Universitat de Girona

TREBALL FINAL DE GRAU

A STUDY OF THE DETERMINANTS OF HOUSEHOLD SAVING IN THE EUROPEAN COUNTRIES

MAIG 2017

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Abstract

This work analyses the empirical determinants of household saving rates using data from 21 European countries for 2000-14. The purpose of this research is to review and extend the usual set of explanatory variables that are used to explain saving behaviour. Previous literature signals that the saving behaviour is determined by economic, demographic, social and cultural factors. This work examines these determinants and also the effects of the economic crisis in saving patterns. Moreover, it adds another possible determinant of household saving decisions: the weather. To carry out the analysis we used a panel data model. The results show that some economic, social and demographic variables have an impact in saving rates. In addition, the crisis is found to have a significant influence in saving patterns. It is also concluded that the weather is not a relevant variable in defining household saving rates. Nonetheless, the study of the variable weather has faced some limitations, that if overcome might bring other results in future studies.

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1. Introduction

This work seeks to examine the determinants of household saving rates signalled in the existing literature. It also aims at studying the effects that the crisis had in household saving rates, and contrasting another possible determinant of saving patterns: the weather. The importance of savings for the economy has aroused the interest of researchers to find how saving decisions are made. This is because savings are necessary to invest in durable goods or capital formation, and essential for the long term economic growth. At the same time, savings are a source of security in front of instable periods such as an economic crisis. In this study we will focus in household savings, which account for a big part of a country's capacity to save.

The literature on the topic of household saving has identified as the main reasons to save: saving for the retirement, the precautionary saving, and saving for a big expense (house, car, kid's university, etc.). In addition, some variables have been found to have a relationship or influence in saving behaviour. Among the most commonly pointed in empirical studies are: economic performance, government spending, public pension system, self-perception of health, inequality or poverty, unemployment, real interest rate, demographics, and even culture or education.

Once reviewed the variables previously signalled at having a relationship with saving patterns, we had the feeling that it was missed a variable that could be important in shaping societies behaviour, the climate. In order to study the weather effects in saving, we chose the following variables: *Sunnydays*, *Rainydays*, and *Icedays*. We asked ourselves, if in countries with nicer weathers households would be more prone to spend money, or the rain or cold might reduce people's incentives to go out and spend disposable income.

The following hypothesis and the implications of each of the determinants of household saving are contrasted carrying out a panel data model. The study includes variables previously signalled at playing an important role in defining saving patterns, a variable that examines the effects of the economic crisis and climatic variables. The analysis comprises 21 European countries, and the data used is from 2000 to 2014.

The rest of the work is organised as follows: Section 2 reviews the previous literature on the topic of household saving rates determinants; Section 3 discusses the

variables chosen as determinants of household saving rates and the econometric model is formulated; Section 4 presents the empirical results of the panel estimations; and Section 5 concludes and exposes if the hypothesis are confirmed.

2. Literature review

Chang (1994) defined household saving as the decision of households to increase asset accumulation or consume less of the current income in order to meet financial goals. Saving has also been treated by psychologists, that defined the saving behaviour as the result of a decision making process, in which people choose to act regularly setting aside resources for a goal (Lewis, Webley, & Funham, 1995; Wärneryd, 1999). The decision to save involves a complex psychological process, although it is also influenced by economic factors (Furnham and Argyle, 1998).

The literature on savings topic has always had the goal to understand and demonstrate which are the saving patterns, the determinants and the motivations that move people to make saving decisions. The divergences in saving behaviour between countries have also pushed the empirical analysis. The objective of most studies was to understand why in some countries people are used to save more, while in other countries the inhabitants spend a bigger part of their disposable income. At the same time, researchers also wanted to obtain information that could be used to promote or dissuade saving.

The study of saving patterns and motivations is essential due to the importance of savings for the economy. The saving and consumption behaviour, especially the one of households, has a particular relevance in the financial stability of the economy (Niculescu-Aron and Mihaescu, 2012). In addition, an unfavourable evolution of savings can induce to problems in periods of financial disequilibrium's or crisis (Modigliani and Blumberg, 1954).

Household saving accounts for a big part of a country's capacity to save. And these savings can in its turn be used to finance business investments or government deficits. In fact, household saving is the main domestic source of funds to finance capital investment, which is a major impetus for long-term economic growth (OECD, 2017). Also, if a country has not enough internal savings will have to obtain them abroad with the extra costs that it carries (Niculescu-Aron and Mihaescu, 2012).

Nonetheless, savings not only promote economic growth. At the same time, high saving rates also lead to lower levels of consumption in the short term, which reduces the aggregate demand and cuts back the present economic activity. There is then, a certain duality of savings as an economic indicator. While low levels can dissuade future investments, and might induce to problems in periods of economic uncertainty; very high levels of saving are reducing consumption and not stimulating the current economic activity.

While savings might be said to promote economic growth, other authors have stablished the causality in the opposite direction; indicating that it is economic growth that promotes higher saving rates (Paxson, 1995).

The current discussion in the literature of household saving rates is centred in China's high household saving rates (37,99% in 2014 according to the OECD). As far as Europe concerns, the authors on the topic of saving rates have lately focused on the changes in the saving rates during the economic crisis; period in which, saving rates increased substantially (ECB, 2016). And by doing so, it was wanted to analyse the reactions of households in a complex socio-economic context.

The studies of household saving rates have identified saving for the retirement, the precautionary saving, or saving for a big expense as the main motivations to save. Linked with the motivations, the authors have identified variables that influence household saving decisions or have a significant relation with them. Variables such the age, the health, the education, the country or the culture of households; but also some personal traits like the risk aversion or the self-control, have been found to influence saving decisions (Canova et al.,2005).

Among the determinants of household saving rates, undoubtedly GDP per capita and the economic development of one country plays an important role in defining the saving possibilities of their population. In general, household saving has been largely influenced by changes in disposable income (European Central Bank, 2016).

The income level of households is decisive. Thaler (1999) signalled that the temporal horizon of saving varies depending on the economic status. While poor families are used to have budgets defined over shorter periods, wealthier families tend to have more long term thought savings. In its turn, Xiao and Noring (1994) found

different saving motives depending on the income level. While low-income households were more likely to save for their daily expenses, mid-income group was more likely to save for emergencies, and the high-income for growth.

The economic status though, is not the only determinant of population saving rates. The overall quality of public systems is also said to influence saving patterns. The generosity of the social programmes that the governments offer can have an effect in the necessity of people to save (Feldstein, 1985). This is because, if people feel confident that in case they suffer a shock (losing their job, getting ill, etc.) the government will assist them, they can be less prone to save. Good social assistance programmes allows households to use a smaller part of their disposable income to precautionary savings, and have higher consumption.

In some papers, for instance ECB (2016) it is proved that during uncertain periods, in which there are shocks like: an economic crisis, natural disaster (earthquake, tsunami, etc.), war, political instability; people tend to increase saving rates. In this case, the paper analysed the saving patterns of households during the economic crisis, and signalled that during this period households had mainly two reactions. One was lowering saving due to the inability to save or the decrease in disposable income. And the other one, the dominant one, was increasing saving rates for the precautionary motives (principally by decreasing consumption). From the beginning of the crisis in 2008 to the higher point of the crisis from 2011-2012, the household saving rates barely doubled. This indicates that households in front of the economic risks and the complex social conjecture chose to increase savings.

