The Spanish Household Indebtedness

The Role of Socio-demographic Factors and Economic Cycle

Degree in Economics

4th Year 2014/2015

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Abstract.

The last decade has witnessed a big increase in households' indebtedness. The aim of this paper is to analyse the role of some socio-demographic factors and the economic cycle in determining the probability of holding debt and the level of debt held by Spanish households. Using data from The Spanish Survey of Households Finances (EFF) for the years 2005, 2008 and 2011, we analyse the value of total, collateralised and non-collateralised debt, as well as the probability of holding these different types of debts. To this end, we use multiple linear regressions and logit models. We find that the socio-demographic factors are relevant to determine the Spanish household debts. In contrast, we cannot confirm the relevance of the economic cycle for the period considered.

JEL classification: D14, D91.

1. Introduction.

In general, households are formed by different individual consumers, but the main breadwinner is who takes the economic decisions. Households play an important role in the economy, because they are consumers of goods and services and working capital for the companies. Also, the families provide liquidity to the banks through their deposits and they can borrow from the banks through different modalities of loans. Moreover, households want to maximize their utility deciding between present and future consumption. In order to achieve this objective, households can exchange future consumption by present consumption across the indebtedness.

Before the economic crisis, households incurred many debts because of the favourable economic environment. Concretely, the Spanish households increased excessively their debts due to the housing purchases, since the Spanish economy developed a real estate bubble in the years previous to the crisis. However, when the economic crisis began a lot of families suffered the consequences of their excessive debts level.

The aim of this paper is to determine the role of some socio-demographic factors and the economic cycle in determining the probability of holding debt and the level of debt held by Spanish households. Our data set has been built from the Spanish Survey of Households Finances (EFF) for the years 2005, 2008 and 2011. In order to achieve our goal, we have used three multiple linear regressions and nine logit models. The econometrics analysis considers the total debts of households, the collateralised debts and non-collateralised debts as dependent variables. Also, we use the dummies of these variables for the Logit models.

We find that the relevant socio-demographic variables to determine the total debts and collateralised debts are income, education and age of the householder, but in relation to the non-collateralised debts are little significant. Besides, we use time-dummies to analyse the effect of the economic cycle. We find that the time variables are significant to explain the level of collateralised and non-collateralised debts, but the effect is not as we expected. Also, time does not significantly affect the probability of holding these debts.

There have been many researchers who have analysed the effect of the socio-demographic factors and the economic cycle over the decisions of consumers. Modigliani and Brumberg (1954) pointed out the different consumption guidelines in relation to the life cycle of the consumers. This fact is used by many researchers in

order to explain the connection among the indebtedness level of the household and his life cycle. Also, taking into account Barnes and Young (2003) research, they studied the raise in US household debts for an extended period of time. Their results verified the relevance of the socio-demographic factors, especially the age of the householder and the income of the household.

In addition, Christelis et al. (2013) analysed the differences in household debt holdings due to household characteristics and the economic environments of the countries. This paper used a comparable household-level data for United States and 11 European countries. The results concluded that the economic environments are relevant to explain the differences in household debt holdings. In contrast, the household characteristics have a little effect over these differences. Moreover, Minsky (1992) stressed the importance of the economic cycle over the debt decisions of households. He stated that households increase their debts in periods of economic prosperity and low interest rates.

In general, the existing empirical literature focuses in the characteristics of households and in the effect of the economic cycle. Our empirical work tries to find out what socio-demographic variables are relevant in determining the indebtedness level of the Spanish household and the effect of the economic cycle on the indebtedness of the Spanish families.

The paper deals with these points as follows. The second section describes some relevant facts about the Spanish economy. Also, we focus on the relation between the real estate bubble and the household indebtedness. The following section discusses the points of view of different authors about the indebtedness level of households. Moreover, the fourth section describes the theoretical framework which analyses three reasons that could explain the Spanish behaviour about debts. The first part explains the income-motive, the second part is about the imperfections of the credit market and the last part studies the housing-finance motive.

In addition, the fifth section describes the statistical data about the Spanish household debts from the information provided by the Bank of Spain. The following section discusses the empirical analysis. This section is constituted by two parts, the first part is formed by the multiple linear regressions and the second part shows the Logit models. Finally, the last section of our study includes the conclusions about the results of our empirical analysis.

2. Recent evolution of the Spanish households' indebtedness.

The graph 2.1 considers the total indebtedness evolution of the Spanish households for the period between 2003 and 2013. As we can see in the graph 2.1, the indebtedness of the Spanish households was increasing rapidly until 2008. Since this year, the Spanish households started to reduce their debts but in a slower pace. As Bernardos (2009) pointed out, the causes of this evolution in the considered period are related to the real estate bubble, the facilities to borrow and the economic crisis.

Graph 2.1 Total Spanish household debts (in millions of euros of 2013).
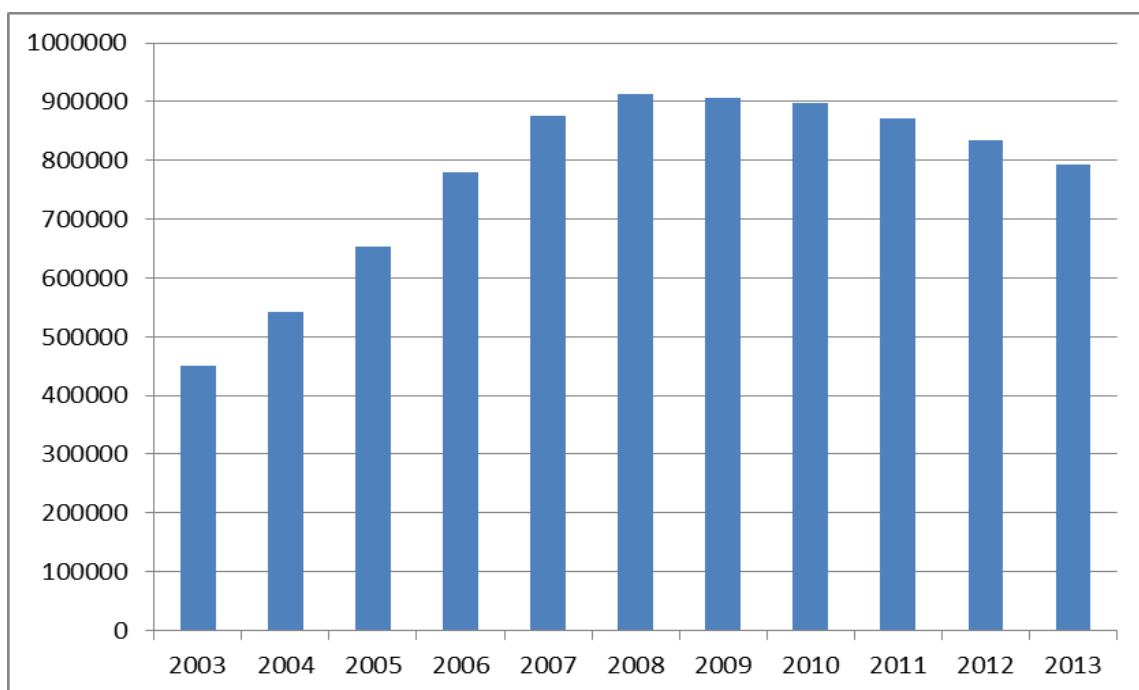
Source: Gay de Liébana (2013).

In relation to the housing bubble, as we can see on the graph 2.2, the real estate investment grew quickly from 1998 until 2008, and the graph also shows a positive correlation between the GDP and real estate investment for the years before the economic crisis. It proves the dependency of the Spanish economic growth from the construction sector.

Graph 2.2 Real estate investment and real GDP (in real terms, index 2000 = 100).

Source: Instituto Nacional de Estadística (INE).

As we can see on the graph 2.3, the housing prices grew quickly from 2002 until 2009, consequence of the great increase of housing demand without the same rise on supply, so there was a great growth in house prices. It is true that the supply increased considerably but not fast enough to meet the demand without increasing the price. The expansion of the demand was produced by the good economic climate and the enlargement of adult population. In reference to supply, the reform of construction land and the perspective of the benefits intensified the housing construction. Accordingly, in this context the Spanish households had to borrow large quantities of money in order to fund their housing.

Graph 2.3 Evolution of housing prices (1995 = 100).
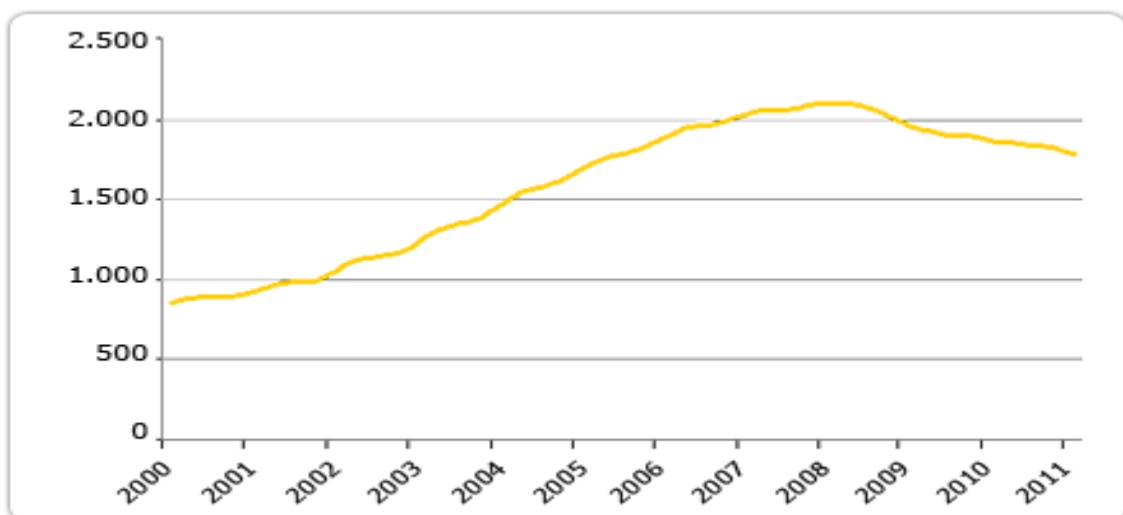
Source: Ministerio de Fomento.

Moreover, the facilities to get debts were another determinant factor in the evolution of the Spanish household indebtedness for this period. The graph 2.4 shows the evolution of the number of granted mortgages in Spain, as we can see during the years of prosperity were granted more mortgages every year, but the number of mortgages dropped down swiftly with the beginning of the economic crisis. The principal causes of the facilities to get debts were: the behaviour of the banks and saving banks, and the small interest rates. Then, households and business borrowed more than they could endure on long-run, so when the economy fell down, in many cases households and companies could not pay their debts. Also, banks and savings banks, assumed too much risk in their operations.

