Precautionary saving in Spain during the Great Recession: evidence from a panel of uncertainty indicators

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Precautionary Saving in Spain during the Great Recession: evidence from a panel of uncertainty indicators[∇]

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Abstract

The aim of this paper is to study empirically the effect of uncertainty on private consumption using a sample of Spanish households, and to check whether the appropriate measure of uncertainty varies with the macroeconomic context. Using data provided by the Spanish Survey of Household Finances (EFF) and the Labour Force Survey (LFS) we construct several uncertainty measures commonly used in the literature and an additional indicator based on job insecurity data and estimate different econometric models under the life-cycle/permanent income hypothesis, using these measures of uncertainty. Our results are twofold: first, we find evidence in favour of the precautionary saving hypothesis. Secondly, we find that the sources of uncertainty vary with the business cycle: the job insecurity indicator is an appropriate variable to approximate income uncertainty in any macroeconomic context, especially when the unemployment rate is low. When unemployment soars, however, it becomes the main uncertainty source for households, together with the degree of instability at the current job.

Keywords: precautionary savings, macroeconomic uncertainty, consumption, EFF

JEL codes: E21, D12, D14

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1. Introduction

In this paper we test the precautionary savings hypothesis for a sample of Spanish households, using a panel of uncertainty measures, both subjective and objective, constructed from the Survey of Household Finance (*Encuesta Financiera de las Familias, EFF)*, provided by the Bank of Spain. The literature on consumption and savings has reached a consensus as regards the theoretical conditions under which uncertainty generates additional household savings, the so-called precautionary savings motive (see inter alia Leland, 1968, Sandmo,1970, and Drèze and Modigliani, 1972). However, the empirical tests of the precautionary saving hypothesis have provided mixed results. Depending on the type of data, country, or econometric approach, different authors provide inconclusive evidence. This paper contributes to the existing literature in three main aspects. Firstly, using a sample of Spanish households we provide new evidence in favour of the existence of such precautionary savings motive. Our econometric results unambiguously confirm the existence of a negative impact on uncertainty on consumption. Secondly, we show that depending on the specific risk measure, uncertainty impacts differently on consumption. In general, we find that subjective measures (based on self-perception about future household income variability) tend to generate a non-significant impact on consumption, and hence on savings. Objective measures (as the risk of losing the job, proxied by the unemployment rate, or the job insecurity that the household reference person faces) generate a significant negative impact on consumption. Finally, we show that the impact of these objective measures is different depending on the moment of the business cycle we study. Specifically, we find that in a context of low unemployment rates, the uncertainty measured through the jobless rate exerts no impact on household consumption, whereas when unemployment is high and rising, it becomes the main source of income uncertainty, generating a large share of precautionary saving. The job insecurity measures, on its part, tend to be significant at all business cycle horizons, but become less important when unemployment soars.

The main feature of this paper is the use of multiple measures of uncertainty. In the existing literature each author has constructed different measures based on the specific information provided by their dataset. In this regard, our paper reviews these measures, and includes as many as possible in the specification of an empirical consumption function. This allows us to check which of these measures are more reliable as uncertainty sources for the households included in our sample. Moreover, we construct an individual composite index of job insecurity, again based on the information provided by our dataset, which allows us to introduce a novel source of income uncertainty, the job insecurity faced by the household reference person. This individual composite index combines information on seniority, type of job arrangement (part time/full time), contract type, number of previous employers, firm size and unemployment record. The higher the index the more vulnerable the worker is to a potential job loss, and thus

we expect a fall in current consumption to increase saving as a buffer against future contingencies. To the best of our knowledge, this is the first time that a composite index of this type is introduced in a consumption equation to test the precautionary saving hypothesis.

Another feature of this paper is that it collects data for two years (2008 and 2011), allowing thus comparisons between household consumption behaviour before and during the Great Recession. The magnitude of such recession, especially in the Spanish case, is likely to have modified the underlying consumption and saving patterns. Our results suggest that indeed this is the case, and that different uncertainty sources impact on household decisions on different moments of time.

Our results are relevant for the design of economic policy. On the one hand, they show that labour market reforms that tend to weak the position of workers as regards job security are likely to impact negatively on aggregate demand, through falls in consumption. Also, they suggest that keeping a low and stable unemployment rate in the economy is not only an economic target *per se*, but would help in reducing the volatility of the saving rate of households.

After this introduction, the paper is organized as follows. Section 2 provides a description of the data and its main characteristics. Section 3 briefly summarises the theoretical framework underlying the econometric analysis and comprises the explanation of the uncertainty measures constructed. Section 4 presents the econometric model and the results. Finally, Section 5 concludes.

2. Data description

Although aggregate measures of income uncertainty (based on macro data) present several advantages, the use of microeconomic information is a preferable option, since the former cannot be used to measure the specific income risk of households, and the information portrayed in the latter may be far more relevant to analyse consumer behaviour, especially in the context of the precautionary savings hypothesis (see Miles, 1997).[1] Therefore, the use of a microeconomic dataset is preferred to analyse several aspects of the economic and financial situation of households and to assess the difference between consumption patterns before and during the current crisis. Among the existing alternatives in the Spanish case we opted for the Survey of Household Finances (*Encuesta Financiera de las Familias,* EFF hereafter). This is an

[1] Among papers using macro data we highlight the contributions of, among others, Hahm (1999), Hahm and Steigerwald (1999), Lyhagen (2001), Menegatti (2007, 2010), Mody et al. (2012) or Bande and Riveiro (2013). In the group of papers using micro data good examples are the contributions by Hall and Mishkin (1982), Skinner (1988),Attanasio and Weber (1989), Zeldes (1989a, b), Guiso et al. (1992, 1996), Dynan (1993), Lusardi (1993, 1997, 1998), Carroll (1994), Carroll and Samwick (1997), Kazarosian (1997), Miles (1997), Banks et al. (2001), Guariglia (2001), Guariglia and Kim (2003), Benito (2006) and Deidda (2013).

