



European
Commission

ISSN 2443-8022 (online)

Household saving rates in the EU: Why do they differ so much?

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DISCUSSION PAPER 005 | SEPTEMBER 2015

EUROPEAN ECONOMY



Economic and
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Luxembourg: Publications Office of the European Union, 2015

KC-BD-15-005-EN-N (online)
ISBN 978-92-79-48666-1 (online)
doi:10.2765/652169

KC-BD-15-005-EN-C (print)
ISBN 978-92-79-48665-4 (print)
doi:10.2765/26634 (print)

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Household saving rates in the EU

Why do they differ so much?

Stijn Rocher, Michael H. Stierle

Abstract

This paper investigates factors which may help explain the persistent differences in household saving rate across the EU, which in 2013 ranged from –10% of household income in Romania to +16% in Germany. Factors explaining changes over time or forecasting of household savings fall out of the scope of this paper.

First, we argue that caution is needed when comparing household saving rates across countries. Institutional differences and data reliability are likely to hinder the international comparability of saving rates.

Second, we discuss various determinants of household saving behaviour. We find that traditional explanatory variables like income levels, age dependency and uncertainty can explain more than half of the cross section variance in saving rates. However, large unobserved country fixed effects (e.g. because of institutional differences and measurement error) appear to be present.

JEL Classification: E21, C23, H55.

Keywords: household saving, international comparability, determinants of saving, panel data.

Acknowledgements: The authors greatly appreciate comments and suggestions made by Geraldine Mahieu, Kristian Orsini, Karl Pichelmann, Werner Roeger, Massimo Suardi, Anna-Elisabeth Thum-Thysen and Tsvetan Tsalinski. This paper does not express the view of the European Commission. The authors are responsible for all remaining errors.

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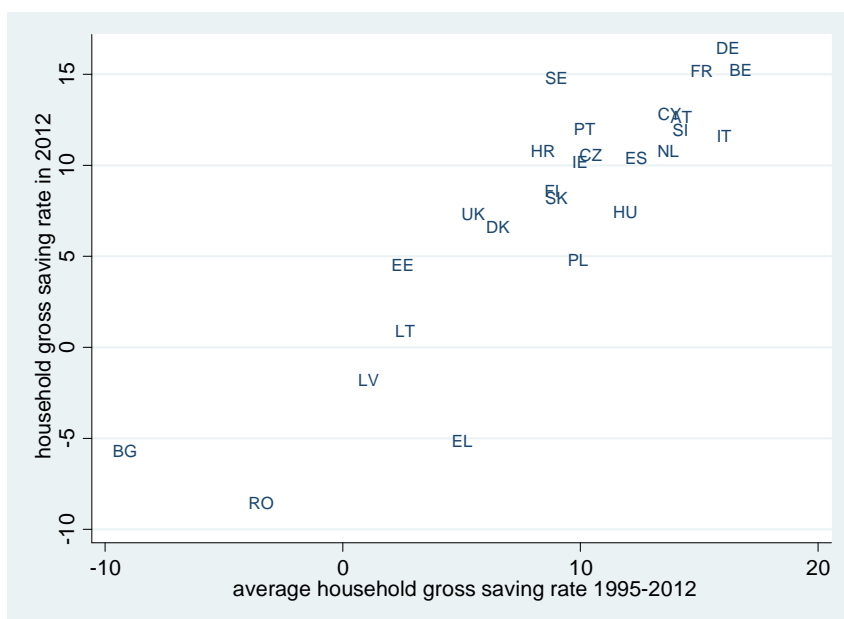
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1. Introduction

Household saving rates differ significantly among EU countries and differences have proven to be persistent over time (see Figure 1). In countries as Germany, France and Belgium, households save a relative large share of their disposable income. On the other hand, households in Romania and Bulgaria seem to spend often more than they earn, resulting in negative saving rates.

Persisting differences across countries may have important implications for the wider economy. Household saving determines to an important extent the availability of credit to finance investments by enterprises and the government. Insufficient household saving may therefore hinder investment and dampen economic growth. The disparity in household saving rates may suggest that some countries rely more on foreign savings to finance domestic investments making these countries more vulnerable to external shocks. Investment in these countries may even be depressed due to the lack of finance.

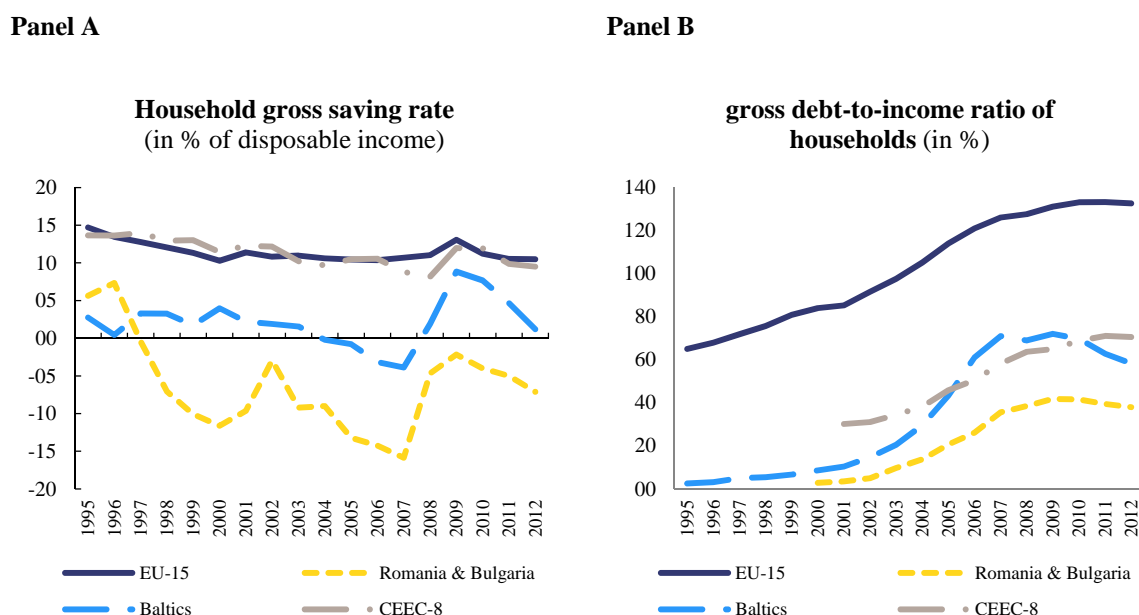
Figure 1 Persistence of household gross saving rate (in %)



Source: Eurostat

However, household saving rates need to be read with care due to data reliability and limited international comparability. Saving rates seem to be in contrast to other economic variables. For example, saving rates have been negative over the last 15 years in Bulgaria (-11%) and Romania (-6%) as shown in Figure 2 (panel A). This would imply that households in these countries spend significantly and persistently more than they earn. The sustainability of this situation could be questioned. However, it might not be fully reflecting economic reality as households' debt-to-income ratios remain rather low in these countries as depicted in Figure 2 (panel B) and even have been decreasing since 2009.

Figure 2 Household gross saving rate and gross debt-to-income ratio of households



Source: Eurostat

The objective of this paper is to investigate why household saving rates differ so much across EU countries. The structure of the paper is as follows. First, we provide a brief literature review. Second, we shortly review how the saving rate is calculated based on national accounts. Third, we examine several data issues which may plague reliability and international comparability of saving rates. Fourth, we discuss and investigate empirically the main factors contributing to differences in saving rates across EU countries. Lastly, we summarize the main findings of our analysis.

2. Literature Review

A number of empirical studies have estimated the effect of various economic and demographic variables on saving. They differ in their geographic as well as their time coverage. We provide an overview of the empirical findings in Table 1. The table lists the potential determinants. In the 2nd column, it provides whether the expected impact on saving is positive or negative according to economic theory which is discussed in section 4 and 5 below. The last column contains the empirical findings according to various studies. Table 1 shows that empirical findings are in general in line with economic theory. However, the empirical literature is not conclusive on all investigated determinants, certainly when also economic theory predicts an ambiguous impact on saving.

This paper contributes to the literature as household saving in the EU member states is the focus of the analysis. Although many empirical studies have estimated the impact of theoretical saving determinants on household saving, only a very limited number analyses household saving behaviour in the EU. Moreover, previous studies have shown that empirical results are largely dependent on the country sample indicating that household saving behaviour may be different across countries (e.g. Schmidt-Hebbel and Servén, 2014). Therefore, earlier findings may not be simply extrapolated to EU member states.