Graph 2.4 Number of mortgages granted.
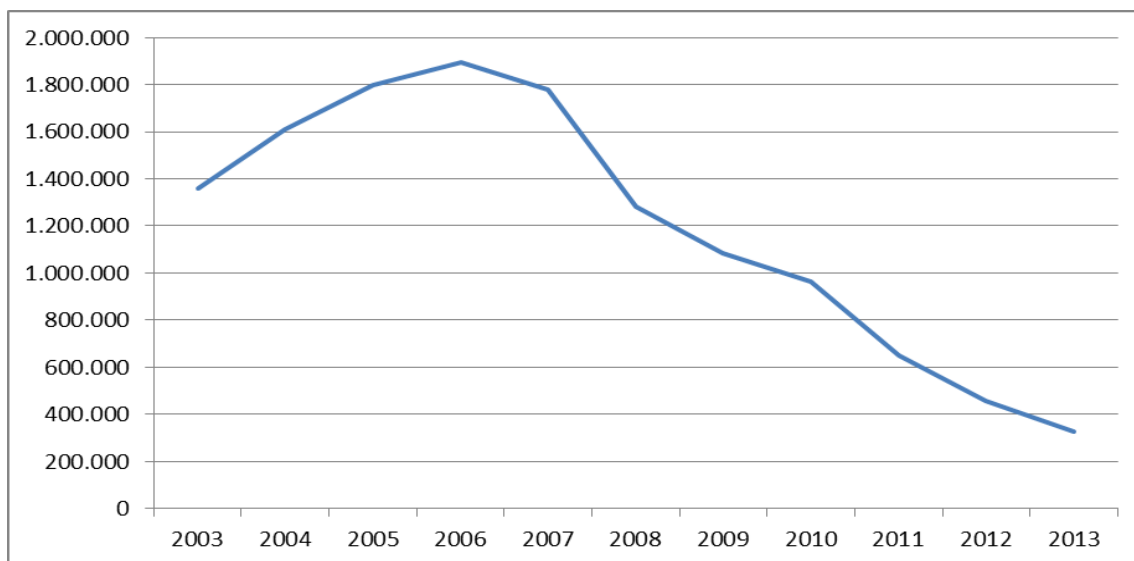
Source: Instituto Nacional de Estadística (INE).

Finally, the economic crisis was the determinant factor in the indebtedness reduction from 2008 until 2013. The increase in unemployment, the reduction on salaries and the downturn on economic growth, were the principal reasons of the minor purchasing power of the Spanish households. Nevertheless, the economic crisis also affected to financial institutions due to the lack of international liquidity. In 2007, in United States broke the subprime mortgages crisis, from this moment the international liquidity decreased, therefore it was more difficult for banks, households and companies, to borrow.

To sum up, the Spanish households could increase their debts for the purchase of housings due to the real estate bubble and the borrow facilities. In this prosperity context, from 2003 to 2008 Spanish households increased excessively their

indebtedness. However, in 2008 the economy entered in crisis, so households began to reduce their debts because of the unfavourable economic environment.

3. Literature review.

Households are a fundamental agent in the economy, they offer workforce and demand goods and services. Moreover, the decisions of the families about consumption and savings have important repercussions on the economy. The indebtedness is an important part of the decisions which all households have to take in some moment (Attanasio and Weber 2010). There are a lot of theories in the existing literature which explain the household indebtedness level due to the economic cycle and the socio-demographic factors.

On the one hand, in relation to the socio-demographic factors, Modigliani and Brumberg (1954) pointed out that the consumers make intelligent decisions about how much they want to consume at each age, limited only by income available over their life. Therefore, consumers get debts to consume more when their income is small. Subsequently, according to Barnes and Young (2003), the decisions about the indebtedness will be affected by age and income of the consumers, and the necessity to be owners of a house. The "consumption-income motive" maintains that consumers would prefer to smooth their consumption over their life cycle through savings and debts. Moreover, the "housing-finance motive" maintains that households need to fund the ownership of the housing where they live.

In addition, Bover et al. (2014) study the relevance of the individual characteristics, institutions and credit conditions. Concretely, they find that age, income and education level of household members, are important socio-demographic factors to explain debt holdings. They support that there are an evidence of a hump-shaped profile of collateralised debt over age groups, the propensity to borrow tends to peak in the age groups of 35-44 years. Besides, education level is an important factor to consider, since as argues Becker (1964) the education level increases the productivity and consequently the income. Then, education level has a positive correlation with the income and, therefore, with the indebtedness decisions.

On the other hand, many economists consider that the economic cycle is more important than the socio-demographic characteristics to explain the indebtedness of households. Christelis et al. (2013) analyse the differences in debt holdings due to the characteristics of households and economic environment, from the data for US and 11 European economies. The results determine that the differences in households characteristics are little relevant, but the economic environment is very important to explain the debt holdings.

In addition, we can find two similar positions to explain the procyclicality of the indebtedness of households. Minsky (1992) pointed out that households benefits from the economic growth and from the reduction of the interest rates to increase their levels of debts. Furthermore, Gual (2009) stated that the financial system is procyclical to the economic cycle. Accordingly, the economic growth causes an increase of the credits granted, due to the higher income and the laxity of the credits conditions.

Finally, in relation to the Spanish household indebtedness, as supports Blanco et al. (2013) the growth of the Spanish economy was consequence of the real estate bubble. Therefore, the propensity of households to borrow for the housing purchase increased due to this type of economic growth. Moreover, Bernardos (2009) supports that the performance of banks and the economic growth were the reasons of the increase in the propensity to borrow. Last, González et al. (2012) considers that the economic cycle has an important effect on the Spanish household indebtedness, concretely through the unemployment and the interest rates.

4. Theoretical framework.

There are many possible models in the existing literature which explain the motives of households to borrow. In order to explain the Spanish household indebtedness from a theoretical point, in this section we describe three facts which could explain the Spanish behaviour in relation to the indebtedness: the consumption-income motive, the credit market imperfections and the housing-finance motive. Our theoretical framework is based on the research of Modigliani and Brumberg (1958) and Barnes and Young (2003).

First, the consumption-income motive suggests the desire of consumers to smooth their consumption over the life cycle with the objective to maximize their utility. Owing to the differences on income and desired consumption over time, consumers have to borrow when their income prevents them from consuming the quantity that maximizes their utility. But when their current income is higher than the minimum necessary to maximize their utility, consumers will save part of the present income for the future. In general, the income of the consumers is lower in the first years of their labour life and it increases every year of their working life. Therefore, it is more possible to be a borrower in the first years of the labour life than in the last years.

In addition, we consider a model of two periods, the present and the future, where the interest rate determines the relative price of future consumption in terms of present consumption. The aim of this model is to explain how the changes on income and interest rate affect consumption and indebtedness. So, the budget constraint is:

$$c + s = y - t \quad (1)$$

Where c is the consumption in the present and s is the saving, s can be positive if the consumer is a lender or negative if consumer is a borrower. Moreover, y and t are the present income and taxes, respectively. In the future the budget constraint is more or less the same:

$$c' = y' - t' + (1+r)\,s \quad (2)$$

Now, we have the interest rate represented by r. The saving multiplied the interest rate expression, if $s < 0$ the consumer pays the interest and the main part of his debt and if $s > 0$ the consumer receives the interest and the main part of his savings. The consumer chooses c, c' and s, in order to smooth his consumption over the life cycle

subject to the budget constraints. Then, the budget constraint in the life of the consumer is the combination of (1) and (2):

$$c + \frac{c\prime}{1+r} = y + \frac{y\prime}{1+r} - t - \frac{t\prime}{1+r} \quad (3)$$

For our objective we only consider the situation of borrowers. Then, we introduce some changes on income and interest rate, respectively. We determine graphically the different situations of equilibrium for the consumer, where the vertical axis represents the future consumption and the horizontal axis represents the present consumption, also it is represented the budget constraint with negative slope and the lifetime wealth of the consumer (we) which cuts in both axes.

$$we = y - t + \frac{y\prime - t\prime}{1+r} \quad (4)$$

First of all, the figure 4.1 shows the equilibrium of the consumer (borrower) without the access to credit, in point E. The optimum is in A, where the consumer maximizes his utility. The difference between point B and point D is the quantity that the consumer has to borrow in the present, because his income after taxes (y-t) is lower than the quantity of consumption which maximizes his utility. However, his future income after tax is higher than the amount of future consumption of the point A, because in the future the consumer pays his debts. The opportunity to borrow allows the consumer to smooth consumption, so his utility in A is higher than in point E.

Figure 4.1 A consumer who is a borrower.
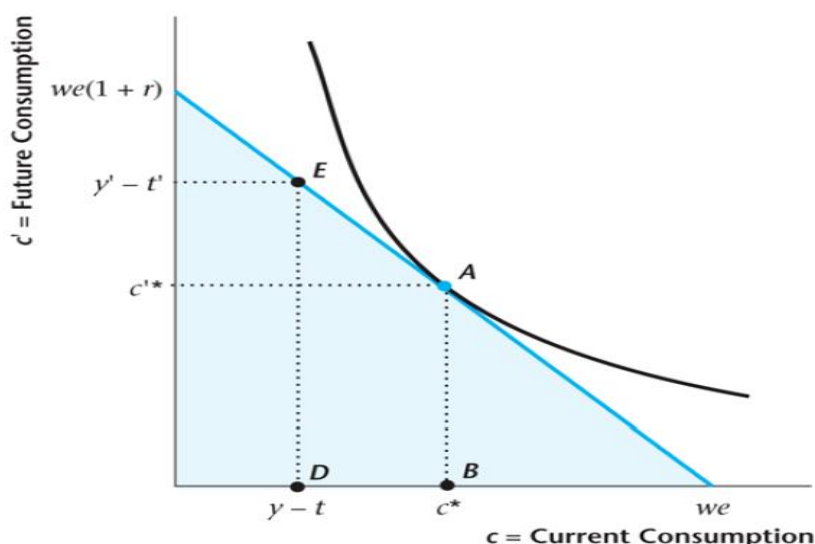
Source: Williamson (2014).

After that, in the figure 4.2 we have a similar situation but there are three budget constraints; BA, ED, and GF. The initial situation is BA, the point H is the initial endowment, which we assume corresponds also to the optimum (because current and future income are the same at this point). Now in the present there is a temporary increase in income, so the budget constraint shifts up. So, the new point of endowment is L and the consumer chooses the point J to consume. The distance between L and H is the increase on present income ($y_2 - y_1$) and the difference among c_2 and c_1 represent the rise in consumption. So, the increase in income is higher than the consumption increase, due to the behaviour of the consumer that wants to smooth his consumption. Therefore, part of the higher income is saved for the future.

