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Abstract

In this paper, we propose the use of a multidimensional approach to the measurement of economic insecurity in Spain. Using longitudinal EU-SILC data from 2008 to 2015, we calculate six different unidimensional indicators proxying the subjective and objective determinants of economic insecurity. We combine these six indicators into a single Economic Insecurity Index that allows for measuring incidence and intensity and for which we undertake a variety of robustness checks regarding the aggregation of the different dimensions (simple mean, PCA and counting approach). Results show that the probability of being economically insecure is higher for the lowest income deciles, young, temporary employees and the unemployed, while tertiary education and a relatively high occupation significantly reduces it. The incidence of insecurity falls as income deciles grow, even if insecurity affects the whole range of the income distribution, and it is significantly present in middle income households. Moreover, the contributions to insecurity by dimensions are significantly different as income grows.

Keywords: economic insecurity, employment instability, volatility, income.

JEL Classification: D63, I31.

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1 Introduction

Traditionally, the study of individual wellbeing has focused on the measurement of inequality and poverty, both in a static and a dynamic perspective, and also on the evaluation of the most effective policies to reduce them. Until recent years, the literature has paid little attention to the role of economic insecurity in modifying the individual perception of wellbeing given a level of inequality and poverty. However, since the seminal works of Osberg (1998) and Osberg and Sharpe (2005) academics have become more and more aware of the prominent role of insecurity in the measurement of wellbeing and have begun to study its dimensions and evolution but, most importantly, have started a deep discussion about the way economic insecurity should be best measured.

There is yet no consensus on the definition of economic insecurity, but some common elements may be drawn from the literature. This phenomenon can be understood as the anxiety produced by anticipating future economic losses and the awareness of not being capable of overcoming them (Osberg, 1998; Osberg and Sharpe 2002, 2005; Hacker *et al.*, 2010; Bossert and D'Ambrosio, 2013, 2016; Rohde, Tang and Rao, 2014; Rohde *et al.*, 2015). Starting from this idea, it is clear that economic insecurity has implications for individual wellbeing and it should be analysed as a part of it beyond inequality and poverty. Given that economic insecurity involves future situations and individuals' perspectives, its measurement is a complex issue. Our main purpose in this paper is to evaluate the level and evolution of economic insecurity in Spain in the last seven years (from 2009 to 2015), focusing on its changes during the Great Recession and on its determinants. We build a variety of multidimensional indices of insecurity following Rohde *et al.*'s (2015) proposal on dimensions, in our opinion a comprehensive method that allows us to construct an individual measure of economic insecurity that combines past experiences while predicting key future states that are most likely to determine the insecurity felt in the present (Osberg, 2015).

Economic security in Spain measured by the *IEWB Economic Security Index* (Osberg and Sharpe, 2002, 2005) has dropped a 23.1% between 1980 and 2009. This is a significantly different result to what has happened in other European countries where economic security has barely changed (for instance, Italy, France or Norway) or has increased (Denmark). The only developed country with a larger fall in this security index in the same period is the United States (-39%). Thus, the empirical part of this paper aims

to contribute to the analysis of economic insecurity and its determinants in a developed country where insecurity is steadily growing, but also in European countries in general, where the analyses on the matter are still scarce (Rohde, Tang and Rao, 2014; D'Ambrosio and Rohde, 2014). Moreover, our paper aims to provide an improvement in the methodology for the measurement of insecurity by considering both objective and subjective indicators as determinants of the phenomenon, by analysing the impact of the probabilities of certain hazards from a household perspective and by providing a guide for researchers aiming to estimate insecurity measures for EU countries using the currently available longitudinal datasets from the European Union Statistics of Income and Living Conditions (EU-SILC). Therefore, our approach could be straightforwardly applied in a wider European context in a comparative way in future research. Also, the measurement of economic insecurity has relevant policy implications as it can help to identify the most insecure subgroups in the population and the kind of policies that should be carried out to fight insecurity levels. We hope this paper will open a new line of research in Spain in order to improve public action.

Our index of economic insecurity for Spain can be classified within an individual multidimensional approach to its measurement, in the lines of Rohde *et al.* (2015, 2016), that combines both objective and subjective dimensions and adopts a mixed strategy between forward-looking (Rohde *et al.*, 2015) and retrospective approaches (Hacker *et al.*, 2010, 2014; Bossert and D'Ambrosio, 2013, 2016; Rohde, Tang and Rao, 2014). Therefore, it will include indicators based on previous experiences and probabilities about future events. The inclusion of objective and subjective measures gives us a more complete picture as we will be capturing both the individuals' perceptions of their future economic situation and the risks they are actually facing. As subjective indicators, we are analysing the inability to face unexpected financial expenses and a measure of financial dissatisfaction, while the income risk, the probability of future unemployment, the probability of extreme expenditure distress and changes in the inability to go on a holiday are our objective indicators.

Moreover, we will explore different methods of weighting and aggregation of these dimensions. In addition to the simple mean and Principal Components Analysis, we use the counting approach (Alkire and Foster, 2011) within the insecurity context for the first time in the literature. Finally, we are also interested in building an individual measure that allows us to study the distribution of economic insecurity among the whole population.

We believe that the most adequate methodology to construct a multidimensional Economic Insecurity Index is a counting approach considering an intermediate threshold and weighting the simple indicators by the proportion of the population less affected. Although this methodology does not capture the magnitude of the economic insecurity dimensions (we only consider if an individual is insecure or not in a given dimension and not the size of the gap), the counting approach has a large number of advantages: it is more robust to the presence of outliers and it allows for the study of both the incidence and the intensity of the phenomenon through an aggregate indicator (M_{EI}) which is decomposable by population subgroups and by dimensions. Thus, we will analyse the diverse determinants of economic insecurity depending on the individuals' position in the income distribution. Furthermore, once we have classified individuals as insecure or not, we will characterize those with the highest risk of suffering insecurity through a probit estimation, distinguishing if insecure individuals at different points of the distribution have different characteristics.

Our main findings are that, using a counting approach, approximately a 14% of the Spanish population is classified as economically insecure and the average number of dimensions in which insecure individuals are not secure is close to 4. Economic insecurity is present along the entire income distribution, even though individuals in the lowest deciles have a larger probability of being insecure, as well as young, unemployed and temporary employees. Also, it is not surprising that individuals with tertiary education, working and high occupations are less likely to be insecure. On average, all dimensions have a similar contribution to the Economic Insecurity Index, but some of them are more relevant than others to determine the risk of insecurity for individuals at different points of the income ladder.

The paper is organized as follows: Section 2 presents a discussion of the previous literature in the field while Section 3 describes the methodology used in the construction of both the unidimensional indices and the economic insecurity composite indicator. This section also includes a detailed description of the data source. In Section 4 we present our main results and Section 5 concludes.

2 Background

Even though there is not yet a consensus in the literature about the definition of what economic insecurity is, it is clear that this phenomenon affects individuals' lives in many aspects, conditioning their economic and political decisions. Insecurity could be understood as the anxiety or stress produced by the exposure of individuals to certain adverse events which may result in economic losses and the inability to recover from them (Osberg, 1998; Osberg and Sharpe, 2005; Hacker *et al.*, 2010; D'Ambrosio and Rohde, 2014; Berloffa and Modena, 2014; Ivels, 2014; Rohde, Tang and Rao, 2014). In the short run, economic insecurity may have an impact on current consumption and housing investment, which would be delayed in the prospect of future losses. Also, as Stiglitz *et al.* (2009) point out, a currently high level of economic insecurity may have an impact in future generations, because, for instance, it would be significantly harder for families suffering from economic distress to invest in their children's education, a key determinant of their future individual wellbeing. Moreover, labour market and fertility decisions may be also affected by insecurity, as well as current and future physical and mental health (Smith, 2009; Modena *et al.*, 2014; Staudigel, 2015; Rohde, Tang and Osberg, 2016; Rohde *et al.*, 2016). Therefore, uncertainty and anxiety about future economic hardship should be included in any analysis of wellbeing, as both current and future inequality could be affected by the dynamics of individual's behaviour (Boarini and Osberg, 2014).

Due to the complexity of the phenomenon, there are many classifications of economic insecurity indices according the unit of analysis (aggregate vs. individual indices), the nature of the dimensions included (objective vs. subjective indicators) or the reference period (backward vs. forward-looking approaches) among others. Regarding the first classification, the majority of economic insecurity indicators have been constructed from an aggregate perspective, resulting in measures for a given population (region, country, etc.), no matter if they are based on data at a macro or a micro level. The first research paper including an economic insecurity measure is Osberg (1998) and the idea is further developed by Osberg and Sharpe (2002, 2005, 2014). These authors propose an aggregate indicator across households with a retrospective strategy using macro data about certain downside economic risks that people may encounter. This is known as a "named risks" approach and includes the following hazards: unemployment, sickness, widowhood and

old age[1]. These dimensions are weighted by the relative size of the population most affected by the lack of any of them. The result is the *IEWB Index of Economic Security*, a multidimensional indicator which resumes the level of economic security for a given population and allows for comparison between countries and over time. Berloffa and Modena (2014) have recently improved this aggregate index considering the risk of unemployment from a household perspective, taking into account the number of household members who depend on the income of the wage earners using two different methods: the insurance approach (assigning to each household member at risk an equivalent expected loss) and the Inactive-Unemployed Dependency Rate (calculating the average number of dependent individuals by unemployed person).

Within the work of the SSF Commission[2], Hacker *et al.* (2010) developed an individual *Economic Security Index (ESI)* associating economic insecurity with large income losses. This is an aggregate indicator calculated as the share of individuals who experience at least a 25% decline in their available household income, based on changes from one year to another (following a retrospective strategy). Also, the index takes into consideration the lack of an adequate safety net (liquid financial wealth sufficient to replace lost income) and the medical out-of-pocket spending (relevant in the U.S. context).