Apart from the mentioned above, another factor that has focused the attention of the literature on the topic of savings, is the part of savings that people accumulate for their retirement. Researchers have found that the quality of the public pension system can explain a big part of the differences in households saving behaviour through the European countries. The characteristics of the public pension system are an important variable that households bear in mind when making their saving decisions. Callen and Thimann (1997) signalled that the improvement or introduction of public pension schemes can lower the household saving. They also added that the public pension systems can substitute private savings as long as the benefits of these systems, net of contributions, have a positive present value. In its turn, Feldstein (1978) affirmed that

the availability of generous public retirement income programs reduces substantially the incentives for young households to save for themselves.

The real interest rate is also said to be a determinant of saving (Elmedorf, 1966). The possibility to obtain higher or lower returns in the financial markets can also be a variable that households consider when deciding which part they save out of their disposable income. Included in the real interest rate, the inflation is also a relevant factor to take into account when making saving decisions. In periods of high inflation, one of the costs is the increase in the use of durable goods at the expense of savings (Niculescu-Aron and Mihaescu, 2012).

The lifetime perception and temporal horizon of savings are said to decisively influence saving. There are two general theories regarding saving decisions. The theory of life cycle (Ando and Modigliani, 1963), and the theory of permanent income (Friedman, 1957). The theory of life cycle adds that individuals make their saving decisions depending in which period of their life they are in. In order to have a stable way of living and consumption, household are expected to borrow and dis-save at a young age, accumulate resources during their adult-worker years and dis-save again when being retired. Friedman's theory of permanent income signals that human consumption decisions are not only made based on people's actual income but also taking into account the income expected to have in the future.

Humans make their saving decisions considering the moment of their life they are in. Linked with that, the self-perceived health is also signalled as an essential variable when deciding which part of the disposable income to save. Poor health is shown to have a negative effect in saving (Fisher and Montalto, 2009). This relationship is owing to the fact that if individuals perceive they might not live longer, they have fewer incentives to save. At the same time, when people perceive they will live more years, they adapt their saving behaviour to that perception, in this case saving more. Though, Xiao and Noring (1994) added as one of the motives of saving, the bequest[1] motive, which could incentive not diminishing savings even though being in poor health. And so the fact of leaving a legacy can also motivate saving.

[1] the money or property belonging to someone that they say that, after their death, they wish to be given to other people http://dictionary.cambridge.org/dictionary/english/bequest. Accesed 14.03.2017.

Also connected with health, the structure of the population of one country is also said to be an important variable to review when looking at household saving rate patterns. First, because the population during their working years has a bigger capacity to save, and second, because saving decisions are made thinking not only in the present but in the lifetime period (Friedman, 1957). So that, in countries with elderly populations one might expect lower saving propensities.

Apart from the economic and demographic variables, some authors add that the divergences in saving rates might not be only be due to economic or demographic variables. Other factors such as culture or education might also influence human decisions of saving (DeVaney et al., 2007). Also, Browning and Lusardi (1996), added the avarice as one of the reasons or motivations when saving.

As another determinant that could influence saving decisions, in this paper we have pointed the weather. Nonetheless, it is not the first time that the climate conditions are said to influence human behaviour. The implications of the weather in people's comportment or in the economic performance of countries are reviewed in several studies. Cunningham (1979) signalled that the sunshine and temperature were found to predict the generosity of the tip left for a restaurant waitress. While other authors have examined the relation between weather and stock market returns. Hirshleifer and Shumway (2003) analysed the relationship between morning sunshine in the city of a country's main stock exchange and the daily market index returns across 26 countries in the period of 1982 to 1997. And, found sunshine to be strongly significantly correlated with stock returns, but still not enough as to make an investment strategy based on weather.

3. Methods and data

In order to find which determinants have more impact on household saving rates and contrast the hypothesis of this work, it is built a panel data model with random effects. To do the study is used data of the period from 2000 to 2014.

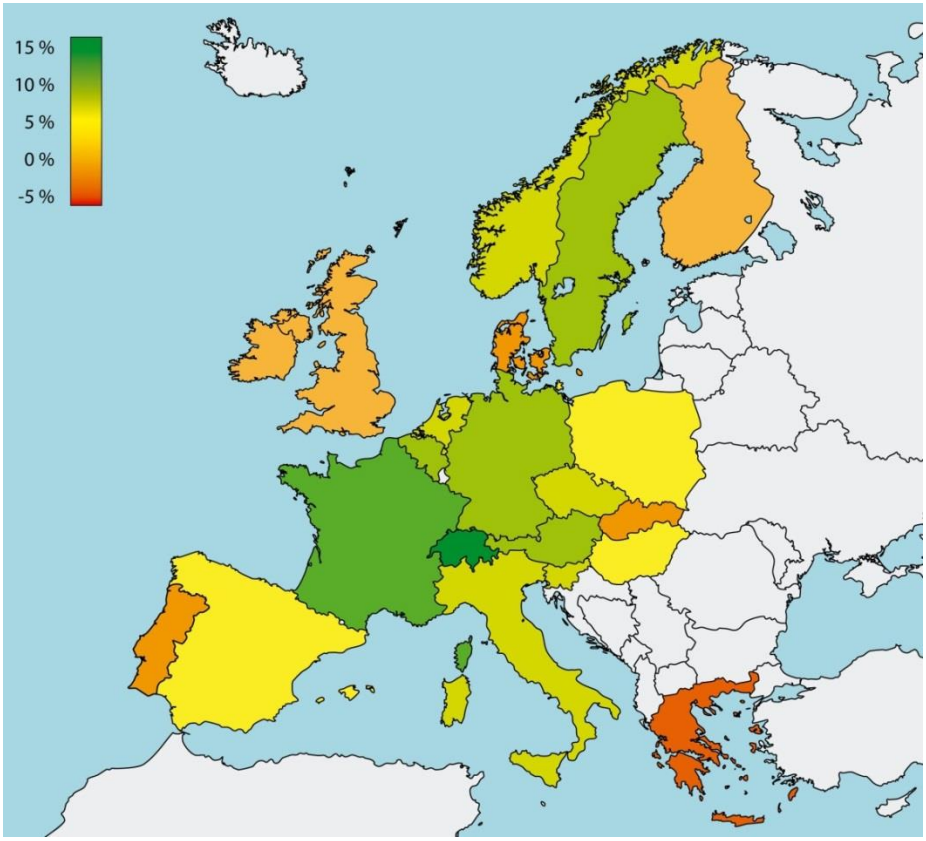
The countries chosen for the analysis are the European countries that belong to the OECD with the exception of Estonia, Island and Luxemburg (due to the lack of data). Thus, analysed countries are Austria, Belgium, Czech Republic, Denmark,

Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

3.1 Dependent variable

The dependent variable is *Savingrate*, and is the net household saving rate. It is obtained from the OECD database, and indicates the percentage of disposable income that the households save as an average in each country each year. The OECD defines it as the subtraction of household consumption expenditure from household disposable income, plus the change in net equity of households in pension funds. The indicator is measured as a percentage of household disposable income (0-100).

Figure 1: Average saving rate (2000-2014)



Data source: OECD, (2017). *Own elaboration.*

As it can be seen in Figure 1 the central-European countries are the ones having higher rates of saving during the period 2000-14. At the head of the list is Switzerland with an average rate of saving of 16,54%. Followed by France (10,02%), Sweden (9,87%), Germany (9,77%), Austria (9,59%) and Belgium (8,74%).