official survey compiled by the Bank of Spain since 2002 to obtain direct information about the financial conditions of the Spanish households. This survey was developed for 2002, 2005, 2008 and 2011 (a fifth wave, the EFF2014, is expected to be released in 2016). Some important features of the EFF are the inclusion of a panel component (several households are followed in consecutive waves, in particular, around 32% of households in the EFF2002 (1,666 households) have been re-interviewed in all the following waves, representing approximately 27% of households in the EFF2011), the oversampling of the upper deciles of the income distribution (to better capture the behaviour of the richer families), and the imputation of non-observed values following a stochastic multiple imputation technique: specifically, the EFF imputes five values for each lost item of each household observation.[2] Therefore, these five values may vary depending on the degree of uncertainty about the imputation model. The study object statistics are obtained by combining the information from these multiple imputations, as suggested by Rubin (1996).

The EFF provides an extensive list of variables on the characteristics of households in the sample and each of its individuals. Questions regarding assets and debts refer to the whole household, while those on employment status and related income are specified for each household member over 16 years. Most of the information refers to the moment of the interview, although information about all incomes before taxes earned during the calendar year prior to the survey wave is also collected.

An important aspect to consider is the labour status of the household reference person. The characteristics of income sources and/or the household consumption and savings patterns, as well as possible sources of uncertainty about their future earnings are likely to differ depending on the labour situation of the household reference person. Therefore, working with all of the households in the sample can lead to erroneous results, since different labour status are covered: employed, unemployed, retired, etc. Due to these limitations, and following the general practice in the literature, (see *inter alia* Lusardi, 1998, Carroll *et al*., 2003 or Benito, 2006), we focus on households whose reference person is an employee.[3]

3. Theoretical underpinnings

The rationale for our econometric analysis below lies in the standard theoretical framework of consumption/savings decisions in a context of uncertainty (see Leland, 1968, Sandmo,1970, and Drèze and Modigliani, 1972), in which individuals tend to behave prudently (Kimball, 1990).

[2] The analysis of household decisions based on the panel dimension of this dataset is the topic of a different paper by the authors, see Lugilde, Bande and Riveiro (2016).
[3] Appendix A1 provides a descriptive table of the main characteristics of households in the sample.

Standard theoretical models of consumer behaviour show that the optimal pattern of consumption is described by an Euler equation, which relates the expected growth of future consumption with the conditional variance of the consumption growth rate (see Attanasio, 1999).[4] However, the latter cannot be directly estimated empirically, as indicated by Carroll (1992), since the conditional variance may be an endogenous variable depending on the accumulated wealth. This problem has been solved in the literature replacing this variable by different measures of uncertainty.

A wide branch of literature has proxied the uncertainty through the variability of income (see *inter alia* Zeldes, 1989a; Caballero, 1990; Guiso *et al*., 1992; Carroll, 1994; Kazarosian, 1997; Lusardi, 1997; Miles, 1997; Blundell and Stoker, 1999; Hahm, 1999; Guariglia and Rossi, 2002; Menegatti, 2007, 2010; or Kitamura *et al*., 2012), using the standard deviation or the variance of income (see for example Zeldes, 1989a, Blundell and Stoker, 1999, or Kitamura *et al*., 2012). In this same line are also the works of Caballero (1991), who measures the uncertainty of labour income by the standard deviation of the percentage change in the annual value of human wealth, or Miles (1997), who uses the variance of income and its standard deviation as a measure of uncertainty. Both find evidence of a strong precautionary saving in the US and UK, respectively. Moreover, using panel data from the US, Kazarosian (1997) proxies the individual specific income uncertainty by the standard deviation of the residual of the profile (log) income-age estimate of each individual. Guariglia and Rossi (2002) estimate the variance of the residuals of an earnings equation in the following year as the volatility of income, using British data. Both studies show evidence of the existence of a precautionary savings. Also Carroll (1994) and Carroll and Samwick (1998), with the Italian Panel Study of Income Dynamics (PSID) data, obtain evidence of precautionary savings in Italy using several measures of income variability.

A different branch of literature has proxied uncertainty by the variability of consumption/expenditures. Dynan (1993) states that "consumption variability is a better measure of risk because the consumption of an optimizing household changes only in response to unexpected changes in income, which represent true risk" (p. 1105).

During recessions uncertainty about future income increases and a large part of that uncertainty is explained by rising unemployment. Thus, another branch of the literature has proxied uncertainty by the probability of continuing to receiving labour income in the future. Since most consumers get their income from labour, losing their job is the biggest negative impact on their income, and the risk of future episodes of unemployment would be a good indicator of the

[4] Usually, the Euler equation includes also the income growth, to capture the existence of liquidity constraints or myopia effects of the consumers which consume all their income.

uncertainty (see Malley and Moutos, 1996; Lusardi, 1998; Guariglia, 2001; Carroll *et al*., 2003; Benito, 2006; Barceló and Villanueva, 2010; Cuadro-Sáez, 2011; Sastre and Fernández-Sánchez, 2011; for a discussion). This is closely related to the probability of being employed, and therefore to the unemployment rate.

Despite the large number of papers analysing the existence of precautionary saving, the empirical results are not conclusive. There is no consensus about the strength of this precautionary motive neither has the existing literature reached a definite answer to what is the most appropriate measure of uncertainty. Consequently, we will include in our empirical analysis several measures of uncertainty about future income as well as a number of control variables commonly used in the literature (such as income, wealth, debt, credit constraints, and individual and familiar characteristics of households and its members). In particular, and using EFF and external data (taken from the Labour Force Survey), we construct several measures related with the probability of continuing to receiving labour income in the future and the household income variability.