Interestingly, a variety of recent papers underline the advantages of constructing individual indicators instead which, potentially, could subsequently be aggregated into a social indicator at a second stage summarizing insecurity for any given population (Bossert and D'Ambrosio, 2013, 2016; D'Ambrosio and Rohde, 2014; Osberg, 2015). Calculating an economic insecurity index for each individual allows the researcher to study the distribution of this phenomenon over the entire population and also in specific

[1] Osberg and Sharpe (2002, 2005) are interested in showing the evolution of those dimensions which drive economic insecurity in a given society. For that reason, their economic insecurity index is based on four specific hazards *named* in the article 25 of the United Nations Universal Declaration of Human Rights: "*Everyone has the right (...) to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control*".

[2] The Commission on the Measurement of Economic Performance and Social Progress (commonly named as the Stiglitz-Sen-Fitoussi Commission) pointed out the relevance of economic insecurity and its measurement as another determinant of wellbeing. These authors proposed to approximate aggregate economic insecurity as the population at risk of poverty, forgetting other aspects of the phenomenon. We think that a more extensive analysis is needed, since identifying economic insecurity with poverty is not correct and these should be treated as different dimensions of welfare.

sociodemographic subgroups, in addition to changes over time. It also allows for the possibility of identifying key covariates in order to design effective policies to fight against high levels of insecurity for diverse socioeconomic groups that may suffer insecurity in a different degree and based on different dimensions. Bossert and D'Ambrosio (2013) developed an individual measure of economic insecurity based on wealth as the only relevant dimension. These authors consider this variable more adequate than income in this context because it represents a "buffer stock we can rely on in case of an adverse future event". Their insecurity index is calculated as a weighted sum of current wealth and past changes on wealth stock, giving more weight to past declines than to gains (loss aversion) and to more recent events than to those further back in time. D'Ambrosio and Rohde (2014) use this indicator to study economic insecurity in Italy and in the U.S., defining wealth as the sum of financial assets minus total liabilities, including illiquid assets as housing. Another individual measure is that proposed by Rohde, Tang and Rao (2014), which focusses on income volatility rather than on wealth as a proxy to economic insecurity. As volatility concerns not only the risk of losses but also gains, they estimate a time series regression for each household and consider insecurity as the downward instability in relation to the trend. Individuals in households that increased their income relative to their overall trend are considered as secure and do not contribute to the measure.

Regarding the nature of the dimensions included in the index, and due to the inevitable psychological component of economic insecurity, a variety of authors use individuals' opinions about their future economic situation to approximate this phenomenon (Anderson, 2001; Espinosa *et al.*, 2014). However, the use of these subjective measures has been discussed in the literature (Krueger and Schkade, 2008), as people in the same situation might have different perspectives about wellbeing (in this case, economic insecurity) due to their personality, the influence of culture, their aspirations or ambitions, etc. Indeed, some authors do not believe in the reliability of subjective data and point out the weak correlation between objective and subjective measures of wellbeing (Krueger and Schkade, 2008; Jahedi and Méndez, 2014). Some researchers propose the use of objective indicators of economic insecurity (Osberg, 1998; Osberg and Sharpe, 2002; Hacker *et al.*, 2010; Bossert and D'Ambrosio, 2013; D'Ambrosio and Rohde, 2014; Rohde, Tang and Rao, 2014) to avoid these issues. Clearly, the use of both objective and subjective measures of insecurity separately would provide us with two different

measurements of economic insecurity, both probably important in their own right. Thus, an individual could be subjectively insecure but not insecure from an objective perspective. For that reason, in the same fashion as in another latent wellbeing concept such as poverty, we believe that a multidimensional analysis could be useful to take into account both points of view at a time.

Recently, some other papers have focused on building an individual economic insecurity indicator combining both objective and subjective measures. Rohde *et al.* (2015) identify economic insecurity as a latent variable and introduce an individual multidimensional approach using the Household, Income and Labour Dynamics in Australia data (HILDA). As subjective dimensions, they consider perceived job security, financial satisfaction and the inability to raise emergency funds. As objective dimensions, they include that of a relevant downward change in the income stream following the approximation by Hacker (2010, 2014). Thus, they consider that individuals are insecure if they experience at least a 25% decline in disposable income and their current income should be less than their permanent income (understood as the average individual income for the available period). They also include the probability of extreme expenditure distress as a proxy for the inability to meet standard expenses, calculated by an ordered probit in which the dependent variable is an ordinal indicator from 0 to 4 that reflects the number of *stress criteria* faced by the household (the inability to pay rent, the pawning of a household item, the inability to pay utilities and the skipping of meals). They compute this dimension as the sum of the probabilities of suffering either three or four of these hazards. They also consider the probability of unemployment as an objective dimension, estimated by a probit model in which the dependent variable takes the value 1 if the individual is currently unemployed and the explanatory variables are based upon one-period lagged regressors of a list of individual demographic and socioeconomic characteristics[3].

Following the same approach, Rohde, Tang and Osberg (2016) believe that economic insecurity is a "latent variable that can be inferred via levels of exposure to some risks rather than the risks themselves" and calculate their index based on the same subjective measures as in their previous work but using income volatility as an objective estimate of economic insecurity instead of the large income losses (they estimate a fixed-effects

[3] The Rohde *et al.* (2015) economic insecurity index shows that this phenomenon impacts more strongly on the young and unmarried individuals with low incomes and low levels of education.

model and extract the error component, using the square as a "marker of income risk"). When analysing the effect of economic insecurity on mental health, Rohde *et al.* (2016) add a *level-and-change* index of income dynamics inspired by the Bossert and D'Ambrosio (2013) indicator, approximating insecurity as a function of current income and a weighted sum of its past changes.

Furthermore, the notion of economic insecurity refers not only to current wellbeing but also to future situations and people's perspectives, making its measurement much more difficult than that of other wellbeing phenomena. For that reason, it is most common in the literature to use a backward-looking approach, considering that past experiences would determine the anxiety about the future. However, an ideal measure of economic insecurity should try to predict future states that would determine the insecurity felt in the present (Osberg, 2015). In fact, some authors have tried to capture this effect using probabilities of certain hazards (Rohde *et al,* 2015; Rohde, Tang and Osberg, 2016).

Focusing our attention in Spain, there is no previous analysis of economic insecurity, although there are studies related to its dimensions such as, for instance, downward income mobility (Bárcena and Moro, 2013; Cantó and Ruiz, 2015), employment deprivation (Gradín *et al.*, 2017) or precarious employment (García-Pérez *et al.*, 2016). Our index of economic insecurity for Spain can be classified within an individual multidimensional approach to the measurement of economic insecurity that combines both objective and subjective dimensions and adopts a mixed strategy between the forward-looking and the retrospective approaches as it will include indicators based on previous experiences and probabilities about future events. We are interested in building up an individual measure to analyse not only the Spanish society as a whole, but to study the distribution of economic insecurity among relevant population subgroups determined by gender, age, equivalent income, etc. Although our measure can be classified within the individual indices, we include several dimensions which are determined in a household level, due to the existence of economies of scale and a shared decision-making process. Moreover, the inclusion of objective and subjective measures gives us a more complete picture of the situation as we will be capturing both the individuals' perceptions of their future economic situation and the risks they are facing, based in Rohde *et al.* (2015).

3 Methodology

3.1 Economic insecurity dimensions

To construct a multidimensional index of economic insecurity, we must take into consideration several aspects: the selection of the dimensions of insecurity, the creation of an economic insecurity index selecting the weighting and aggregation method and the identification of those individuals economically insecure. In this case, our measure of economic insecurity is based on the methodology developed by Rohde *et al.* (2015) with some unavoidable adjustments in order to adapt to the information available in the EU Survey of Income and Living Conditions (EU-SILC). The result is a multidimensional index at an individual level for the 2009-2015 period which combines objective and subjective indicators that reflect the exposure to certain risks and adopts a forward-looking approach using probabilities of suffering a certain economic distress in the future.

Unfortunately, there are fewer questions in our data related to people's appreciations about their future economic situation than in the HILDA dataset that Rohde *et al*. (2015) use and none of them ask directly about perceived insecurity or labour market risk. From the information included in EU-SILC we are only able to develop two subjective indicators of insecurity: (i) the household's incapacity of facing unexpected expenses (a binary variable which takes the value 1 if the household cannot afford an unexpected required expense and pay it through its own resources, requiring assistance from other people, not paying it in the required period or deteriorating its situation regarding potential debts) and (ii) household's financial dissatisfaction. This second indicator is constructed as the difference between household disposable income and the lowest annual income that would be necessary to make ends meet according to the respondent's view, giving us more information than an ordered scale of dissatisfaction. We construct this measure with respect to the needed income level and we assign a value of 0 for those individuals who are not financially dissatisfied:

$$financial\ dissatisfaction_{it} = \begin{cases} \dfrac{w_{it} - y_{it}}{w_{it}} & if\ w_{it} > y_{it} \\ 0 & otherwise \end{cases} \quad (1)$$

where w_{it} is the lowest annual equivalized income needed to make ends meet and y_{it} the equivalized household disposable income. This indicator is bounded between 0 and

1, reflecting a higher level of dissatisfaction as it becomes closer to 1 and capturing the intensity of this phenomenon for those who are not able to afford basic expenses[4].

Our economic insecurity measure also includes four objective indicators: income risk, unemployment hazard, probability of extreme expenditure distress and changes in the inability to go on a holiday. Rohde *et al.* (2015) only include the first three and, even in these, we have some intended and unintended differences in their exact definition. Regarding the first objective dimension, we consider that an individual suffers from income risk if his household disposable income has experienced at least a 25% decline from the previous year and its level is below his permanent income (calculated as the average individual income for the period available in the data), following Hacker *et al.*'s (2010) approach and in the same way as Rohde *et al.* (2015), although we do not find necessary to account for out-of-pocket medical expenses as those are widely covered by the Spanish public health system. The income risk indicator could be represented as follows:

$$income\ risk_{it} = \begin{cases} \dfrac{y_{it} - y_{it-1}}{y_{it-1}} & if\ y_{it} < 0.75 y_{it-1}\ \ and\ \ y_{it} < \bar{y}_i \\ 0 & otherwise \end{cases} \qquad (2)$$

where y_{it} is the equivalized household disposable income at moment t, y_{it-1} is that of the previous year and $\bar{y}_i$ is permanent income, calculated as the average equivalized household disposable income for each individual and for the period available in the data[5].