Table 1 – Determinants of private saving: theory and empirical findings in the literature

Determinants of private saving	Expected sign	Empirical findings
<u>income:</u>		
level of real GDP per capita	positive	(0) 5, 6; (+) 1, 2, 3, 7, 12, 13, 15
growth rate of real GDP per capita	ambiguous	(-) 11, 13; (0) 5, 6; (+) 2, 3, 4, 7, 10, 12, 15
terms of trade	positive	(0) 15; (+) 2, 6, 7, 8
income inequality	positive	(0) 3
<u>wealth:</u>		
wealth/gdp	negative	(0) 2, 6
<u>demographics:</u>		
old age dependency ^(a)	negative	(-) 4, 7, 13, 14, 15; (0) 8, 11, 12
young age dependency ^(b)	negative	(-) 7, 12
age dependency (a+b)	negative	(-) 2, 3, 10; (0) 5, 6
degree of urbanization	negative	(-) 3, 7, 11, 12, 15
<u>rates of return:</u>		
real interest rate	ambiguous	(-) 7, 8; (0) 1, 2, 4, 5, 6, 9, 14; (+) 11, 15
<u>uncertainty:</u>		
inflation rate	positive	(0) 1, 2, 3, 8; 14; (+) 4, 7, 11, 13, 15
unemployment rate	positive	(+) 13
<u>fiscal policy:</u>		
government surplus	negative	(-) 2, 5, 6, 13
government saving	negative	(-) 1, 3, 4, 7, 8, 10, 14; (0) 15
government expenditure or consumption	negative	(-) 2, 6, 13
direct taxation	negative	(-) 4
<u>pension system:</u>		
social security	negative	(-) 3, 4, 5
<u>financial market performance:</u>		
Money stock	ambiguous	(-) 10; (0) 7; (+) 1, 3
private sector credit	ambiguous	(-) 3, 5, 7, 9, 12; (0) 15
<u>international financial integration:</u>		
current account deficit	ambiguous	(-) 1, 2, 3, 10

Note: The table gives an overview of the empirical findings from following studies: (1) Corbo and Schmidt-Hebbel (1991), (2) Masson, Bayoumi and Samiei (1995), (3) Edwards (1996), (4) Callen and Thimann (1997), (5) Baillu and Reisen (1998), (6) Ul Haque, Pesaran and Sharma (1999), (7) Loayza, Schmidt-Hebbel and Servén (2000), (8) de Serres and Pelgrin (2003), (9) Bandiera et al (2000), (10) Schrooten and Stephan (2005), (11) Niculescu-Aron and Mihaescu (2012), (12) Samwick (2000), (13) Kessler and Perelman (1993), (14) OECD (2002), (15) Grigoli et al (2014).

3. Household saving in national accounts²

An in-depth analysis of the international comparability of household saving rates is necessary even when using harmonized data for EU countries. The majority of research on household saving determinants carefully compiled datasets to maximize international comparability. Even when using highly harmonized data for EU countries, significant differences remain. To prepare for the discussion of factors impacting the international comparability of household saving rates, this section describes underlying statistical definitions.

The household sector in our analysis includes the non-profit organisation serving households (NPISH), such as charities and trade unions. This is because some national statistical offices only provide historical figures for the household sector incorporating this relatively small institutional sector. This definition of the household sector may to some extent affect the international comparability of saving rate as we will discuss below (section 4.4, delineation of the household sector).

Gross household saving equals the part of gross disposable income that is not spent as final consumption expenditure plus the change in net equity of households in pension fund reserves (see Equation 1). National accounts correct gross household saving for item "D.8". This accounting adjustment is necessary in order to reconcile the household income account with their financial account. National accounts in fact treat contributions to and pensions paid out by pension funds as contributions to and payments from the social security system. This is recorded in the income account. At the same time, changes in pension fund assets of households are also recorded in the financial accounts including their changes in net equity. Consequently, differences in pension systems among countries can reduce the international comparability of saving rates (see section 4.1, pension systems).

Equation (1):

$$\text{gross saving (B.8g)} = \text{gross disposable income (B.6g)} - \text{final consumption expenditure (P.31)} \\ + \text{change in net equity in pension fund reserves (D.8)}$$

The gross saving rate of households is calculated as the ratio of gross household saving to gross disposable income adjusted for the change in net equity of households in pension fund reserves (see Equation 2). The national accounts correct gross household saving for item "D.8". Consequently, item D.8 is also added to the denominator of the household saving ratio (disposable income), because it is included in the numerator (saving).

Equation (2):

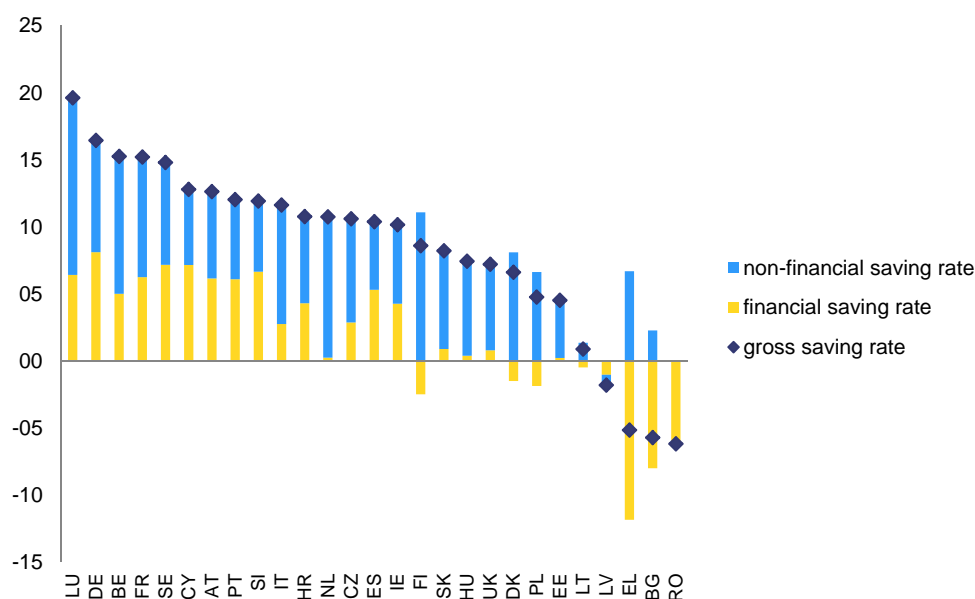
$$\text{saving rate} = \frac{\text{gross saving (B.8g)}}{\text{gross disposable income (B.6g)} + \text{change in net equity in pension fund reserves (D.8)}}$$

Household saving is used to acquire non-financial and/or financial assets. The acquisition of non-financial assets such as housing or valuables (e.g. gold) is called non-financial saving. Household saving can also be used to purchase financial assets (e.g. deposits in a savings account) or to repay debt (e.g. repayment of a consumer loan or a mortgage). This is defined as financial saving. Households are net borrowing when their financial saving is negative. This results in higher liabilities and/or lower financial assets of households, *ceteris paribus*.

Households are in general net lenders to the economy. Figure 3 depicts that aggregate gross household saving in most countries is large enough to finance both their financial and non-financial asset acquisitions. As such households are generally net lenders to the economy. In turn, in some countries like Finland, Denmark or Poland, households borrow to finance some part of non-financial asset acquisition, e.g. housing. However, there are several countries where households are net borrowing. In Greece, Bulgaria and Romania, households also finance part of their consumption expenditures by borrowing since their non-financial saving is smaller than their net borrowing.

² See OECD (2006) "Understanding National Accounts" for more information on national accounts.

Figure 3 – Household financial and non-financial saving rate in 2012 (in %)



Source: Eurostat

4. Data issues: Are saving rates internationally comparable?

Institutional differences between countries can result in different household saving rates even if the underlying consumption and saving behaviour of households are similar. For example, the diversity of national pension systems may hamper international comparison of household saving rates since they are differently recorded in household accounts.

Furthermore, differences in data quality underlying the national accounts aggregates may result in imprecise saving rate estimates. For instance, estimates of the size of the shadow economy, i.e. those economic activities and the income derived thereof that circumvent or avoid government regulation or taxation, range from 8% in Austria up to 29% in Romania (Schneider, 2012). Although estimates of these unobserved activities are included in the national accounts, they are likely to be very imprecise and can result in biased estimates of the saving rate, certainly when the size of the shadow economy is large. Moreover, as household saving is obtained as the difference of two large aggregates (gross disposable income and consumption) even a small estimation inaccuracy in one of those components automatically leads to a substantial error in the balance item, household savings.

Understanding the magnitude of the impact institutional differences and other data issues have on saving rates is highly relevant. In the following, we will try to indicate the potential size of institutional differences and the potential bias due to imprecise estimates of the saving rate. It is clear that these are only approximations as actual institutional changes could affect underlying household consumption and saving behaviour. In addition, these indications are often based on strongly simplifying assumptions.

The two types of data issues discussed below relate to i) institutional factors and ii) potential estimation inaccuracies of savings. First, we will quantify the impact of institutional differences on saving rates among countries. Four institutional factors that have an impact on the recording of household savings are discussed below: (i) differences in pension systems, (ii) differences in the degree of social services in kind provided by the government, (iii) the impact of direct versus indirect taxation and (iv) the delineation of the household sector. Second, we will provide a rough estimate of the potential impact of imprecise estimates of consumption, disposable income and resulting saving ratio by households due to unrecorded remittances and the shadow economy.