The mean saving rate of the countries in the sample during this period is situated at 5,32%. The southern countries present lower than average saving rates, with the exception of Italy with 6,83%, and with Greece having the lowest rates of saving with -4,69%. Spain is also below average with an average rate of 3,90%. Also under the mean values can be found the eastern-Europe countries and the British Islands with Ireland 2,73% and United Kingdom 1,97%.

Looking at the overall picture, the lower levels of saving are not only found among the poorer countries. This indicates that the household saving rates are not only determined by the income levels of each country. There are some high income countries that present low rates of saving. Perhaps, the most surprising is Denmark (-0,80%) with average negative saving rates during this period. Also Finland and the English countries have lower than probably expected saving rates.

Figure 2: Mean household saving rate[2]

Data source: OECD, (2017). *Own elaboration*.

In the evolution of saving rates in Figure 2 the effects of the economic crisis are notorious. While saving rates were declining at the earlies 2000, the crisis changed the trend. At the aggregate level, since 2008 the majority of the European countries increased their savings[3]. The conjuncture of the crisis provoked mainly two effects. The first effect is that the disposable income decreased, even though it did not felt as much as GDP due to the stabilizers of public sector. This phenomenon was expected to lower the capacity of households to save. But savings increased during the crisis. This is

[2] Figure 2 represents the average rate of saving of the 21 countries analysed in each year
[3] The evolution of savings in each country can be found in the Annex 2

because the second effect, the uncertainty, pushed households to increase precautionary savings. The principal reaction of households as a response to the conjuncture of the crisis was lowering the consumption. As a consequence, it provoked an increase in saving rates (ECB, 2016). When the worse years of the crisis had gone over, the confidence of households returned. Then, the increase in consumption pushed the saving rates back to pre-crisis levels.

Nonetheless, this saving behaviour was not the only reaction. In Greece, the saving rates had traditionally been negative. With the effects of the crisis they not only keep negative but felt even more down. In general, the countries that suffered the most the crisis were the ones showing more volatility in their saving rates[4]. In the other side, in countries like Germany or France the fluctuations were minimum[5].

3.2 Explanatory variables

The explanatory variables are divided in 6 groups. The first four groups include variables pointed to be determinants of household saving in previous studies. The fifth group includes a dummy variable that reviews the reactions of households during the first years of the crisis. And, the sixth group is formed by climatic variables.

1. The first group is composed of **economic** variables. It is formed by: *Lngdpcapita*, *Giniindex*, *Temporaryjob*, *Unemployment*, and *Realinterestrate*.

   The first variable, *Lngdpcapita* is the natural logarithm of Gross Domestic Product per capita, and the data is from The World Bank database. Then, *Giniindex* which is obtained from Eurostat database measures the inequality in income. The indicator is from 0 to 100, 0 being perfect equality. The variable *Temporaryjob*, is also obtained from the Eurostat database. It represents the temporary employees as a percentage of the total number of employees. *Unemployment* is the unemployment rate measured as a percentage of the total labour force, and is from The World Bank database. These variables are chosen to contrast if the level of wealth of one country, the job market insecurities or the inequalities in income, have an effect in saving. The last variable, which is *Realinterestrate*, is the real interest rate (data from Eurostat, and OECD databases). It is the market interest rate minus the inflation. It serve us to

[4] See Annex 1, the evolution of Ireland Figure A.6, and the evolution of Spain and Greece in Figure A.7
[5] See Annex 1, the evolution of Germany and France in Figure A.8

contrast if people consider the possible market returns of saving when deciding which part to save out of the disposable income.

2. The second group is **public social assistance** variables. The variables are: *Pensionincome, Socialbenefits* and *Socialspending*.

   The variable *Pensionincome,* is the public spending per capita in pensions, divided by the average income in each country (data from OECD and Eurostat databases). By doing so, it is aimed to compare the public pension system of all the analysed countries. We divided the average spending per capita in pensions per the average income of the population in order to extract the differences in income and in the cost of living in the different countries.

   The other variables included in this group were obtained in OECD database. *Socialbenefits* is measured as a percentage of GDP and includes social benefits and social transfers to households. The variable *Socialspending*, also measured as a percentage of GDP includes the government expenditure in cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. With these variables it is aimed at finding if the best social systems lead to lower saving rates. The hypothesis that we want to contrast is whether when people live in a country with a generous public social system, they have fewer incentives to save for themselves (Feldstein, 1985). If people reduce their precautionary savings since they perceive that if they suffer a shock or an unexpected problem they will be assisted (i.e. getting ill, unemployed, or being retired).

3. The third group of variables is **health/age** variables. The group is formed by these variables: *Population65, Lifeexpectancy, Goodhealth and Yearslost.*

   The variable *Population65* is the percentage of population over 65 years old out of the total population, and is from Eurostat database. *Lifeexpectancy* displays the life expectancy at birth in total years, and is obtained in The World Bank database. *Goodhealth* represents the percentage of the total population who perceive their health to be good or very good (data obtained in OECD database).

Also from OCDE database, *Yearslost* is an indicator of the premature mortality, and summarises the years lost for early deaths for every 100.000 people[6].

Some studies indicate that the self-perception of health is an important variable shaping saving behaviour. So that, if one feels healthy have more incentives to save since perceives more possibilities to live more years. This group reviews the self-perception of health as a motivation of saving behaviour, but also the theory of life-cycle hypothesis. Ando and Modigliani's theory which implies that the higher the old-age dependency ratio[7], the lower will be aggregate household saving, as this population group dis-save in retirement (Callen and Thimann, 1997).

4. The forth group is **cultural and educational** variables. The variables that make up this group are *Protestants* and *Terciary*.

   The cultural variable is *Protestants* and is from the Pew Research Centre. It represents the percentage of Protestants in each country. Even though not being in itself a cultural variable, but a religious one; it was chosen due to the cultural values linked with the protestant population. Protestant culture has been connected with the values of Capitalism, and with the hard work ethic (Weber, 1934). For instance, Stulza and Williamson (2003) indicated that a country's principal religion is better indicator of a creditor rights than a country's openness to international trade, its income per capita or the origin of its legal system. The second variable is *Terciary*, which represents the percentage of adults with tertiary education. The education that the population of a country has achieved may also have some implications in chapping their consumption and saving decisions. Devaney et al. (2007) included education as a significant predictor of saving behaviour.

[6] This indicator is a summary measure of premature mortality, providing an explicit way of weighting deaths occurring at younger ages, which may be preventable. The calculation of Potential Years of Life Lost (PYLL) involves summing up deaths occurring at each age and multiplying this with the number of remaining years to live up to a selected age limit (age 70 is used in OECD Health Statistics). In order to assure cross-country and trend comparison, the PYLL are standardised, for each country and each year. The total OECD population in 2010 is taken as the reference population for age standardisation. This indicator is presented as a total and per gender. It is measured in years lost per 100 000 inhabitants (total), per 100 000 men and per 100 000 women, aged 0-69. https://data.oecd.org/healthstat/potential-years-of-life-lost.htm. Accesed 01.04.2017.

[7] the proportion of population aged over 65 to the working-age population

5. The fifth group is **crisis** variables. The group consists of one variable, *Crisis*. This variable is a dummy variable, which reviews the saving behaviour during the first years of the crisis 2008-10. The reason of this variable is finding if during the early stage of the crisis, households had a particular reaction regarding saving. It also serve us to contrast if the uncertainty pushes households to increase saving (probably for precautionary reasons).

