government launched a “National Happiness Fund” to reduce and to restructure the outstanding debt of delinquent borrowers.

A third factor is the quality of credit information available through public or private credit registers. Jappelli, Pagano and di Maggio (2013) 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.

Religious, cultural and social norms may 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; for instance in the Netherlands household debt reached high levels because interest payments on mortgages are fully deductible. Unfortunately we were not able to find international time series on the tax treatment of interests on mortgages. Moreover tax structures tend to change slowly and therefore might not be able to explain the boom and bust of household debt (Hunt, 2014; on household debt determinants see also the survey by Zinman, 2015).

To sum up, we expect that debt should be positively linked to per capita GDP and wealth and negatively linked to household saving. The impact of GDP growth and life expectancy on debt is not easy to determine *ex ante*. Turning to supply side, 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 data used in the econometric exercises.

3. The data

Our sample consists of 33 countries: 27 members of the European Union (complete data on Malta were not available) plus Japan, South Korea, Canada, Australia, New Zealand and the US

over the period 1995 to 2013. We start from 1995 as harmonized data on household debt are available for many countries only since that year (for instance following the introduction of the European System of Accounts).

In the econometric exercises the dependent variable is the ratio of households' financial debt to disposable income; in the robustness checks we also discuss regressions in which the dependent variable is the ratio of household debt to GDP. Loans include mortgages, consumer credit and other loans, such as leasing and factoring, and credit to sole proprietorships. 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. The data on financial debt are taken from the annual financial accounts (i.e. flow-of-funds). Data are available from 1995 on for the entire sample with the exception of Bulgaria (2000), Ireland (2001), Latvia (1996), Luxembourg (2006), Romania (1998), Slovenia (2001), Croatia (2001) and South Korea (2002).

Turning to independent variables, other covariates include per capita GDP and the real GDP growth rate. The numerator for the saving/GDP ratio is gross saving (this is preferable for international comparisons in that for some countries estimates for depreciation, in order to compute net saving, are not available). We also take life expectancy at birth into account. The sources of the national accounts data and of life expectancy are the online Eurostat database for the 27 European countries and the online OECD statistical database (*OECD.Stat*) for the non-European nations. Household financial assets are also taken from the flow-of-funds data. Statistics on household real wealth are made available by the OECD for a sub-sample of our countries.

Among the countless other factors that might influence household debt, we consider four supply side 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). Seven sample countries have systems of Anglo-Saxon origin (the US, Canada, Australia, New Zealand, the UK, Ireland, and Cyprus).

Second, the availability of more credit information, from either a public registry or a private bureau, might positively influence debt by facilitating lending decisions: the index collected by the World Bank ranges from 8 – a high quality of credit registers – to 0. In 2013 the US, the UK and many large European countries had high quality credit registers, while lower indices characterized countries such as Luxembourg, Slovenia and Cyprus.

The third variable is the quality of bankruptcy law. In this case the range is from 12 – a very good bankruptcy law, protecting the rights of borrowers and lenders and thus facilitating lending –

to 0. In 2013 bankruptcy laws were considered very positively in countries such as New Zealand, Australia and the US, while the judgments were quite negative for Italy and Portugal. We are conscious that bankruptcy laws are mainly related to the treatment of corporate sector defaults: unfortunately information on consumer bankruptcy laws is available only for few countries.

The fourth factor is time to resolve insolvencies, that is the number of years required to recover debt: the indicator goes from less than one year to more than nine years. In 2013 for instance less than one year was needed to recover a debt in Belgium, Finland and Ireland, while in Greece, Romania and Bulgaria more than 3 years were needed. 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>). These indicators are available since 2004.

Our panel is unbalanced, in that neither the dependent nor the independent variables are available uniformly for the entire period 1995-2013. 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. The highest household debt to GDP ratios are found in Denmark, the Netherlands, Cyprus and Ireland, that also registered the strongest increases in the ratios in the last 15 or 10 years; remarkable increases took place also in Portugal and Spain. The lowest ratios of household debt to GDP are common in Central and East European countries such as Bulgaria, Romania, Latvia, Slovakia, Slovenia, Czech Republic, Hungary and Poland.

In most of the countries the rate of growth of household debt was positive until the explosion of the financial crisis in 2007-2008. In the following years the Great Recession caused a deceleration of household debt; in many European countries the annual rate of growth became negative in 2012-2013. On the contrary in the non-European countries this growth remained positive.

Table 2 gives the correlation matrix. Household debt is correlated positively with per capita GDP and negatively with GDP growth rate. Life expectancy shows 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 baseline econometric results

In order to ensure robustness of the results we use three econometric methods to study the determinants of the household debt to disposable income ratio: the random effects estimator (RE), the fixed effects estimator (FE), the Hausman-Taylor estimator (HT). 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. The latter is a relevant issue here in that saving, financial assets, and total wealth are among our covariates.