We first use subjective data to build a measure of uncertainty related to the income variability.[5] Guiso *et al*. (1992) and Lusardi (1997), using subjective data of the variance of income drawn from the data provided by the Italian Survey on Income and Wealth (SHIW), find inconclusive evidence on the precautionary saving hypothesis. Their uncertainty measure is based on household responses to two questions regarding the probability distribution of the rate of growth of income and inflation in the year following the interview. The EFF has a similar question, whether the household perceive their current income higher than usual, lower than usual or "normal".[6] We therefore create a dummy variable ($shock\_y\_negat$)**,** taking value one when the household perceives that it has suffered a negative income shock and zero otherwise.

The remaining uncertainty measures are related with the probability of continuing to receiving labour income in the future. In this case, the EFF data allow us to construct different (objective and subjective) measures at the individual level since we have the information needed for all household members aged 16 and over. However, we decide to proxy the household uncertainty by that of its reference person.[7]

In empirical works, income uncertainty due to the risk of unemployment is proxied by several variables. Studies based on micro data have measured the risk of unemployment by the *ex-ante*

[5] Since we are working with cross-sectional data, obtaining estimates of permanent income is not entirely correct, ruling out this approach to the subject matter.
[6] Specifically, the question is the following: "How would you describe your household's current income: Higher than usual for your household, Lower than usual for your household, Normal?"
[7] Following Guiso et al. (1992) and Lusardi (1997, 1998) we justify this procedure by the underlying assumption that the variance of household income can be reasonably approximated by the variance of the income of the household reference person.

(subjective and/or predicted) probability to become unemployed (job loss). This is the focus of the works of Lusardi (1998), Guariglia (2001) and Benito (2006), among others.

In relation with the subjective measures, changes in the survey design between 2008 and 2011 do not allow us to construct exactly the same variables, although they basically measure the same concept and are comparable. In the case of the EFF2008, respondents declared whether they believe they would lose their job or not in the following twelve months. Accordingly, we construct a dummy (job_loss) for the reference person, taking value 1 when the individual believes that he will become unemployed in the next 12 months, and 0 otherwise.

In the EFF2011, however, respondents are asked to assign a specific probability to the event of losing their job in the forthcoming twelve months.[8] From this information we derive two uncertainty measures, using only the responses given by the household reference person. The first one is simply the square of this subjective probability of losing the job (p^2), which gives greater weight to high odds of becoming unemployed. Specifically, we re-scale the probability to a 0-1 interval and square it. The second uncertainty measure is the one used in Lusardi (1998) and Guariglia (2001). Under certain simplifying assumptions, they derive a measure of the variance of income from subjective probability to being unemployed in future. Let p the subjective probability of job loss and $(1-p)$ the probability of maintaining the employment status. If the replacement rate of the unemployment insurance is zero and earnings do not change when the respondent does not lose his job (income next year will be the same as the 2011), then the individual earnings can be interpreted as a random variable, where the expected value of individual earnings is $(1-p)Y$ and the variance of income is equal to $p(1-p)Y^2$ where Y is the logarithm of labour income (see Lusardi, 1998, p. 451). We have built this second variable of uncertainty (denoted var_Ylab) from the labour income data for the household reference person in 2011 (in logs) and the probability that he assigns to become unemployed in the next twelve months. [9]

In addition to the subjective probability of losing employment, we can proxy the uncertainty in the labour market from various objective measures. In the empirical works at a macroeconomic level is common to use the unemployment rate as a proxy for uncertainty. Thus, those who have been assigned higher unemployment rates will be subject to greater future job insecurity than those who belong to a group with lower average unemployment rate (See Estrada *et al.*, 2014; Mody *et al.*, 2012; or Bande and Riveiro, 2013).

[8] In particular, the question is: "At present there are people who lose their job due to termination of work contract, dismissal or other reasons. On a scale of 0 to 100, what do you think is the probability that you will lose your job in the next twelve months?"

[9] The variable labour income is constructed from the income data for the reference person in the current year provided by the survey.

Given that the EFF does not report unemployment rates (under any type of aggregation) nor the geographical location within the Spanish territory of households in the sample (such that we could assign the jobless rate of where they lived) we are forced to use external data to assign unemployment rates to households. Following Campos *et al*. (2004), we proxy the uncertainty through the unemployment rate provided by the Labour Force Survey for the age group to which the reference person of the household belongs. So, using the LFS microdata we compute, for each EFF wave, average unemployment rates by five-year age groups for each sample year (2008 and 2011 respectively) and assign those rates to the households included in the EFF. In this way, the uncertainty measures are the unemployment rates assigned to the household reference person for the current year (un). [10] If the precautionary saving hypothesis holds, households would consume less the higher the unemployment rate; that is, when the reference person belongs to a group with higher average unemployment rate, the household would perceive more uncertainty about future labour income and would reduce their consumption expenditures, i.e., precautionary saving would take place.

Labour market uncertainty can also be measured through other objective variables related to the reference person's job. Some of them are seniority, size of the company, number of employers, having a temporary contract, having been unemployed in the previous year or working part time. Overall, the first two are negatively related with the risk of job loss while the remaining have a positive relationship with uncertainty (see Lusardi, 1997, Benito, 2006 or Miles, 1997, among others). Working part time can be a choice of the worker, but the evidence suggests that those who have this type of contract are generally subject to less job security than those who work full time. Employees who are hired on full-time or with permanent contracts may experience less job insecurity because they may have a greater feeling of being an integral part of the organization than part-time or temporary employees would (Barling and Gallagher, 1996; Sverke et al., 2000). For the Spanish economy, Barceló and Villanueva (2010) using data from the EFF (waves of 2002 and 2005), find evidence in favour to the existence of precautionary savings proxying the probability of losing employment by the type of contract that the main recipients of income at household have.