4.1. Pension systems

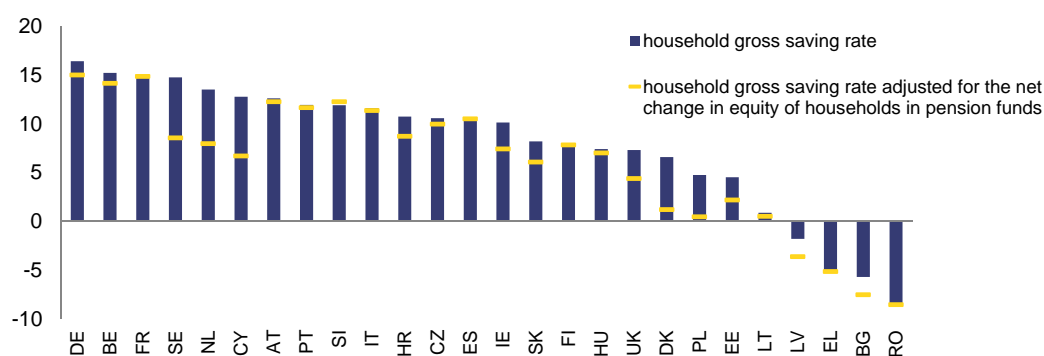
Most EU countries have developed a three pillar pension system. The first pillar consists of publicly provided mandatory pension schemes. The second pillar consists of collective occupational pension plans. The third pillar is formed by individual pension products such that individuals can save for topping up their pension, often taking advantage of tax benefits.

Recently some countries have switched part of their first pillar social security pension schemes into funded schemes. Pensions within the first pillar are often based on the pay-as-you-go principle (PAYG), where contributions of current employees are used to finance the pension benefits of current retirees. However, funded pension schemes (or capitalization plans) became more important across the EU as countries prepare for increasing pension expenditures as a result of demographic changes. In these pension plans, each employee contributes to a fund from which his or her future pension benefit will be paid. Therefore, these statutory funded private schemes are referred to as first pillar bis schemes. Also, second and third pillar pension plans are, in general, capitalization plans and administered by a pension fund or insurance company.

In national accounts, there are notable differences in the recording of unfunded (e.g. first pillar schemes) and funded (e.g. first pillar bis schemes) pension schemes. Contributions to a PAYG plan are deducted from income whereas pension benefits in this scheme are considered as part of income. In capitalization plans, all contributions/benefits are recorded as an increase/decrease in the pension fund assets of employees in the financial accounts. In order to improve the comparability of household sector accounts, national accounts also add and subtract these benefits and contributions to household income. Importantly, the investment income on accumulated pension fund assets is recorded as being reinvested by the households in the pension fund and therefore also included in household saving (item D.8). This is not the case for increasing pension entitlements in PAYG schemes.

Although households may perceive both systems as equal, the type of pension arrangement has technical implications on the saving rate. Countries with a funded pension system likely have a higher saving rate than countries with a predominantly PAYG based pension system, since changes in actuarial reserves of pension funds is considered as household saving in the first, but not in the latter case.

Figure 4 – Impact of the change in net equity of households in pension funds on household gross saving rate in 2012 (in %)



Source: AMECO and own calculations

The role of the change in pension fund equity is particularly important in countries with large pension funds. Figure 4 shows the impact on saving rates of deducting the net change in equity of households' pension funds (item D.8) from both the numerator and denominator. This difference is particularly large in countries with large pension fund assets like Sweden (-6.2 pp.), the Netherlands (-5.4 pp.) and Denmark (-5.4 pp.). Broadly speaking, changes in the valuation of pension fund assets accounts for a large proportion of household saving in these countries.³

³ Although Finland holds substantial pension fund assets, the accrual of these assets was very limited in 2011/2012 and hence the change in net equity of households in pension funds.

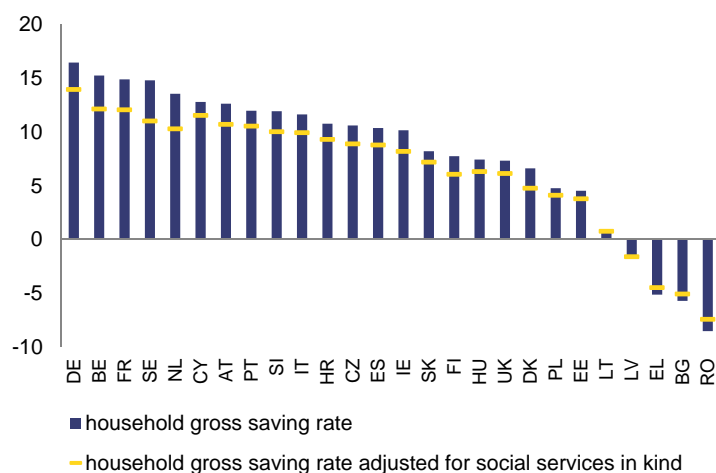
4.2. Social services in kind

Governments often provide services used by members of household on an individual basis such as education and health. This is because these social services in kind may otherwise be under-provided according to prevailing social norms. The extent to which the government provide these services largely varies between countries and households may have to pay a part of the cost of these services themselves.

The degree of government provision of social services in kind has an impact on the household saving ratio. Simplifying that government taxes households to finance these services, household savings will not be directly affected. However, disposable income will be lower as these households have to pay taxes. In return, households benefit from social services in kind and have lower consumption expenditures. Conversely, only household consumption expenditure (and not disposable income) is affected in the absence of government provision of social services in kind, since households then pay a higher amount for the same level of social services. Since disposable income is the denominator, the household saving ratio is likely to be higher in countries with a generous public provision of social services in kind.

Figure 5 shows the saving rate calculated using disposable income including social services in kind. To measure the impact on the household saving rate, we add individual services produced by the public sector to the disposable income of the household sector. As expected, this correction reduces the saving rate in countries with a substantial government provision of social services, such as Sweden (-3.8 pp.), Belgium (-3.1 pp.) and France (-2.8 pp.).

Figure 5 – Impact of social services in kind on household saving rate in 2012 (in %)



source: AMECO and own calculations

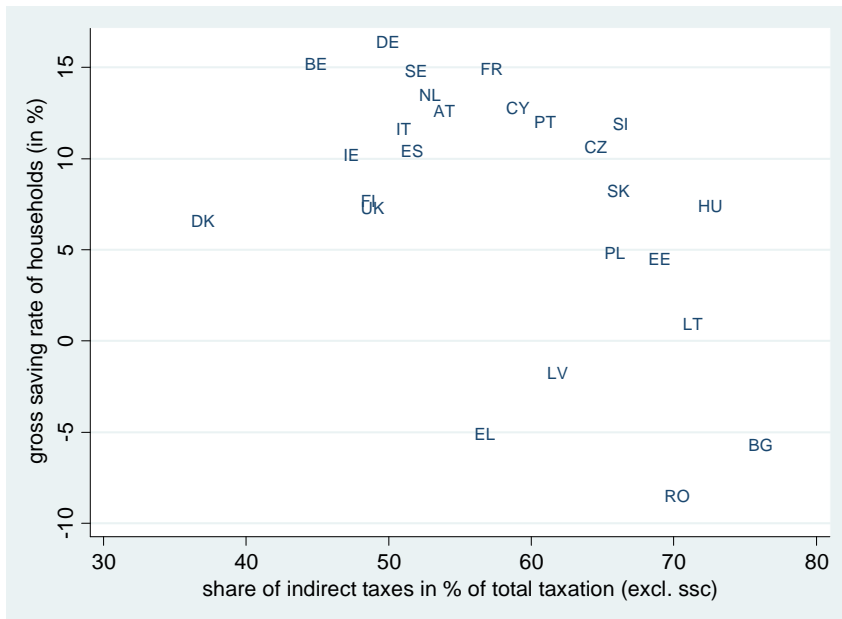
4.3. Direct versus indirect taxation

Governments rely on direct and indirect taxes to generate tax revenue. Direct taxes, such as income taxes, decrease household disposable income. Indirect taxes, such as VAT, do not decrease household disposable income, but will raise consumption expenditure.

The mix of direct and indirect taxation may affect household saving rates. Even if households have equal savings in both situations, household saving rates will be higher the greater the reliance of the government on direct taxes as disposable income is the denominator of the saving ratio.⁴ Figure 6 shows that the share of indirect taxation as a % of total taxation indeed differs across EU countries. Moreover, a higher share of indirect taxation is associated with lower household saving rates as predicted. Further analysis is however needed to investigate whether this is a causal relationship or whether other factors explain this correlation.

⁴ Higher levels of indirect taxation could, however, reduce the incentive to consume and therefore increase saving. This may partially cancel out the negative effect on household saving rates of higher reliance on indirect taxation.