In contrast, the budget constraint GF represents the situation when the increase in income is permanent. The interpretation at present is the same, but in the future the income also increases in the same quantity ($y'_2 - y'_1$) and the consumption increases from c_1 to c_3. Furthermore, the initial endowment is M and the consumer chooses the point K where maximizes his utility, so the consumer has to borrow to reach point K.

The main difference between these situations is that according to the preferences of the consumer, in a temporary increase in income he saves part of the increase to consume in the future, but in a permanent increase he has to borrow to consume more in the present. Hence, the decision to borrow depends on the preferences between present and future consumption of each consumer, represented by the indifference curves, and on the present and future income. Moreover, if the income decreases temporarily or permanently, the procedure is the same but upside down.

Figure 4.2 Temporary and permanent increases in income.
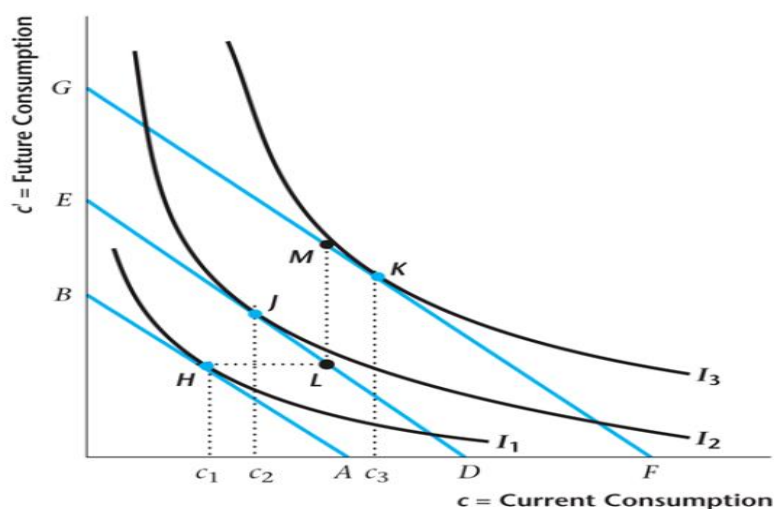
Source: Williamson (2014).

The last situation to analyse is an increase in the interest rate, as we can see in the figure 4.3, when the interest rate rises the curve of the budget constraints is steeper. The increase in the interest rate cheapens the future consumption in relation to the present consumption. Obviously, when the interest rate decreases, the effect would be the opposite. Consequently the price of the future consumption in terms of present consumption will be higher.

Figure 4.3 An increase in the real interest rate.
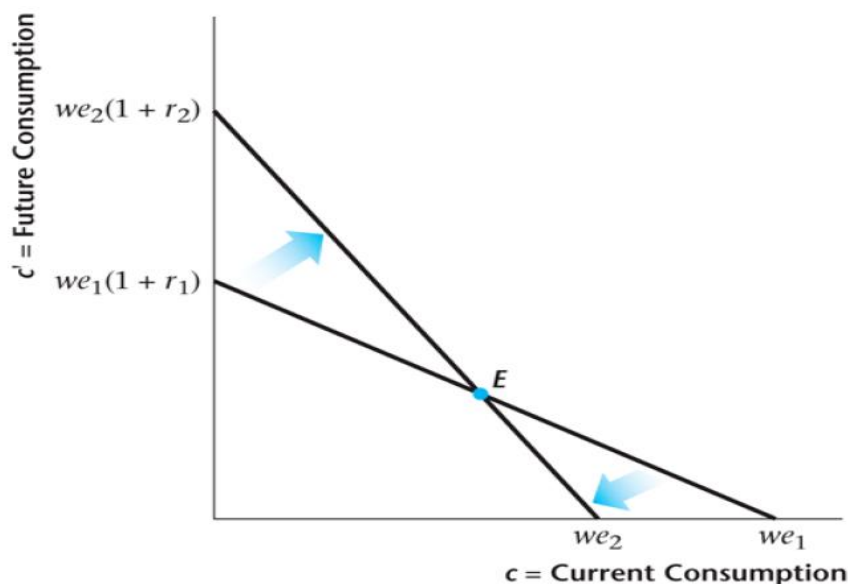
Source: Williamson (2014).

Therefore, as we can see in the figure 4.4 an increase in the interest rate changes the lifetime wealth of the consumer, so the budget constraint pivots around the endowment point E, which of course is not affected by the interest rate. The consumer initially chooses point A, but after the change in the interest rate he prefers point B, borrowing much less. In order to find the income and substitution effects, we have drawn a new straight line (FG) with the same slope than the new budget constraint and tangent to the indifference curve which corresponds to the initial maximum utility. The movement from A to D is the substitution effect, it provokes that the future consumption increases and the present consumption decreases (because future consumption is now cheaper). The movement from D to B is the income effect that reduces both consumptions (because lifetime wealth is lower).

Figure 4.4 An increase in the real interest rate for a borrower.
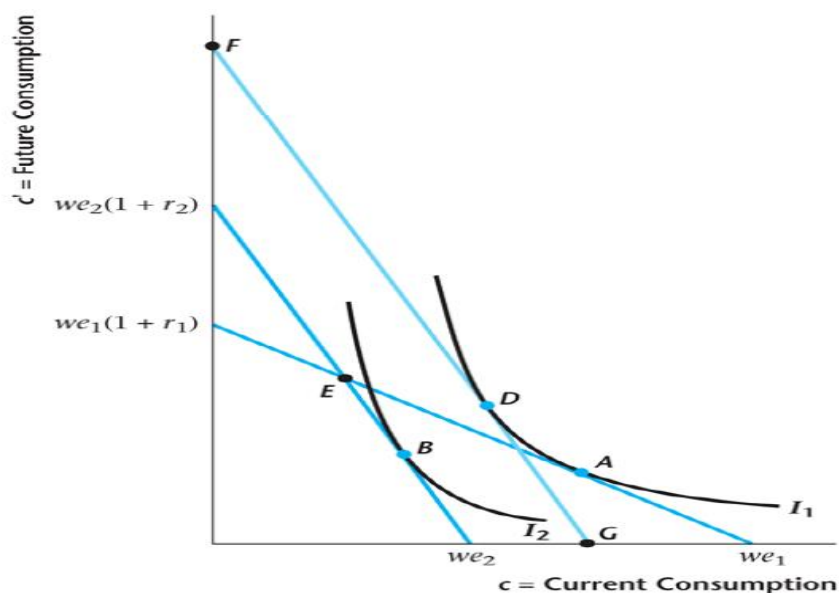
Source: Williamson (2014).

Then, the present consumption will decrease because of the two effects. However, the future consumption will depend on which of the two effects is higher, if the substitution effect is higher than the income effect, the future consumption will increase and if the substitution effect is smaller than the income effect, it will decrease. In any case, the consumer chooses to borrow to consume more than his income in the present, but the higher interest rate reduces the quantity borrowed.

Hence, the consumption-income motive explains how the variations in the interest rate affect the indebtedness level of the consumers. Also, it explains the effects over the consumption and indebtedness decisions due to the changes in present and future income. This theory then explains the evidence that in a context of low interest rates and an increase in income perceived as permanent, households' borrowing demand increases.

Secondly, it is important to analyse how the credit market imperfections affect to indebtedness decisions. We will explain two imperfections: Asymmetric information and limited commitment. The asymmetric information is a consequence of the little financial information that lenders know about borrowers. The limited commitment refers to situations where the borrower cannot ensure the payment of the loan.

On the one hand, to explain the asymmetric information, we consider an economy with banks and consumers. The banks are financial intermediaries that borrow and lend to consumers. Also, the fraction of borrowers that never defaults is a and *1-a* always

default, the banks cannot distinguish the good borrowers from the bad ones. Moreover, we assume that all of them borrow the quantity L, the interest rate of the deposits is r_1 and the loan rate is r_2 $(r_2 > r_1)$.

The bank pay for every deposit in the future $L (1+r_1)$ and the average payment to the bank will be $aL(1+r_2)$, so the benefits of the banks are:

$$\pi = aL (1+r_2) - L (1+r_1) = L [a (1+r_2) - (1+r_1)] \quad (5)$$

In perfect competition, every bank must obtain zero benefits, because the negative benefits would imply that the banks fail and the positive benefits expand indefinitely. Then, $\pi=0$ in equilibrium, so:

$$r_2 = \frac{1+r1}{a} - 1 \quad (6)$$

From equation (6), we can see that if a=1 there are not defaulters in the economy, so $r_2=r_1$, and the credit market imperfection disappears. Every solvent consumer has to pay a default premium $(r_2 - r_1)$. The default premium increases when the fraction of solvent borrowers (*a*) decreases.

Figure 4.5 Asymmetric information in the credit market.
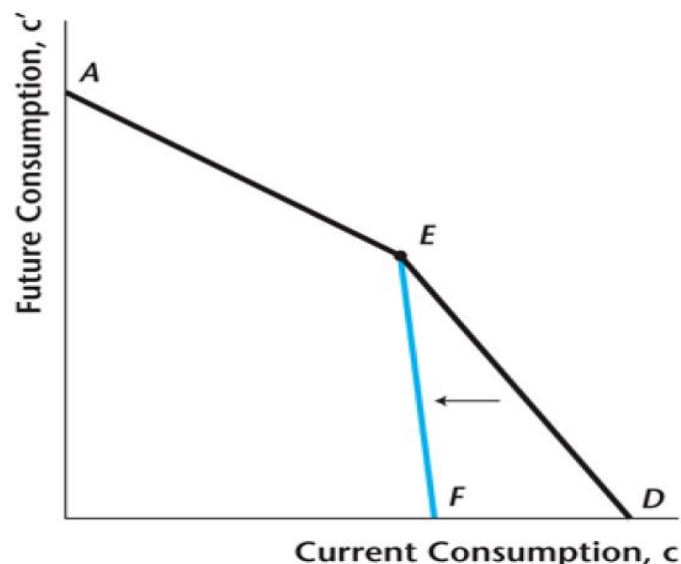
Source: Williamson (2014).

As the figure 4.5 shows, the budget constraint is AED and E is the endowment point, so when *a* decreases the budget constraint shifts to AEF. Therefore, as a result of the increase of the number of defaulters, the consumption and loans of the solvent borrowers will be smaller. The result for borrowers is like to the previous analysis,

because the default premium rises the price of the present consumption in relation to future consumption. However, in this situation the effect is bigger, so some borrowers can borrow and consume more than their income in the present with a higher price than before, but others cannot access the credit market because the debts are more expensive, so they consume the endowment point. Consequently, the existence of the default premium in the credit market restricts the access to the indebtedness.