Given the different dimensions of job insecurity, we opted to construct an overall composite indicator of job insecurity, rather than using these variables in isolation of one another in the econometric estimations. In particular, the six variables that make up the indicator are *seniority*,

[10] Note, however, that to avoid multicollinearity this forces us to drop from the group of control variables the age of the reference person. Also, note the unemployment rate is clustered in a fixed number of groups, which must be taken into account in the estimations to avoid the Moulton or group bias, which can lead to lower standard errors. We therefore use cluster standard errors using a robust covariance matrix.

size of the company, *number of employers*, *type of contract*, *having been unemployed in the previous year* and *work full/part time*.

We build this uncertainty measure (job_insec_ind) by assigning a numerical value (consecutive numbers) to each of the different categories of these six variables, such that the greater the value the poorer the employment status of the household reference person (i.e. values in ascending order from best to worst employment situation). To avoid penalizing the different work situations in the variables having more categories (by construction they would have greater values of the indicator), we normalize the assigned values by the number of categories of the variable, so that the maximum value that can be assigned is 1 in each variable. The aggregation method to construct the indicator is a linear aggregation (i.e., the sum of the normalized individual indicators) and, in this case, unweighted. The resulting job insecurity indicator is therefore the sum of the assigned values to these six variables according to the employment status of the reference person in the household. In this context, greater job insecurity is proxied by higher values of the indicator, reflecting, therefore, a greater likelihood of becoming unemployed. It is important to remind that this measure is computed at the individual level, and, to the best of our knowledge, it is the first time in the literature that such type of uncertainty indicator is employed in the analysis of precautionary savings.

TABLE 1. Composition of job insecurity indicator of household reference person

VARIABLE	CATEGORIES	ASSIGNED VALUE	STANDARDIZED VALUE ASSIGNED
Seniority	A>=5	1	1/3
	1<=A<5	2	2/3
	A<1 year	3	3/3
Partial/Full Time	T=full	1	1/2
	T=partial	2	2/2
Contract Type	C=indefinite	1	1/3
	C= temporary	2	2/3
	C= other lab. agreement / without contract	3	3/3
Number of employers	N<=1	1	1/4
	1<N<=5	2	2/4
	5<N<=10	3	3/4
	N>10	4	4/4
Enterprise size (number of workers)	S>=500	1	1/5
	100<=S<500	2	2/5
	20<=S<100	3	3/5
	10<=S<20	4	4/5
	S<10	5	5/5
Unemployed last year	D= not unemployed	1	1/2
	D=unemployed	2	2/2
JOB INSECURITY INDICATOR = SUM OF STANDARDIZED ASSIGNED VALUES OF A, T, C, N, S, D			

Notes: Own elaboration using data from the EFF.

4. Econometric model and results

In this section we present the econometric model and summarise the main results. In the literature three variants are used to test the existence of precautionary savings. Some authors analyse the effect of uncertainty on consumption (see Attanasio and Weber, 1989; Zeldes,

1989a; Andrés *et al*., 1990; Guiso *et al*., 1992; Argimón *et al*., 1993; Dynan, 1993; Carroll, 1994; Miles, 1997; Blundell and Stoker, 1999; Banks *et al*., 2001; or Benito, 2006, among others). Other authors analyse precautionary saving by estimating saving equations directly (some studies are those of Japelli and Pagano, 1994; Hubbard *et al*., 1994; Hahm, 1999; Hahm and Steigerwald, 1999; Guariglia, 2001 or Guariglia and Kim, 2003, for example). A third group of authors have tried to analyse the proportion of wealth (of a country or a household) explained by the presence of uncertainty or how the wealth to income ratio varies when a source of uncertainty is included (see, for example, Caballero, 1991; Hubbard *et al*., 1995; Guiso *et al*., 1996; Karazarosian, 1997; Lusardi, 1997, 1998 and Carroll and Samwick, 1998).

Among these three general approaches, the first one seems to best fit our dataset.[11] Thus, we will assess the existence of precautionary saving by analysing the effect of different types of uncertainty on consumption. If there is a precautionary saving, uncertainty in the current period should increase savings and thus decrease current consumption, i.e., we expect a negative sign on the uncertainty variable.

The econometric model relates the consumption of a household with a number of covariates related with the personal, family, work and financial characteristics of the households included in the sample. Specifically, assuming that the relationship among the dependent and independent variables can be expressed in a log-linear form, the model is:

$$\log\ c_i = \beta_0 + BX_i + CZ_i + v_i \qquad (1)$$

Where c_i is consumption of the i-th household; **B** and **C** are vectors of parameters to be estimated; β_0 is the intercept; $\boldsymbol{X_i}$ is a vector of variables that collects personal individual characteristics of each individual/household (age, sex, education level...) and $\boldsymbol{Z_i}$ is a vector of variables that reflect the main economic determinants of consumption (income, real wealth and financial wealth, expressed in logarithms); v_i is an error term assumed independently and identically distributed as a $N(0, \sigma^2)$. This equation is estimated by OLS (see Caroll ,1994; Lusardi , 1997; Miles, 1997; Guariglia and Rossi, 2002; Deidda, 2013; or Estrada *et al*., 2014; among others).[12]

The income variable included in the model is the income of the household reference person in the year prior to the survey, given that our uncertainty measures are defined in relation to this reference person. We include the income of the previous year and not of the current year by

[11] The EFF also allows for the computation of total wealth, net worth and net financial worth, and therefore we could also opt for the estimation of a wealth equation, adding an uncertainty term. However, this analysis would be out of the scope of the present paper, and is left for future research.