Table 3 presents the baseline results. We start focusing on demand factors, as these variables are often available since 1995, and controlling for the effect of legal origin, as the other supply side variables are available only since 2004. The signs of the estimated coefficients turned out to be coherent in most of the specifications. 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. Davies et al. (2010) got the same result in a cross-section on 38 countries proxying per capita GDP with real consumption per capita. Jappelli et al. (2013) also found a positive coefficient for per capita GNP in a cross-section for 45 countries. The positive correlation between debt and income reappears in household micro data as well (see ECB 2013).

The coefficient of the GDP growth rate is negative and statistically significant, implying that households increase their debt during cyclical downturns; a negative coefficient is also reported by Davies et al. (2010) even if their coefficient is not significant.

Life expectancy has 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., 2010, and Zinni, 2012). Also, banks may be more inclined to grant credit if people live longer.³

On the contrary the ratio of saving to GDP does not influence the ratio of debt to household disposable income in all the interval 1995-2013. The coefficient of the saving/GDP ratio is not significant both in the random effects and in the fixed effect regression. When we instrument saving using the Hausman-Taylor estimator, we also got a coefficient that is not statistically significant. We will come back later on the issue of the influence of saving on debt.

³ Following Davies et al. (2010), Zinni (2012) and Jappelli et al. (2013) we originally included the population growth rate in the regressions. The coefficient of this variable was rarely significant and therefore we present here the regressions without the population growth rate (the previous results are available from the authors).

A good many scholars claim that countries with Anglo-Saxon legal origins tend to have larger financial – and credit – systems (La Porta et al., 1997). In our regressions the coefficient of the legal origin variable is positive and statistically significant in the random effect estimator. This evidence is consistent with the results obtained in a cross-country regression by Jappelli et al., 2013. However when we use the Hausman-Taylor estimator the coefficient is not significant.

As noted in Section 2, household debt may be affected by a number of 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 4 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 2004-2013.

The coefficient of the quality of credit registers is not significant: household debt is not influenced by the information that intermediaries may collect on borrowers. On the contrary the quality of bankruptcy laws has a positive effect on household debt. Such countries as Italy, Slovenia, and Greece have poor-quality bankruptcy laws by international standards and also low levels of household debt.

The length of time to resolution of insolvencies correlates negatively with the level of household debt in all the regressions: 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 two or three years or more to resolve insolvencies; it is high in countries like Denmark, the Netherlands, and the UK, where insolvencies are settled within a year. According to our estimates a reduction of one year for the time to resolve insolvencies would increase the ratio of household debt to disposable income of around 2 per cent. Our result tallies with the argument of Casolaro, Gambacorta and Guiso (2005), who observed that the length of trials has a strong effect on bank credit to household. Also Djankov et al. (2007) found a negative coefficient regressing private credit on the contract enforcement days (the number of days to resolve a payment dispute through courts).

The results of Table 4 are broadly consistent with those of Table 3. The GDP growth rate maintains its negative association with household debt while GDP per capita and life expectancy have a positive effect. The most important change is that now the coefficient of saving has a negative and statistically significant influence on household debt in all the regressions. Once supply-side variables are taken into account saving has a negative link with household debt.

Moreover this negative link is also influenced by the shorter time span (2004-2013) that we took into account. From 2004 to 2007 we observed the strongest acceleration of household debt and the contemporaneous slowdown of saving. After the Lehman Brother collapse, the Great Recession and the euro area debt sovereign crisis led to deleveraging and to an increase in saving. As we will see this negative linkage between debt and saving since the half of the first decade of the new Millennium will be confirmed in the following robustness checks (see paragraph 5.4).

5. Robustness checks

5.1 Do household financial assets influence debt?

Wealthier households may have an incentive to take out more debt, as emerges from surveys on individual budgets (see for instance Christelis, Ehrmann and Georgarakos 2015). Moreover banks might be more prone to grant credit if customers have a greater financial wealth (i.e. collateral). We accordingly included the ratio of household financial assets to GDP as an additional independent variable. In the Hausman-Taylor estimate, wealth is treated as endogenous and so instrumented using its lagged value. Financial wealth turns out to have a positive and statistically significant correlation with household debt in all the regressions. This is true using only the demand variables for the interval 1995-2013 (Table 5) and using both demand and supply variables for the shorter interval 2004-2013 (Tables 6). The signs and the statistical significance of the other variables are similar to those obtained in Tables 3 and 4. In Table 6 per capita GDP is not anymore statistically significant as the ratio of financial assets to GDP probably already captures the fact that richer households have more debt.

5.2 Does total household wealth affect debt?

Household debt is often connected with house purchases, as showed by surveys with information on individual households. There is quite a consensus on the idea that since the late 1990s in many countries debt levels increased because of rising house prices. The latter raised the collateral available to homeowners and encouraged them to borrow more; intermediaries had similar incentives (Hunt, 2014). For 15 countries we have time-series on non-financial assets from 1995 to 2013 and so we can calculate the ratio of total household wealth to GDP.⁴ Table 7 presents

⁴ For real assets our sample includes Australia, Canada, Czech Republic, France, Germany, Hungary, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Spain, United Kingdom, and the US. Due to the paucity of observations we did not run the regression for the shorter time span 2004-2013.

regressions where we added household total assets as determinant of debt. The exercise is not trivial as household debt includes both collateralized and uncollateralized debt (the financial accounts data do not allow to split mortgages from other types of household debt).