On the other hand, another imperfection is the limited commitment. The lenders demand collateral to borrowers in order to guarantee the payment of their debts, for example, a house is collateral of a mortgage loan or a car is collateral for a car loan. The collateral is an asset of the borrower, but the lender has the right to possess it when the borrower does not pay his debts. Now, we consider a consumer that has an asset, denoted by H, the price of H in the future is denoted by p. So, the lifetime wealth of the consumer is:

$$we = y - t + \frac{y' - t' + pH}{1+r} \quad (7)$$

The lenders are ready to lend the quantity lower than the collateral value in the future (pH), then the loan must satisfy the collateral constraint:

$$-s\,(1+r) \le pH \quad (8)$$

Where $-s$ is the borrowing in the present and $-s\,(1+r)$ is the payment of the loan in the future. In this context, the life cycle budget constraint is:

$$c + \frac{c'}{1+r} = y - t + \frac{y' - t' + pH}{1+r} \quad (9)$$

Figure 4.6 Limited commitment with a collateral constraint.
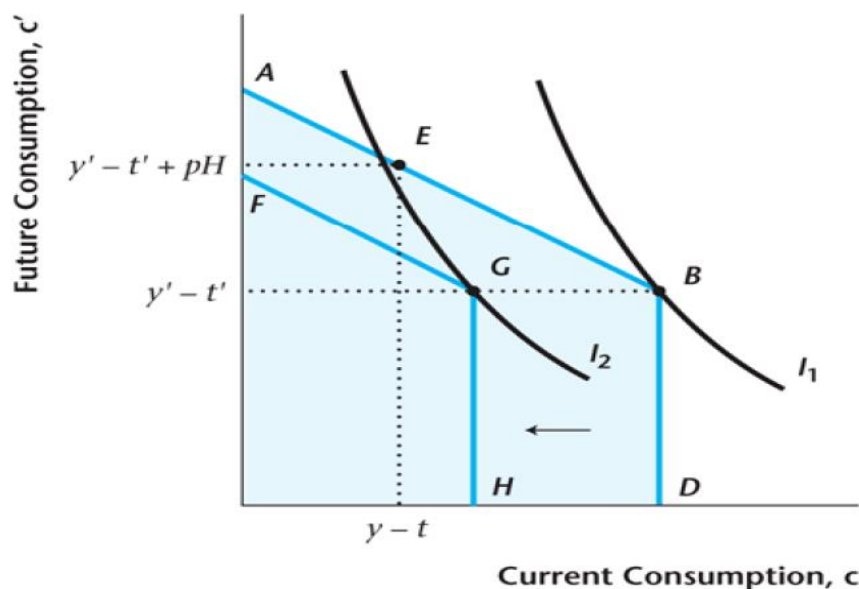
Source: Williamson (2014).

The endowment point is E, where the consumer consumes all his present income and all the future income plus the value of the collateral. The consumer can only borrow the value of the collateral, as a result the budget constraint is discontinuous. The figure 4.6 shows that the initial budget constraint is ABD, where the consumer chooses to consume the point B. Then, the price of the collateral decreases, so the budget constraint shifts to FGH, now the consumer has to reduce his present consumption to the point G. In this situation the indebtedness of the consumers depends principally on the value of his collateral, so a decrease on consumer´s collateral reduces his capacity to borrow.

If the consumer chooses in the region AB (without including B), a decrease in the collateral price would force the consumer to reduce present and future consumption. But in the figure 4.6, the consumer is constrained, so the reduction in the level of collateral price would be reflected one-to-one into the present consumption.

In general, these two credit market imperfections, asymmetric information (default premium) and limited commitment, affect negatively the indebtedness of the consumers, because the imperfections reduce the amount of debt and restrict the access to borrow. Moreover, if the number of defaulters increases and the price of the collateral decreases as in the recent economic crisis, we should observe a decrease in borrowing.

Finally, the housing-finance motive arises from the utility of the consumers, which increases with the purchase of the house where they live. In some cultures, there is a real need to be the owner of housing, for example in Spain. In order to explain this fact, we do an adaptation from the model described by Barnes and Young (2003). This model suggests that under certain conditions it is beneficial, in terms of utility, the purchase of housing.

In this model, the consumer wealth (*we*) can be in the form of financial assets or housing. The parameter a_t is a net asset for the consumer, which represents the financial assets or debts in the present period, when a > 0 his assets are higher than his debts and when a < 0 the debts are higher, so in the last case the consumer is a borrower. Also, *r* represents the interest rate in the model. The value of housing is equal to the number of housing units (*h*) multiplied by their price (*q*).The depreciation rate of housing assets is *d,* the impact of this parameter in the equation is small, because houses lose their value slowly. The price of consumption goods (*c*) is *p* and the income of households is y. Moreover, the utility of the consumer depends positively on the consumption and housing units, in a way that owned house units give a higher utility than rented house units.

$$we_{t+1} = y_{t+1} + a_t \ (1+r) + q \ (1-d) \ h_t - pc \quad (10)$$

$$U \ (c, h) \quad (11)$$

Then, the consumer who is *a* borrower has to increase his collateralised debts (a_t more negatively) to finance his owner housing ($q \ h_t$), because there is a collateral constraint. Accordingly, the wealth for the borrower tends to be constant with the purchase of the housing, whenever the depreciation and the interest rate are lower and the price of his housing does not change, because of this the reduction on his wealth by the higher collateralised debts is compensated by the value of his housing. Moreover, given that utility is higher for owning the house, the consumer has the incentive to borrow for the purchase of his house units. This can be called the "housing-finance" motive.

5. Data description.

In this section we will describe the debts distribution of the Spanish households for the years 2005, 2008 and 2011, from the Financial Survey of Spanish Households carried out by the Bank of Spain. We chose this data set because it gives us relevant financial information from the Spanish households and we select these three years because they are representative of the indebtedness evolution of the Spanish households over the business cycle. We are going to analyse the percentage of households with some type of debt in relation with three socio-demographic factors; the age of the head of household, the labour situation of the householder and the number of members with a job. As we can see in the Table 5.1, the 49.5 % of Spanish households had some type of debt and if we consider the age of the householder, the percentage is bigger for the first years of the labour life than for the last ones. Analysing the labour situation of the householder, the differences among the employees and the unemployed ones are almost 30 percentage points, and between the pensioners 40 percentage points.

The last factor to consider is the number of employed members of the household, we can see how the percentage of households that had some type of debt increases in 40 percentage points between the families without employed members and the families with one member employed or self-employed. The increase drops every time we add any additional employed member and when we get three working members, the growth is only one percentage point.

In addition, the percentage of the Spanish households with some type of debt was of 50 % and of 49.4 % during the years 2008 and 2011 (Tables 5.2 and 5.3), respectively. In reference with the labour situation of the householder, this percentage grows continuously from 2005 to 2008 and 2011. However, for self-employees and retired people the trend is different, in as much as this percentage decreased over two percentage points for self-employees from 2005 to 2008 and in 2011 it increased up to 65.9 %. For the retired the trend changes between 2008 and 2011, since it was reduced by two percentage points.

Besides, we will describe the distribution of the debts for the purchase of the principal housing in relation to the same socio-demographic factors. It is important to note that the differences among collateralised and the total are very small, for this reason we will consider the total as if were the collateralised debts for the purchase of the principal housing. Then, taking into account the age of the head of the household, the

percentage of households with this type of debt tends to be higher on the first years of the life cycle than the last ones. This fact is true during the three years.

In reference to the labour situation of the household´s head, there are not any differences between 2005 and 2008, only for the unemployed where the percentage increased in four percentage points. Also, in 2011 for the salaried employees the percentage increased two percentage points and for the unemployed increased in a rate of variation about a 30 %. The last factor to analyse is the number of employed members of the household. In this aspect, from 2005 to 2011 for all the possibilities, the percentage of households with debt for the purchase of the principal housing had increased. Nevertheless, in 2008 this percentage decreased in five percentage points for households with three or more members with a job.

Moreover, we consider the differences into every socio-demographic factor without considering changes between the years. In relation to age of the householder, the percentage is bigger for the first ranges of age and smaller for the last ones. The reason is linked to the life cycle, on the first years of the cycle the consumers have to increase their borrowing to smooth their consumption over time, and this is true for all types of debt.

Now, we are going to describe the distribution of other debts for the three years. This part includes: debts by the purchase of other properties, other collateralised debts, personal credits, debts of credit cards and other debts. First, the debt incurred for the purchase of another property has a significant importance on the total debt. It is necessary to stand out that in 2005 the percentage of households with debt for the purchase of other proprieties was over 8 % and in 2008 it remained constant, but in 2011 the percentage increased to 9.6 %. This means that after the beginning of the crisis Spanish citizens continued getting into debt to purchase other properties, as happens with collateralised debt of the previous paragraph.

In addition, in the case of other collateralised debts, the percentage of households with this debt decreases by a 16.6 % between the years 2005 and 2008, but in 2011 it increased up to coming to 3.4 %. The percentages of this type of debt are very small because in the Spanish culture it is uncommon to borrow with this type of debts. Otherwise, debts relative to personal credits are more common in Spanish households. In 2005 there were 24.6 % of households indebted by personal credits, this percentage decreased by one percentage point in 2008 and by four points in 2011. Normally in Spain this credit is for consumption of durable goods.

Moreover, credit cards debt is not very common in Spain. In 2005 only two per cent of Spanish households had this type of debt, but there was a great increase about five percentage points in 2008. Although in 2011 the percentage decreased approximately to 6 %. This type of debt, usually in Spain, is aimed at financing the consumption of non-durable goods. The last type of debt to analyse is "other debts", these debts cannot be included in the rest of debts because of their characteristics. The percentage of households with this debt had increased from 2005 to 2011, but in 2008 it decreased 0.3 percentage points, lastly in 2011 the percentage was roughly 6 %.