Labour market situation is one of the most relevant determinants of individual economic security as it is the first source of income for most of the population. To calculate unemployment risk, we adopt a forward-looking strategy following the Rohde *et al.*'s (2015) example and we compute the probability of being unemployed in the future considering two risks: the risk of losing one's job (for current employed individuals) and the risk of not finding a job (for those currently unemployed). The indicator is estimated using a probit model in which the dependent variable takes the value 1 if the individual is unemployed in period t according to the ILO definition[6], leaving out of the sample

[4] This measure would depend on people's appreciations of which expenses they consider as basic or not.

[5] For those individuals observed twice, this is the mean between y_{it} and y_{it-1} only.

[6] According to the ILO definition, an individual is considered unemployed if he does not have any job in the week of reference, is available for work in the next two weeks and has been looking for a job in the

those individuals who are considered as inactive. Lagged individual characteristics (those at $t-1$) are used as explanatory variables, including past situation in unemployment, gender, age, occupational status, marital status, level of education, experience[7], occupation, health status and the number of household members. Note that using this estimation strategy we cannot obtain the probability of unemployment for the first wave in which the individual is present (Model 3 in Table A3).

After predicting this unemployment risk for all active individuals, we introduce a household perspective, calculating a household unemployment risk as a weighted average between the unemployment probabilities of the active members of the household in which the weights capture the relative importance of each market income[8] in the total household market income for a given year t:

$$\bar{p_h}(u_{it}) = \frac{\sum_{i=1}^{k} u_{it} \cdot m_{it}}{\sum_{i=1}^{k} m_{it}} \tag{3}$$

where u_{it} is the individual probability of unemployment, m_{it} is the individual market income at moment t and k is the number of active members in the household. After that, we impute this household unemployment probability to the inactive, who do not have any value in this dimension but suffer from a similar risk. Berloffa and Modena (2014) adjust the household unemployment risk taking into account the number of dependent members in it in a given period using an aggregate approach. In our case, instead we are dealing with the individual risk of being unemployed in the future and what we do is assign it both to the active individuals but also to other dependent household members. We believe that this is an adequate way to consider the household's dimension of unemployment in insecurity.

The third objective indicator is the probability of extreme expenditure distress, which allows us to focus our attention on certain household overdue payments: arrears on

previous month. Those individuals who are working at the time of the interview will be considered as employed and those who are neither employed nor unemployed will be classified as inactive. This classification may not exactly match the self-assessed labour status asked in the survey.

[7] Experience is defined as the number of years spent in paid work as an employee or self-employee since the individual's first regular job.

[8] Market income is calculated as the sum of employee cash income, non-cash employee income, cash benefits or self-employment incomes and pensions from individual private plans. To avoid weights above 1, we impute a value zero to all negative values (only to a relatively few number of observations: 544)

mortgage or rental payments, arrears on utility bills (as electricity, heating, gas, water...) and arrears on hire purchase instalments or other loan payments. We create an indicator from 0 to 3 which counts the number of these difficulties experienced by the household and consider it as the dependent variable in an ordered probit model. The variables reflecting the overdue payments are referred to the previous year of the survey, so we choose to include lagged values of our explanatory variables which are both related to the sociodemographic characteristics of the head (age, gender and employment status) and the socioeconomic characteristics of the household as a whole[9]. Based on this estimation, individual probabilities of obtaining a score of 2 or 3 are predicted and combined for obtaining the probability of extreme expenditure distress in the short-term. As this model is estimated at a household level, the probability obtained for a given household is imputed to each member in it. Although EU-SILC collects information on the affordability of a meal with proteins every second day, this phenomenon affects very few individuals in the population and we choose to include only certain household arrears as determinants of expenditure distress whereas Rohde *et al.* (2015) for the Australian case do consider the skipping of meals as a relevant indicator.

When an individual is suffering from an economic disorder or believes that he will be prone to suffer it in the relatively near future, it is very likely that expenses in certain items will be cut off, especially those which are less necessary for his daily life. For that reason, we consider a new dimension in our insecurity index that takes into account changes in the inability to go on a holiday, meaning the household's incapacity to afford one annual week away from home even if they would like to, provided they did enjoy it the previous year. It is most likely that this is the first item households cut back in an economically uncertain situation (Deutsch *et al.*, 2014). Despite the fact that being able to go on holiday is possibly a subjective decision, we objectivize it by calculating a binary indicator which reflects the incapacity to go on a holiday the current period (t) while the individual could afford it the previous year ($t-1$). We believe that the dynamics of the inability to go on a holiday indicator captures changes in individual economic insecurity for many households, particularly those over median income.

[9] The socioeconomic characteristics considered are: household disposable income, if the household receives some kind of financial aid, if it perceives capital income flows, tenure status, number of members, household structure, percentage of unemployed, temporary and permanent employees and percentage of household members according to their level of education and to their health status (Model 3 in Table A4).

With all these six dimensions, we believe we are globally capturing the different ways in which insecurity reveals itself, as perceptions about the financial situation, income and unemployment risk, the probability of suffering from an expenditure distress or changes in the inability to go on a holiday reveal individual's awareness of future economic difficulties. Hence, these dimensions will be the basis of our economic insecurity composite indicator.

3.2 Constructing a multidimensional index of economic insecurity

3.2.1 Individual index

As stated previously, our goal is to create a composite indicator gathering all the information supplied by the six dimensions of insecurity described above. It is well known that there are several ways to summarize the information provided by different variables, for instance, Osberg and Sharpe (2002, 2005) use a simple mean strategy and Rohde *et al.* (2015) use a Principal Components Analysis, but it is not yet clear in the literature if there is an advantage in using one particular methodology. Thus, we will explore two common methods and we will also introduce, for the first time in this context, the use of the counting approach (Alkire and Foster, 2011) as this method allows us to consider both the incidence and the intensity of economic insecurity and enables us to construct an aggregate decomposable index (M_{EI}) in order to study the contribution of population subgroups or dimensions to the overall phenomenon.

The counting approach methodology is commonly used in the measurement of multidimensional poverty analysis (Alkire and Foster, 2011). In this case, following García Pérez *et al.* (2016a and b), we adapt the strategy proposed by Alkire and Foster (2011) to produce an Economic Insecurity Index. This approach needs the setting of a threshold in each simple indicator to identify those individuals who lack security in a given dimension and, subsequently, a multidimensional threshold in order to classify individuals as economically insecure or not (double cut-off strategy). Regarding incapacity to face unexpected expenses, financial dissatisfaction, income risk and inability to go on a holiday, we consider that an individual lacks security in any of them if the individual value of the dimension is different from zero. With respect to the unemployment risk and the probability of extreme expenditure distress, we establish the

mean as a threshold, thereby those lacking security in any of those dimensions must be individuals situated above it. Our individual index (EI_i) counts the number of weighted dimensions in which the individual lacks security with respect to the total number of dimensions, being bounded between 0 and 1:

$$0 \leq EI_i = \frac{\sum_{j=1}^{D} w_j I_{ij}}{D} \leq 1 \tag{4}$$

where I_{ij} is a variable that takes the value 1 if the individual i lacks security in the dimension j and 0 otherwise, and D is the total number of dimensions (in this case, $D = 6$). We weight each dimension j by w_j, obtained as follows:

$$w_j = \frac{D * P_j}{\sum_{j=1}^{D} P_j} \tag{5}$$

where D the total number of dimensions and P_j the proportion of individuals who do not lack security in the dimension j. We choose to weight our simple indicators by the relative proportion of the population that does not suffer from insecurity in that dimension when constructing EI_i, as we believe it is worse to suffer from economic insecurity in a dimension in which most of the individuals in a reference population are secure. Furthermore, this relative perspective allows us to adapt our economic insecurity index to a given society, as the relevance of each dimension may be different in one country or another depending on its distribution.

In a second step, we set a multidimensional threshold (k) in order to identify those economically insecure. We will analyse the union approach (an individual lacking security in one sixth of the sum of weighted dimensions will be defined as insecure: $k \geq \frac{1}{6}$), the intersection approach (an individual must lack security in all indicators: $k = 1$) and an intermediate approach (an individual is economically insecure if he is not secure at least in a 50% of the sum of weighted dimensions: $k \geq 0.5$).

We have also calculated our economic insecurity index using the simplest methodology: an equal weighted mean of our six indicators. Despite its simplicity, this strategy implies that all dimensions have the same importance in our economic insecurity index. In addition, if these simple indicators are highly correlated we will be double counting the common information these variables are reflecting, but this does not seem to be the case in Spain, as none of the correlation coefficients is higher than 0.5 (see Table

A2). Each dimension has a different scale, so we standardize each of them by the max-min normalization method[10] and then we obtain the mean for each individual. Moreover, we explore a PCA approximation considering economic insecurity as a latent variable which could be inferred from our six dimensions. We compute the first principal component of the indicators and predict our composite index[11]. Nevertheless, we must be aware that Principal Components Analysis has some disadvantages, for instance, we cannot be sure that we are capturing economic insecurity instead of some other unobservable variable. Furthermore, this procedure is very sensitive to the way we define the indicators or to the presence of outliers, and once we have calculated our individual index we cannot decompose it by subpopulations or dimensions.

We believe that the counting approach is the most adequate methodology to analyse the multidimensional economic insecurity phenomenon for several reasons: the union and intersection approaches are focused on extreme events so that this strategy allows us to study economic insecurity more broadly. Also, the counting approach is not influenced by the way we define the dimensions or the presence of outliers, while the simple mean and PCA are more sensitive to these issues. Likewise, by weighting the simple indicators by the population less affected by the specific phenomenon we are giving more importance to those dimensions in which most of the individuals are secure and we are reflecting the context in which the index is calculated, as these weights will be different for diverse societies. Furthermore, the counting approach allows us to calculate some interesting aggregated indicators, taking into consideration both the incidence and the intensity of economic insecurity.