We found that total wealth is indeed positively associated with household debt in all the regressions (Table 7). A positive coefficient is also obtained using real wealth alone as independent variable. On the contrary when we use as regressors both financial wealth and real wealth, only the latter variable is significant (results are available upon request by the authors). The explanation is that in most of our countries real wealth is greater than financial wealth and household debt includes mainly mortgages: therefore the effect of real wealth prevails on that of financial wealth.⁵

5.3 Does public debt impact on household debt?

We studied household debt without taking into account the indebtedness of other sectors, but one may argue that household balance sheets and public sector finances are not independent. Following a Ricardian equivalence argument, public debt might influence taxation and therefore household saving and debt. In recent years firms and households reduced their levels of debt while in most of countries public debt went on increasing as an effect of the Great Recession and bank bailouts (IMF 2012b, and De Bonis and Stacchini, 2013). In 2013 the public debt/GDP ratio was greater than in 2007 in all the countries of our sample.

Therefore we added the ratio of public debt to GDP as further independent variable in our regressions. Indeed we found a negative and statistically significant coefficient for the public debt/GDP ratio. This is true both in our “demand equation” (Table 8) and in the more complete, but shorter, “demand and supply equation” (Table 9). The signs and the statistical significance of the other variables are very similar to those of the previous regressions. A greater public debt may be associated with a smaller household debt through different, but not mutually exclusive, channels. First, in a Ricardian perspective high public debt may increase household saving and therefore reduce their demand of loans. Second, a higher public debt to GDP ratio may induce banks to be regular holders of government securities, inducing a crowding out of loans to households (and firms). Third, as shown by the recent euro area sovereign debt crisis, high government debt might have adverse effects on the costs and the availability of bank funding. Banks may react increasing

⁵ We were not able to use the homeownership rates as independent variable as time series are not available. International organizations publish these rates for some countries and only for a few years (see ECB, 2003, OECD, 2011 and ECB, 2013). As a consequence, we might run a regression only with a very low number of observations. See De Bonis, Fano and Sbrana (2013) for a comment on trends in real household wealth.

interest rates on loans to households and cutting credit to the private sector, thus leading to a lower household debt.

5.4 Splitting the sample in two periods to scrutinise the role of saving

There is currently a large debate on the relationship between household deleveraging and changes in saving (Geneva Reports on the World Economy 2014, Bouis 2015, and Arslanalp et al 2015). In our regressions saving was not found to have a significant negative link with debt taking into account all the period 1995-2013 (see Tables 3, 5, 7, 8). On the contrary we found a negative association between debt and saving for the interval 2004-2013 (Tables 4, 6, 9). Our choice was dictated by the availability of institutional (supply side) variables only since 2004.

Therefore we analyse in more detail the association between the ratio of debt to disposable income and the saving ratio splitting our sample in two periods, 1995-2006 and 2007-2013. The watershed between the two periods is the start of the global financial turmoil. The new regressions confirm our previous results: saving is not statistically associated to household debt from 1995 to 2006 (Table 10). In other words during the years of debt acceleration, the reduction of saving propensity was not a main determinant of its growth. On the contrary we got a negative and statistically significant coefficient for saving in the period 2007-2013 (Table 11): afterwards 2006 saving appears to be a significant variable in explaining the decrease or the stabilization of household debt.

Our evidence is compatible with that reported by Bouis (2015) for a sample of industrial countries. Analysing the determinants of household saving rates, this author found a negative association with changes in debt-to-income ratios. But this relationship is more significant only in some periods and some countries while there are other variables – such as income and household wealth – that influence saving much more than household debt. We agree with this conclusion: also in our framework demand factors and institutional variables influence household debt in a more robust way than saving.

5.5 Using the household debt/PIL ratio as dependent variable

There is not agreement among scholars on the best scale variable for household debt. In the previous regressions of this paper – and in surveys on individual balance sheets – household debt is related to disposable income. However in the working paper version of our work we used the ratio of household debt to GDP as dependent variable. Our results were consistent with those reported in this new version. The household debt/GDP ratio is greater in countries with higher per capita GDP

and household wealth. The efficacy of bankruptcy laws is correlated with the level of household debt, while a longer time to resolve insolvencies is associated with lower debt. These two institutional variables are linked to household debt more robustly than is the quality of credit registers.

6. Conclusion

In the years leading up to the Great Recession household debt soared while since the financial crisis debt levels have fallen. According to many scholars household debt has been at the root of both the global financial crisis and the debt sovereign crisis in the euro area. In comparison with previous work the novelty of this paper is to study the determinants of the household debt/disposable income ratio examining a larger sample of countries (33), analysing a longer period (1995-2013), and taking into account a greater number of independent variables. The paper gets two main results, that refer respectively to the role of demand side and supply side indicators.