[12] We take the variables in logarithms to eliminate the effect of the different units of measure in which they are expressed.

homogeneity in the data. Due to the different moments of time when interviews are conducted, all households respond at the time of the interview what their "regular monthly" income is. Therefore, to avoid assuming that current income is the same throughout the year of the interview, we use the income of the previous year which is the last known yearly income. The respondents report their total income (in different categories) in the calendar year preceding the survey (2007 or 2010, in each case).[13]

A set of variables comprising individual and family characteristic are also included in addition to income and wealth. These variables are the size or composition of the family (see, for example Skinner, 1988; Lusardi, 1993, 1997; or Banks *et al*., 2001), whether there are children at home (as in Miles, 1997, Kazarosian, 1997; Lusardi, 1997; Carroll and Samwick, 1998; or Guariglia and Kim, 2003) and the number of recipients of income, which in our case refers to the number of adults working (Dynan, 1993; Lusardi, 1998, or Guariglia and Kim, 2003; among others). Other variables that reflect personal characteristics are age, sex, marital status, health or education level (see, for example, Guiso et al., 1996; Kazarosian, 1997; and Carroll and Samwick, 1998; Lusardi, 1998; Guariglia, 2001; Benito, 2006; or Deidda, 2013).[14]

Tables 2 and 3 show the results of the estimations for 2008 and 2011. Column (1) summarises the estimation of a consumption equation without any uncertainty measure, to provide a baseline model. Subsequent columns summarise the estimation of different models, including alternative uncertainty measures. Columns (2) and (3) in Table 2, and (2) to (3b) in Table 3 include the different subjective uncertainty measures. Columns (4) to (6) summarise the results with objective uncertainty measures (job insecurity indicator, the unemployment rate and an additional model including both of them). In general, the variables introduced in the estimations are significant (and show the expected signs) and the regressions have a relatively high goodness of fit, with an R^2 around 20-25% in the case of EFF2008 and about 30% for the EFF2011, and the F-statistic suggests that the null hypothesis of jointly insignificance (the set of estimated coefficients take zero value) should be rejected.

To analyse and to interpret these results it is necessary to overview the different macroeconomic context in which they are estimated. In general terms, 2008 is characterized by high private debt (the household debt as a percentage of GDP reached 83% in 2007), the absence of liquidity constraints (by 2008, before the financial meltdown, the Spanish banking system had completed a wild competition process, fuelled by the housing bubble: commercial and saving banks had competed for new clients using mortgages and personal loans as a commercial vehicle, hence the wide availability of cheap credit) and a very low unemployment rate (in 2007 the

[13] Although we are only considering employees, the income variable comprises all incomes they declare that have earned in the previous year and not just salary or extra payments received.
[14] Table A2, in the Appendix A2, contains the list of variables used in the model and their description.

unemployment rate stood at the 30-years low 8.2%, rising to 11.2% in 2008). On the contrary, 2011 is characterized by a high and rising unemployment rate (almost doubled since 2008, reaching 21.4%). The private debt in terms of GDP continued to increase during the first years of the crisis due to the negative performance of aggregate production, reaching its peak in 2010.[15] In addition, the strong restructuring of the banking sector, forced by the financial meltdown, led commercial banks to restrain credit, limiting the ability of households to borrow. Our econometric results are consistent with these differences in the macroeconomic context.

[15] Banco de España (2013).

TABLE 2. **EFF2008**: estimated equations with different measures of uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)
	without	**shock_y_negat**	**job_loss**	**job_insec_ind**	**un**	**job_insec_ind & un**
lnY_rp_py	0.016	0.012	0.015	0.005	0.017	0.005
	(0.014)	(0.014)	(0.014)	(0.014)	(0.021)	(0.014)
lnRW	0.023***	0.023***	0.024***	0.021***	0.025***	0.022***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
lnFW	0.016**	0.011	0.016**	0.014*	0.017*	0.015*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
0b.debt_3catY	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
1.debt_3catY	-0.044	-0.052	-0.049	-0.055	-0.050**	-0.060
	(0.041)	(0.039)	(0.041)	(0.041)	(0.022)	(0.041)
2.debt_3catY	-0.132**	-0.130**	-0.136**	-0.136**	-0.155**	-0.155***
	(0.062)	(0.061)	(0.062)	(0.062)	(0.060)	(0.060)
credit_const	0.052	0.088	0.050	0.055	0.047	0.050
	(0.082)	(0.082)	(0.081)	(0.081)	(0.061)	(0.080)
1b.numadwork	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
2.numadwork	0.162***	0.133***	0.170***	0.166***	0.152***	0.157***
	(0.043)	(0.042)	(0.043)	(0.044)	(0.044)	(0.043)
3.numadwork	0.249***	0.228***	0.251***	0.249***	0.260***	0.258***
	(0.073)	(0.069)	(0.073)	(0.073)	(0.062)	(0.073)
child	0.139***	0.154***	0.133***	0.126***	0.145**	0.130***
	(0.041)	(0.040)	(0.041)	(0.041)	(0.047)	(0.040)
empl_and_self	-0.086					
	(0.140)					
age	0.003	0.004*	0.003	0.003		
	(0.002)	(0.002)	(0.002)	(0.002)		
man	0.050	0.046	0.050	0.036	0.053	0.038
	(0.037)	(0.037)	(0.038)	(0.038)	(0.042)	(0.038)
couple	0.116**	0.126***	0.118**	0.129***	0.115***	0.129***
	(0.047)	(0.047)	(0.047)	(0.048)	(0.034)	(0.048)
prim_ed	0.007	0.016	0.016	0.034	0.024	0.048
	(0.047)	(0.045)	(0.047)	(0.048)	(0.041)	(0.047)
high_ed	0.225***	0.207***	0.230***	0.211***	0.226***	0.212***
	(0.042)	(0.042)	(0.042)	(0.042)	(0.027)	(0.042)
UNCERTAINTY		**-0.159*** **	**-0.056**	**-0.091*** **	**-0.274**	
		(0.039)	(0.064)	(0.030)	(1.284)	
job_insec_ind						**-0.096*** **
						(0.031)
un						**-0.053**
						(1.425)
_cons	8.381***	8.509***	8.394***	8.856***	8.519***	8.971***
	(0.158)	(0.155)	(0.158)	(0.215)	(0.235)	(0.246)
r2_a	**0.2160**	**0.2312**	**0.2188**	**0.2271**	**0.2135**	**0.2253**
Observations	**1874**	**1874**	**1844**	**1844**	**1874**	**1844**

Notes: Coefficient estimates. Cluster robust standard errors in parentheses. Significance levels: *** p<0.01 ** p<0.05 * p<0.10.