3.2.2 Aggregate index

Once we have classified individuals as insecure or not, the counting approach allows us to calculate some interesting aggregate indicators in a given society in order to study the level of economic insecurity for any particular population and its evolution over time.

[10] The max-min normalization strategy, which could be represented as follows:

$$I(x_i) = \frac{x_i - min(x)}{max(x) - min(x)}$$

[11] We may recall that this method is not scale invariant, so we previously transform our simple indicators using the max-min normalization strategy. In addition, we normalize the results from PCA, in order to obtain an economic insecurity index between zero and one.

These indicators allow us to have an adequate social measure of economic insecurity, that considers both the incidence and the intensity of the phenomenon and easily allows for comparisons in the dimension and trend of economic insecurity between different countries or subpopulations and over time. Thus, the incidence of economic insecurity (H_{EI}) in a given population is calculated as follows:

$$H_{EI} = \frac{\sum_{i=1}^{N} I(EI_i \geq k)}{N} = \frac{q_{EI}}{N} \tag{6}$$

where $I(EI_i \geq k)$ takes the value 1 if the individual is economically insecure, q_{EI} is the number of people classified as economically insecure above the threshold k and N is the total population. Also, we can measure the intensity of economic insecurity:

$$\mu_{EI}^{q_{EI}} = \frac{\sum_{i=1}^{N} EI_i I(EI_i \geq k)}{\sum_{i=1}^{N} I(EI_i \geq k)} \rightarrow A = \frac{\mu_{EI}^{q_{EI}}}{D} \tag{7}$$

where $\mu_{EI}^{q_{EI}}$ measures the mean value of the variable EI_i among the economically insecure and A is the standardization of this indicator by the number of dimensions. After that, we can calculate the economic insecurity adjusted rate (M_{EI}), which is decomposable by population subgroups and by dimensions (Alkire and Foster, 2011) and can be written as follows:

$$M_{\mathrm{EI}} = \frac{\sum_{i=1}^{N} EI_i I(EI_i \geq k)}{ND} = \frac{q_{EI}}{N}\frac{\mu_{EI}^{q_{EI}}}{D} = H_{EI}A \tag{8}$$

3.3 Data

To calculate our index of economic insecurity, we use the Spanish version of the European Survey of Living Conditions (EU-SILC), the *Encuesta de Condiciones de Vida* (*ECV*). This is a standardized source of income and socioeconomic data in the European Union, which allows for sound comparisons on EU countries' wellbeing. It contains annual individual and household data on income, employment, education, material deprivation or health, among others. In particular, we are using the longitudinal version of the survey, which is a four-year rotating panel conducted by EUROSTAT since 2004 that follows individuals a maximum of four waves. However, we must be aware that income variables are referred to the previous year of the interview, while demographic and socioeconomic information are related to the interview year. In 2013, a new

methodology for household income measurement was introduced in the Spanish version of EU-SILC. It is well known that information related to income is difficult to obtain from individuals' surveys because people tend to under-declare it (making necessary the use of imputation procedures). In this context, administrative records of Social Security and tax databases are now combined with survey information to construct better quality income variables. This methodological change does not seem to have significantly affected inequality and poverty indicators based on household income in Spain (Vega and Méndez, 2014) although mean household income has increased significantly after the new system was introduced. For this reason, in this paper we are only using a consistent income data series covering the period from 2008 to 2015 where the new methodology is used. Moreover, we find that focusing on the crisis period and evaluating how the economic downturn and recovery is reflected in economic insecurity is of interest.

We decided to trim the data eliminating the 1% tails of the household disposable income distribution (Cowell and Victoria-Feser, 2006) and to discard those individuals remaining in the survey only for a wave, due to the dynamic nature of certain dimensions. Our final dataset includes 195,675 observations corresponding to individuals observed from two to four times along the 2008 - 2015 period[12].

4 Results

4.1 Dimensions of economic insecurity

Economic insecurity is measured using six different dimensions. Descriptive statistics of the six indicators included in our index for the whole period of analysis are shown in Table 1. Regarding subjective indicators, we find that a 39.2% of the population feel the incapacity to face unexpected expenses while the average gap of financial dissatisfaction is 0.1148 (for the mean individual, their household income should increase an 11.48% to be satisfactory). Regarding our first objective indicator, the mean income drop rate is 6.39%, although if we consider only those individuals actually suffering from a household income drop its mean value is 44.15%. The average unemployment probability is 0.148, with a maximum of 0.932 while the probability of extreme expenditure distress is

[12] Our initial dataset had 209,459 observations of individuals registered from one to four times (we discard approximately a 6.58% of the original sample).

somewhat lower: a 0.041 on average. Finally, an 8.37% of the population experiences a worsening in the inability to go on a holiday indicator from $t-1$ to t.

TABLE 1. Descriptive statistics - Unidimensional indicators.

	Overall				Individuals affected	
Dimension	**Mean**	**Standard deviation**	**Min**	**Max**	**Incidence**	**Mean**
Incapacity to face unexpected expenses	0.3923 (0.0014)	0.4883	0	1	39.23%	-
Financial dissatisfaction	0.1148 (0.0006)	0.1997	0	0.9924	38.52%	0.3005 (0.0011)
Income risk	-0.0639 (0.0006)	0.1665	-0.9849	0	14.46%	-0.4415 (0.0015)
Unemployment risk	0.1482 (0.0009)	0.2154	0	0.9324	-	-
Probability of extreme expenditure distress	0.0413 (0.0002)	0.0629	0	0.5767	-	-
Inability to go on a holiday	0.0837 (0.0009)	0.2770	0	1	8.37%	-

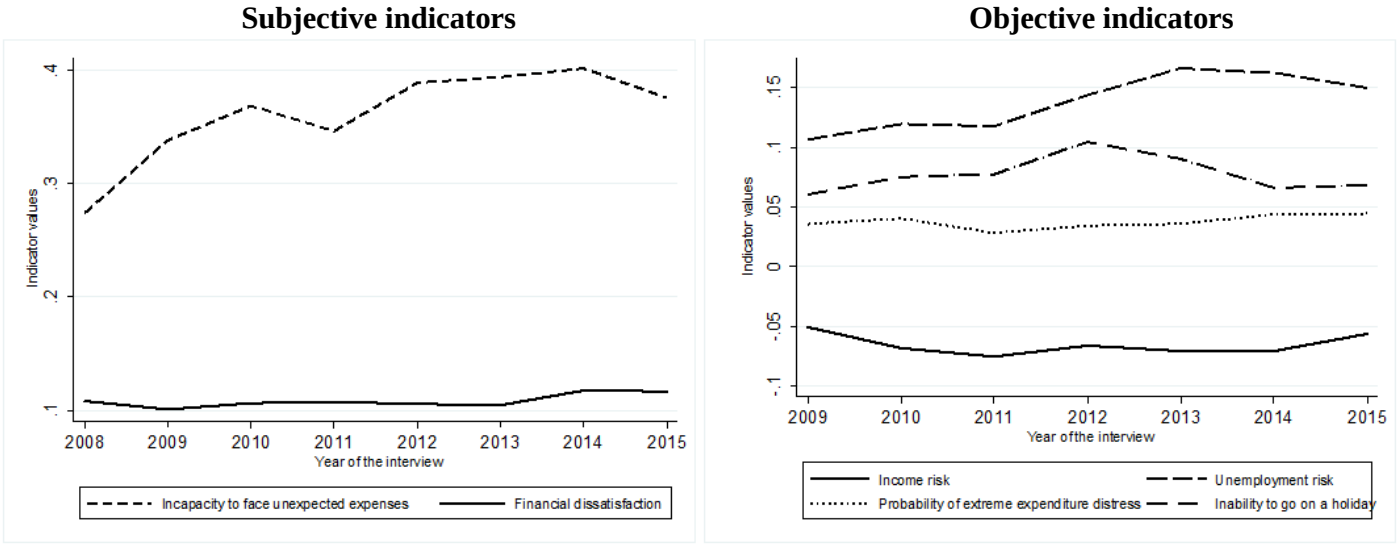
Notes: (1) We present descriptive statistics of the dimensions of economic insecurity. The overall mean includes indicators values equal to zero. (2) Affected individuals are defined as those who do not present a value of zero in a certain insecurity dimension and the incidence is calculated dividing the observations of affected individuals by the total in each indicator. (3) We do not statistics for affected individuals in unemployment risk and extreme expenditure distress as these dimensions are probabilities (we do not observe zero values), neither means of affected individuals for binary variables (incapacity to face unexpected expenses and inability to go on a holiday). (4) Standard errors for the means are shown in brackets.

Source: Author's calculations based on longitudinal EU-SILC dataset.

All previous results belong to the mean of each dimension for the whole period of analysis while dimensions could have different yearly averages depending on their correlation with the economic cycle. The economic cycle in Spain was characterized by a negative GDP growth from 2008 to 2010, recovering briefly from the recession with positives growth rates until 2011, when GDP fell back for two more years. As a consequence, there was a huge increase in unemployment rates (rising almost 18 percentage points since the beginning of the crisis) along with a large level of debt as a result of the housing bubble and in general many household's disposable income suffered from severe drops. In Figure 1 we show the population average of our insecurity dimensions by year for the 2008-2015 period in order to see their correlation with the economic cycle. Out of the two subjective indicators, the incapacity to face unexpected expenses has been persistently growing all along the period while financial dissatisfaction

has been more stable and shows some significant growth between 2009 and 2010 and from 2013 onwards. With regard to the objective indicators, unemployment risk raises notably in 2012 and 2013 (reflecting the labour market crisis in Spain, when the unemployment rate reached a 24.8% and a 26.09%, respectively) and with a little recovery since then. Also, it is worth noting the "W" shape in the income risk indicator that suggests that this dimension of insecurity is the most correlated with the economic cycle[13]. The probability of extreme expenditure distress is rather stable, reaching its maximum in 2014 and showing a small reduction in 2015. Coinciding with the second recession in the economic activity in 2012, we can observe an increase in the inability to go on a holiday indicator and returning to the level of 2009 in the last years.