First, indebtedness is greater in countries where per capita GDP is greater and where household financial and total wealth are higher. This result is intuitive and jibes with the results generally found by household-level surveys (often not available for a large number of countries and for many years, but only as cross-sections data).

Second, considering supply side variables that are able to influence intermediaries credit, the quality of bankruptcy law is positively correlated with the volume of household debt. Moreover, the length of time required to resolve insolvencies has a negative relation with debt. These two indicators are the institutional variables that perform better in the regressions. On the contrary, the quality of credit registers does not have a strong link with household debt. Also the countries' legal origin is not always statistically significant in explaining the ratio of household debt to disposable income.

Our evidence is robust to the use of both the debt/disposable income ratio and the debt/GDP ratio as dependent variable. The econometric results are also robust to the introduction of other independent variables. For instance life expectancy is positively linked to household debt while public debt exerts a negative influence on individuals' debt. We also found a negative association between saving and household debt for the period 2004-2013 (or 2007-2013) but not for the longer period 1995-2013. Following the financial crisis of 2007-2008 the necessity of households to deleverage was associated to a higher saving in many countries. However in our econometric

exercises the links between household debt and saving are weaker than those found for the other demand side and supply side indicators.

The main implications for policy makers of our findings are that household debt is high in rich countries characterised by an efficient institutional framework for the protection of creditor rights and the resolution of insolvencies. At the same time household indebtedness is negatively correlated to Government debt.

We are conscious that we provided *prima facie* evidence, rather than uncontroversial causality. Further research is needed to scrutinise the connections between household debt and other variables. We will mention five directions of research. First, it could be interesting to study if the Great Recession was harder in countries with greater household leverage. Second, household debt could have been greater in countries with wider securitization practices. Third, it would be interesting to distinguish the determinants of collateralized and not collateralized debt. Fourth, household debt might be influenced by the type of contracts that banks offer to consumers, for instance with reference to the alternative between fixed and variable interest rates. Fifth, the nexus between household debt and inequality should be investigated. We leave these subjects to future research.

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

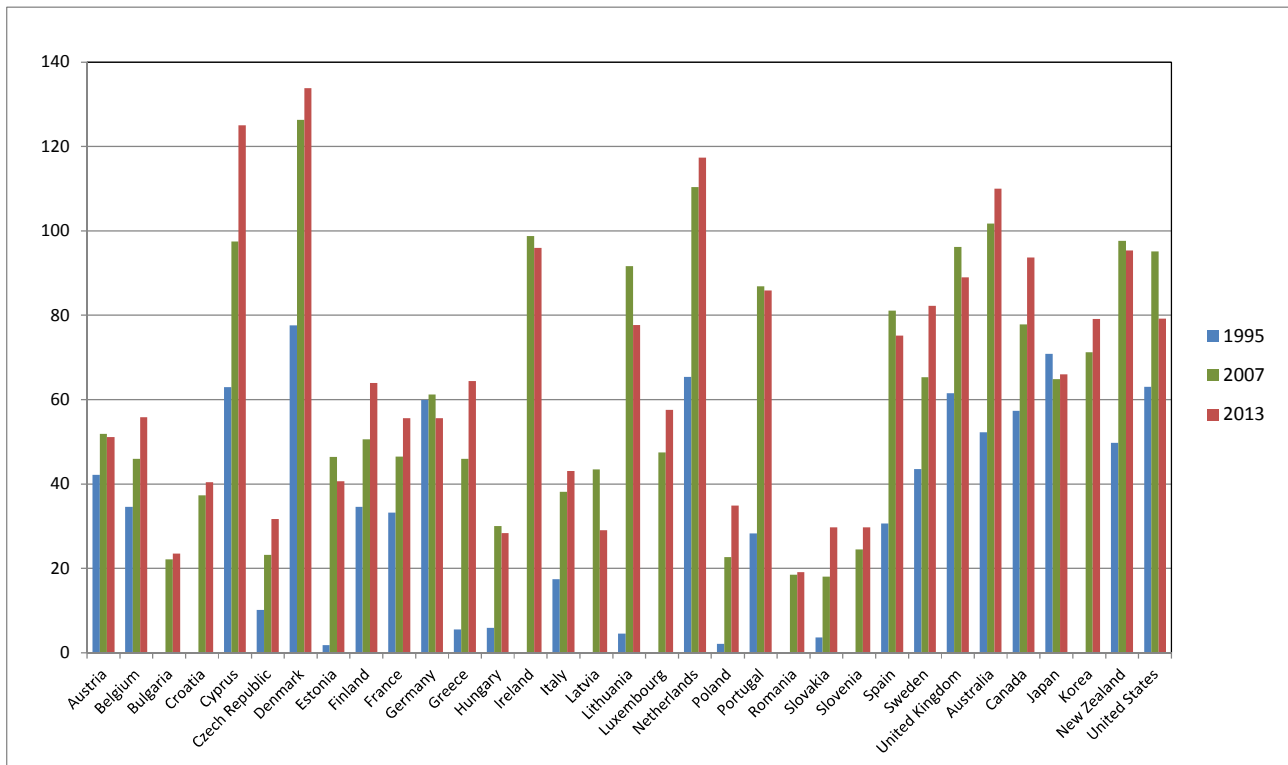


Figure 2. Standard deviation of household financial debt/GDP ratio between countries