Figure 6 – Direct versus indirect taxation (2012)

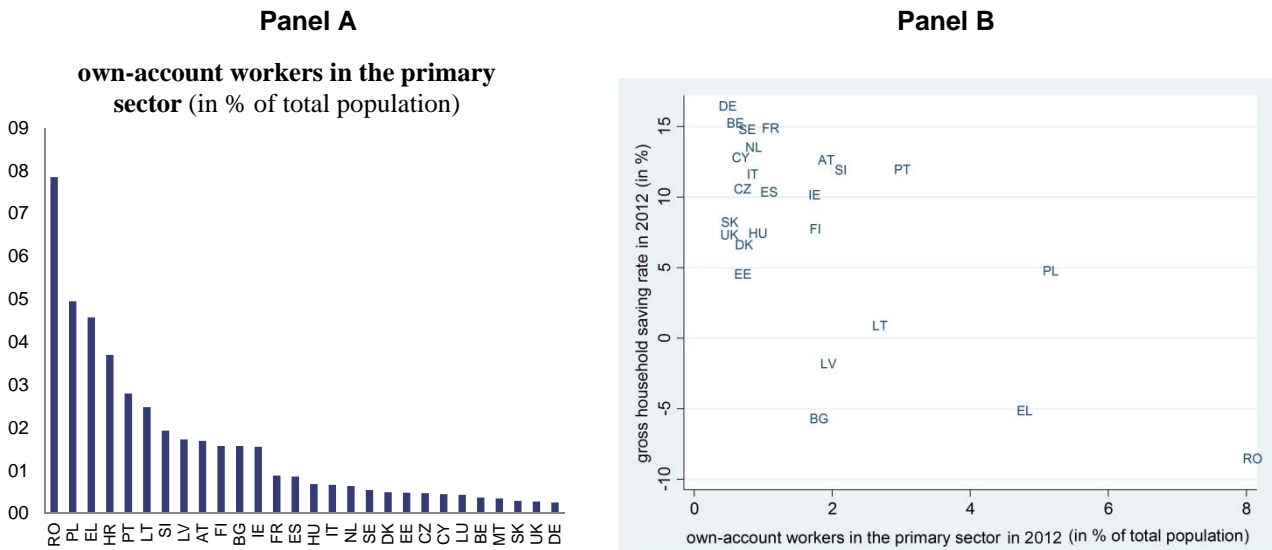


Source: Eurostat

4.4. Delineation of the household sector

The households sector comprises all households and includes small unincorporated enterprises and associations. These cover sole proprietorships and most partnerships that do not have an independent legal status. In addition, non-profit institutions serving households (NPISHs), such as charities and trade unions, are grouped with households. Therefore the households sector, in addition to consumption, also generates output and entrepreneurial income.

Figure 7 – Own-account workers in the primary sector in 2012



Source: Eurostat and own calculations

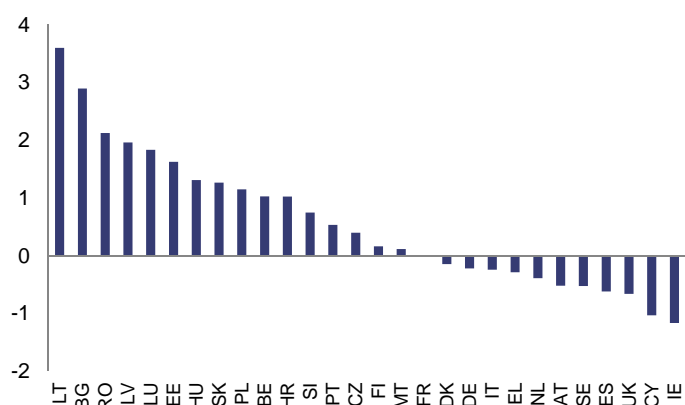
The proportion of firms and associations within the household sector can impact the aggregate saving ratio, because producers may have different saving behaviour. Figure 7 panel A shows the share of own-account workers in agriculture as a % of the total population. These own-account workers are always classified as households. The figure suggests that the economic importance of own-account entrepreneurs and small unincorporated enterprises is larger in some countries than in others as it is true for own-account workers in

agriculture. This may affect the international comparability of household saving rates if saving behaviour of these entrepreneurial households differs from regular households (see Figure 7 panel B).

4.5. Remittances

The amount of net remittances received by households largely differs from country to country. The majority of remittances flows comprises money sent by individual migrant workers to families residing in the country of origin, often through informal channels. More broadly remittances refer to transfers by individuals in cash or in kind from one place to another. Figure 8 shows large differences in the size of net remittances received by EU countries, with Lithuania being the largest net receiver and Ireland the largest net sender.

Figure 8 - Net remittances received in 2012 (in % of GNI)

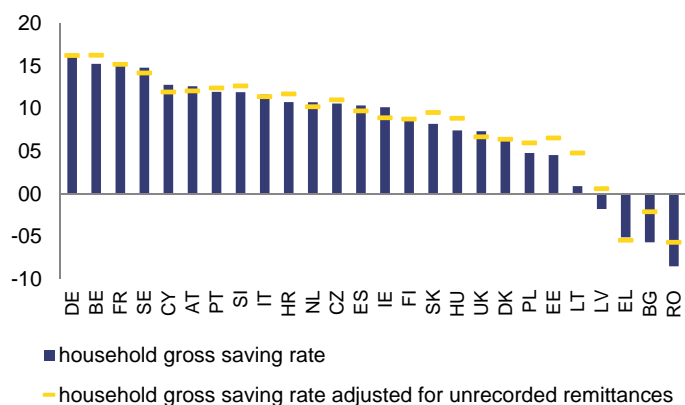


Source: IMF, World Bank and own calculations

National accounts may not adequately grasp the amount of remittances received by households, and the size of unrecorded informal flows is estimated to be high. Following Freund and Spatafora (2005) they account between 35 and 75% of official remittances. Consequently, actual disposable income may be higher than national accounts indicate. Assuming that national account figures on consumption expenditure are more accurate, this may result in lower readings of official saving rates in countries where net received remittances are large. To the extent that consumption expenditure is underestimated as well, the effect on the saving rate may be reduced out as both the numerator and denominator are impacted.

Remittances tend to explain why saving rates are so low in some countries. In a hypothetical exercise, we estimate the impact of remittances on household saving rates by increasing disposable income with 75% of official net received remittances. The resulting gross household saving rates for the different member states are shown in Figure 9. This exercise raises the saving rate in some of the countries with negative or very low saving rates, such as Romania (+2.8 pp.), Bulgaria (+3.6 pp.) and Latvia (+2.4 pp.).

Figure 9 – Impact of unrecorded remittances on household saving rate in 2012



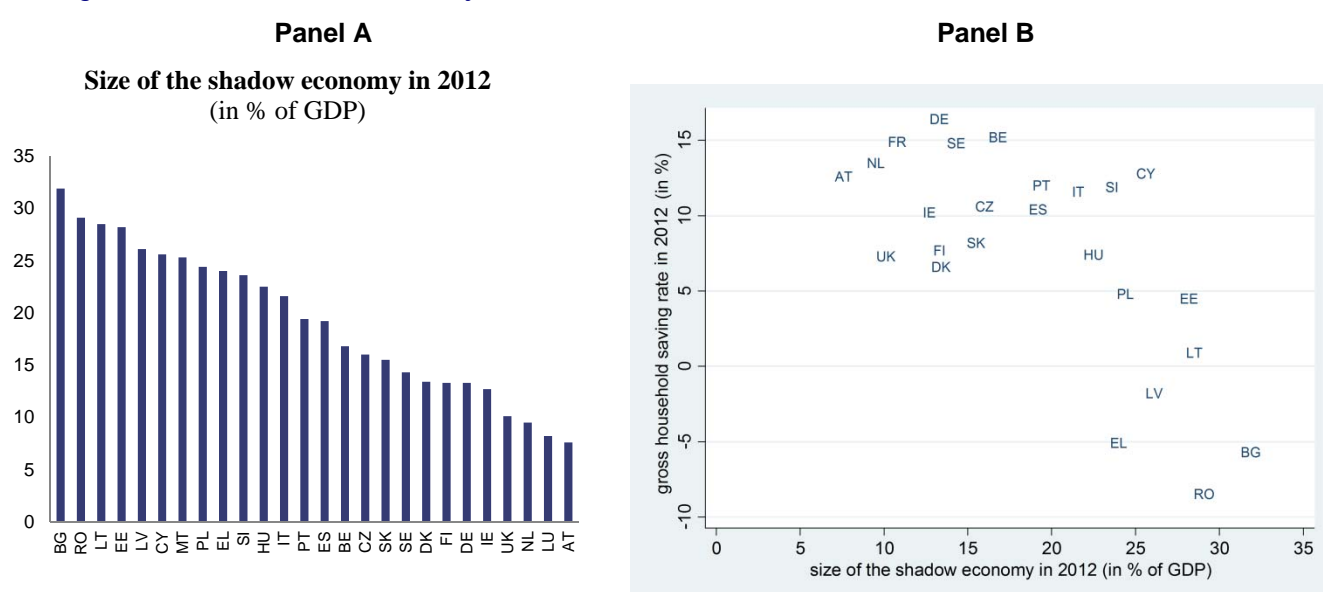
Source: Eurostat, IMF, World Bank and own calculations

4.6. Size of the shadow economy

Another statistical artefact may arise when individuals have an income from undeclared work. In this case, their income known by official statistical offices is lower than their actual disposable income. Although national accounts do make corrections for the size of the shadow economy, these corrections are likely to be imperfect. For example, Estonian national statistical office estimates the size of the shadow economy at 4%, while it is 28% according to Schneider (2012). Incomplete coverage may lead to underestimation of actual disposable income. Therefore, household saving may be biased downwards due to this measurement error. To the extent that consumption expenditure is impacted as well, the effect on the household saving rate will, however, be limited.