FIGURE 1. Subjective and objective indicators of Economic Insecurity.



Source: Author's calculations based on longitudinal EU-SILC dataset.

4.2 Individual Economic Insecurity Index

In this section, we present the results for our individual composite indicator. Table 2 displays the descriptive statistics by year of our Economic Insecurity Index (EI_i) using the counting approach. The average normalized weighted sum of insecure dimensions for each individual fluctuates between 0.221 in 2009 and a maximum of 0.256 in 2014, meaning that individuals lack security in approximately 1.32 to 1.54 dimensions on average. We can distinguish different sub-periods: insecurity increases in 2010, has a

[13] In this case, there is a positive correlation as the index is defined in negative terms: when the economic cycle experiences a decrease, the income drop gaps will be more negative.

reduction in 2011 (-6.33%) and does not stop rising until 2015. This trend is clearly related to the evolution of the economic cycle: the drop in 2010 reflects the large reduction of the economic activity at the beginning of the Great Recession followed by a small recovery (we may recall the "W" shape of the economic growth in this period). The increase in the following years may be due to the worsening in the Spanish labour market, the loss of unemployment benefits for those long-term unemployed (having an impact on the income risk indicator) and the reduction in public spending (which has a direct effect on financial dissatisfaction and the incapacity to face unexpected expenses). In 2015, the economic recovery with the increase in growth rates and the fall in unemployment rates initiated in the previous year clearly affects our economic insecurity indicator. It seems that the Economic Insecurity Index captures the decreases in economic activity relatively fast but the subsequent rebound is reflected with a certain delay, probably because it takes more time to recover the confidence and expectations of the individuals after an economic crisis than it is to lose it when a deep recession starts.

TABLE 2. Descriptive statistics by year – individual Economic Insecurity Index (EI_i).

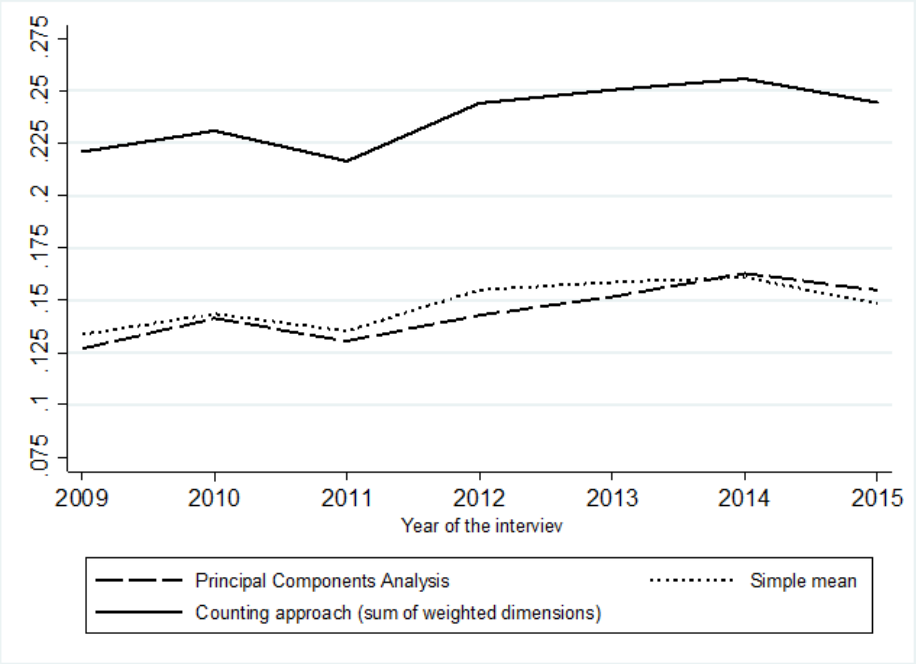
	Mean	Median	Standard deviation	% Variation of the mean
2009	0.2208 (0.0037)	0.1595	0.2247	-
2010	0.2309 (0.0027)	0.1698	0.2277	4.59%
2011	0.2163 (0.0021)	0.1595	0.2206	-6.33%
2012	0.2442 (0.0023)	0.1698	0.2308	12.90%
2013	0.2505 (0.0023)	0.1902	0.2319	2.58%
2014	0.2559 (0.0025)	0.1698	0.2417	2.16%
2015	0.2445 (0.0024)	0.1698	0.2295	-4.44%

Notes: (1) We present descriptive statistics by year of the individual Economic Insecurity Index (EI_i) using the counting approach, being the standardized weighted sum of dimensions in which the individual lacks security. (2) Standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC dataset.

We also obtain the Economic Insecurity Index using alternative methods to aggregate our six dimensions checking for robustness: simple mean and Principal Components Analysis. All three methodologies show a similar pattern in the evolution of economic

insecurity (Figure 2), although we believe the counting approach presents more advantages than the other strategies, as it is less sensitive to the presence of outliers or the way we define our six dimensions, and it can be interpreted as the percentage of the sum of weighted dimensions in which individuals do not have security.

FIGURE 2. Economic Insecurity Index. 2009 - 2015.



Source: Author's calculations from longitudinal EU-SILC dataset.

4.3 Aggregate indicators of economic insecurity using the counting approach

Even though all three methodologies present the same evolution, the counting approach has the main advantage of allowing us to study several indicators regarding the incidence and the intensity of economic insecurity as well as the contribution of our six dimensions to the overall insecurity adjusted rate (Table 3). The incidence of economic insecurity (H_{EI}) is a 52.21% when considering a union approach, a 0.14% with an intersection strategy and a 13.9% considering an intermediate threshold. In the first case, the intensity of the phenomenon ($\mu_{EI}^{q_{EI}}$) is 2.52 dimensions on average while it is close to 4 dimensions (3.93) with an intermediate strategy. We may pay attention to the economic insecurity adjusted rate (M_{EI}) which combines the information provided by the two previous indicators (incidence and intensity of economic insecurity) and it can be explained as the total weighted sum of insecure dimensions among the economically

insecure individuals divided by the maximum number of dimensions in the population. M_{EI} is significantly lower than the regular rate regarding the union approach (0.2189) and the intermediate approach (0.0911). The intersection strategy remains unchanged as it considers only those cases with the maximum intensity.

TABLE 3. Counting approach indicators and decomposition by dimensions.

		Union approach	Intermediate approach	Intersection approach
Intensity	H_{EI}	0.5221	0.1390	0.0014
Intensity	$\mu_{EI}^{q_{EI}}$	2.5162	3.9303	6.0000
Normalised intensity	**A**	0.4194	0.6550	1.0000
Economic insecurity adjusted rate	M_{EI}	0.2189	0.0911	0.0014
		Contribution to M_{EI}		
Incapacity to face unexpected expenses	M_{EI}^{1}	20.55%	18.19%	13.84%
Financial dissatisfaction	M_{EI}^{2}	19.14%	18.99%	14.28%
Income risk	M_{EI}^{3}	12.87%	14.48%	19.02%
Unemployment risk	M_{EI}^{4}	18.56%	19.65%	16.99%
Extreme expenditure distress	M_{EI}^{5}	19.13%	19.36%	15.95%
Inability to go on a holiday	M_{EI}^{6}	9.74%	9.33%	19.94%

Source: Author's calculations from longitudinal EU-SILC dataset.

In Table 3, we also present the contribution of each dimension to the economic insecurity adjusted rate. Results differ according to the threshold established to measure economic insecurity. Focusing on the intermediate approach, we can observe a similar contribution of all six dimensions, with exception of the inability to go on a holiday indicator and, to some extent, the income risk. Economic insecurity is driven mainly by four indicators, with a participation in the insecurity adjusted rate of around 20% each: unemployment risk (19.65%) and extreme expenditure distress (19.36%), followed by the two subjective indicators (18.19% for the incapacity to face unexpected expenses and 18.99% for financial dissatisfaction) while income risk (14.48%) contributes somewhat less and the holidays dimension contributes the least (9.33%).

Table 4 presents the evolution of the previous intermediate approach indicators by year. We can observe that increases in incidence (H_{EI}) not always correspond with increases in economic insecurity intensity ($\mu_{EI}^{q_{EI}}$) as, for instance, in 2010. Thus, the use of the economic insecurity adjusted rate (M_{EI}) enables us for a more complete analysis, due to the possibility of considering both incidence and intensity in one indicator. Nevertheless, in the Spanish case, changes in the economic insecurity adjusted rate are driven by changes in incidence, as normalised intensity is pretty stable along the period.

TABLE 4. Counting approach indicators by year (intermediate approach).

	Incidence	**Intensity**	**Normalised intensity**	**Economic insecurity adjusted rate**
	H_{EI}	$\mu_{EI}^{q_{EI}}$	**A**	M_{EI}
2009	0.1165	3.9601	0.6600	0.0769
2010	0.1268	3.9378	0.6563	0.0832
2011	0.1118	3.9058	0.6510	0.0728
2012	0.1470	3.9050	0.6508	0.0957
2013	0.1469	3.9294	0.6549	0.0962
2014	0.1699	3.9753	0.6625	0.1126
2015	0.1360	3.9095	0.6516	0.0886

Source: Author's calculations from longitudinal EU-SILC dataset.