6. The sixth group is **weather** variables. The group if formed by three variables, which are *Sunnydays*, *Rainydays*, and *Icedays*.

   All the variables are obtained from the European Climate Assessment & Dataset. The data adjudicated to every country is of the meteorological station from the most populated city or in its absence from the nearer station. The fact of giving a station the representativeness of a whole country is a limitation, since we are losing the heterogeneity inside countries. Nonetheless, the station chosen is the one that represents a higher proportion of the inhabitants of each country.

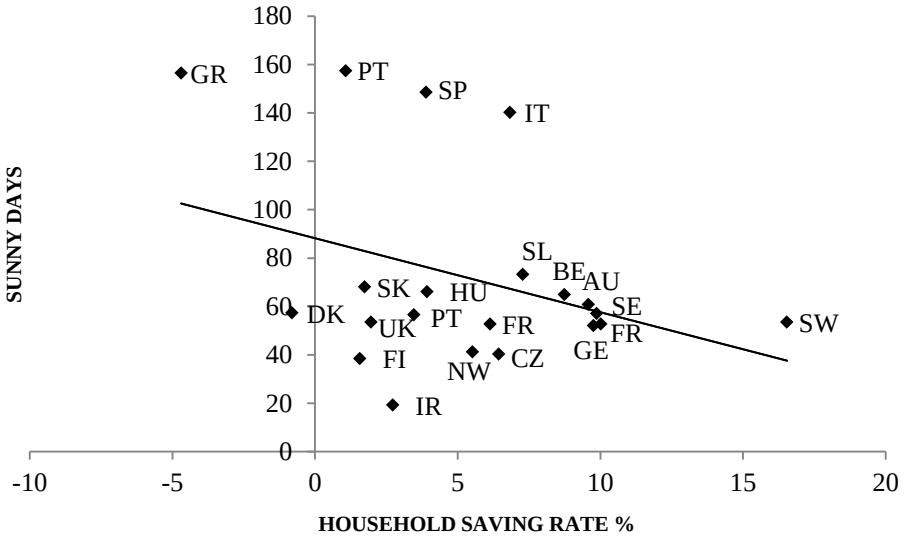
- *Sunnydays* reflects the days of each year with low cloudiness. Low cloudiness is measured in oktas[8]. The days in which the cloud cover is below 2 oktas are considered sunny days.
- *Rainydays* reflects the days of each year in which it rains at least 1 ml.
- *Icedays* reflects the days of each year with the average temperature below 0 °C.

The variables of the fifth group are the ones that will be used to contrast if the hypothesis that the weather is a determinant or present a relationship with household saving rates is correct.

Before the econometric model the three variables have been analysed. For each climatic variable it is built a dispersion graphic. This graphics compare the average values of saving rates and of the climatic variable for each country for 2000-14.

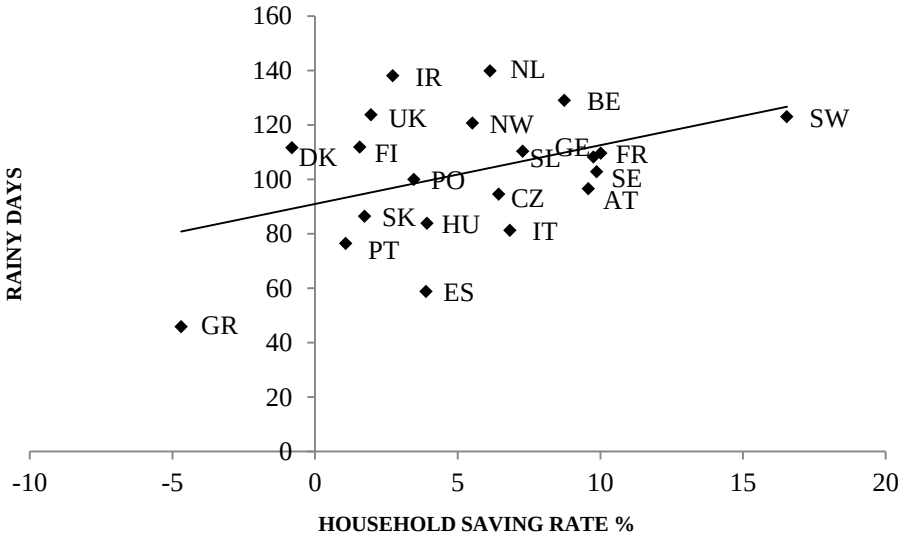
[8] In meteorology, an okta is a unit of measurement used to describe the amount of cloud cover at any given location such as a weather station. Sky conditions are estimated in terms of how many eighths of the sky are covered in cloud, ranging from 0 oktas (completely clear sky) through to 8 oktas (completely overcast). https://en.wikipedia.org/wiki/Okta. Accesed 04.03.2017.

Figure 3



Data source: OECD and ECA&D. *Own elaboration*.[9] $R^2 = 0{,}1214$

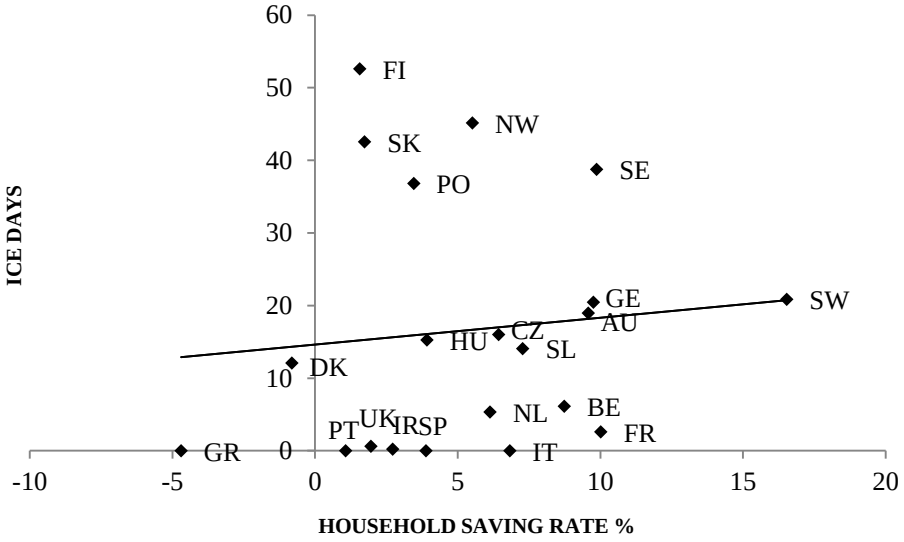
Figure 4



Data source: OECD and ECA&D. *Own elaboration*. $R^2 = 0{,}171$

[9] Being: Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), France (FR), Germany (GE), Greece (GR), Hungary (HU), Ireland (IR), Italy (IT), Netherlands (NL), Norway (NW), Poland (PO), Portugal (PT), Slovakia (SK), Slovenia (SL), Spain (SP), Sweden (SE), Switzerland (SW) and United Kingdom (UK).

Figure 5



Data source: OECD and ECA&D. *Own elaboration*. $R^2 = 0{,}0102$

In the figures one can see that the climatic variable that shows a stronger relationship with saving rates is *Rainydays*. Figure 5 illustrates that the countries with more rainy days over this period tend to have higher rates of saving. In Figure 4, *Sunnydays* present a negative relation with saving rates. In sunnier countries people use to have lower rates of saving. Finally, Figure 6 shows that *Icedays* has a very weak positive relationship with savings.