Schneider (2012) has estimated the size of the shadow economy for different EU member states (see Figure 10 panel A). According to these estimates, the shadow economy is four times as large in Bulgaria as it is in Austria. This may affect the comparability of saving rates if national accounts do not adequately correct for this (Figure 10 panel B).

Figure 10 – Size of the shadow economy in 2012 (as % of GDP)



Source: Schneider (2012), Eurostat

4.7. Conclusion

Factors not linked with underlying household saving behaviour partially explain the large differences in household saving rates across the EU. In this section we discussed institutional factors and potential estimation inaccuracies of saving that may hamper the international comparability of household saving rates. All these elements tend to reduce the observed differences of saving rates in the EU. However, we cannot provide an estimate of the combined impact.

A more in-depth analysis is needed as important disparities of saving rates across countries remain. This is done in the next section. The corrections made above to control for institutional factors and data inaccuracies were based on strongly simplifying assumptions. Therefore, these are rather rough estimates of potential biases and give at best an indication of the direction of the bias. Consequently, we prefer to proceed with the unadjusted household saving rate and to control for unobserved country specific differences via the estimation method in the next section.

5. Determinants of Saving

Household saving is driven by a range of motives. The household saving rate is a key indicator of households' economic behaviour. Households decide to save, rather than consume, a proportion of their disposable income for various reasons. According to the life cycle hypothesis, households tend to smooth their consumption expenditures over the life cycle. Young workers save during their working life and consume their savings during retirement. Another motive to save is for precautionary reasons and to finance unexpected income losses. Also the purchase of "big ticket" consumer goods, like durables, often is preceded by the accumulation of household savings.

These saving motives suggest a large number of potential household saving determinants. In the following, we discuss these determinants in more detail, which will serve as explanatory variables in our empirical analysis to explain the differences in saving rates across EU countries. An overview of the variables used in the regression analysis is documented in Appendix Table A1.

5.1. Income and wealth

The saving rate is expected to increase with income level which is called the "income effect". The proportion of an additional euro in disposable income that is saved is expressed as the marginal propensity to save. There is clear evidence that the marginal propensity to save increases as disposable income rises (e.g. Dynan et al, 2004).

Regarding the impact of the growth rate of income, economic theory is less straightforward. On the one hand, successive working generations in a growing economy will have higher disposable income than older generations at that age. Due to the income effect, aggregate saving would increase. Increasing dependency ratios might dampen this effect in fast ageing economies (see 5.3). On the other hand, younger generations may anticipate future income growth and increase current consumption. This in turn can depress current household saving and result in a reduced saving rate.

The "wealth effect" predicts that wealthier individuals consume more and save less of their income all other things being equal. Wealth may serve as a buffer-stock and inclines individuals to consume more of their income. As a result, wealthier households tend to have lower saving rates (Serres and Pelgrin, 2003). However, there is an ambiguous causal relationship because saving also leads to the accumulation of wealth. This is why direct measures of wealth are seldom adopted in an empirical specification.

The level of GDP per capita and the growth rate of GDP per capita are taken as potential explanatory variables. GDP per capita and its growth rates are also used in other studies as proxies for income. As alternative measures, we also use terms of trade, a proxy for discretionary income (weight of food in HICP index) and a proxy for economic development (share of agriculture in GDP) in order to check the robustness of our findings. Home ownership as a share of the total population and net financial assets of household (in % of GDP) are used as measures for wealth. They are however strongly related to the income measures and therefore not included in our analysis.

5.2. Income inequality

Countries with unequal income distributions are likely to have higher saving rates. As discussed above (see section 5.1.), households with higher disposable income tend to save more of their income than households at the lower end of the income distribution. At the aggregate level, this would suggest that income inequality tends to increase the household saving rate. We proxy income inequality by the Gini coefficient. As an alternative, we also use the income quintile share ratio (s80/s20).

5.3. Demography

According to the life cycle hypothesis, the saving rate is hump-shaped with regards to the life time of an individual. Due to consumption smoothing over the life time, young people tend to save little, working age people tend to save much, and elderly people tend to dis-save. Hence, economies with high age dependency are

expected to have a lower aggregate household saving rate. This is confirmed by some empirical studies (see e.g. Edwards (1995) Callen and Thimann (1997) and Loayza et al, 2000)), although Haque et al (1999) find no significant effect.

Therefore, age dependency is considered as a potential explanatory variable of the difference in saving rates across EU countries. We define age dependency as the ratio of the population younger than 20 and older than 60 on the population aged 20 to 60. In addition, we also use the young dependency and the old dependency separately.

Rising life expectancy may also influence saving behaviour of households. Demographic projections show that the population is rapidly ageing in many EU member states. Consequently, households may increase their saving as they face longer retirement. Therefore, we also include life expectancy at the age of 65 as a potential explanatory variable to capture this effect.

5.4. Uncertainty

For precautionary motives, individuals tend to save more when they expect bad times. The variance in inflation may be one factor of macroeconomic uncertainty. Therefore, higher variance in inflation could be expected to be positively correlated with household saving. Also previous literature relies on inflation as a measure of macroeconomic uncertainty. However, caution is needed when interpreting estimation results as inflation may directly affect consumption and saving (e.g. due to money illusion). Furthermore, the unemployment rate can be seen as a measure of income uncertainty as it proxies the probability to become unemployed. However, also the unemployment rate is to the utmost an imperfect measure as it also reflects labour market inefficiencies.

Both the variation in inflation and unemployment levels are taken as proxies for uncertainty in our empirical estimation. We calculate the variance in inflation as the annual variation in monthly HICP and alternatively, we also use its annual deviation from the medium-term average. A high variance in inflation is strongly correlated with the level of inflation, particularly in new member states. Furthermore, we also use the unemployment rate as a measure for uncertainty. However, high levels of unemployment are likely to affect aggregate household income directly.

5.5. Interest rate

The effect of interest rates on household saving is ambiguous. On the one hand, higher interest rates may tend to increase household saving. Consumption smoothing households receive more compensation for postponing their current consumption. As a result, they will tend to save more and step down their current consumption. This substitution effect is in line with the intuitive notion that higher interest rates "reward" saving. On the other hand, higher interest rates also produce a positive income effect which may result in lower saving. Without affecting their future consumption standard, households can increase their current consumption (and lower their saving). We measure the interest rate by the long-term real interest rate calculated as real yields on government bonds with 10 years maturity.

5.6. Fiscal policy

Active fiscal policies to induce consumption can negatively affect the saving rate. In order to increase national consumption and stimulate the economy, the government can increase government spending and run a budget deficit. This may, however, dampen current household consumption expenditure if households anticipate future tax increases to finance government debt. Given consumption smoothing, a drop in expected future income will dampen current consumption and increase current household savings. Lower household consumption may fully offset the effect of increased government spending on aggregate demand, which became known as the Ricardian equivalence hypothesis. Consequently, public and private saving is expected to move in opposite direction.

Fiscal policy of countries is measured by government surplus in % of GDP and the level of public debt in % of GDP. As discussed in section 4, also the proportion of indirect taxation of total taxation (excl. social security contributions), social protection expenditures by the government (in % of GDP) and the size of pension

fund assets (in % of GDP) may have an effect on the household saving rate due to technical reasons. However, Kohl and O'Brien (1998) argue that there are also other reasons to believe that pension schemes affect saving behaviour of households (e.g. due to tax incentives).

5.7. Financial market sophistication and access to finance

The link between the degree of financial market sophistication and household saving is ambiguous. The development of the financial system may increase the opportunities for financial saving at interesting conditions, stimulating household saving. However, it also enhances the access to credit and ease liquidity constraints faced by households. Therefore, deeper financial markets may encourage consumption smoothing resulting in more borrowing and less saving by households. In Central and Eastern European countries, financial market development may have a significant impact on household saving given its link with the economic transformation process (see e.g. Schooten and Stephan (2003)).

Access to finance is closely linked to the development of the financial system. Easy access to financial services at a competitive price strongly depends on the stability and efficiency of the financial market. In turn, this is subject to the degree of financial market development and sophistication. We measure the degree of financial market depth by stock market capitalization in % of GDP and the ratio of monetary aggregate M2 in % GDP. Although both measures have their limitations as they focus on the size of the financial system, they are considered traditional measures of financial market depth.

5.8. International financial integration

Analogue to the degree of financial market sophistication, the impact of international financial integration is ambiguous. Better international financial integration and easier access to foreign credit can stimulate (foreign) borrowing by households and decrease their saving. At the same time, international financial integration can also increase the saving opportunities of households.