TABLE 3. **EFF2011**: estimated equations with different measures of uncertainty

	(1)	(2)	(3a)	(3b)	(4)	(5)	(6)
	without	**shock_y_negat**	**p2**	**varY_lab**	**job_insec_ind**	**un**	**job_insec_ind & un**
lnY_rp_py	0.045***	0.043***	0.041***	0.042***	0.033***	0.045***	0.032***
	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)	(0.014)	(0.010)
lnRW	0.013**	0.013**	0.012**	0.012**	0.012**	0.014*	0.013**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
lnFW	0.018***	0.018***	0.018***	0.019***	0.015**	0.020**	0.016**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
0b.debt_3catY	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1.debt_3catY	0.023	0.026	0.021	0.021	0.018	0.018	0.015
	(0.036)	(0.035)	(0.036)	(0.036)	(0.036)	(0.022)	(0.035)
2.debt_3catY	-0.264***	-0.259***	-0.274***	-0.273***	-0.272***	-0.286***	-0.289***
	(0.045)	(0.045)	(0.047)	(0.046)	(0.047)	(0.030)	(0.045)
credit_const	-0.100**	-0.098**	-0.098*	-0.103**	-0.092*	-0.098***	-0.088*
	(0.049)	(0.050)	(0.050)	(0.050)	(0.050)	(0.023)	(0.050)
1b.numadwork	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)
2.numadwork	0.097***	0.094***	0.096***	0.099***	0.107***	0.087**	0.100***
	(0.034)	(0.035)	(0.035)	(0.035)	(0.035)	(0.030)	(0.034)
3.numadwork	0.303***	0.299***	0.317***	0.316***	0.335***	0.326***	0.358***
	(0.065)	(0.066)	(0.064)	(0.065)	(0.063)	(0.092)	(0.063)
child	0.246***	0.246***	0.246***	0.247***	0.237***	0.247***	0.237***
	(0.036)	(0.036)	(0.036)	(0.036)	(0.037)	(0.045)	(0.037)
empl_and_self	0.076						
	(0.100)						
age	0.006***	0.006***	0.005***	0.005***	0.005**		
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)		
man	-0.017	-0.019	-0.013	-0.014	-0.014	-0.018	-0.016
	(0.034)	(0.034)	(0.035)	(0.034)	(0.035)	(0.026)	(0.034)
couple	0.119***	0.120***	0.122***	0.120***	0.122***	0.118**	0.122***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
prim_ed	-0.089**	-0.089**	-0.077*	-0.080*	-0.075*	-0.079**	-0.066
	(0.044)	(0.044)	(0.045)	(0.046)	(0.045)	(0.030)	(0.045)
high_ed	0.120***	0.119***	0.111***	0.115***	0.109***	0.115**	0.103***
	(0.039)	(0.038)	(0.039)	(0.039)	(0.039)	(0.048)	(0.039)
UNCERTAINTY		**-0.026**	**-0.095**	**-0.001**	**-0.058****	**-1.708****	
		(0.033)	(0.067)	(0.002)	(0.025)	(0.683)	
job_insec_ind							**-0.067*****
							(0.024)
un							**-1.684****
							(0.754)
_cons	8.132***	8.153***	8.205***	8.180***	8.487***	8.652***	9.027***
	(0.138)	(0.141)	(0.142)	(0.143)	(0.195)	(0.253)	(0.217)
r2_a	**0.3497**	**0.3500**	**0.3535**	**0.3520**	**0.3562**	**0.3475**	**0.3556**
Observations	**1724**	**1724**	**1671**	**1671**	**1671**	**1724**	**1671**

Notes: Coefficient estimates. Cluster robust standard errors in parentheses. Significance levels: *** p<0.01 ** p<0.05 * p<0.1.

In general, the results for the standard control variables are in line with previous analysis, with expected signs. Wealth (both real and financial) impact positively on consumption, the level of indebtedness and the existence of credit constraints tend to limit household consumption, and the household characteristics show the expected relations. Additionally, the estimated coefficients are, in general, robust to the specification as regards the inclusion of different

uncertainty measures, even though they differ in magnitude in the two years considered in our analysis. This is especially interesting as regards wealth variables. Real wealth shows greater coefficients in 2008 (ranging between 0.21 and 0.25 depending on the specification), falling to values in the vicinity of 0.12-0.13 in 2011, whereas financial wealth shows similar coefficients in both years (with slightly greater values in 2011). Contrary to the predictions of standard models of consumption, income is not significant in 2008, turning to significant coefficients in 2011. We interpret this joint result as the outcome of the macroeconomic context outlined above. In 2008 the household wealth had been substantially increased, both real (rise of value of real estate due to the housing boom) and financial (stock market responded positively to the growth of the economy). This growth of wealth, coupled with the absence of liquidity constraints may explain why in 2008 income is not significant. Households had purchasing power via wealth (real and/or financial) and borrowing against their price-increasing real assets. However, in 2011, as a result of the burst of the housing bubble, real estate prices fell dramatically, hence decreasing the value of real wealth. Additionally, households tended to accumulate financial assets.[16] This would explain why the two variables of wealth are significant and robust to the type of specification, but the coefficient of real wealth is much lower in 2011 than in 2008. The elasticity of financial wealth is higher in 2011 than in 2008, which may be due to increase in the percentage of financial assets on total assets of the Spanish households from 10.9 % in 2008 to 15.6 % in 2011.[17] Due to the loss of real wealth and the existence of strong credit restrictions, in 2011 income becomes an important determinant of consumption, being, together with financial wealth, the main source of purchasing power. Moreover, the elasticity of income remains more or less stable, which means that the estimated parameter is robust to the type of specification.