4.4 Characterizing the risk of being economically insecure

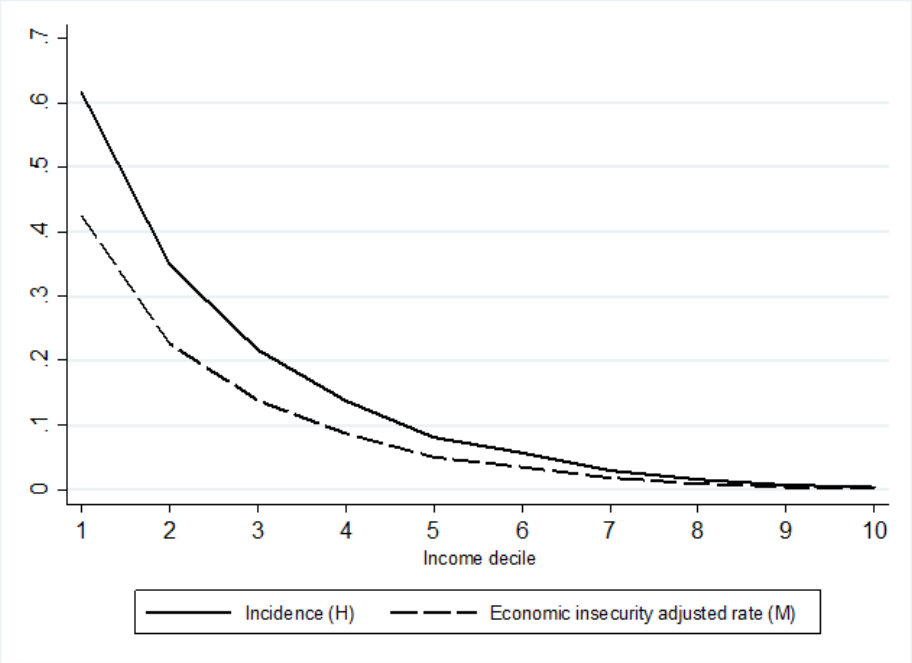
After studying the level of economic insecurity and its evolution over time, we are interested in characterising those individuals with a higher risk of insecurity and in checking if these characteristics differ for individuals in diverse socioeconomic positions. The main purpose of this analysis is to establish a profile of insecure individuals in order to know where and how to focus public action.

Figure 3 presents our Economic Insecurity Index by income decile. A first interesting result is that, economic insecurity appears along the entire income distribution and it is not only present in the lowest income deciles (a 32.1 % of insecure individuals are not classified as poor[14] while more than half of the individuals below the poverty line, a

[14] We consider as poor those individuals whose equivalent household disposable income (calculated with the OECD modified scale) is below the 60% of the median threshold, using the usual EU definition of individuals at risk of poverty (see Eurostat, 2014) .

55.52%, are not economically insecure). Nevertheless, as it could be expected, the poorest individuals are also those more economically insecure and insecurity falls as the level of income grows. A 61.63% of the individuals in the first decile suffer from economic insecurity, while this percentage falls rapidly from the second decile onwards. We can clearly distinguish three subgroups in the income distribution according the level of insecurity suffered: the three first deciles present high values of economic insecurity, from the fourth to the sixth decile insecurity shows moderated values and from the seventh decile onwards it affects a quite limited number of individuals.

FIGURE 3. Incidence (H_{EI}) and Economic Insecurity adjusted rate (M_{EI}) by income deciles.



Source: Author's calculations from longitudinal EU-SILC dataset.

In this context, taking advantage of the M_{EI} decomposability, it is also relevant to analyse if the different dimensions are more or less important to individual insecurity depending on the individual's position on the income distribution. Table 5 shows the economic insecurity adjusted rate in each income decile and the contribution of our six dimensions to this index. The participation of the incapacity to face unexpected expenses and the unemployment risk is rather constant and does not appear to be related to the income decile. Financial dissatisfaction and the probability of extreme expenditure distress are important indicators at the lower tail of the income distribution and their contribution falls for the highest deciles. On the contrary, the inability to go on a holiday indicator is more relevant for those situated in the upper tail of the distribution, probably

because individuals situated in the first deciles cannot afford a week away from home in any period and do not experience changes in this indicator. The income risk dimension does not present a clear pattern, revealing that income drops do not only matter for the poorest individuals, at least in the case of Spain.

TABLE 5. Contribution of each dimension to Economic insecurity adjusted rate (M_{EI}) by income decile.

		Contribution to M_{EI}					
	Economic insecurity adjusted rate	**Incapacity to face unexpected expenses**	**Financial dissatisfaction**	**Income risk**	**Unemployment risk**	**Extreme expenditure distress**	**Inability to go on a holiday**
1	0.4245	18.08%	20.43%	18.39%	18.04%	20.20%	4.86%
2	0.2257	18.39%	19.95%	12.69%	21.07%	20.61%	7.29%
3	0.1384	18.43%	19.19%	11.87%	21.13%	20.19%	9.19%
4	0.0867	17.40%	17.67%	11.98%	19.97%	18.52%	14.46%
5	0.0503	18.41%	15.31%	10.88%	20.13%	16.17%	19.11%
6	0.0349	17.43%	16.21%	9.10%	19.00%	15.81%	22.44%
7	0.0179	18.67%	11.62%	11.35%	20.79%	12.53%	25.04%
8	0.0090	19.57%	8.57%	10.90%	20.70%	8.48%	31.78%
9	0.0039	22.83%	1.30%	6.38%	27.65%	4.49%	37.35%
10	0.0021	21.84%	0.00%	14.43%	20.95%	6.33%	36.44%

Source: Author's own elaboration from longitudinal EU-SILC dataset.

We are also interested in studying the relationship between insecurity and several sociodemographic characteristics of the individuals. For this purpose, we estimate the probability of being economically insecure according to the intermediate counting approach methodology (see Model 1 in Table A7) for the whole population and for different subgroups based on income deciles constructed by analysing Figure 3: those with high levels of economic insecurity (deciles 1 to 3), individuals with medium insecurity (deciles 4 to 6) and those who barely suffer it (deciles 7 to 10). Table 6 displays the average marginal effects of these estimations. Focusing on the overall population, men are more insecure than women (0.48 percentage points), probably due to the fact that men were more affected by unemployment in Spain, and all age groups present less insecurity than individuals between 16 and 30, although the difference with those between 31 and 45 is not significant when we control for the status in employment effect. Older individuals are more secure probably because of wealth and savings, in contrast with children, who depend financially of other household members. Only reaching a tertiary education is relevant to reduce the risk of insecurity (the probability is 2.72 percentage

points lower regarding those individuals with primary education). As expected, household disposable income presents a large negative effect on the economic insecurity probability. Moreover, an additional member in the household reduces the probability on 1.07 percentage points while an additional child raises it (0.97). These coefficients make sense as more members in the household usually will contribute positively to their disposable income while children do not add income but increase household spending. Bad self-assessed health has a positive impact in the insecurity probability in comparison with good health (1.86 percentage points) as well as being a chronically ill person (0.71).

TABLE 6. Determinants of Economic Insecurity Index. Average Marginal Effects.

	(1) Overall	(2) Low income	(3) Middle income	(4) High income
Gender	0.0048**	0.0174	0.0097**	0.0011
	(0.0024)	(0.0229)	(0.0044)	(0.0015)
Age				
<16	-0.0193***	-0.1993***	-0.0045	-0.0059**
	(0.0048)	(0.0471)	(0.0094)	(0.0026)
31-45	-0.0027	-0.0177	0.0046	-0.005**
	(0.0043)	(0.0421)	(0.008)	(0.0025)
46-65	-0.0259***	-0.2237***	-0.0118	-0.0081***
	(0.0044)	(0.0452)	(0.0082)	(0.0024)
>65	-0.028***	-0.3433***	-0.0121	-0.0023
	(0.006)	(0.0636)	(0.0115)	(0.004)
Level of education				
Secondary	0.0024	0.0141	0.0085	-0.0022
	(0.0033)	(0.0287)	(0.0064)	(0.0028)
Tertiary	-0.0272***	-0.2675***	-0.0016	-0.0073**
	(0.0042)	(0.0427)	(0.0082)	(0.0029)
HH disposable income (ln)	-0.173***	-0.9101***	-0.2304***	-0.0369***
	(0.0022)	(0.0268)	(0.0161)	(0.0043)
Marital status				
Single or widowed	0.0011	-0.0055	0.0086	-0.0013
	(0.0033)	(0.0311)	(0.0062)	(0.0021)
Sepatated or divorced	0.0113**	0.0884**	0.0076	0.0021
	(0.0052)	(0.0442)	(0.0098)	(0.0036)
HH composition				
Number of members	-0.0107***	-0.0651***	-0.0183***	-0.0021**
	(0.0011)	(0.0097)	(0.0023)	(0.0009)
Number of children	0.0097***	0.0669***	0.0119***	0.0002
	(0.0018)	(0.0161)	(0.0035)	(0.0015)

TABLE 6. Determinants of Economic Insecurity Index. Average Marginal Effects (continued).

	(1) Overall	(2) Low income	(3) Middle income	(4) High income
Health				
Bad health	0.0186***	0.1132**	0.021	0.0037
	(0.0065)	(0.0538)	(0.0135)	(0.0046)
Chronic illness	0.0071**	0.0616**	0.0149**	-0.004**
	(0.0032)	(0.0302)	(0.0061)	(0.0018)
Basic activity status				
Inactive	-0.0189***	-0.163***	-0.0208***	-0.0017
	(0.0044)	(0.0408)	(0.0077)	(0.0032)
Unemployed	0.0878***	0.5214***	0.0754***	0.0359***
	(0.0055)	(0.0351)	(0.0112)	(0.0072)
Occupation				
High	-0.0113**	-0.0776	-0.0012	-0.0035
	(0.0049)	(0.0555)	(0.0095)	(0.0024)
Medium	0.007*	-0.0056	0.0204***	0
	(0.004)	(0.0386)	(0.0076)	(0.0025)
Low	0.0175***	0.0564	0.0179*	0.0092*
	(0.0051)	(0.0431)	(0.0099)	(0.0054)
Status in employment				
Temporary employee or without contract	0.0544***	0.347***	0.0485***	0.0256***
	(0.0049)	(0.0385)	(0.0094)	(0.0058)
Permanent employee	-0.036***	-0.223***	-0.0527***	0.0006
	(0.0049)	(0.0451)	(0.0091)	(0.0033)
Employer	-0.0608***	-0.5804***	-0.0563***	0.0027
	(0.0056)	(0.0741)	(0.0076)	(0.0067)
Independent worker	-0.0373***	-0.3489***	-0.0389***	0.0094
	(0.005)	(0.0541)	(0.0082)	(0.0058)

Notes: (1) We present average marginal effects for probit estimations in which the dependent variable is the Economic Insecurity Index calculated by the counting approach (intermediate strategy) methodology. (2) Group 1 includes deciles 1 to 3 of the income distribution, Group 2 contains deciles 4 to 6 and Group 3 is formed by deciles 7 to 10. (3) References of categorical variables are the following: age between 16 and 30 years (age), primary (education), working (basic labour status), married (marital status), good health (bad health), without occupation (occupation) and never worked (status in employment). (3) Average marginal effects for discrete variables are the discrete change from the base level. (4) For continuous variables, average marginal effects are calculated using the mean of continuous variables.
Source: Author's calculations from longitudinal EU-SILC dataset.