Furthermore, causality of the relationship between foreign borrowing and domestic saving is not clear-cut. If domestic investment exceeds domestic saving, a country is a net borrower to the rest of the world.⁵ Hence, all things equal strong domestic investment or feeble domestic saving therefore results in more foreign borrowing. E.g. companies may be forced to find foreign financing for their projects when domestic saving is low.

Nevertheless, domestic saving and foreign borrowing are often assumed to be substitutes. In this paper, we use net inflow of foreign direct investment in % of GDP as an indicator of international financial integration.

6. Estimation Results

We use a panel data set for 25 EU member states for the period 2000-2012. We gathered annual data from 1995 up to 2012 for the 28 EU member states, however we restrict our dataset in order to construct a strongly balanced panel dataset.⁶ We exclude Luxembourg, Croatia and Malta since data is either not available (Malta) or is only available as of 2002 (Croatia) or 2006 (Luxembourg). Furthermore, incomplete time series of our explanatory variables limit the dataset further to the period 2000 to 2012. This leaves us with a panel dataset of 25 countries observed over 13 years.

Both saving rates and many of the explanatory variables are persistent over time, but large variation exists across countries. Table A2 reports some descriptive statistics on the selected variables. The table also makes distinction between the variance across countries and within countries over time. Note that gross of the total variation in annual household gross saving rates in the panel originates from differences between countries and not within countries over time. Also, many of the explanatory variables have higher between than within variation.

⁵ Since the current account is the balance of domestic saving and domestic investment, a country is a net lender when its current account balance is positive.

⁶ The between component is the largest source of variation in household gross saving rates as can be seen in Table A2 in appendix. Inclusion or exclusion of certain countries across regressions would hamper the comparability of the estimates of the different regressions.

We are mainly interested in the determinants of differences in household saving rates between countries and therefore start off by using the "between estimator". The between estimator is the OLS estimator from regression of \bar{y}_i on an intercept and \bar{x}_i for country i and time t . This estimator exclusively focusses on the variance between countries. In other words, it provides information whether countries with e.g. a high income level, have higher saving rates or not. It is therefore straightforward to use the between estimator to analyse the differences in saving rates between countries. In addition, this estimator averages over the observed period. Consequently, it has the benefit to measure the impact of long-term differences in saving behaviour.

However, there are two important drawbacks of the between estimator. Firstly, it may be biased as it relies on the assumption that the country-specific effects are independent of the other covariates in the model. A second drawback is that we lose information by averaging over the period. Indeed, the between estimator only takes into account the cross sectional variation in the panel. Our panel contains 25 countries, the number of observations in this case. Therefore we can only include a limited number of explanatory variables in the regression.

In the remainder of this section we present several alternative models. They address these drawbacks. In addition, they also result from several econometric tests that guide us in the choice of a final model.

First, we compare results from the between estimator with results from pooled OLS, an estimator that exploits all panel data information. In the pooled OLS model, we regress y_{it} on an intercept and x_{it} for country i and time t . The pooled OLS estimator exploits both the within and between variation in our data. The benefit of the pooled OLS estimator is to enlarge the number of observations which allows studying the impact of other potential explanatory variables on household savings. We estimate a reduced form linear specification in order to include the broad range of saving determinants which were outlined in the previous section.

Both our benchmark and the alternative pooled OLS specification, however, rely on important assumptions which are tested. Several statistical checks were performed to test the underlying model assumptions. We check for multicollinearity problems which may break down OLS estimation. First, we did a visual analysis of the data. To this end, we used matrix graphs plotting each of the relevant variables against each other. These graphs can be found in the appendix (see Figure A1).⁷ Only HICP and to a lesser extent also the proxy for long-term real interest rate and FDI, shows a strong linear relationship with some other variables. Also transformations of HICP, such as deviation from average HICP as shown in figure A1 do show visible linear relationships with other variables. However, statistical tests (like VIF) did not indicate any issues of severe multicollinearity. Therefore, we proceed with this group of variables.

We perform several additional statistical tests to check the assumptions underlying the pooled OLS model. First, we calculated Cooks' D to check the data on outliers which may heavily influence the regression results. The highest value of Cooks' D equals 0.31 and is well below the cut-off value of 1. Therefore, we conclude there are no clear outliers in the data. We also checked the homoscedasticity condition of the error term. Due to the characteristics of our panel in which we pooled different countries, it is highly likely that the standard errors are not constant across the panel but clustered at the country level. The homoscedasticity assumption is indeed rejected by the Breusch-Pagan test, albeit weakly (p-value = 0.08). Therefore, Table 2 reports cluster robust standard errors which allows for within country correlation. In other words, we allow for some degree of serial correlation of the error term at the country level.

Next, we investigate whether these country-specific effects are correlated with the regressors as this would raise endogeneity issues. To this end we first examine the presence of time and country fixed effects. A simple F-test on the coefficients of time dummies could not reject the assumption of a common time intercept (p-value = 0.66). However, a similar test indicates that the pooled OLS model is misspecified as it does not include country-specific effects, which appear to be present.

Afterwards, we investigate whether the country-specific effects are likely to be correlated with the regressors. For example, measurement error of remittances flows or the size of the shadow economy is likely to be correlated with the level of GDP per capita as mentioned earlier. Therefore, we report the regression results of the random and fixed effects estimator in resp. the fourth and fifth column of Table 2 and test whether the regressors are indeed correlated with the country-specific effects. If this is the case, the random effects estimator breaks down. If there is no correlation present, the fixed effect estimator is consistent, but inefficient. In this case, the random effects estimator should be preferred. The Hausman test suggests that the country-specific effects may not be

⁷ We report only those variables for which we have no missing values.

considered random (p-value = 0.00). Therefore, the regression results of the fixed effects estimator are preferred above those of the other panel estimators which are likely to suffer from endogeneity bias.

The estimation results of our panel analysis are reported in Table 2. In all regressions, the dependent variable is the household saving rate as defined in Section 2. The different explanatory variables that were used in the analysis are reported in the first column. In alternative specifications (not shown), we also looked into the other potential explanatory variables defined in Section 5. However, these turned out to be insignificant. The following columns show the estimation results of the panel estimators described above and which will be discussed below.

The first specification in the second column reports the estimation results of the between estimator. This estimator only takes into account the cross sectional variation in the panel. Our cross section contains 25 countries and therefore we can only include a limited number of explanatory variables in this regression. The estimated model contains the key explanatory variables which were identified in previous literature and also had explanatory power in our case. These are GDP per capita as income variable, age dependency, HICP and the government surplus/deficit.

Besides the between estimator, we report four other sets of regressions using different models. The second specification is an intermittent step towards pooled OLS (specification (3)). Specification (2) shows the estimation results using a dataset consisting of stacked periods of three-year averages: 2001-2003, 2004-2006, 2007-2009 and 2010-2012. The next specifications are the random (specification (4)) and the fixed effects estimator (specification (5)) as previously mentioned. In all specifications, robust standard errors are shown between brackets.

The results of the fixed effects estimator should be preferred above other specifications. We have shown above that country fixed effects appear to be present. Moreover, the Hausman test indicated these fixed effects are correlated with our regressors. Therefore, only the fixed effects estimator is consistent and the other estimates suffer from endogeneity bias. The results of specification (1) to specification (4) should be interpreted with caution.

The results of the panel estimation indicate the following:

- **Income and wealth:**

- *The level of GDP per capita* has an insignificant impact on the household saving rate according to the within estimator. However, other estimators taking into account cross country variation in income levels point at a significant positive impact on household saving. Households in poorer economies save less than those in richer countries. Various reasons may explain this finding. First, this might be empirical evidence for the income effect that seems to explain much more of the differences in saving rates across than within countries. Second, the income level is most likely to be correlated with the fixed effect capturing unobserved differences like differences in institutions and other data issues. Third, the coefficient may also capture any reverse causality as higher saving may lead to higher investment, an important source of economic growth and income.
- At the country level, it is rather the *change in real GDP per capita* that explains changes in household saving rates. It seems that income growth results in positive expectations about the future. Instead of a convergence effect of household saving rates, we therefore rather see a convergence in consumption expenditures accompanied by higher indebtedness.
- Also the *change in terms of trade* has a negative impact on household saving rates. Raising purchasing power seems to stimulate consumption rather than increase savings through the income effect. However, the result is not significant at the 10% significance level.

- **Demography:**

- In contrast to the cross section analysis, no evidence is found for a significant impact of *age dependency* on aggregate household saving. Demography however only evolves slowly over time. The period under analysis may be too short to show the impact of population ageing on household saving. As table A1 in the appendix shows, variance in age dependency ratios is much larger between countries than within countries over time.