Focusing on the different uncertainty measures, and thus in the analysis of a precautionary motive for saving, we firstly focus on the subjective measures. Starting with the perceived income shock by households ($shock\_Y\_negat$), this variable shows a significant and negative coefficient in 2008 (-0.159) but it is not significant in 2011. Thus, it seems that this subjective measure of uncertainty implied a certain amount of precautionary saving during the upturn of the business cycle, while in the downturn it seems to exert no effect on consumption, probably due to the presence of strong employment destruction, which changed families focus on uncertainty sources. These results are similar to those of Lusardi (1997) or Guiso *et al*. (1992) who, using subjective data of the variance of income from the data provided by the Italian

[16] According to the Bank of Spain, compared to the first quarter of 2009, in the first quarter of 2011 the percentage of Spanish households with any type of financial asset was greater (and the increase in this percentage was higher in the lower half of the wealth distribution). For families with some kind of financial asset, the median value of these assets increased by 23.1%. See Bank of Spain (2014).
[17] These data of real and financial assets are taken from Bank of Spain (2014).

SHIW, find evidence in favour of the hypothesis of precautionary saving, although the estimated coefficients are small, so that precautionary saving is a small percentage of total wealth accumulation.[18] As explained above, we constructed a second subjective uncertainty measure for 2008, a binary variable taking value 1 if the reference person of the household believes he will lose his job in the forthcoming 12 months (job_loss). The regression with this variable resulted in a non-significant effect, most likely due to a low self-perceived risk of job loss during the strongest business cycle of the Spanish economy in the last 40 years. For 2011 we constructed two additional uncertainty measures. Firstly, we use the squared probability of the self-perceived probability of losing the job in the next 12 months ($p2$), which is included in our consumption equation (column (3a) in table 3). Given the non-significance of this measure, we also computed the variance of the expected income from the subjective probability of being unemployed in the next 12 months ($varY\_lab$) and estimated the model accordingly. Results, summarised in column (3b) of table 3 suggest that this subjective measure of uncertainty is not significant either. Therefore, the general image that emerges from this first set of econometric results is that subjective uncertainty measures play no role in the explanation of consumption patterns of the sample of households, which would reject the hypothesis of a precautionary saving motive. These results are in line with those of Benito (2006) who does not find evidence of precautionary savings in UK using the subjective probability of losing the job.

Turning now to the objective uncertainty measures (the unemployment rate of the reference person and the job insecurity index) we estimated consumption equations including both variables separately for each year of our analysis. Starting with the job insecurity index (columns (4) in tables 2 and 3 respectively) we observe a negative and significant coefficient in each year. In 2008 the coefficient took value -0.091 while in 2011 it fell to a value of -0.058. If we compare these results with those of including the unemployment rate (column (5) in tables 2 and 3 respectively) we observe that the estimated coefficients are negative in both years, but are only significant in 2011, with a rather large impact of unemployment on consumption in this year. Again, we interpret these results in the context of the macroeconomic performance of the Spanish economy during the recession. Unemployment was not a worrying problem in the years 2007-2008 (the unemployment rate was in its 30-year lowest value), and hence it did not

[18] This variable (subjective income shocks) refers to the perception of households if their income has been lower, higher or equal to 12 months preceding the survey, so that it collects all household income. However, the variable of income used as covariate is the sum of the income of the household reference person for the following items: income from employment, i.e., gross earnings and payments in kind (excluding daily living allowances or contributions to a pension scheme by the employer); as well as, income in the form of support provided by relatives, contributory and/or welfare benefits and private insurance. Therefore, the variable of household income shock (subjective) is a broader concept (may also be picking up variations in household income from financial assets, dividends, real estate speculation...) and related to the current wealth and that is not included in the income variable. This would explain why the income of the reference person is not significant in the regressions (purchasing power through wealth and debt) contrary to the measure of uncertainty based on the change in income.

generate uncertainty on consumption/saving decisions. Therefore, the measure of uncertainty approximated by the unemployment rate assigned to the reference person (un) is not significant for 2008. However, in 2011, due to the strong increase in the number of unemployed workers, expectations of further rises in the unemployment rate were present (in fact two years later it peaked to 26%). Given the great job destruction that was taking place, the unemployment risk became an important source of uncertainty. Hence, the unemployment rate is significant and has a strong negative impact in consumption regressions for 2011. Mody *et al*. (2012), Bande and Riveiro (2012) or Estrada *et al.* (2014) find similar results as regards the existence of precautionary savings using the level of the unemployment rate in the first two cases, and its volatility, in the latter. Campos *et al*. (2004), however, using the probability of becoming unemployed for the household reference person, find no evidence of precautionary savings. This result may be in line with our estimates for 2008, given that they analyse a period (1985-1995) in which the unemployment rate did not follow a defined pattern, with marked upswings and declines.[19]

A high value for the job insecurity indicator implies that the working conditions are not optimal, i.e., the individual has a job with poor conditions and precarious stability, which translates into a greater risk of losing it. Barceló and Villanueva (2010) use as a measure of uncertainty the type of contract of the reference person and find evidence for precautionary savings in Spain. Our measure is more complete since it adds others sources of job instability, which may reinforce or mitigate the effect of the type of contract alone, such as seniority in the company, the size of the firm, if the individual was unemployed or not during the previous year, etc. Our results point in the same line than those of Barceló and Villanueva (2010). Although unemployment may be low, the labour conditions that the individuals face in the workplace may become a source of uncertainty. For instance, individuals with a worse situation, e.g., on a temporary contract, without seniority, etc., perceive a greater uncertainty about their future job situation than others with greater job security. Therefore, in 2008 the indicator of job insecurity is significant. In 2011 this measure is still important but not as relevant as in 2008. We interpret this result as the outcome of the great job destruction that was taking place: uncertainty affected all types of work, and even being in a "good" and stable job was not a guarantee to avoid dismissals, and therefore many workers did not feel secure in their job, and saved "for a rainy day".