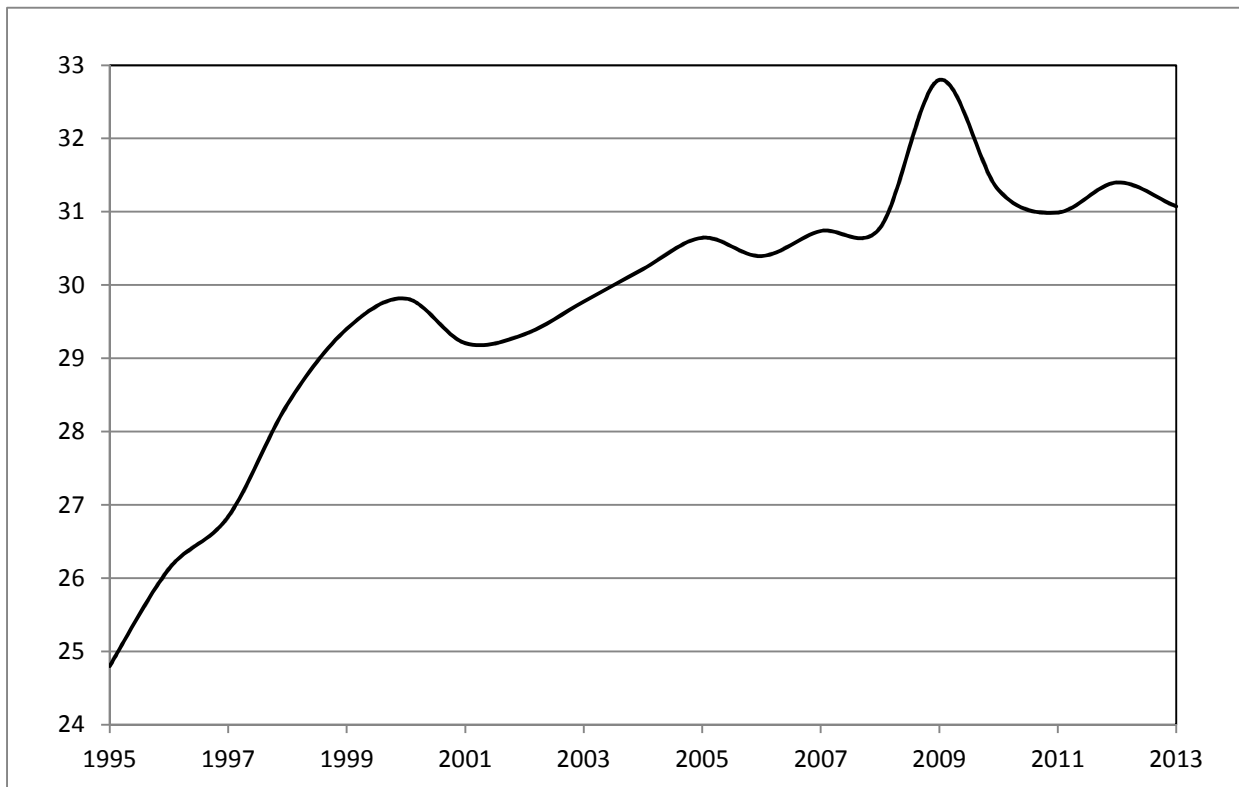


Table 1 Summary statistics. Data refer to the period 1995-2013. Financial debt is made up of loans granted by banks and other financial intermediaries to households. Loans include mortgages, consumer credit and other loans to households, e.g. leasing, factoring and credit to sole proprietorships. Life 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 8 and from 1 to 12. Time to resolve insolvencies is the number of years required to recover debt. For the list of sources see Section 3. Standard deviation within is defined in terms of deviations of observations from their specific group mean ($y_{it} - \bar{y}_i$). Standard deviation between is defined in terms of deviation of specific group mean from the overall mean ($\bar{y}_i - \bar{y}$).