- Increasing *life expectancy* which proxies anticipatory saving to prepare for longer retirement of an ageing population, is expected to be positively linked with saving. However, the coefficient turns out to be insignificant.
- **Uncertainty:**
 - Measures for uncertainty have a positive impact on household savings. In our regression we use the *deviation of HICP and the unemployment rate from their medium term average* as proxies for the degree of uncertainty in the economy. High relative levels of inflation and unemployment increase household saving. This is in line with our expectations.
- **Fiscal policy:**
 - Government finances have a mixed effect on household saving. In line with the Ricardian equivalence hypothesis, *government deficits* increase household saving.⁸ However, higher *public debt levels* appear to be associated with lower household saving. For precautionary reasons we would expect households to save more in case of heavily indebted governments.
 - Degree of *social protection* as measured by the level of social security provision by the government (in % of GDP) is not significantly correlated to household saving. One explanation may be that the high coverage of social protection schemes is not always seen as sustainable by households. In alternative estimations (not reported here), we indeed see that the *type of pension schemes* matters. If the system is funded and the fund size is relatively large in terms of GDP, this has a dampening effect on household saving. Furthermore, in a restricted EU-15 sample, social protection has the expected negative sign.
 - The *ratio of indirect taxes to total government revenue* has a positive and significant impact on household saving. The reason for this may be solely technical as previously explained. The positive relationship may indicate a significant downward bias of household saving rates when governments heavily rely on indirect taxation. However, there is reason to believe that the tax structure also influences household saving behaviour more directly. For example, lower reliance on direct taxation such as saving income taxes may also more directly stimulate household saving.
- **Financial market sophistication and access to finance:**
 - The *real interest rate* has no significant effect. Also other indicators of the performance of financial markets are insignificant in alternative regressions (not reported in table 3). These results do not provide evidence that the availability of liquidity in the economy may stimulate borrowing and therefore decrease aggregate household saving as found by others (see table 1).
- **International financial integration:**
 - The *net inflow of foreign direct investment* is negatively related with household saving. Therefore, FDI seems to be a substitute for domestic saving. However, the direct causal relationship can be questioned as insufficient household saving will force companies to finance their investment by attracting foreign capital.
- **Other factors:**
 - Also other factors were investigated (analysis not shown). The importance of *social transfers in kind* was not found to have any significant impact on the level of household saving. This may be explained by the strong correlation with the degree of total social protection (corr = 0.76). The impact of income inequality was also investigated in alternative regressions. Standard measures of income inequality (Gini and S80/S20) were found to be insignificant. This result was also found by others (e.g. Edwards (1996)).
 - The *proportion of own-account workers in agriculture* as a proxy for the importance of unincorporated enterprises included in the household sector is not found to have a significant impact. However, the variable is highly collinear with GDP per capita, as is the size of remittances and the estimated size of the shadow economy. Therefore, the coefficient of *GDP*

⁸ The coefficient is significantly different from -1. This implies that perfect Ricardian equivalence does not hold

per capita should be interpreted with caution, certainly in OLS regressions. However, our fixed estimator produces robust results as these variables only slowly change over time and consequently can be treated as a fixed effect.

Table 2 – Results of panel data analysis (dependent variable: household saving ratio)

VARIABLES	(1) Between estimator	(2) Pooled Periods OLS	(3) Pooled OLS	(4) Random effects	(5) Fixed effects
gdp per capita	0.28** (0.12)	0.26** (0.10)	0.28*** (0.05)	0.28** (0.14)	-0.03 (0.18)
growth in real gdp per capita		-0.08 (0.28)	-0.15* (0.09)	-0.13* (0.07)	-0.16* (0.08)
terms of trade		-1.29** (0.64)	-0.35* (0.20)	-0.12 (0.10)	-0.15 (0.09)
age dependency ratio	-0.41* (0.24)	-0.28*** (0.09)	-0.32*** (0.05)	-0.03 (0.08)	-0.03 (0.08)
life expectancy ⁹		-0.53 (5.57)	-0.09 (1.43)	0.18 (0.59)	0.18 (0.57)
deviation from average HICP	-1.25** (0.52)	0.38* (0.22)	0.45*** (0.10)	0.29** (0.14)	0.23 (0.15)
deviation from average unemployment rate		0.02 (0.46)	-0.06 (0.19)	0.21* (0.12)	0.22* (0.11)
deviation from average LT real interest rate		0.28 (0.56)	0.29 (0.26)	0.22 (0.23)	0.15 (0.22)
foreign direct investment net inflows		-0.12 (0.13)	-0.10* (0.06)	-0.07** (0.03)	-0.06* (0.03)
government surplus	-0.38 (0.50)	-0.22 (0.31)	-0.21 (0.13)	-0.28*** (0.09)	-0.31*** (0.09)
public debt		0.02 (0.04)	0.01 (0.02)	-0.10** (0.04)	-0.11** (0.04)
social protection		0.11 (0.18)	0.20** (0.10)	0.12 (0.27)	0.04 (0.33)
share of indirect taxation		-0.01 (0.13)	0.01 (0.07)	0.11** (0.05)	0.17** (0.06)
constant	38.91* (19.20)	23.69** (11.49)	23.05*** (6.26)	2.40 (8.07)	7.00 (8.29)
observations	25	100	325	325	325
number of countries	25	25	25	25	25
R-squared	0.56	0.52	0.47		0.34

Robust Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

⁹ Life expectancy contains a unit root. The Levin-Lin-Chu test could not reject the null of the presence of a unit root (p-value = 0.75). Therefore, we included life expectancy in first differences in our analysis.

Lastly, we see that the explanatory power of the latter models decreases. In other words, the explanatory variables do a poorer job in explaining the within country variation over time. This indicates that household saving rates are persistent over time and are expected to adapt only slowly to changes in underlying economic determinants. Nonetheless, the fixed effects estimation broadly confirms the results of the other specifications.

Finally we performed some sensitivity checks to examine the robustness of our results. First, we analyse the impact of the crisis on household saving behaviour by comparing the pre- and post-crisis period. The crisis had a big impact on households' income in many EU member states. This could have altered their saving decisions. The fixed effects estimates are reported in Table 3 in resp. the second and third column. We also perform a Chow test to compare the results between the two periods. The test indeed shows a significant difference in the estimation results (p-value = 0.0).

Comparing the pre- and post-crisis period, the most remarkable differences concern the impact of inflation and interest rates on household saving behaviour. While inflation and interest rates were significantly associated with higher saving before 2008, they appear no longer to determine household saving behaviour. Historical low levels of inflation and interest rates do not reflect the level of uncertainty in the post-crisis period. This may have led to this decoupling. Furthermore, stable income per capita and/or high levels of social protection significantly benefitted household savings in the post-crisis period. Other findings were reasonably robust.

We also analysed three different country groups with relatively different developments in household saving rates: EU-15, CEEC-6 and the Baltics, Bulgaria and Romania. As visible in Figure 2, these country groups had very different household saving rates evolutions. Therefore, we perform separate robust fixed effects analysis for each country group to check the sensitivity of our results. The estimation outcome is reported in columns (4) to (6) of Table 3. Again, we find significant differences supported by a Chow test (p-value = 0.0) between the different groups.

Notwithstanding very different developments in household saving rates, all country groups have rather similar household saving behaviour. Overall, the estimation results for EU-15, CEEC-6 and the Baltics, Bulgaria and Romania are relatively similar. They only importantly differ regarding the impact of the public sector on household savings. For example, for the EU-15 we find that social protection has the expected negative sign. This is not the case for the other two groups. Large differences in the scope of social protection measures between EU-15 and the other EU member states may explain this finding. In addition, regarding public debt levels we do not find a significant negative relationship for EU-15 in contrast to CEEC-6 and the Baltics, Bulgaria and Romania. A strong negative relationship is a puzzle as we would expect that in the case of heavily indebted governments, households would save more anticipating tax rises.

Table 3 – Results of sensitivity analysis (dependent variable: household saving ratio)