Table 5.1 Financial Survey of Spanish Households, 2005. (In percentage)

	2005							
	Purchase of the principal housing		Other debts					Some type of debt
	Total	Collateralised	Purchase of other properties	Collateralised	Personal credit	Debts with credit cards	Other debts	
All households	26.1	25.3	7.8	3.6	24.6	2	2.9	49.5
Age of the head of household								
Less than 35 years	46.6	46.1	5.4	1.6	31.2	2	3.2	65.2
35-44	48	46.8	11.4	3.2	31.5	2.8	3.5	70.4
45-54	26.5	25.9	12.5	7.3	33.3	3.1	4.5	63.1
55-64	15.1	14.1	9.6	4	26	2.1	3.4	48.5
65-74	3.7	3.2	2.5	3	11.3	0.5	1.4	19.8
More than 74	1.9	1.3	0.5	0.3	2.9	0.2	0	5.6
Labor situation of the head of household								
Employee	41.2	40	8.7	3.3	33.7	3.2	3.4	67.5
Self-employee	31.6	31.1	19.5	9.6	27.9	1.1	7	66.6
Retired	4.9	4.4	3.2	2.5	10.9	0.4	1.4	19.9
Unemployed	11.8	11.5	5	2.4	17.5	1.3	1.4	32.6
Number of members with job								
None	4.8	4.4	1.6	1.1	8	0.7	1.1	15.2
One	30.5	29.8	7.5	4.1	26.4	2.1	3.3	56.1
Two	42.4	41	11.4	4	33.4	2.7	4.1	70.2
Three or more	22.4	22.4	18.3	8.9	44.7	3.4	3.7	69.2

Source: Bank of Spain.

Table 5.2 Financial Survey of Spanish Households, 2008. (In percentage)

	Purchase of the principal housing		Other debts					Some type of debt
	Total	Collateralised	Purchase of other properties	Collateralised	Personal credit	Debts with credit cards	Other debts	
All households	26,3	25,9	7,9	3	23,1	7,3	2,6	50
Age of the head of household								
Less than 35 years	45,6	45,1	9	2,7	31,1	12,8	2,2	68,6
35-44	51,4	51	9	2,7	28,9	10,9	3,2	72,3
45-54	27,9	27,1	10,9	5,1	30,2	9,1	3,4	60
55-64	13,3	13,2	10,1	3,8	22,1	5,9	3,5	48,3
65-74	4,6	4,2	4,8	2,4	13,6	1,7	1,7	22,9
More than 74	1,9	1,8	0,8	0,4	5,9	0,8	0,7	9,9
Labor situation of the head of household								
Employee	41,8	41,4	9,9	3	30	12,6	3	68,3
Self-employee	31,3	30,9	18	6	25,4	4,7	6,2	63,9
Retired	5,1	4,7	4	2,6	12,2	1,8	1	22,2
Unemployed	15,8	15,3	3	2	20,4	3,9	1,8	36,7
Number of members with job								
None	8	7,5	2,6	1,5	10,3	2,1	1,2	21,3
One	28,9	28,5	7,7	2	26,9	8,3	3	56,5
Two	44,5	44,2	11,7	4,4	30,2	11,4	3,2	70
Three or more	16,9	16,7	18,3	9,5	36,8	9,1	5,4	69,7

Source: Bank of Spain.

Table 5.3 Financial Survey of Spanish Households, 2011. (In percentage)

| | 2011 | | | | | | | |
| | Purchase of the principal housing | | Other debts | | | | | Some type of debt |
	Total	Collateralised	Purchase of other properties	Collateralised	Personal credit	Debts with credit cards	Other debts	
All households	26,6	25,9	9,6	3,4	19,3	5,9	3,8	49,4
Age of the head of household								
Less than 35 years	56,9	56,9	12,7	3,3	32,7	11,9	2,1	80,6
35-44	50,3	48,3	12,5	2,2	21	9,5	6,2	71,8
45-54	31,9	31,3	12,9	5,5	25,6	6,2	5,6	61
55-64	11,5	11,1	11,9	5,7	21,1	4,9	3,3	45,1
65-74	4,4	4	2,7	2,2	10,8	2,7	2,1	22,1
More than 74	1,8	1,3	2,1	0,6	3,9	0,3	1,1	8,2
Labor situation of the head of household								
Employee	43,7	42,8	12	3,3	25	8,6	5,4	69,5
Self-employee	30,8	29,4	25,4	8,2	22,9	6,7	5,9	65,9
Retired	4,7	4,2	3,7	1,7	9,3	2,3	1,3	20
Unemployed	20,8	20,3	4,9	3,5	19,6	5,4	3	41,7
Number of members with job								
None	7,7	7,3	2,3	1,7	8,3	2,2	2,1	20,2
One	31,7	30,2	10,1	3,5	24,3	8,3	3,5	57,9
Two	45,6	45,2	17	5,3	26,4	8,5	6,3	74,7
Three or more	26,5	26,1	21,7	5,5	28,3	1,9	5,4	70,4

Source: Bank of Spain.

Finally, we are going to analyse the distribution of the total income and total debts of households over the life cycle (using the age of the householder). As the graphs 5.1 and 5.2 show, there is an inverse relationship between debts and income in the first three age groups, but in the last groups this relation changes and both variables go in the same way. It is important to describe separately each variable:

On the one hand, the indebtedness of households is higher in the first years of the life cycle, because to maximise their utility the consumers have to get into debt to smooth their consumption over the life cycle. For this reason, the indebtedness is higher at the beginning and it is reduced in time. The peak of the variable is at the beginning of the life cycle.

On the other hand, the total household income is higher in the first age group than in the two last groups, but total income does not decrease over the life cycle like debts. In general, the total income increases slightly until the retirement, so it is in the retirement

years when income decreases rapidly to smaller levels, that is, each additional year of retirement reduces the income. It is important to note that the peak is on the previous years of the retirement.

The important thing of this analysis is that households hope a higher future income, so they get into debts to smooth consumption over their life. Then, when their income increases over time, they must pay their debts. Finally, the indebtedness is in the lowest level in the retirement years, because the debts are paid, and also income is in the smallest level.

Graph 5.1 Median of the debt value of indebted households (in Euros of the year 2011).
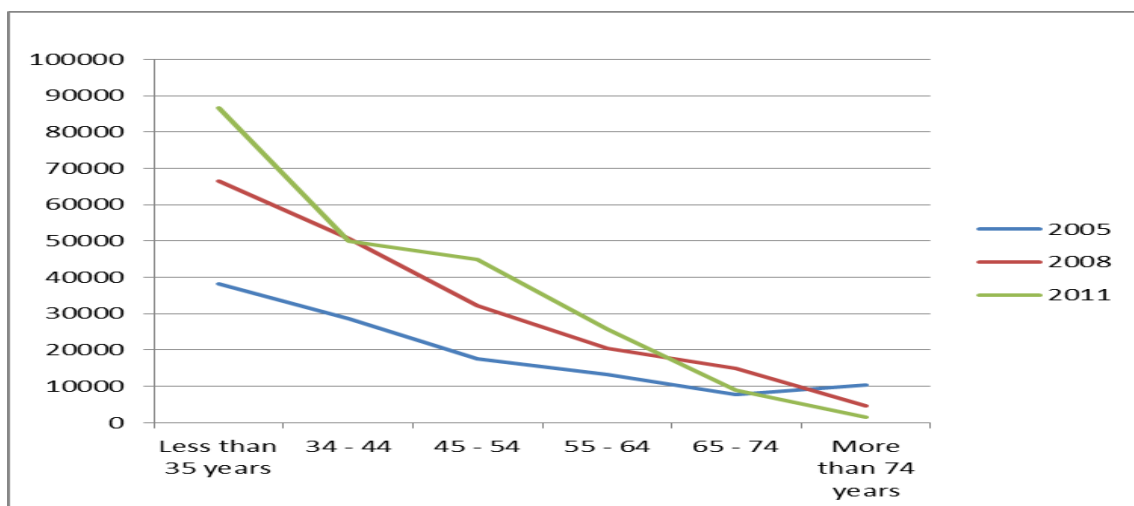
Source: Own elaboration.

Graph 5.2 Median of the value of total household income (in Euros of the year 2011).
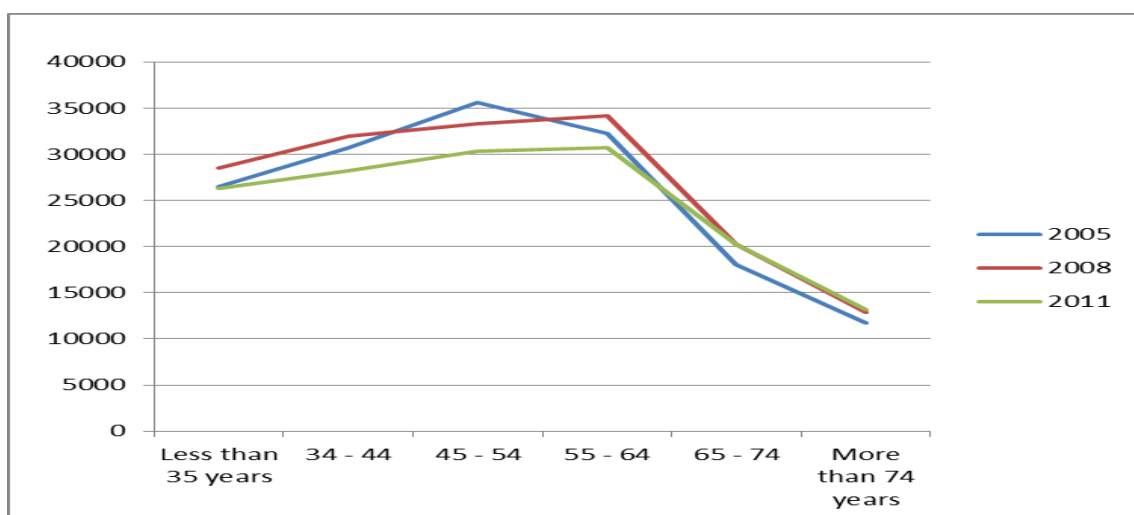
Source: Own elaboration.

6. Empirical Analysis.

In order to investigate how the socio-demographic factors and the economic cycle affect the Spanish indebtedness, we have built our data set from The Spanish Survey of Households Finances (EFF), from the years 2005, 2008 and 2011. Also, all the variables are expressed in euros of the year 2005.

We first estimate three multiple linear regressions taking as dependent variables the total debt, collateralised debts and non-collateralised debts, if positive. We then run nine logit models, three for each year, with the same independent variables as before (without time dummies), and where the dependent variables are dummies equal to one if the family has some form of debt, some collateralised debt and some non-collateralised debt, respectively.

We chose the multiple linear regressions in order to test how the value of households' debts depends on socio-demographic factors and the economic cycle. The logit models allow us to analyse how the probability of being indebted depends on the socio-demographic factors of households.

The multiple linear regression use as dependent variables: *ltotaldeuda* which represents the sum of all types of household debts, the variable *lcolldebt* which is the amount of all debts secured by collateral and the variable *lnocolldebt* which is the sum of all unsecured debts. It is important to note that our regressions only include the indebted households. The first independent variable is the logarithm of the household income (*lrenthogr*). It includes wages, pensions, financial assistance, etc., of each household member.