In columns (6) of tables 2 and 3 we include both measures of uncertainty and find that both are jointly significant only for 2011. In 2008, again, the job insecurity index is the only significant uncertainty measure, (-0.096), whereas in 2011 both the unemployment rate and the job

[19] They use data from the Households Budget Continuous Survey (1985-95).

insecurity index are significant, with a much greater value for the former. These results reinforce the general picture that emerges from the estimation of the previous models.

Overall, our results show evidence of the existence of precautionary savings in Spanish households in 2008 and 2011. The evidence obtained in this analysis for the Spanish case is consistent with the hypothesis that households adjust their consumption and savings to changes in the risk of job loss. As Deaton (2011) points out, unemployment tends to have a greater negative impact on welfare than the impact that can be explained by a reduction in income, and that higher unemployment can lead to higher savings rates not only by the increased risk of labour income, but also by the reduction in expected revenues (Mody *et al*., 2012).

The different macroeconomic context that surrounds each of these years explains differences in the effect of the different explanatory variables on consumption, as well as the differences in the sources of uncertainty. In the view of the results, we could say that the perceived uncertainty in 2008 was derived from the characteristics of employment or changes in income perceived by the household and not by unemployment. The high level of unemployment in 2011 makes this variable the main source of uncertainty. Thus, in a context of low unemployment, it doesn't generate uncertainty and therefore it is not a good measure of risk of income loss. However, the conditions an individual has in its job, measured by the job insecurity, generate uncertainty about the length of the employment spell, and therefore on future labour income, regardless of the moment of the business cycle.

6. Concluding thoughts

In general, the evidence found on this paper supports the existence of a precautionary saving motive among the Spanish households, and adds to the existing literature on this topic by providing new estimates based on different uncertainty sources. The magnitude of the effect that uncertainty has on household consumption varies depending on the considered measure of uncertainty, which in turn varies with the macroeconomic context.

Our findings corroborate the assumption that the risk of future episodes of unemployment is a good indicator of uncertainty. But we obtain evidence that when unemployment is high and rising, it becomes the main source of income uncertainty, generating a large share of precautionary saving, whereas in a context of low unemployment rates, the uncertainty measured through the jobless rate exerts no impact on household consumption. However, the composite index of job insecurity is a good proxy of the uncertainty perceived by Spanish households, regardless of the moment of the business cycle. Hence, the job insecurity indicator would be one of the most appropriate measures to proxy the uncertainty borne by households regardless of the macroeconomic context.

Appendix A1

TABLE A1. Sample size and average values of the variables included in the analysis. Households belonging to the EFF2008 and the EFF2011 whose reference person is employee

		EFF2008	EFF2011
	sample size (number of households)	1874	1724
HOUSEHOLD	annual non-durable consumption	14074.41	13757.41
	annual total consumption	17440.89	17049.01
	real wealth	247500.20	225805.20
	financial wealth	28653.73	38504.57
	debt value	46364.13	52505.57
	debt-income rate (%)	134.9	154.9
	% with credit constraints	6.6	8.9
	% with children at home	0.674	0.68
	number of adults currently working	1.756	1.654
REFERENCE PERSON	income of previous year	20759.97	24235.29
	age	43.03	43.98
	% man	55.7	59.5
	% married or De facto partner (couple)	0.706	0.682
	% with secundary education	54.6	53.6
	% with high education	27.7	29.6
UNCERTAINTY MEASURES	% households with current income Lower than usual	0.29	37.4
	% ref. person expect to loss their main job	7.6	-
	square of subjective probability of job loss	-	0.152
	variance of income from subjective probability of job loss	-	10.604
	job insecurity indicator	3.03	2.992
	unemployment rates (%)	8.6	17.3

Own elaboration from the EFF2008 and EFF2011 data.

Appendix A2

TABLE A2. List of variables used in the model and its description.

Variable name	Brief Description
lncons_nondur	Average annual non-durable consumption, in logarithms
lnY_rp_py	Total annual income of reference person in the previous year, in logarithms
lnRW	Household real wealth, in logarithms
lnFW	Household financial wealth, in logarithms
debt_3catY	Debt by categories, according with the ratio debt/gross income of household*
category 0	debt/renthog=0
category 1	debt/renthog>0 & debt/renthog<3
category 2	debt/renthog>=3
credit_const	Dummy taking value one when de household has credit constraints
numadwork	Number of adults belonging to the household that are currently working
child	Dummy taking value one when there are one or more children at home
empl_and_self	Dummy taking value one when the reference person is self_employed in addition to employee
age	Age of reference person
man	Reference person is a man
couple	Reference person is married or like De facto partner
prim_ed	Highest educational level reached by the reference person is Primary Education In the EFF educational level equal to 1, 2 or 3
sec_ed	Highest educational level reached by the reference person is Secondary Education In the EFF educational level equal to 4, 5, 6, 7, 8 or 9
high_ed	Highest educational level reached by the reference person is High Education In the EFF educational level equal to 10, 11 or 12
shock_y_negat	Dummy taking value one when the household describes its current Income Lower than usual
job_loss	Dummy taking value one when the reference person expects to loss her main job in the next 12 months
p2	Square of subjective probability of job loss in the next twelve months
varY_lab	Variance of labor income from subjective probability of job loss in the next twelve months
job_insec_ind	Job insecurity indicator
un	Average unemployment rates assigned to the household reference person according to the five-year age group to which she belongs from the microdata LFS for the current year

Own elaboration.

* Categories according with the thresholds established by the Bank of Spain in calculating measures of debt burden of households with outstanding debts in its document: “Encuesta Financiera de las Familias (EFF) 2008: métodos, resultados y cambios desde 2005”.

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