Variable		Mean	Std. Dev.	Min.	Max.	N
Household Financial Debt (millions of national currency over disposable income in national currency)	overall	88.38	58.49	1.20	295.09	N=562
	between		254.39	17.68	230.12	n=33
	within		23.64	7.47	153.36	T-bar=17.03
GDP Growth Rate (% change)	overall	2.62	3.35	-17.70	11.70	N=616
	between		1.14	0.74	4.87	n=33
	within		3.16	-19.29	9.60	T-bar=18.66
GDP per Capita (US\$ at constant PPPs)	overall	26773.90	10717.55	7773.00	72573.00	N=627
	between		10328.83	11892.00	62831.53	n=33
	within		3353.91	12596.37	36515.37	T-bar=19.00
Life Expectancy (years)	overall	77.44	3.26	67.70	83.20	N=576
	between		2.99	71.76	81.74	n=33
	within		1.45	72.69	81.69	T-bar=17.45
Gross Saving Rate (millions of national currency over GDP in national currency)	overall	5.92	4.24	-11.18	18.27	N=576
	between		3.66	-5.25	10.97	n=33
	within		2.43	-11.14	18.24	T-bar=17.45
Household Financial Assets (millions of national currency over GDP in national currency)	overall	160.93	82.37	17.70	387.56	N=581
	between		79.04	52.34	336.70	n=33
	within		21.39	83.79	230.59	T-bar=17.60
Legal origin (dummy variable)	overall	0.21	0.40	0.00	1.00	N=626
	between		0.41	0.00	1.00	n=33
	within		0.00	0.21	0.21	T-bar=18.96
Quality of credit registers (index)	overall	4.53	1.79	0.00	8.00	N=324
	between		1.50	0.00	6.20	n=33
	within		1.09	-0.66	7.63	T-bar= 9.81
Quality of bankruptcy laws (index)	overall	6.84	2.11	2.00	12.00	N=324
	between		2.07	2.90	10.20	n=33
	within		0.56	4.14	8.64	T-bar= 9.81
Time to resolve insolvencies (years)	overall	1.97	1.30	0.40	9.20	N=355
	between		1.18	0.40	6.18	n=33
	within		0.54	-2.10	4.99	T-bar=10.75
Public Debt (millions of national currency over over GDP in national currency)	overall	54.58	36.23	3.70	220.27	N=565
	between		37.44	5.90	167.73	n=33
	within		14.93	-14.21	120.42	T-bar=17.12

Table 2 Correlation matrix. Data refer to the period 1995-2013. For a description of the variables see Table 1. For the list of sources see Section 3. Correlation is defined in terms of deviations of observations from the overall mean $(y_{it} - \bar{y})(x_{it} - \bar{x})$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Household Financial Debt	1.00										
(2) GDP Growth Rate	-0.18	1.00									
(3) GDP per Capita	0.59	-0.13	1.00								
(4) Life Expectancy	0.56	-0.24	0.61	1.00							
(5) Gross Saving Rate	0.08	-0.26	0.39	0.42	1.00						
(6) Household Financial Assets	0.56	-0.19	0.60	0.62	0.32	1.00					
(7) Legal origin	0.46	-0.02	0.35	0.27	-0.03	0.37	1.00				
(8) Quality of credit registers	0.22	-0.17	0.05	0.28	0.02	0.37	0.22	1.00			
(9) Quality of bankruptcy laws	0.26	0.13	-0.03	-0.15	-0.33	-0.04	0.52	0.08	1.00		
(10) Time to resolve insolvencies	-0.51	0.18	-0.50	-0.52	-0.27	-0.56	-0.35	-0.22	0.00	1.00	
(11) Public Debt	0.10	-0.29	0.17	0.40	0.29	0.59	-0.01	0.30	-0.34	-0.36	1.00

Table 3 Baseline specification: the role of demand factors. Data refer to the period 1995-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate is treated as endogenous. Yearly dummy variables are included. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor
GDP Growth Rate	-1.257*** (0.000)	-1.231*** (0.000)	-0.895*** (0.000)
GDP per Capita	0.00163*** (0.000)	0.00176*** (0.000)	0.00270*** (0.000)
Life Expectancy	6.581*** (0.000)	7.134*** (0.000)	9.547*** (0.000)
Gross Saving Rate	-0.0477 (0.866)	0.0356 (0.900)	-0.143 (0.605)
Legal origin	35.67** (0.014)	omitted	20.14 (0.257)
Constant	-480.9*** (0.000)	-517.8*** (0.000)	-728.3*** (0.000)
σ fixed effect	32.57	39.29	41.02
σ random effect	12.66	12.66	12.92
ρ	0.869	0.906	0.910
LM test for H_0 :OLS, H_1 :RE	(0.000)		
Hausman test for H_0 :RE, H_1 :OLS	(1.000)		
Hausman test for H_0 :RE, H_1 :FE		(0.866)	
Hausman test for H_0 :HT, H_1 :RE			(0.000)
R^2 within	0.734	0.734	
R^2 between	0.542	0.465	
R^2	0.555	0.502	
Observations	519	519	519

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4 Do supply side factors matter? Data refer to the period 2004-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate is treated as endogenous. Yearly dummy variables are included. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor
GDP Growth Rate	-0.983*** (0.000)	-0.950*** (0.000)	-0.971*** (0.000)
GDP per Capita	0.000785** (0.044)	0.000259 (0.571)	0.000695* (0.081)
Life Expectancy	4.644*** (0.000)	3.156** (0.031)	4.375*** (0.001)
Gross Saving Rate	-0.744*** (0.001)	-0.724*** (0.001)	-0.716*** (0.001)
Quality of credit registers	-0.691 (0.224)	-0.433 (0.455)	-0.631 (0.262)
Quality of bankruptcy laws	4.841*** (0.000)	4.460*** (0.001)	4.730*** (0.000)
Time to resolve insolvencies	-2.401*** (0.007)	-2.303*** (0.010)	-2.375*** (0.007)
Legal origin	37.16** (0.046)	omitted	38.81* (0.063)
Constant	-321.8*** (0.001)	-183.5 (0.116)	-298.6*** (0.004)
σ fixed effect	41.18	49.70	46.01
σ random effect	7.053	7.053	6.842
ρ	0.972	0.980	0.978
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		(0.994)	
Hausman test for H_0 :HT, H_1 :RE			(0.998)
R^2 within	0.666	0.669	
R^2 between	0.517	0.550	
R^2	0.512	0.481	
Observations	288	288	288