In relation to the education of the householder, we have two dummy variables in the regression: *univ* and *bach*. The primary education is the base level in our regression, then when the head of the household has the baccalaureate title, *bach* will be one, if not, it will be zero, and when the head of the household has a university degree, *univ* will be one and if this is not the case it will be zero. In order to understand the results we can obtain, consider first a simple regression with only these two explanatory variables:

$$ltotaldeuda = \beta_0 + \beta_1\ univ + \beta_2\ bach$$

The sum of the estimated coefficients $\beta_0 + \beta_1 + \beta_2$ is the average total debt owed by a household whose householder has a university degree. In a regression with more explanatory variables, then, $\beta_1 + \beta_2$ is the marginal effect on debt of holding a university degree. Moreover, when the householder only has high school studies the effect will be: $\beta_0 + \beta_2$. This is because in the Spanish education system to arrive to university, previously it is necessary to get the baccalaureate title.

In addition, the labour situation of the householder is composed by three dummy variables: *tipempleo*, *jubld*, *desempleo*. The variable desempleo is equal to one if the householder is unemployed, zero otherwise. The variable *jubld* can be one if the head of the household is a pensioner or zero if not. When the householder is self-employed, the variable *tipempleo* will be one, in the opposite case it will be zero. Therefore, the base situation is when the householder is a salaried employee; it is when these three dummy variables are zero. The effect of each dummy over the variable *ltotaldeuda*:

$$ltotaldeuda = \beta_0 + \beta_1\ tipempleo + \beta_2\ jubld + \beta_3\ desempleo$$

Then, the sum of the estimated coefficients $\beta_0 + \beta_3$ is the average total debt owed by a household whose householder is a unemployed, when the head of household is a pensioner the sum of the estimated coefficients would be $\beta_0 + \beta_2$, the sum for a self-employed is $\beta_0 + \beta_1$, and for a salaried employee the estimated coefficient is β_0.

Another important factor to consider is the age of the head of the household, we have five dummy variables in our data set, and each variable represents a band of age. The variable *age1* represents all those who are less than 35 years old. This is the base variable in our regression. It means that when the rest of the dummies are zero in the regression, the head of the household is less than 35 years old. The rest of dummies represent other age groups: *age2* represents the age band of more than 34 and less than 45 years old, *age3* more than 44 and less than 55, *age4* more than 54 and less than 65, and age5 more than 64 and less than 74 years old.

Besides, the last two variables in relation to the characteristics of households are *numiem* and *numtrab*. These two variables refer to the members of the household. The variable *numiem* represents the number of members which form the household and *numtrab* is the number of employed members of the household.

Finally, we have three years in our data set, so there are three dummy variables in the data set: *vt05* for the year 2005, *vt08* for 2008 and *vt11* for 2011. Then, we have introduced *vt08* and *vt11* in the regression and we have taken *vt05* as base year. Besides, we chose these independent variables because they provide information

about the income level, the pattern of consumption and the composition of different households. Therefore, these variables allow us to relate the regressions with the theoretical framework.

$$\text{ltotaldeuda} = \beta_0 + \beta_1 \text{ lrenthogr} + \beta_2 \text{ univ} + \beta_3 \text{ bach} + \beta_4 \text{ tipempleo} + \beta_5 \text{ jubld} + \beta_6 \text{ desempleo} + \beta_7 \text{ age2} + \beta_8 \text{ age3} + \beta_9 \text{ age4} + \beta_{10} \text{ age5} + \beta_{11} \text{ numiem} + \beta_{12} \text{ numtrab} + \beta_{13} \text{ vt08} + \beta_{14} \text{ vt11}$$

(1)

As we can see, equation (1) picks up all the described variables previously. We expected that the value of β_1 is positive, because households with higher income have more facilities to credit market access, so they will be more indebted. For the same reason, we hope that the effect of the variables *univ* and *bach* are positive over the total debts, since higher education is associated with a future higher income.

Now, we consider the labour situation of the head of household. Our expectation is that the indebtedness is higher for a self-employed than for a salaried employee, for this reason the value of β_4 is likely to be positive, because in general, the self-employees have to get into debt due to their business. The expected value for β_5 is negative or close to zero, because we hope that the pensioners have reduced their debts over their working life. We also hope that β_6 is negative, because of the lower income. Similarly, considering the age of the householder, it is expected that β_7 is close to zero (not significant), because we hope that there are not significant differences among *age1* and *age2*. Additionally, the parameters β_8, β_9, and β_{10}, will be negative due to the decreasing of debts over the life cycle, so each coefficient will be more negative.

In addition, in relation with the expected value of β_{11} and β_{12}, it is expected that β_{11} is positive and β_{12} negative, because each additional member will suppose more household expenses, and therefore more debts. In contrast, each additional employed member will contribute to finance the household expenditure, thereby less debts. Moreover, the last two parameters to analyse are β_{13} and β_{14}, we expect that the parameter β_{13} is positive and β_{14} negative, because according with the economic cycle the tendency of household indebtedness before 2009 would be positive and after that year the trend would be slightly negative. In general, this expectation about all variables which we have described would be equal for the other regressions.

The Table 6.1 shows the results of the first regression, but previously to these results, we have analysed the presence of heteroscedasticity with the Breusch-Pagan test. The results of the test are:

chi2 (14) = 248.94

Prob. > chi2 = 0.000

As we can see, the p-value is very small, so we must reject the null hypothesis of homoscedasticity. For this reason, in order to solve the heteroscedasticity problem we calculate the robust standard errors. Hence, the t statistics are correct, so the probability of rejecting the null hypothesis when it should not be rejected is lower now. Therefore, the table includes the estimated coefficients, the robust standard errors and the t statistic (robust).The number of observations (households) is 7,263 and the value of the R-squared is 20.01 %.

In our regressions, we will raise the null hypothesis that the coefficient is equal to zero (H_o: $\beta = 0$) and the alternative that the coefficient is different from zero (H_1: $\beta \neq 0$). The chosen levels of the test are 10 % (*), 5 % (**) and 1 % (***).

Table 6.1 Multiple linear regression with total debts.

Dependent Variable : ltotaldeuda			
Independen Variables	Coefficients	Robust Standard Errors	t
lrenthogr ***	.644	.028	22.80
univ **	.104	.050	2.06
bach ***	.200	.046	4.36
tipempleo ***	.622	.047	13.29
jubld	−.037	.087	−0.43
desempleo	.020	.069	0.30
age2	−.096	.071	−1.34
age3 ***	−.451	.071	−6.31
age4 ***	−.692	.076	−9.11
age5 ***	−.641	.106	−6.03
numiem *	−.035	.019	−1.85
numtrab **	.066	.032	2.10
vt08	.032	.043	0.73
vt11 ***	.160	.045	3.54
constant ***	3.611	.278	13.01
n = 7263			
R-squared = 0.197			

Source: Own elaboration.

It is important to note that the variable *lrenthogr* has the expected value, positive, so it is true that there is a positive relation between household income and his total debts. The variable *lrenthogr* is statistically different from zero at the 1% significance level.

Thus, keeping all variables constant, a rise by 1 % on the income of household will increase the total debts by about a 0.64 %.

In reference to the education of the householder, the two variables (*univ* and *bach*) are statistically significant at the 5 % significance level, but only *bach* at the 1 %. The value of the two variables is positive, therefore as we had predicted: a greater level of education is associated with a higher future income and with more debts. In general, keeping constant the rest of variables, those households whose householder has the baccalaureate title are a 20 % more indebted than the base households. Similarly, the indebtedness of the household increases a 30.4 % when the head of the household has a university degree.

As well as education level, the labour situation of the head of households is important in relation to total debts. The variable *tipempleo* is statistically significant at the 1 % significance level. The value of this variable is positive, as we expected so households whose householder is a self-employed are more indebted than those whose head is a salaried employee. Concretely, *Ceteris Paribus* the rest of variables, the self-employed are a 62.2 % more indebted than salaried ones.

In addition, we have divided the age of the head of household in five groups, as we have already commented the reference group (*age1*) represents those that are younger than 35 years old. There is no evidence against the null hypothesis that the variable age2 is zero, so we cannot consider differences in the total indebtedness of these two groups, like we expected before. In contrast, the rest of variables related to the age of the householder are statistically significant at the 1 % significance level, so we have enough empirical evidence to reject the null hypothesis for the three variables.

Therefore, Ceteris Paribus the rest of variables, those households where the head of household is in the age range of more than 44 years and less than 55 years (*age3*), they are a 45.1 % less indebted than those from the base group. Besides, for those that shape the fourth group, keeping all variables constant, their total debts on average are a 69.2 % smaller than the debts of the reference group. The coefficient of the fifth group implies that they are a 64.1 % less indebted than those households in which the head of the family is younger than 35 years old. It must emphasize that the marginal effects and the values of the coefficients are as we had predicted before.

In reference to the members who form the household, the variable *numiem* is only statistically different from zero at the 10 % significance level, so there is little empirical evidence against the null hypothesis. It is not consistent with what expected previously.

Furthermore, the variable *numtrab* is statistically significant at the 5 % significance level, so we can reject the null hypothesis with 95 % confidence. The value of the variable is positive, also unlike to our expectation, according to each additional employed member in the household, keeping constant the other variables the indebtedness will increase by a 6.6 %, at the 5 % significance level.

Finally, the last two variables are *vt08* and *vt11*. First, there is not enough empirical evidence to reject the null hypothesis that the coefficient of the variable *vt08* is zero. For this reason, we can conclude that there are no differences in Spanish household indebtedness between the years 2005 and 2008, due to the fact that the coefficient is not significant to any significance level. These results are unexpected, because as we have already argued the variable *vt08* was expected to be positive, but it is not significant and the coefficient is very small. Secondly, we can reject the null hypothesis that the coefficient of the variable *vt11* is zero, so the variable *vt11* is statistically different from zero at the 1 % significance level. So, it is also unexpected because the value is positive and, *Ceteris Paribus* the other variables, in 2011 the total debts of the Spanish households are a 16 % higher than in 2005.

Our second regression uses the same independent variables, but now the dependent variable is the logarithm of the total collateralised debts of the Spanish households. The variables used are the same as in the previous regression, as well as the expected value for the coefficients.

$$\text{lcolldebt} = \beta_0 + \beta_1 \text{ lrenthogr} + \beta_2 \text{ univ} + \beta_3 \text{ bach} + \beta_4 \text{ tipempleo} + \beta_5 \text{ jubld} + \beta_6 \text{ desempleo} + \beta_7 \text{ age2} + \beta_8 \text{ age3} + \beta_9 \text{ age4} + \beta_{10} \text{ age5} + \beta_{11} \text{ numiem} + \beta_{12} \text{ numtrab} + \beta_{13} \text{ vt08} + \beta_{14} \text{ vt11}$$

(2)

The table 6.2 shows the results of the second regression, where there are 3,771 observations and the value of the R-squared is 13.10 %. Also we have checked the presence of heteroscedasticity with the Breusch-Pagan test. The results of the test are:

chi2 (14) = 161.25

Prob. > chi2 = 0.000

As we can see, the p-value is lower than the 5 %, so there is evidence against the null hypothesis that the variance is constant (Homoscedasticity). Therefore, we use the robust standard errors as before, in order to solve the heteroscedasticity problem.