Although not being strong relations, the aggregate numbers seem to show that in countries with "worse" weather (more rain and less sunny days), households tend to save a higher proportion of their disposable income.

4. Results and discussion

In order to contrast the determinants of saving, the effects of the crisis and the hypothesis of the weather as a determinant, in this section we made the estimations by using a panel data model. The fact of using a panel data model allowed us to have a larger sample, and at the same time exploit the cross-country and time-series information in the data. In order to treat the aleatory effects we choose the random effects panel data model. This estimator assumes the condition that the individual effects are not correlated with the explanatory variables of the model:

Thus: $(\propto , X)=0$

Being,

$\propto i$ =Individual effects

X= Explanatory variables

So, the individual effects are added to the error term, defining the model as:

$$Yit = \beta\ Xit + (\alpha i + \mu it)$$

In pursuance of studying the determinants of household saving rates, we had to choose a model out of the 19 variables. To pick which of the 19 variables were the more relevant to construct the model the following procedure was implemented. First we made econometric models for each group of variables. Then, with the significant variables of each group, and also considering possible correlations, we made several models (in table A.1 in the Annex 2 are found some of the models). The fact of designating the optimum models among the possible ones was difficult due to various reasons. First, because we had an unbalanced model (there were missing observations). And secondly, some of the variables were highly correlated.

Finally, the models chosen are models (12), (14) and (15) of Table A.1 in the Annexes.

The equations for the household saving rates can be defined as:

$$Model\ A: Savingrate_{it} = \beta_{0i} + \beta_{1i}\ Lngdpcapita_{it} + \beta_{2i}\ Temporary_{it} + \beta_3\ Pensionincome_{it} + \beta_{4i}\ Population65_{it} + \beta_{5i}\ Terciary_{it} + \beta_{6i}\ Crisis_{it} + \beta_{7i}\ Sunnydays_{it} + (\alpha_i + u_{it})$$

$$Model\ B: Savingrate_{it} = \beta_{0i} + \beta_{1i}\ Lngdpcapita_{it} + \beta_{2i}\ Temporary_{it} + \beta_3\ Pensionincome_{it} + \beta_{4i}\ Population65_{it} + \beta_{5i}\ Terciary_{it} + \beta_{6i}\ Crisis_{it} + (\alpha_i + u_{it})$$

$$Model\ C: Savingrate_{it} = \beta_{0i} + \beta_{1i}\ Lngdpcapita_{it} + \beta_{2i}\ Temporary_{it} + \beta_{3i}\ Pensionincome_{it} + \beta_{4i}\ Population65_{it} + (\alpha_i + u_{it})$$

- $Savingrate_{ij}$ is the household saving rate of the country *i* in the year *j*.
- β_{0i} represents the different coefficients for each variable and country.
- $Lngdpcapita_{ij}$ is the natural logarithm of the GDP per capita in the country *i* in the year *j*.
- $Temporary_{ij}$ is the percentage of workers with temporary jobs in country *i* in the year *j*.

- $Pensionincome_{ij}$ is the public spending per capita in pensions divided by the average income in country *i* in the year *j*.
- $Population65_{ij}$ is the percentage of population over 65 years out of the total population in country *i* in the year *j*.
- $Terciary_{ij}$ is the percentage of adults with terciary education in country *i* in the year *j*.
- $Crisis_{ij}$ is a dummy variable, with 1's in years 2008-10.
- $Sunnydays_{ij}$ is the number of sunny days in country *i* in the year *j*.
- α_i is the individual effects
- u_{it} is the error term per country and year.

Table 1. Results

	Household saving rate		
	(A)	(B)	(C)
Lngdpcapita	**-2.15727****	**-2.23377*****	**-2.11849*****
	(0.854154)	(0.851585)	(0.554412)
Temporaryjob	**-0.18337****	**-0.18321****	**-0.16909****
	(0.071271)	(0.071295)	(0.069006)
Pensionincome	**-35.54218*****	**-34.72261*****	**-28.16838*****
	(11.171174)	(11.150038)	(10.223134)
Population65	**-0.40754***	-0.37169	
	(0.232704)	(0.230480)	
Terciary	0. 09371	0. 08653	
	(0.070223)	(0.069943)	
Crisis	**0.85711****	**0.92074****	**0.97188****
	(0.393835)	(0.38680)	(0.377810)
Sunnydays	-0.01033		
	(0.009417)		
Constant	**40.90413*****	**40.39242*****	**34.07956*****
	(8.623110)	(8.613467)	(6.566904)
Observations	303	303	315
AIC	1533.318	1525.029	1569.562

Notes: in parenthesis Standard error. Signification 0,01 ***, 0,05**, 0,1*

Source: Authors' calculations

Table.2 Correlations between variables

	Lngdpcapita	Temporary	Pensionincome	Population65	Terciary	Crisis
Lngdpcapita						
Temporaryjob	-0.116					
Pensionincome	0.178	0.064				
Population65	-0.153	-0.006	0.262			
Terciary	-0.531	-0.086	-0.150	-0.511		
Crisis	-0.353	0.038	0.072	0.171	0.041	
Sunnydays	-0.082	0.002	0.066	0.140	-0.093	0.147

Source: Authors' calculations

The results of the model in Table 1 show *Lngdpcapita*, *Temporaryjob*, *Pensionincome* and *Crisis* as the variables having a relation with saving rates. Also *Population65* has a significant coefficient in Model (A). Both *Terciary* and *Sunnydays* are found to be non-significant.

Thus, the hypothesis that pointed that the weather might have an influence in saving behaviour of households is refused. None of the climatic variables appears significant in any of the models tested[10]. Therefore, it cannot be said that the saving behaviour is influenced by the weather conditions. The variable Crisis, confirms the hypothesis that during periods of uncertainty, households increase their saving rates. Also, the econometric study of the determinants of saving rates has led to some important findings.

Niculesu and Mihaescu (2012) signalled income and wealth as an important explanatory variable for estimating the household saving rate. Our results indicate that GDP per capita has a negative relation with the household saving rates. This implies that in countries or years, in which the GDP per capita is higher, the saving rates tend to be lower. The quality of the public pension system is also a significant variable in defining the saving levels. Callen and Thimann (1997) or Feldstein (1978) pointed that in countries with generous public pension systems, people have fewer incentives to save. As expected, in the results of our model the variable that measures the generosity of the pension system has a negative relation with the saving rates of the population.

[10] See Table A.1 in the Annex 2

This implies that high quality public pension systems are linked with lower levels of saving among households.

The variable *Temporaryjob* is found to have a significant negative relationship with the dependent variable. Therefore, in the countries or years in which the temporality in the job contracts predominates, households tend to have lower levels of saving. This relationship might come from the fact that the job insecurity is more habitual in contexts of low wages or part-time jobs. In these contexts households might not be able to have high saving rates. Nonetheless, these implications contradict some of the reviewed theories that point that in uncertain contexts households tend to increase saving. The variable *Population65*, is found in some tested models, and in Model (A) to have a significant negative relation with *Savingrates*. High percentages of people over 65 years old lead to lower levels of saving. These results could be linked with different theories regarding saving determinants. First, Fisher and Montalto (2009) identified health as a determinant of saving. If people perceived their own health to be bad, their levels of saving decreased. So, in societies with a high percentage of retired people (whom is expected to have a worse self-perception of health) one might forecast the population to have lower saving rates. Secondly, the theory of life cycle (Ando and Modigliani, 1963) identified that in the old age people tend to dis-save. This also supports the fact that in the populations with higher percentage of people older than 65 years old, the levels of saving are lower.