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Do household financial assets affect household debt? Data refer to the period 1995-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate and the household financial assets are treated as endogenous. Yearly dummy variables are included. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1)	(2)	(3)
	RE	FE	Hausman-Taylor
GDP Growth Rate	-1.259*** (0.000)	-1.229*** (0.000)	-0.924*** (0.000)
GDP per Capita	0.00137*** (0.000)	0.00165*** (0.001)	0.00239*** (0.000)
Life Expectancy	5.940*** (0.000)	7.301*** (0.000)	8.231*** (0.000)
Gross Saving Rate	-0.160 (0.566)	-0.0700 (0.802)	-0.208 (0.441)
Household Financial Assets	0.175*** (0.000)	0.196*** (0.000)	0.180*** (0.000)
Legal origin	24.74 (0.101)	omitted	10.68 (0.563)
Constant	-445.4*** (0.000)	-552.5*** (0.000)	-643.7*** (0.000)
σ fixed effect	33.47	39.00	42.54
σ random effect	12.40	12.40	12.62
ρ	0.879	0.908	0.919
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		(0.685)	
Hausman test for H_0 :HT, H_1 :RE			(0.000)
R^2 within	0.746	0.746	
R^2 between	0.555	0.507	
R^2	0.562	0.523	
Observations	517	517	517

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6 Do household financial assets and supply factors affect household debt? Data refer to the period 2004-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate and the household financial assets are treated as endogenous. Yearly dummy variables are included. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor
GDP Growth Rate	-0.967*** (0.000)	-0.935*** (0.000)	-0.960*** (0.000)
GDP per Capita	0.000597 (0.133)	0.000184 (0.689)	0.000571 (0.154)
Life Expectancy	3.862*** (0.003)	2.816* (0.052)	3.779*** (0.003)
Gross Saving Rate	-0.798*** (0.000)	-0.768*** (0.001)	-0.773*** (0.000)
Household Financial Assets	0.148*** (0.001)	0.136*** (0.005)	0.150*** (0.001)
Quality of credit registers	-0.775 (0.164)	-0.532 (0.352)	-0.747 (0.178)
Quality of bankruptcy laws	4.293*** (0.001)	3.931*** (0.003)	4.226*** (0.001)
Time to resolve insolvencies	-2.041** (0.020)	-2.007** (0.024)	-2.029** (0.020)
Legal origin	30.54 (0.112)	omitted	30.83 (0.124)
Constant	-273.7*** (0.007)	-172.5 (0.135)	-266.7*** (0.008)
σ fixed effect	42.89	46.23	43.60
σ random effect	6.949	6.949	6.726
ρ	0.974	0.978	0.977
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		(0.975)	
Hausman test for H_0 :HT, H_1 :RE			
R^2 within	0.678	0.680	
R^2 between	0.548	0.565	
R^2	0.545	0.538	
Observations	286	286	286

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Do household total assets matter? Data refer to the period 1995-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate and the household total assets are treated as endogenous. Yearly dummy variables are included. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor
GDP Growth Rate	-2.593*** (0.000)	-2.722*** (0.000)	-1.618*** (0.000)
GDP per Capita	0.00494*** (0.000)	0.00590*** (0.000)	0.00409*** (0.000)
Life Expectancy	9.402*** (0.000)	16.44*** (0.000)	2.434* (0.082)
Gross Saving Rate	-1.284** (0.035)	-1.101* (0.057)	-0.507 (0.335)
Household Total Assets	0.118*** (0.000)	0.132*** (0.000)	0.135*** (0.000)
Legal origin	1.613 (0.929)	omitted	12.55 (0.568)
Constant	-793.4*** (0.000)	-1362.0*** (0.000)	-268.4*** (0.006)
σ fixed effect	28.67	61.74	38.22
σ random effect	10.23	10.23	11.06
ρ	0.887	0.973	0.923
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			
R^2 within	0.808	0.816	
R^2 between	0.406	0.385	
R^2	0.455	0.416	
Observations	232	232	232