Table 6.2 Multiple linear regression with collateralised debts.

Dependent Variable : lcolldebt			
Independen Variables	Coefficients	Robust Standard Errors	t
lrenthogr ***	.347	.030	11.70
univ *	.093	.049	1.90
bach ***	.160	.044	3.61
tipempleo ***	.292	.051	5.71
jubld	−.014	.114	−0.13
desempleo ***	.222	.069	3.23
age2 ***	−.466	.051	-9.07
age3 ***	−.641	.055	−11.54
age4 ***	−.876	.068	−12.81
age5 ***	−.621	.130	−4.76
numiem *	−.0316	.018	−1.77
numtrab	.044	.034	1.31
vt08 **	.103	.045	2.28
vt11 ***	.240	.045	5.31
constant ***	7.343	.288	25.46
n = 3771 R-squared = 0.122			

Source: Own elaboration.

Like before, the variable *lrenthogr* is statistically significant at the 1 % significance level, so we cannot reject the null hypothesis. The value is positive as we expected, then a 1 % rise on the total income supposes that the total collateralised debt will increase by a 0.347 %. Moreover, in relation to the education of the head of household, the variable *bach* is significant at the 1 % significance level, but *univ* only at the 10 %. At 95 % of confidence, the families where the householder has high school studies are a 16 % more indebted with collateral than the rest.

In addition, the variables *tipempleo* and *desempleo* are statistically different from zero at a 1 % significance level. Therefore, the total collateralised debt is a 29.2 % higher for self-employed than for salaried employees, and it is a 22.20 % higher for unemployed, keeping constant the rest of variables. The coefficient value of the variable *tipempleo* was expected, but the coefficients of the other two variables were not expected.

In relation to the age group of the householder, it is important to note that the null hypothesis is rejected at the 1 % significance level for the four variables (*age2, age3, age4* and *age5*). The value of the four variables is like we expected previously, it is negative because every year on life cycle the consumers reduced their debts. Hence,

the total collateralised debts of the second group are a 46.6 % less than the total of the base group. Moreover, for the third group, this debt is a 64.09 % smaller than for the reference group, and for the fourth and fifth group, the total collateralised debts are an 87.60 % and 62.1 % lower than for the base group.

Besides, in this regression both time variables are statistically higher than zero at the 5 % significance level. The value of the two variables is positive, then in 2008 the total collateralised debts of the Spanish households are a 10.3 % higher than in 2005, and in 2011 is a 24 % greater than in the base year. As we had predicted previously the variable vt08 is positive, but the variable vt11 should be negative according to the economic cycle.

Finally, the table 6.3 shows the last multiple linear regression, now the dependent variable is the logarithm of the total no-collateralised debt. Also, the description of the variables is the same than the previous regressions and the expected sign is the same as well.

$$\text{lnocolldebt} = \beta_0 + \beta_1 \text{lrenthogr} + \beta_2 \text{univ} + \beta_3 \text{bach} + \beta_4 \text{tipempleo} + \beta_5 \text{jubld} + \beta_6 \text{desempleo} + \beta_7 \text{age2} + \beta_8 \text{age3} + \beta_9 \text{age4} + \beta_{10} \text{age5} + \beta_{11} \text{numiem} + \beta_{12} \text{numtrab} + \beta_{13} \text{vt08} + \beta_{14} \text{vt11}$$

(3)

As before, our regression has a heteroscedasticity problem. The results of the test are:

chi2 (14) = 268.91

Prob. > chi2 = 0.000

We have enough empirical evidence to reject the null hypothesis at the 5 % significance level, so to get a suitable t-statistic we use the robust standard errors. Also, the number of observations is 3,652 and the R-squared value is 16.93 %.

Table 6.3 Multiple linear regression with non-collateralised debts.

Dependent Variable : lnocolldebt			
Independen Variables	Coefficients	Robust Standard Errors	t
lrenthogr ***	.589	.046	12.83
univ	.023	.077	0.30
bach	−.039	.056	−0.69
tipempleo ***	.871	.073	11.92
jubld	−.031	.114	−0.27
desempleo *	.146	.079	1.84
age2 **	−.181	.084	−2.15
age3	−.086	.081	−1.07
age4	−.010	.088	−0.11
age5	.137	.132	1.03
numiem	−.009	.024	−0.38
numtrab	.046	.042	1.09
vt08 ***	−.212	.056	−3,78
vt11 ***	−.332	.061	−5.40
constant ***	2.560	.442	5.79
n = 3642			
R-squared = 0.1731			

Source: Own elaboration.

It is important to note that there are only five cases in this regression in which is possible to reject the null hypothesis at the 5 % significance level. It means that socio-demographic factors are less important to explain the non-collateralised debts. The variable *lrenthogr* is statistically significant at 1 %; the value of the coefficient is the awaited. Then, a rise by a 1 % of household income entails that the total no-collateralised debts increase by 0.59 %.

In addition, another significant variable is *tipempleo* at 1 % significance level there is enough empirical evidence to reject the null hypothesis. Also, the value of the variable is as we expected, because self-employed have to get debts in order to fund their business. Then, *Ceteris Paribus* the rest of variables, those households whose householder is a self-employed are an 87.1 % more indebted than those in which the head of the household is a salaried employee. Moreover, in relation to the age of the householder the unique relevant variable is *age2*, so in general the age of the householder is no relevant to explain the non-collateralised debts.

The last two variables to analyse are *vt08* and *vt11*. At 1 % significance level there is enough empirical evidence to reject the null hypothesis in both cases, so the two

variables are significant. The value of the coefficient *vt08* is unexpected because we thought that it would be positive. In general, in reference to the non-collateralised debts, the household indebtedness is a 21.2 % and 33.2 % less in 2008 and 2011, respectively, than in the base year.

Finally, these regressions confirm the relevance of income and the type of employment to explain all types of debts. It is because with a higher income, households can access to greater amounts of debts, and because the self-employed depend on their borrowing to fund their business. Also, the education level of the householder and the fact of being unemployed, are relevant to explain the total collateralised debts.

Moreover, the variables related to the age of the householder are relevant to explain the total debts and the collateralised, so we can conclude that these debts are consistent with our theoretical framework. The reason would be that households get collateralised debts for the purchase of their main housing in the first years of their life cycle.

It is important to stand out that apart from income and the type of employment only the time variables are relevant to explain the non-collateralised debts. The results confirm that each year the level of non-collateralised debts is lower, without being related to the economic cycle. The cause would be that before 2008 the banks stopped lending money without collaterals. Also, the time variables are relevant to explain the collateralised debts. It seems to be consistent with the theory, because the increase between 2008 and 2011 maybe was caused by the housing-finance motive and the last moments of the real estate.

Lastly, the effect of the time variables over the total debts is completely unexpected, because there are not differences between 2005 and 2008, and it increases in 2011 when the economy was in crisis. The rise in 2011 would be consequence of the increase in collateralised debts.

Now, we present nine logit models, one for each year, in order to analyse how the odds ratios related to the socio-demographic factors vary between the years. These models have been estimated by the maximum likelihood in Stata. The logit model determines the probability of holding: some type of debt, collateralised debts and non-collateralised debts, as a function of the same independent variables of the previous regressions. The variable *adeuda* is a dummy which takes value one when household is indebted with some type of debt and value zero when it is not. Furthermore, we can do the same interpretation for the collateralised and non-collateralised debts with the variables

acolldebt and *anocolldebt*, respectively. Therefore, the purpose of our logit models is to compare how the independent variables affect the probability of holding debts in each year.

Additionally, the tables of results show the odds ratios not the coefficients, because our objective is to know how each variable increases or decreases the probability of being indebted. Moreover, an odds ratio higher than one implies that the variable affects positively the probability and if it is less than one, the variable affects negatively.

As we can see in the table 6.4, the first logit model determines the probability of holding some type of debts as a function of the independent variables, which represent the principal characteristics of households, for each year. As before, the models have been estimated with the robust standard errors, because of the heteroscedasticity. Also, in this model the dependent variable is *adeuda*.

Table 6.4 Logit Models with total debts.

Dependent Variable : adeuda						
Independen Variables	2005		2008		2011	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
lrenthogr	1.216	0.000	1.300	0.000	1.430	0.000
univ	.747	0.001	.716	0.000	.768	0.003
bach	1.048	0.564	1.120	0.148	1.062	0.442
tipempleo	.892	0.213	.902	0.265	.942	0.528
jubld	.983	0.897	.909	0.456	1.039	0.764
desempleo	.919	0.470	.822	0.076	1.018	0.871
age2	1.055	0.665	1.121	0.417	1.001	0.997
age3	.665	0.001	.588	0.000	.513	0.000
age4	.428	0.000	.388	0.000	.288	0.000
age5	.165	0.000	.152	0.000	.103	0.000
numiem	1.218	0.000	1.266	0.000	1.207	0.000
numtrab	1.496	0.000	1.264	0.000	1.267	0.000
constant	.087	0.000	.056	0.000	.029	0.000
Number of obs	5910		6162		6054	
Prob > chi2	0.000		0.000		0.000	
Pseudo R2	0.200		0.194		0.203	

Source: Own elaboration.

The results of the model are very relevant for our investigation, as we can see the variables: *bach*, *tipempleo*, *jubld*, *desempleo* and *age2*, are not significant at any significance level for the three years. In contrast, the other variables are relevant because we can reject the null hypothesis at the 1 % significance level, for each year. The odds ratio for *lrenthogr* is higher than one, so higher incomes will increase the

probability of holding some type of debts, the value is the same for the three years, but not the odds ratio which is higher every year, so each year the income increases more this probability. Thus, if income goes up by a 1 %, on average in 2005, the odds of being indebted are 1.22 times larger than those that have a 1 % less of income. Also, for years 2008 and 2011, are 1.3 and 1.43 times, respectively.