As we would have expected, being currently unemployed increases the probability in 8.78 percentage points with respect of those who are employed but, in contrast, being inactive implies a lower risk of insecurity compared to those who are working (-1.89 percentage points), presumably due to the financial assistance (private or public) they

receive. Furthermore, if the current or last occupation of the individual can be classified as high, the probability of being insecure decreases 1.13 percentage points with respect to those without occupation, possibly reflecting the effect of higher salaries and better labour conditions, while having a low occupation has the opposite effect (insecurity probability increases 1.75 percentage points). Employees with a temporary contract have a higher probability of being insecure (5.44 percentage points) reflecting the anxiety produced by the instability of temporary contracts or unregulated jobs and the anticipation of losses for the termination of work. Unsurprisingly, permanent employees, employers and independent workers are more secure, highlighting the relevance of job stability and good labour conditions, which in Spain are significantly more common in these particular groups (Arranz *et al.*, 2017).

Focusing on the results for the subgroups by income decile, we find interesting differences in the effect of the previous variables for individuals at diverse positions of the income distribution. Gender only matters for individuals in the middle group, although the effect is rather small (0.97 percentage points). The impact of age in the overall regression is mainly driven by those in the lower tail of the distribution. This result is similar for richer individuals, though the average marginal effects are much lower and being older than 65 is not significant in this case. For the middle group, age is not relevant, presumably because insecurity is mainly driven by the employment situation. The impact of tertiary education in reducing the risk of insecurity is much higher for the poor than for the richest individuals (-26.76 vs. -7.3 percentage points, respectively), while we cannot find any effect of education for middle classes (who are more affected by the level of occupation). With respect to marital status, being separated or divorced only affects the first group with a small marginal effect (8.84 percentage points), while it is not relevant to determine the probability of insecurity in other groups. The number of members in the household has a negative effect for all income subgroups, even if the effect decreases as income grows. The positive effect of an additional child does not matter for those with higher incomes, probably because they can afford the associated increase in expenses. Self-assessed bad health only affects those in the first group (presumably because of worse life conditions and the lack of access to medical care beyond the public system) and having a chronic illness has a larger impact for poor individuals than for those situated in the middle group (6.16 vs. 1.49 percentage points).

Regarding labour variables, being unemployed increases insecurity probability for all groups, although the impact in the lowest deciles is much larger (52.14 percentage points), as poor individuals have been more affected by this phenomenon: approximately a 21% of the people in this group are unemployed (see descriptive statistics in Table A5). Inactive status has a significant negative effect for low-income individuals (because of the access to private or public pensions) and a small marginal effect for middle classes, while it is not significant for the highest deciles. Having a medium or low occupation only increases the probability of being insecure for middle income individuals. Being a temporary employee or without a contract has a positive impact in insecurity probability, even if this effect decreases as income grows. Having a permanent contract or being an employer or an independent worker reduce the probability for the first and the second group (with larger effects for the former) but we cannot find any difference between these statuses and those who have never worked for the highest deciles (only negative affected by low quality employments). Thus, even though insecurity is present along the entire income distribution, different solutions are required for diverse socioeconomic positions, as public action should be focussed on improving those variables most relevant to each income subgroup.

5 Conclusions

This paper has proposed the analysis of economic insecurity in Spain using an intermediate counting approach to study both its nature and evolution along the last seven years (from 2009 to 2015) and characterizing insecure individuals along the entire income distribution. Our empirical analysis makes a sound proposal for a methodology to measure economic insecurity using the EU-SILC dataset which may allow for further empirical analyses of this phenomenon in a European context. We have calculated a multidimensional individual index of economic insecurity, capturing both subjective and objective dimensions and a mixed approach between a retrospective and a forward-looking strategy. In particular, we have measured the incapacity to face unexpected financial experiences and financial dissatisfaction as a proxy to self-assessed insecurity, as well as income risk (large income losses from one year to another), unemployment risk, extreme expenditure distress probability and changes in the inability to go on a holiday as objective indicators. Although we have based our analysis in Rohde *et al.*'s (2015) methodology, we have proposed new definitions of some dimensions (for

instance, the comparison between necessary and current household income to measure financial dissatisfaction or the introduction of a household perspective in the probability of unemployment), in addition to considering some new indicators (as the inability to go on a holiday indicator). Especially relevant is the use of the counting approach, typically used in multidimensional poverty analysis, as a methodology of interest in insecurity analysis due to its advantages: it is less sensitive to the presence of outliers, highlights differences in time or by income decile and allows us for the analysis of both incidence and intensity through the economic insecurity adjusted rate and its decomposition by dimensions or subpopulations.

After analysing the robustness of the individual Economic Insecurity Index to diverse methodologies, we focus on the counting approach strategy and propose the use of aggregate indicators to analyse the level and intensity of economic insecurity for a society. Using this approach, we undertake an empirical illustration in Spain where economic insecurity affects, on average, a 14% of the population with an intensity of 3.93 dimensions. Also, taking into account both incidence and intensity, we obtain an economic insecurity adjusted rate of 0.0911. Considering the whole population, all dimensions, with the exception of the inability to go on a holiday indicator, contribute in a similar way to insecurity. Moreover, its evolution between 2009 and 2015, shows a negative correlation with the economic cycle: insecurity grows when economic growth falls, even if with some delay in the economic recovery, as people's security seem to be harder to recover than to destroy.

Although insecurity is present along the entire income distribution, the relevance of our six dimensions is different by income decile. While the contribution of the incapacity to face unexpected expenses and unemployment risk are similar for any income decile, financial dissatisfaction and the probability of extreme expenditure distress mainly drive insecurity in the lower tail of the distribution and the incapacity to go on a holiday is the most important dimension for the highest deciles. In addition, income, unemployment and the quality of the job are the major determinants of economic insecurity for the whole population, even though this phenomenon is driven by different variables regarding diverse socioeconomic positions.

By identifying those groups of individuals most affected by economic insecurity and its trend along recent years, this paper contributes to the measurement of economic

insecurity as another relevant dimension of wellbeing in a European context and especially in Spain, where no previous analysis of this kind is available. Our work provides an empirical example of the use of a variety of methodologies that should be further explored in the measurement of income insecurity, expanding dimensions and using different aggregation and weighting schemes, and suggests that further development of the counting approach in this field may have significant advantages. Furthermore, our empirical results could help policy-makers to target insecure social groups and define social policies in order to reduce the increasingly high levels of economic insecurity in developed countries.

References

Alkire, S. and Foster, J. (2011). Counting and multidimensional poverty measurement, *Journal of Public Economics*, 95 (7), 476-487.

Anderson, C. J. (2001). Economic insecurity in a comparative perspective, Department of Political Science, Centre on Demographic Performance, Binghamton University, n. 117.

Arranz, J. M. and Cantó, O. (2012). Measuring the effect of spell recurrence on poverty dynamics: evidence from Spain, *Journal of Economic Inequality*, 10 (2), 191-217.

Arranz, J. M., García-Serrano, C. and Hernanz, V. (2017). Employment quality: are there differences by types of contract?, *Social Indicators Research*, online ed., 1-28.

Azpitarte, F. (2011). Measurement and Identification of Asset-Poor Households: a Cross-National Comparison between Spain and the United Kingdom, *Journal of Economic Inequality*, vol. 9 (1), 87-110.

Azpitarte, F. (2012). Measuring Poverty using both Income and Wealth: a Cross-Country Comparison between the U.S. and Spain, *The Review of Income and Wealth*, 58 (1), 24-50.

Bárcena, E. and Moro, A. (2013). Movilidad de los ingresos en España: el efecto de la crisis, *Papeles de Economía Española*, 135.

Barnes, M. G. and Smith, T.G. (2011). Tobacco Use as Response to Economic Insecurity: Evidence from the National Longitudinal Survey of Youth, *The B.E. Journal of Economic Analysis and Policy*, volume 9 (1), article 47.

Berloffa, G. and Modena, F. (2014). Measuring (in)security in the event of unemployment: are we forgetting someone?, *The Review of Income and Wealth*, series 60 (supplement issue), S77-S97.

Bilston, T., Johnson, R. and Read, M. (2015). Stress Testing the Australian Household Sector Using the HILDA Survey, Reserve Bank of Australia, Research Discussion Paper, 2015 (1).

Boarini, R. and Osberg, L. (2014). Economic Insecurity: Editors' Introduction, *The Review of Income and Wealth*, series 60 (supplement issue), S1-S4.

Bossert, W. and D'Ambrosio, C. (2013). Measuring economic insecurity. *International Economic Review*, 54 (3), 1017-1030.

Bossert, W. and D'Ambrosio, C. (2016). *Economic insecurity and variations in resources*, ECINEQ, Working Paper n. 422.

Cantó, O. and Ruiz, D. O. (2015). The contribution of income mobility to economic insecurity in the US and Spain during the Great Recession, in Garner, T. and Short, K. (eds.) Research on Economic Inequality, chapter 4, pages 109-152, vol.23,

Cowell, F. A. and Victoria-Feser, M. P. (2006). Distributional dominance with trimmed data, *Journal of Business & Economic Statistics*, 24 (3), 291-300.

D'Ambrosio, C. and Rhode, N. (2014). The distribution of economic insecurity: Italy and the U.S. over the Great Recession, *The Review of Income and Wealth*, series 60 (supplement issue), S33-S52.

Decancq, K. and Lugo, A. M. (2013). Weights in multidimensional indices of wellbeing: An overview, *Econometric Reviews*, 32 (1), 7-34.