The variable *Crisis* has a significant positive relation with saving rates. This relation indicates that in uncertain periods (such the first years of the economic crisis 2008-10) households tend to increase saving rates, as was pointed in the study of the ECB (2016). During the early stage of the crisis the households responded to the uncertainty increasing their saving. The precautionary reasons pushed households to increase saving rates, though having decreasing disposable income ECB (2016).

As for the cultural and educational variables, both *Protestants* and *Terciary* are not found to have a significant relation with the dependent variable. Though, the variable *Terciary* was identified in the first model (which included only *Terciary* and *Protestants* as explanatory variables) to have a significant negative relation with household saving rates. In other models, it appears as non-significant, probably due to the fact that is highly correlated with *Lngdpcapita* and *Population65*.

The climatic variables appear in all the models tested as non-significant. Nonetheless, the study of these variables has faced some limitations that might have had an effect in the final results. At first, these variables were aimed to compare the different climates and saving patterns through the European regions. But the data of household saving rates was unavailable at a regional level. Therefore, finally the analysis was made per countries. So, we had to adjudicate common climatic figures for each country. By doing the study per countries it was assumed that it was an imperfect approximation. This is because the weather indicators vary substantially between the different regions inside the European countries, and this problem became more evident in big and diverse countries like Spain or France, in which cohabitate different climates and the regions may also have substantial differences in their economic figures.

5. Conclusions

This study of the determinants of household saving rates has brought some important findings. The empirical results of this work indicate that the economic performance, the quality of public social assistance programmes, the health/age and the crisis have a role in defining household saving rates. Concretely, GDP per capita, the pension system, the variable *Crisis*, the percentage of population over 65 years old and the length of the job contract are the variables found to be determinants of household saving. Other variables such as the social spending per capita and the percentage of adults with terciary education are also found significant in some of the tested models but the correlation with *Lngdpcapita* and *Population65* reduced their signification and forced us to exclude them in the final models. These results regarding saving motives or determinants of household saving give us some important information that can be used to promote or dissuade saving. At the same time, they also serve us to understand some of the differences in the saving patterns through the European Countries.

The empirical results support, as described in previous studies, that households tend to save less in countries with better pension systems. Thus, generous public assistance programmes give people fewer incentives to save for their future needs. The GDP per capita levels present a negative relation with household saving rates. This indicates that in countries or years in which the GDP per capita is higher, the levels of saving among households tend to be lower. The variable temporary job remains significant in all the models tested. The negative coefficient indicates that in societies

with lower levels of job security people have smaller saving rates, probably due to the inability to save. We do not have empirical evidence but we conjecture that job insecurity could be linked with part-time or badly paid jobs. The significant positive coefficient of the variable *Crisis* confirms one of the main hypotheses regarding saving, the one that pointed that in uncertain periods households increase their saving provisions. Finally, supported by the results of the Model (A), the percentage of population over 65 years old has a negative relation with saving rates. This implies that in older societies the saving rates are expected to be lower.

The hypothesis regarding the role of the weather as a determinant of savings is not confirmed. None of the climatic variables has a statistically significant influence in in the household saving rates. Nevertheless, the study of the climatic variables as possible determinants of household saving rates has faced an important limitation, the inability to make the study regionally. If in further studies this variable can be analysed regionally, implications of the weather in the households saving behaviour might be found significant.

References

Adult education level - Education attainment - OECD Data (2017). Retrieved February 220, 2017, from https://data.oecd.org/eduatt/adult-education-level.htm#indicator-chart

Ando, A., and Modigliani, F., (1963). The Life-Cycle Hypothesis of Saving: Aggregate Implications and Tests. American Economic Review, 53(1), 55-84.

Browning, M., and Lusardi, A. (1996). Household saving: Micro theories and micro facts. Journal of Economic Literature, 34(4), 1797–1855.

Canova, L., Rattazzi, A. M., and Webley, P. (2005). The hierarchical structure of saving motives. Journal of Economic Psychology, 26, 21–34.

Chang, Y. R. (1994). Saving behaviour of U.S. households in the 1980s: Results from the 1983 and 1986 Survey of Consumer Finances. Financial Counselling and Planning, 5, 1–21.

Cunningham, M.R. (1979). Weather, mood, and helping behaviour: Quasi experiments with the sunshine Samaritan. Journal of Personality and Social Psychology, Vol 37 (11), November 1979, 1947-1956.

Daily data - Home European Climate Assessment & Dataset (2017). Retrieved February 2, 2017, from http://eca.knmi.nl/dailydata/index.php

Elmendorf D. (1996). The Effect of interest rate changes on household savings and consumption: A survey. Federal Reserve. Retrieved March 03, 2017, from http://www.federalreserve.gov/pubs/feds/1996/199627/199627pap.pdf.

Expense (% of GDP) – World Bank (2017). Retrieved February 11, 2017, from http://data.worldbank.org/indicator/GC.XPN.TOTL.GD.ZS?view=chart

Feldstein, M. (1978). The Welfare Cost of Capital Income Taxation. *Journal of Political Economy, 86*.(2 part 2) doi:10.1086/260693

Fisher, P. J., and Montalto, C. P. (2010). Effect of saving motives and horizon on saving behaviors. *Journal of Economic Psychology, 31* (1), 92-105. doi:10.1016/j.joep.2009.11.002

Friedman, M. (1957). *A theory of the consumption function*. Princeton, NJ: Princeton University Press.

Furnham, A., and Argyle, M. (1998). The psychology of money. New York: Routledge.

GDP per capita (current US$) | Data | Table - World Bank (2017). Retrieved February 10, 2017, from http://data.worldbank.org/indicator/NY.GDP.PCAP.CD

Gini coefficient of equivalised disposable income – EU-SILC survey – Eurostat (2017). Retrieved February 11, 2017, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12&lang=en

Health status - Potential years of life lost - OECD Data (2017). Retrieved March 15, 2017, from https://data.oecd.org/healthstat/potential-years-of-life-lost.htm

Hirshleifer, D. and Shumway, T. (2003), Good Day Sunshine: Stock Returns and the Weather. The Journal of Finance, 58: 1009–1032. doi:10.1111/1540-6261.00556

Household accounts - Household disposable income - OECD Data. (2017). Retrieved February 11, 2017, from https://data.oecd.org/hha/household-disposable-income.htm

Household accounts - Household savings - OECD Data (2017). Retrieved February 15, 2017, from https://data.oecd.org/hha/household-savings.htm

Inflation, consumer prices (annual %) | Data - World Bank. (2017). Retrieved March 15, 2017, from http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG

Lewis, A., Webley, P., and Furnham, A. (1995). The new economic mind. The social psychology of economic behaviour. Hemel Hempstead: Harvester Wheatsheaf

Life expectancy at birth, total (years) - World Bank (2017). Retrieved February 15, 2017, from http://data.worldbank.org/indicator/SP.DYN.LE00.IN

Liu, J. (2011). Table: Christian Population in Numbers by Country. Retrieved March 02, 2017, from http://www.pewforum.org/2011/12/19/table-christian-population-in-numbers-by-country/