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 Baseline specification with public debt. Data refer to the period 1995-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate is treated as endogenous. Yearly dummy variables are included among regressors. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1)	(2)	(3)
	RE	FE	Hausman-Taylor
GDP Growth Rate	-1.479*** (0.000)	-1.415*** (0.000)	-0.986*** (0.000)
GDP per Capita	0.000848** (0.042)	0.000191 (0.735)	0.00127*** (0.002)
Life Expectancy	8.276*** (0.000)	7.768*** (0.000)	12.44*** (0.000)
Gross Saving Rate	-0.464 (0.109)	-0.440 (0.130)	-0.310 (0.271)
Public Debt	-0.359*** (0.000)	-0.401*** (0.000)	-0.343*** (0.000)
Legal origin	36.15** (0.013)	omitted	23.26 (0.230)
Constant	-563.3*** (0.000)	-500.5*** (0.000)	-894.4*** (0.000)
σ fixed effect	32.28	44.66	45.05
σ random effect	11.45	11.45	11.99
ρ	0.888	0.938	0.934
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			
Hausman test for H_0 :HT, H_1 :RE			
R^2 within	0.756	0.757	
R^2 between	0.484	0.346	
R^2	0.538	0.415	
Observations	475	475	475

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9 Do supply side factors and public debt matter? Data refer to the period 2004-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate is treated as endogenous. Yearly dummy variables are included. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1)	(2)	(3)
	RE	FE	Hausman-Taylor
GDP Growth Rate	-0.951*** (0.000)	-0.911*** (0.000)	-0.928*** (0.000)
GDP per Capita	0.000599 (0.186)	-0.000434 (0.437)	0.000172 (0.723)
Life Expectancy	4.208*** (0.006)	1.773 (0.302)	3.112** (0.047)
Gross Saving Rate	-0.689*** (0.004)	-0.681*** (0.004)	-0.666*** (0.004)
Public Debt	-0.144** (0.014)	-0.194*** (0.002)	-0.164*** (0.004)
Quality of credit registers	-0.327 (0.592)	0.145 (0.813)	-0.118 (0.841)
Quality of bankruptcy laws	5.694*** (0.000)	5.368*** (0.000)	5.507*** (0.000)
Time to resolve insolvencies	-2.356*** (0.009)	-2.233** (0.012)	-2.283*** (0.008)
Legal origin	36.95** (0.041)	omitted	43.27* (0.093)
Constant	-283.4** (0.015)	-56.34 (0.675)	-186.8 (0.122)
σ fixed effect	38.55	56.56	57.53
σ random effect	6.917	6.917	6.678
ρ	0.969	0.985	0.987
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		(0.316)	
Hausman test for H_0 :HT, H_1 :RE			(0.921)
R^2 within	0.969	0.985	0.987
R^2 between	0.473	0.099	
R^2	0.468	0.110	
Observations	268	268	268

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10 Splitting the sample to analyze the role of saving: 1995-2006. Data refer to the period 1995-2006. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate is treated as endogenous. Yearly dummy variables are included among regressors. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1) RE	(2) FE	(3) Hausman-Taylor
GDP Growth Rate	-1.040*** (0.007)	-1.366*** (0.000)	-1.141*** (0.002)
GDP per Capita	0.00296*** (0.000)	0.00594*** (0.000)	0.00395*** (0.000)
Life Expectancy	4.683*** (0.001)	8.537*** (0.000)	5.453*** (0.001)
Gross Saving Rate	-0.488 (0.159)	-0.481 (0.162)	-0.420 (0.212)
Legal origin	23.81* (0.090)	omitted	15.36 (0.521)
Constant	-362.7*** (0.001)	-708.9*** (0.000)	-441.1*** (0.001)
σ fixed effect	29.98	60.61	53.04
σ random effect	9.610	9.610	9.359
ρ	0.907	0.975	0.970
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		(0.184)	
Hausman test for H_0 :HT, H_1 :RE			(0.962)
R^2 within	0.698	0.713	
R^2 between	0.573	0.528	
R^2	0.620	0.582	
Observations	324	324	324

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11 Splitting the sample to analyze the role of saving: 2007-2013. Data refer to the period 2007-2013. The dependent variable is the household debt-to-disposable income ratio. RE denotes Random effects estimator. FE denotes Fixed effects estimator. In the Hausman-Taylor estimation the saving rate is treated as endogenous. Yearly dummy variables are included among regressors. For the definition of the independent variables and the list of sources see Table 1 and Section 3 above.

	(1)	(2)	(3)
	RE	FE	Hausman-Taylor
GDP Growth Rate	-0.794*** (0.000)	-0.740*** (0.000)	-0.777*** (0.000)
GDP per Capita	0.000541 (0.207)	-0.000214 (0.663)	0.000347 (0.425)
Life Expectancy	1.658 (0.215)	-0.498 (0.735)	1.072 (0.423)
Gross Saving Rate	-0.811*** (0.000)	-0.762*** (0.000)	-0.780*** (0.000)
Legal origin	59.07*** (0.004)	omitted	61.87** (0.011)
Constant	-46.34 (0.658)	157.3 (0.184)	4.598 (0.965)
σ fixed effect	45.41	62.58	54.94
σ random effect	5.472	5.472	5.318
ρ	0.986	0.992	0.991
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		(0.178)	
Hausman test for H_0 :HT, H_1 :RE			(0.074)
R^2 within	0.236	0.255	
R^2 between	0.339	0.170	
R^2	0.339	0.111	
Observations	195	195	195

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$