Besides, the variable *univ* is statistically significant and the value is negative for the three years, because the value is less than one. So those households where the householder has a university degree have lower odds of being indebted than those who do not have a degree. This is a contradictory result, because it is thought that more education increases (current and future) income and consequently the probability of being indebted. On average, in 2005 the odds of being indebted for the university graduates are a 74.7 % of the odds of those which do not have a university degree. In 2008 and 2011 the odds represent a 71.6 % and a 76.8 %, respectively, of the odds of being indebted towards those which do not have a university degree.

In reference to the age of the householder, the variables *age3*, *age4* and *age5*, are significant and their odds ratio are less than one for the three years. The value of the odds ratio is lower for the older groups, so each year of the life cycle reduces the odds of being indebted. For example, in 2005 on average, the odds of being indebted of householders of the group *age3* are a 66.5 % of the odds of the base group. Moreover, the two last variables, *numiem* and *numtrab*, are positive for the three years. Accordingly, each additional member rises the odds, but if this member is employed the increase on the probability is higher. Then, in 2005 on average with an additional employed member in the household, the odds of being indebted are 1.5 times bigger than without this member.

The Table 6.5 shows the probability of holding collateralised debt as a function of the independent variables for each year. Hence, the dependent variable is *acolldebt*. Also, the models have been estimated with the robust standard errors, because of the heteroscedasticity.

Table 6.5 Logit Models with collateralised debts.

Dependent Variable : acolldebt						
Independen Variables	2005		2008		2011	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
lrenthogr	1.187	0.000	1.260	0.000	1.180	0.001
univ	.773	0.009	.731	0.001	.827	0.052
bach	1.068	0.459	1.081	0.377	1.108	0.248
tipempleo	.879	0.174	.916	0.369	.811	0.035
jubld	.887	0.445	.862	0.363	.745	0.079
desempleo	.635	0.001	.719	0.011	.806	0.085
age2	1.061	0.615	1.370	0.017	1.208	0.211
age3	.527	0.000	.580	0.000	.603	0.001
age4	.289	0.000	.315	0.000	.258	0.000
age5	.116	0.000	.097	0.000	.099	0.000
numiem	1.062	0.097	1.177	0.000	1.109	0.004
numtrab	1.273	0.000	1.411	0.090	1.191	0.010
constant	.083	0.000	.038	0.000	.098	0.000
Number of obs	5910		6162		6054	
Prob > chi2	0.000		0.000		0.000	
Pseudo R2	0.161		0.188		0.192	

Source: Own elaboration.

In these models only the variables *lrenthogr*, *age3*, *age4* and *age5*, are statistically significant at the 1 % significance level for the three years. What´s more, the value of the odds ratio is the same than in the previous regression. Therefore, the results are the same, so a higher income increases the probability of being indebted with collateralized debts and this probability is reduced each life cycle year.

On average, in 2005 when the income increases in 1 % the odds of being indebted are 1.19 times higher. In 2008 and 2011, 1.26 and 1.18 times larger respectively. Moreover, in 2005 on average the odds of the *age3* group are a 52.7 % of the odds of the base group, the odds of the age4 and age5 groups are a 28.9 % and 11.6 % of the odds of the base group. Then, the probability of being indebted is lower each life cycle year.

The rest of variables have different significance each year. It is important to note that *tipempleo* is statistically significant in 2011, the value of the odds ratio is less than one, so in that year those households whose householder is a self-employed have less probability to borrow collateralised debts than salaried employees, maybe because of higher risk linked to their job. Moreover, we can reject the null hypothesis at the 5 % significance level that the variable *desempleo* is zero, in the years 2005 and 2008.

Then, being an unemployed householder reduces the probability of holding collateralised debts. Besides, in 2011 the variables numiem and trabmiem are significant, so like in the previous regression each additional member will increase the odds and when this member is employed, the probability will rise much more.

Finally, the last logit models determine the probability of holding non-collateralised debt as a function of the independent variables for the three years. Therefore, the dependent variable is *anocolldebt*, the p-value of the chi-squared is lower than the 5 % for the three years, and this means we can reject the null hypothesis that all coefficients of the model (except β_0) are zero. Given the heteroscedasticity problem, the models have been estimated with the robust standard errors.

Table 6.6 Logit Models with non-collateralised debts.

Dependent Variable : anocolldebt						
Independen Variables	2005		2008		2011	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
lrenthogr	.924	0.070	.915	0.076	1.087	0.083
univ	.690	0.000	.654	0.000	.675	0.000
bach	.964	0.677	1.039	0.648	.990	0.907
tipempleo	.756	0.004	.815	0.038	.866	0.163
jubld	.786	0.114	.988	0.934	1.139	0.402
desempleo	.787	0.067	.939	0.599	1.099	0.448
age2	.849	0.194	.800	0.105	.699	0.021
age3	.794	0.061	.676	0.003	.576	0.000
age4	.625	0.000	.517	0.000	.430	0.000
age5	.264	0.000	.241	0.000	.165	0.000
numiem	1.217	0.000	1.266	0.000	1.230	0.000
numtrab	1.382	0.000	1.264	0.000	1.176	0.012
constant	.499	0.087	.627	0.324	.130	0.000
Number of obs	5910		6162		6054	
Prob > chi2	0.000		0.000		0.000	
Pseudo R2	0.113		0.096		0.096	

Source: Own elaboration.

The table 6.6 shows that the variable *lrenthogr* is not statistically significant at the 5 % significance level, so we can conclude that the household income is not important for this probability, in the three years. The variable *univ* is statistically significant for the three years, on average in 2005 the odds of holding non-collateralized debts of those householders which have a degree are a 69 % of the odds of those householders that do not have a degree. In 2008 and 2011 the odds represent a 65.4 % and 67.5 % of the odds of those householders which do not have a degree. Otherwise, we can reject

the null hypothesis that the variable *tipempleo* is not significant for 2005 and 2008. Hence, the self-employed have less probability to hold non-collateralised debts than the salaried ones.

In addition, age variables continue with the same pattern as in the previous models, but now only *age4* and *age5* are statistically significant at the 1 % for all years. The variable *age3* is significant in 2008 and 2011, and *age2* only in 2011. The results are like before, the odds of being indebted with non-collateralised debts decreases with each year of the life cycle. In relation to the last variables, *numiem* and *numtrab* are statistically significant at the 5 % significant level. Therefore, we can conclude that each additional member rises the probability and when the member has an employment the probability increases even more.

In general, income and age of the householder are the main relevant variables to determine the probability of being indebted with some type of debts, collateralised debts and non-collateralised debts. Moreover, using the same dependent variables, we have tested the significance of the interactions between the independent variables (the same as before) and the time variables for 2008 and 2011, in order to analyse the relevance of the effect of time over the independent variables. In general, the results determine that the effect of time over the independent variables is not relevant, because the interacted variables are not statistically significant, and this is true for the three cases.

7. Conclusions

Nowadays, the analysis of the family indebtedness is an important task in order to develop the economic policies and the action plans. In this paper our aim is to determine the role of some socio-demographic factors and the economic cycle in the indebtedness of the Spanish households. In order to achieve our aim, we consider in a separate way the total debts, the collateralised debts and the non-collateralised debts. Furthermore, we have used multiple linear regressions and logit models to analyse the significance of some socio-demographic variables and the time variables. The data which have been used in this paper are the years 2005, 2008 and 2011 from the Spanish Survey of Households Finances (EFF).

Therefore, from our econometrics we can describe which socio-demographic factors are relevant to explain the debts of the Spanish Households. Moreover, the time variables allow us to analyse the differences in the Spanish Households indebtedness over the economic cycle, concretely, before and after the economic crisis.

On the one hand, generally not all of the socio-demographic variables are significant to explain the indebtedness. For example, the number of members and working members of the household are not relevant to explain the indebtedness level. In contrast, the income of households is relevant to determine the indebtedness level. It is important to stand out that the income has a higher marginal effect on the non-collateralised debts than on the collateralised debts. Maybe, the reason could be that the access to collateralised debts depends mainly on collateral owned, so income would be not so important. What is more, the level of education of the householders is relevant to explain the total debts and collateralised debts, but it is not significant to determine the non-collateralised debts level.

In addition, the differences between self-employees and salaried employees are significant in the regressions. Therefore, households in which the head of the family is a self-employed are more indebted. It is a logical result, because self-employed households need more funding for their business. Besides, the age of the householder is significant except for the non-collateralised debts, so the results in relation to the total debts and collateralised debts are according with our theoretical framework. Therefore, in the first years of the life cycle, households increase drastically their debts and, after that, the indebtedness level is reduced over each year of the life cycle.

On the other hand, the time variables do not affect to the Spanish indebtedness as we expected. It is important to remind from the Literature Review part that the indebtedness of households is procyclical to the economic fluctuations. In general, between the years 2005 and 2008 the total debts do not vary, it is contradictory to our expectation because 2005 and 2008 were years of economic growth, so the total debts should increase among these years. In contrast, in 2011 when the economy was in crisis, the total debts were higher than in 2005 and 2008, maybe due to the increase on the collateralised debts.

It is important to emphasise that the non-collateralised and collateralised debts follow different evolutions, which explain the inconsistency of the total debts with the economic cycle. The non-collateralised debts have been decreasing since 2005, this fact is unexpected because between 2005 and 2008 it would be hoped an increase on these debts due to the economic growth. The reason would be that before 2008 the banks stopped lending money without collaterals. At the same time, the collateralised debts are higher in 2011 than 2008, which could be explained because of the housing-finance motive and the last moments of the real estate.

To sum up, the relevant socio-demographic variables are in line with our theoretical framework. Therefore, income and age influence considerably over the households indebtedness, as the income-motive establishes. What is more, education level and the type of employment are also important factors, but in a lower way. Furthermore, the economic cycle does not affect to the household indebtedness as we expected. However, the collateralised debts seem to be consistent with the theory, because the housing-finance motive and the last moments of the real estate would explain the increase between 2008 and 2011. In general, our data do not adjust to the presented theory about the economic cycle, the reason would be that our data set considers few years on the analysis.

The results reported here about the socio-demographic factors are in line with Barnes and Young (2003), who highlight the relevance of the life cycle and the income of households as determinants of the indebtedness level. In contrast, our results in relation to the economic cycle are not consistent with Minsky (1992), however the collateralized debts seem to adjust a little with the author.

Clearly, this investigation has a number of limitations to be considered. On the one hand, the data set of the study only includes information from the Spanish households. For further research it would be interesting to extend the same study to other countries in order to compare the results. On the other hand, this study considers uniquely three

years, so it is complicated to analyse the effect of the economic cycle considering so few years. Due to that reason, it would be important for future research to include more years and more countries in the data set, given that the limitation my study did not allow me to expand them. Moreover, it would be interesting to analyse the correlation between the GDP and the debts of households in order to study the indebtedness procyclicality, for example from monthly aggregate data of national accounts.

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