VARIABLES	(1) Fixed effects	(2) Fixed before 2008	(3) Fixed after 2008	(4) EU-15	(5) CEEC-6	(6) BG&RO& Baltics
gdp per capita	-0.03 (0.18)	0.11 (0.24)	0.90* (0.51)	-0.02 (0.10)	0.52 (0.47)	0.64 (1.24)
growth in real gdp per capita	-0.16* (0.08)	-0.23 (0.23)	-0.11 (0.12)	-0.22*** (0.07)	-0.11 (0.13)	0.03 (0.15)
terms of trade	-0.15 (0.09)	-0.20* (0.11)	0.17 (0.11)	0.04 (0.09)	-0.07 (0.17)	-0.24 (0.20)
age dependency ratio	-0.03 (0.08)	-0.00 (0.13)	-0.33 (0.26)	-0.03 (0.05)	0.06 (0.11)	-0.14 (0.52)
life expectancy	0.18 (0.57)	-0.34 (0.43)	1.57 (0.93)	0.46 (0.58)	-0.18 (1.20)	-2.46 (2.83)
deviation from average HICP	0.23 (0.15)	0.54*** (0.16)	-0.11 (0.28)	-0.64*** (0.19)	0.20 (0.24)	0.34** (0.14)
deviation from average unemployment rate	0.22* (0.11)	0.08 (0.15)	0.33 (0.28)	0.12 (0.09)	0.35** (0.16)	0.75** (0.32)
deviation from average LT real interest rate	0.15 (0.22)	0.64*** (0.19)	-0.17 (0.18)	-0.49*** (0.10)	0.25 (0.28)	0.15 (0.24)
FDI net inflows	-0.06* (0.03)	-0.05* (0.02)	-0.01 (0.02)	0.00 (0.02)	-0.02 (0.04)	-0.30** (0.13)
government surplus	-0.31*** (0.09)	-0.23* (0.11)	-0.18 (0.14)	-0.26*** (0.06)	-0.35** (0.15)	-0.50 (0.37)
public debt	-0.11** (0.04)	-0.04 (0.07)	-0.06 (0.05)	0.02 (0.02)	-0.14*** (0.04)	-0.32** (0.07)
social protection	0.04 (0.33)	-0.07 (0.35)	0.60* (0.32)	-0.63*** (0.15)	-0.11 (0.46)	0.67 (0.50)
share of indirect taxation	0.17** (0.06)	0.08 (0.09)	0.10 (0.14)	0.12 (0.08)	0.11 (0.11)	-0.05 (0.15)
constant	7.00 (8.29)	6.10 (13.39)	0.33 (19.31)	22.05*** (6.22)	2.09 (13.67)	7.51 (48.65)
observations	325	200	125	182	78	65
number of countries	25	25	25	15	6	5
R-squared	0.34	0.34	0.38	0.38	0.32	0.69
Robust Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

7. Conclusion

In this paper, we have investigated the large differences in household saving rates across EU member states. Persistent differences among EU member states may have an impact on investment and growth as household saving is an important financing source for private and public investment. Furthermore, observed negative saving rates in some EU countries also raises questions of household debt sustainability.

This disparity in household saving rates is reduced when adjusted for institutional factors and data issues. We find that differences in household saving rates are at least partially explained by institutional differences that merely impacts the calculated saving rate in a technical way (e.g. differences in pension system, reliance on direct vs. indirect taxation, delineation of the household sector, etc.). Besides institutional differences, also the size of unrecorded flows (remittances, income in the black economy) in the household sector is likely to hamper the international comparability of household saving rates.

Differences in household saving behaviour across EU countries can be explained by a large variety of determinants. We discussed various determinants of household saving behaviour which are candidates to explain household saving rates differentials. We can group these determinants in six categories: (i) income and wealth, (ii) demography, (iii) economic uncertainty, (iv) fiscal policy, (v) financial market sophistication and (vi) the degree of international financial integration.

We perform a panel data analysis to empirically investigate potential explanatory variables. Since saving rates are highly persistent over time, variance in saving rates is much larger between countries than within countries over time. Therefore, we perform two types of analysis: (i) we focus solely on the between variation and (ii) we also take into account the variation over time in order to be able to include more potential variables.

The results of the between estimator largely confirm the relationships between key determinants of household saving behaviour and household saving rates as expected from economic theory. The lessons we can draw from our empirical analysis is that income has a positive effect on household saving. Richer countries therefore tend to have higher saving rates. Second, countries with high age dependency are associated with low saving rates, because working age population tend to save more than the old and the young. Third, weak government finances incline households to save more. However, this effect was not significant at the 10% level. Lastly, higher inflation was found to be linked with lower household saving rates. This is contrary to our expectations as higher uncertainty should increase household saving according to the precautionary saving theory.

More advanced panel data estimators have the important benefit to enlarge the number of observations and allows for including more potential explanatory variables compared to the between estimator without limiting the degrees of freedom of the model too much. Due to the presence of significant country-fixed effects, the assumption of a common intercept in the pooled OLS model is rejected. Instead, we estimated a robust fixed effects estimator. This model has the benefit that the estimates of explanatory variables which are correlated with unobserved fixed effects are not biased.

We conclude from the panel data estimation that:

- Conversion of income levels in the EU rather leads to convergence of household consumption than to convergence of household saving rates. This could result in high indebtedness of households in emerging EU countries.
- Furthermore, precautionary saving motives are found to be important. Higher economic uncertainty stimulates households to save more.
- Financial market integration give companies access to foreign sources of capital. Foreign direct investment seems to be a substitute of domestic saving.
- The government has an impact on household savings via various channels. Households tend to save more when the government budget is in deficit. Households may for example expect higher taxes in the future and therefore save more now to smooth their consumption.

- The degree of social protection has no significant impact on household saving. However, households may not always perceive the level of social protection as sustainable. For example, it is found that the absence of funded pension systems with large reserves is linked with higher household saving based on between estimation results.
- On the other hand, the taxation system has a significant impact on household saving. Higher reliance on direct taxation (e.g. saving income taxes) dampens reported household saving.

While this note aims to contribute to the analysis of persistent differences in household saving rates across EU countries, there is much room for further research. We see various potential avenues for future research. For example, one could analyse micro data on household saving across EU countries and discuss how they relate to their macro-economic aggregate. Another extension could be to look into the impact of ESA2010 as its objective was to improve data collection methodologies and further harmonize the national accounts. Lastly, a dynamic analysis of household saving in EU countries could help to better understand the short-term impact of the crisis on household saving (e.g. more in-depth analysis of the housing market bubble and burst or the dramatic loss of financial wealth).

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Table A1: Overview of saving determinants

Variables	definition	source
gross household saving rate	gross household savings (adjusted for the change in net equity of households in pension funds reserves) on household gross disposable income	AMECO
GDP per capita	GDP at constant 2005 market prices on total population	AMECO & own calculations
per capita growth rate of GDP	annual growth rate of GDP per capita	AMECO & own calculations
terms of trade	price deflator exports of goods and services on price deflator of import goods and services	AMECO
old age dependency ratio	ratio of the population older than 64 on the population aged 15 to 64	Eurostat
young age dependency ratio	ratio of the population younger than 15 on the population aged 15 to 64	Eurostat
age dependency ratio	ratio of the population younger than 20 and older than 60 on the population aged 20 to 60	Eurostat
HICP	harmonized index of consumer prices	Eurostat
life expectancy	life expectancy at the age of 65	Eurostat
unemployment rate	harmonized unemployment rate	Eurostat
LT real interest rate	yield on government bonds with 10 years maturity minus HICP	Eurostat
FDI net inflows	net inflows of foreign direct investment (BOP) as % of GDP	World Bank
government surplus/deficit	net lending/net borrowing of general government (EDP) as % of GDP	AMECO
public debt	general government consolidated gross debt (EDP) as % of GDP	AMECO
social protection	total general government expenditure on social protection as % of GDP (e.g. old age, unemployment, family & children, sickness, ...)	Eurostat
share of indirect taxation	share of indirect taxation as a % of total taxation (excl. social security contributions)	Eurostat

Table A2: Descriptive statistics

Variables	Mean	Standard Deviation			Minimum	Maximum	Number of observations		
		overall	between	within			total	n	T
gross household saving rate	8.27	7.33	6.83	2.96	-24.2	21.2	325	25	13
gdp per capita	19.34	11.28	11.42	1.25	2.18	41.00	325	25	13
per capita growth rate of gdp	2.17	4.03	1.84	3.60	-16.33	11.99	325	25	13
terms of trade	-0.05	2.00	0.87	1.81	-6.13	9.92	325	25	13
old age dependency	23.52	3.61	3.43	1.29	15.60	32.00	325	25	13
young age dependency	24.43	3.21	2.88	1.52	19.00	34.50	325	25	13
Life expectancy	17.9	1.69	1.56	0.71	14.1	21.7	325	25	13
HICP	3.49	3.94	2.47	3.10	-1.70	45.70	325	25	13
unemployment rate	8.77	4.12	3.08	2.80	2.50	24.80	325	25	13
LT real interest rate	1.98	2.86	0.97	2.70	-15.85	21.50	325	25	13
FDI	5.44	6.94	3.80	5.85	-16.42	51.90	325	25	13
government surplus/deficit	-2.80	3.90	2.32	3.17	-30.60	7.00	325	25	13
public debt	53.56	29.62	27.20	12.84	3.70	170.30	325	25	13
social protection	16.26	4.25	4.05	1.51	7.88	25.27	325	25	13
share of indirect taxation	55.76	9.02	8.82	2.53	35.52	77.16	325	25	13
social services in kind	11.81	3.04	2.95	0.93	5.99	21.20	325	25	13
M2/GDP	103.26	58.40	54.72	22.78	22.86	283.40	324	25	13
stock market capitalization	49.24	39.02	35.28	18.00	2.26	246.05	300	25	12
size of pension funds	28.92	42.34	40.96	9.32	0.00	197.39	243	22	11
own-account workers in agriculture	2.98	3.37	3.32	0.87	0.29	16.42	325	25	13
remittances	0.52	1.21	1.23	0.00	-1.16	3.60	25	25	1
shadow economy	19.10	6.89	7.02	0.00	7.60	31.90	25	25	1
PISA score maths	489.72	24.20	24.66	0.00	438.70	523.00	25	25	1

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