Niculescu-Aron, I., and Mihăescu, C. (2012). Determinants of Household Savings in EU:What Policies for Increasing Savings? *Procedia - Social and Behavioral Sciences, 58*, 483-492. doi:10.1016/j.sbspro.2012.09.1025

Occasional Paper Series - European Central Bank. (2016). Retrieved April 1, 2017, from https://www.ecb.europa.eu/pub/pdf/scpops/ecbop167.en.pdf

Paxson, C. (1995). Saving and Growth: Evidence from Micro Data. doi:10.3386/w5301

Perceived Health by status and gender – OECD (2017). Retrieved March 15, 2017, from http://stats.oecd.org/index.aspx?queryid=30117

Population Ages 65 and Above (% of total) - World Bank (2017). Retrieved February 10, 2017, from http://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS

Real interest rate (%) – Data Market (2017). Retrieved March 15, 2017, from https://datamarket.com/data/set/1497/real-interest-rate

Social protection - Social benefits to households - OECD Data (2017). Retrieved February 11, 2017, from https://data.oecd.org/socialexp/social-benefits-to-households.htm

Social protection - Social spending - OECD Data (2017). Retrieved February 11, 2017, from https://data.oecd.org/socialexp/social-spending.htm

Social protection statistics – pensions – Eurostat (2017). Retrieved February 12, 2017, from. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12&lang=en

Stulz, R. M., and Williamson, R. (2003). Culture, openness, and finance. *Journal of Financial Economics, 70*(3), 313-349. doi:10.1016/s0304-405x(03)00173-9

Temporary employees as percentage of the total number of employees, by sex, age and citizenship (%) – Eurostat (2017). Retrieved March 1, 2017, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_etpgan&lang=en

Thaler, R. H. (1999). Mental accounting matters. Journal of Behavioral Decision Making, 12, 183–206.

Unemployment, total (% of total labor force) (modeled ILO estimate) – World Bank (2017) . Retrieved March 13, 2017, from http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS

Weber, M. (1930). *The protestant ethic and the spirit of capitalism*. London: Unwin University Books. DeVaney, S. A., Anong, S. T., & Whirl, S. E. (2007). Household savings motives. The Journal of Consumer Affairs, 41(1), 174–186.

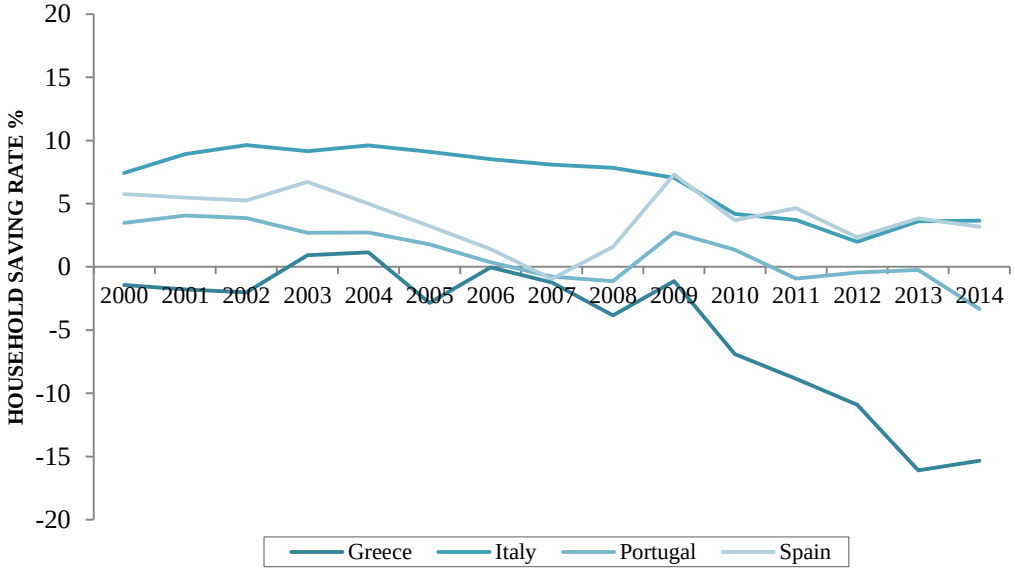
Xiao, J. J., and Noring, F. E. (1994). Perceived Saving Motives and Hierarchical Financial Needs. Retrieved May 1, 2017, from https://afcpe.org/assets/pdf/vol-52.pdf

Annex 1

Figure A.6

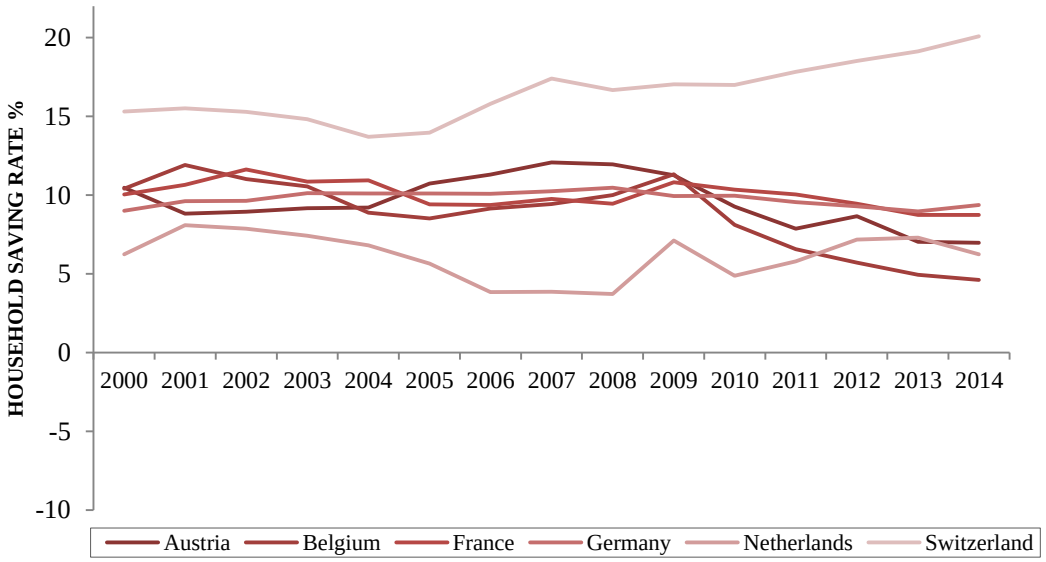
Data source: OECD, (2017). *Own elaboration*.

Figure A.7



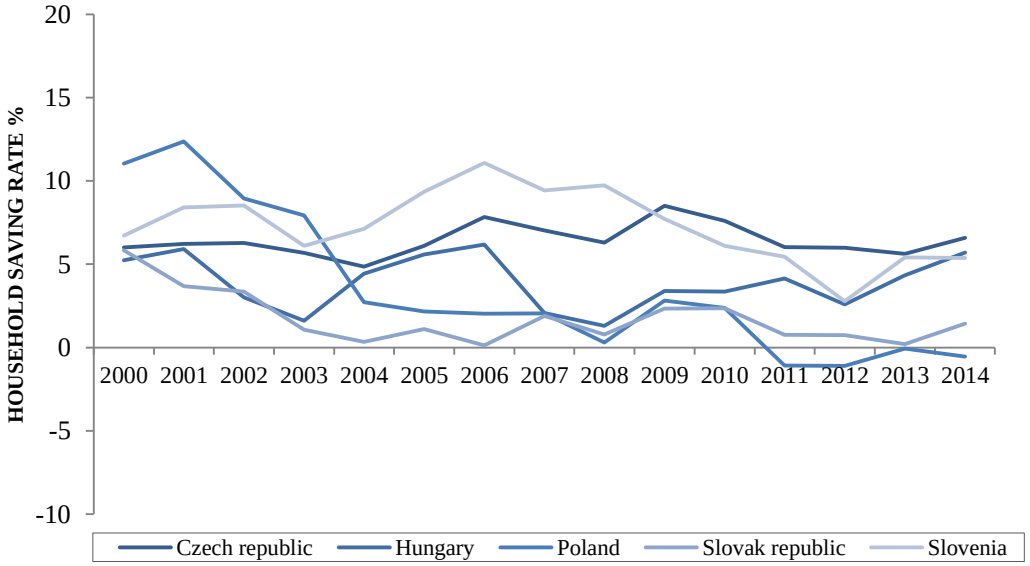
Data source: OECD, (2017). *Own elaboration*.

Figure A.8



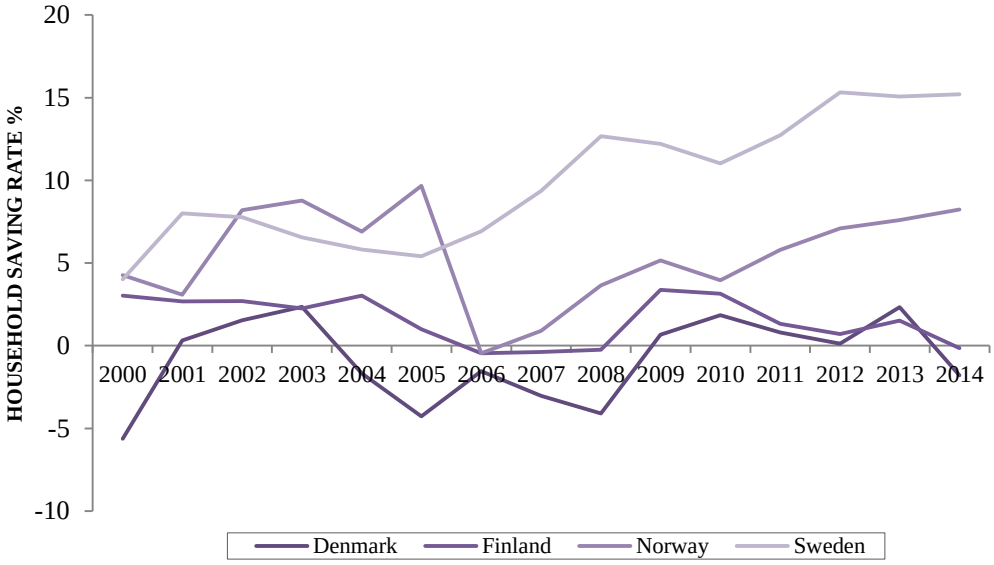
Data source: OECD, (2017). *Own elaboration*.

Figure A.9



Data source: OECD, (2017). *Own elaboration*.

Figure A.10



Data source: OECD, (2017). *Own elaboration*.

Annex 2

		Table A.1: Results													
		Household saving rate													
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Lngdpcapita		**-1.462840** (0.600609)**	**-1.370126** (0.567781)**	**-1.495678** (0.589666)**	**-2.757360** (1.12056)**	**-1.09210* (0.626334)**	**-1.61029** (0.811828)**	**-1.50828* (0.804969)**	**-2.23377*** (0.851585)**	**-2.25365*** (0.866178)**	**-2.15727** (0.854154)**	**-2.17972** (0.857919)**	**-2.32126*** (0.857744)**	**-1.69072** (0.672446)**	**-2.11849*** (0.554412)**
Giniindex		0.000616 (0.113727)													
Temporary		**-0.158783** (0.075306)**	**-0.182816 ** (0.070565)**	**-0.182374** (0.070440)**	-0.118806 (0.08440)	**-0.16816** (0.069616)**	**-0.18642** (0.072134)**	**-0.18893*** (0.071744)**	**-0.18321** (0.071295)**	**-0.18286** (0.071509)**	**-0.18337** (0.071271)**	**-0.18200** (0.071413)**	**-0.18230** (0.071369)**	**-0.16267** (0.069232)**	**-0.16909** (0.069006)**
Unemploymentrate		-0.074537 (0.067046)													
Realinterestrate		-0.132632 (0.093271)	-0.069145 (0.079878)												
Pensionincome			**-19.278332* (10.959345)**	**-26.574956** (10.436305)**	**-22.358941* (12.37019)**	**-32.87030*** (10.531409)**	**-38.71900*** (11.687877)**	**-35.46361*** (11.156867)**	**-34.72261*** (11.150038)**	**-36.16783*** (11.224430)**	**-35.54218*** (11.171174)**	**-34.44323*** (11.145460)**	**-35.37254*** (11.183917)**	**-31.96691*** (10.535086)**	**-28.16838*** (10.223134)**
Socialbenefitsh			-0.080624 (0.121671)												
Socialspending				-0.034293 (0.085495)											
Lifeexpectancy					0.799931 (0.55530)										
Yearslost					0.000966 (0.00117)										
Goodhealth					0.045813 (0.06603)										
Population65					-0.222486 (0.35495)	**-0.32050* (0.189658)**	**-0.45073* (0.230506)**	**-0.44697* (0.228866)**	-0.37169 (0.230480)	**-0.40595* (0.233563)**	**-0.40754* (0.232704)**	-0.37505 (0.230983)	-0.37061 (0.230884)	-0.23558 (0.192440)	
Protestants							0.03333 (0.055461)								
Terciary							0.07428 (0.070823)	0.07540 (0.070281)	0.08653 (0.069943)	0.09849 (0.071010)	0.09371 (0.070223)	0.08399 (0.070131)	0.09041 (0.070136)		
Crisis									**0.92074** (0.389680)**	**0.92417** (0.405298)**	**0.85711** (0.393835)**	**0.89431** (0.394857)**	**0.98254** (0.397406)**	**6.612490** (0.384706)**	**0.97188** (0.377810)**
Sunnydays										-0.01077 (0.010454)	-0.01033 (0.009417)				
Rainydays										-0.00170 (0.012473)		0.00490 (0.011189)			
Icedays										-0.01142 (0.014831)			-0.01158 (0.014702)		
Constant		**23.416448*** (6.580982)**	**26.511375*** (6.343570)**	**28.541186*** (6.429704)**	-26.948700 (43.96092)	**29.74185*** (6.395744)**	**35.76716*** (8.438679)**	**34.83045*** (8.383661)**	**40.39242*** (8.613467)**	**42.23072*** (9.028886)**	**40.90413*** (8.623110)**	**39.39512*** (8.795009)**	**41.45723*** (8.699238)**	**34.11083*** (6.612490)**	**34.07956*** (6.566904)**
Observations		267	315	315	232	315	303	303	303	303	303	**303**	**303**	**315**	**315**
AIC		1366.287	1581.834	1578.889	1165.662	1574.675	1534.137	1528.513	1525.029	1550.256	1533.318	1533.989	1533.012	1571.547	1569.562
Notes: in parenthesis Standard error. Signification 0,01 ***, 0,05**, 0,1*															

Source: Authors' calculations