Deutsch, J., Guio, A.C., Pomati, M. and Silber, J. (2014). Material deprivation in Europe: Which expenditures are curtailed first?, *Social Indicators Research*, 120 (3), 723-740.

Espinosa, J., Friedman, J. and Yévenes, C. (2014). Adverse shocks and Economic Insecurity: Evidence from Chile and Mexico, *The Review of Income and Wealth*, series 60 (supplement issue), S141-S159.

EUROSTAT. (2014). At-risk-of-poverty rate. In: http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty_rate

Fabrizi, E. and Mussida, C. (2009). The determinants of labour market transitions, *Giornale degli Economisti e Annali di Economia*, 233-265.

García-Pérez, C., González-González, Y. and Prieto-Alaiz, M. (2016a). Identifying the multidimensional poor in developed countries using relative thresholds: an application to Spanish data, *Social Indicators Research*, 1-13.

García-Pérez, C., Prieto-Alaiz, M. and Simón, H. (2016b). A New Multidimensional Approach to Measuring Precarious Employment, *Social Indicators Research*, 1-18.

Gradín, C., Cantó, O. and del Río, C. (2017). Measuring employment deprivation in the EU using a household-level index, *Review of Economics of the Household*, 15 (2), 639-667.

Greene, W. H. (2012). *Econometric analysis*, Prentice Hall, 7th edition.

Hacker, J., Huber, G., Rehm, P. Schlesinger, M. and Valletta, R. (2010). Economic security at risk: Findings from the Economic Security Index, Rockefeller Foundation, Yale University.

Hacker, J., Huber, G., Nichols, A., Rehm, P., Schlesinger, M., Valletta, R. and Craig, S. (2014). The economic security index: a new measure for research and policy analysis, *The Review of Income and Wealth*, series 60 (supplement issue), S5-S32.

Ivlevs, A. (2014). Economic insecurity in transition: A primary commodities perspective, *The Review of Income and Wealth*, series 60 (supplement issue), S117-S140.

Jahedi, S. and Méndez, F. (2014). On the advantages and disadvantages of subjective measures, *Journal of Economic Behavior & Organization*, 98, 97-114.

Krueger, A. B. and Schkade, D. A. (2008). The reliability of subjective well-being measures, *Journal of Public Economics*, 92 (8), 1833-1845.

Mendola, D. and Volo, S. (2017). Building composite indicators in tourism studies: Measurements and applications in tourism destination competitiveness, *Tourism Management*, 59, 541-553.

Modena, F., Rondinelli, C. and Sabatini, F. (2014). Economic insecurity and fertility intentions: the case of Italy, *The Review of Income and Wealth*, series 60 (supplement issue), S233-S255.

Nardo, M., Saisana, M., Saltelli, A., Tarantola, S., Hoffman, A. and Giovannini, E. (2005). Handbook on constructing composite indicators: Methodology and user guide, OCDE Publishing.

Nichols, A. and Rehm, P. (2014). Income Risk in 30 Countries, *The Review of Income and Wealth*, series 60 (supplement issue), S98-S116.

Olivera, J., and Ponomarenko, V. (2016). Pension insecurity and wellbeing in Europe, *Journal of Social Policy*, 46 (3), 517-542.

Osberg, L. (1998). Economic Insecurity in the Malaysian Context, Queen's University, John Deutsch Institute for the Study of Economic Policy.

Osberg, L. (1998). Economic insecurity, University of New South Wales, Social Policy Research Centre.

Osberg, L. (2015). How should one measure economic insecurity?, OECD Statistics Working Papers, 2015/01.

Osberg, L. and A. Sharpe (2014). Measuring economic insecurity in rich and poor nations. *The Review of Income and Wealth*, series 60 (supplement issue), S53-S76.

Osberg, L. and Sharpe, A. (2002). An index of economic well–being for selected OECD countries, *The Review of Income and Wealth*, vol. 48 (3), 291-316.

Osberg, L. and Sharpe, A. (2005). How should we measure the economic aspects of well-being?, *The Review of Income and Wealth*, 51(2), 311-336.

Rhode, N., Tang, K. K. and Rao, P. (2014). Distributional characteristics of income insecurity in the US, Germany and Britain, *The Review of Income and Wealth*, series 60 (supplement issue), S159-S176.

Rohde, N., Tang, K. K. and Osberg, L. (2016). The self-reinforcing dynamics of economic insecurity and obesity, *Applied Economics*, 49(17), 1668-1678.

Rohde, N., Tang, K. K., Osberg, L. and Rao, D. S. (2015). Economic Insecurity in Australia: Who is Feeling the Pinch and How?, *Economic Record*, vol. 91(292), 1-15.

Rohde, N., Tang, K. K., Osberg, L. and Rao, P. (2016). The effect of economic insecurity on mental health: Recent evidence from Australian panel data, *Social Science & Medicine*, vol. 151, 250-258.

Smith, T. G., Stoddard, C. and Barnes, M. G. (2009). Why the poor get fat: weight gain and economic insecurity, *Forum for Health Economics & Policy*, vol. 12 (2).

Staudigel, M. (2016). A soft pillow for hard times: Economic insecurity, food intake and body weight in Russia, *Journal of Health Economics*, vol. 50, 198-212.

Stiglitz, J. E., Sen, A. and Fitoussi, J. P. (2009). Report by the Commission on the Measurement of Economic Performance and Social Progress.

United Nations. Department of Economic and Social Affairs (2008). World Economic and Social Survey: Overcoming Economic Insecurity, UN Working Papers.

Vega, P. and Méndez, J. M. (2014). Comparación de los ingresos del trabajo entre la Encuesta de Condiciones de Vida y las fuentes administrativas, *INE*, Working Papers 2/2014.

Venn, D. (2011). Earnings volatility and its consequences for households, OECD Statistics Working Papers, 2015/01.

Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*, Nelson Education.

Zhou, P., Ang, B. W. and Zhou, D. Q. (2010). Weighting and aggregation in composite indicator construction: A multiplicative optimization approach, *Social Indicators Research*, 96 (1), 169-181.

Appendix

TABLE A1. Data structure.

	Wave		Number of waves in the sample	
	Freq.	**Percent**	**Freq.**	**Percent**
1	49703.17	25.4	-	-
2	58606.74	29.95	29735.24	15.20
3	48478.41	24.77	41092.97	21.00
4	38886.68	19.87	124846.78	63.80
Total	195675	100	195675	100

Source: Author's calculations from longitudinal EU-SILC dataset.

TABLE A2. Correlation between dimensions.

	Incapacity to face unexpected expenses	**Financial dissatisfaction**	**Income risk**	**Unemployment risk**	**Extreme expenditure distress**	**Inability to go on a holiday**
Incapacity to face unexpected expenses	1					
Financial dissatisfaction	0.2731	1				
Income risk	-0.1213	-0.4478	1			
Unemployment risk	0.2888	0.1960	-0.1168	1		
Extreme expenditure distress	0.4434	0.3923	-0.1063	0.3972	1	
Inability to go on a holiday	0.1442	0.0266	-0.0400	-0.0075	-0.0081	1

Source: Author's calculations from longitudinal EU-SILC dataset.

TABLE A3. Unemployment risk. Probit model.

Dependent variable: $unemployed_t$	(1) Model 1	(2) Model 2	(3) Model 3
Unemployed $_{t-1}$	1.394***	1.394***	1.394***
	(0.0366)	(0.0365)	(0.0366)
Gender $_{t-1}$	0.0229	0.0243	0.0228
	(0.0224)	(0.0225)	(0.0224)
Age $_{t-1}$	-0.0169**	-0.0169**	-0.0166**
	(0.00811)	(0.00814)	(0.00792)
Age^2 $_{t-1}$	0.000272***	0.000271***	0.000268***
	(9.90e-05)	(9.95e-05)	(9.60e-05)
Married $_{t-1}$	-0.0749***	-0.0744***	-0.0739***
	(0.0262)	(0.0279)	(0.0253)
Secondary education $_{t-1}$	-0.139***	-0.139***	-0.139***
	(0.0311)	(0.0311)	(0.0311)
Tertiary education $_{t-1}$	-0.327***	-0.325***	-0.327***
	(0.0381)	(0.0381)	(0.0381)
Experience $_{t-1}$	-0.0127***	-0.0128***	-0.0127***
	(0.00393)	(0.00392)	(0.00391)
Experience^2 $_{t-1}$	-2.89e-05	-2.78e-05	-3.00e-05
	(9.32e-05)	(9.31e-05)	(9.28e-05)
Never worked $_{t-1}$	0.363***	0.363***	0.363***
	(0.0457)	(0.0457)	(0.0457)
Employee without contract $_{t-1}$	0.693***	0.689***	0.693***
	(0.0884)	(0.0883)	(0.0884)
Temporary employee $_{t-1}$	0.614***	0.613***	0.614***
	(0.0274)	(0.0274)	(0.0273)
Employer $_{t-1}$	-0.148**	-0.150**	-0.148**
	(0.0637)	(0.0637)	(0.0637)
Independent worker $_{t-1}$	0.00763	0.00729	0.00768
	(0.0407)	(0.0407)	(0.0407)
Without occupation $_{t-1}$	0.172***	0.171***	0.172***
	(0.0437)	(0.0437)	(0.0437)
Occupation 2 $_{t-1}$	-0.264***	-0.265***	-0.264***
	(0.0567)	(0.0566)	(0.0567)
Occupation 3 $_{t-1}$	-0.00944	-0.00991	-0.00950
	(0.0510)	(0.0510)	(0.0510)
Occupation 4 $_{t-1}$	0.0384	0.0379	0.0383
	(0.0489)	(0.0489)	(0.0489)
Occupation 5 $_{t-1}$	0.0895**	0.0880**	0.0893**
	(0.0431)	(0.0432)	(0.0432)
Occupation 6 $_{t-1}$	-0.169**	-0.168**	-0.169**
	(0.0840)	(0.0839)	(0.0840)
Occupation 7 $_{t-1}$	0.247***	0.245***	0.246***
	(0.0437)	(0.0436)	(0.0437)
Occupation 8 $_{t-1}$	0.0365	0.0363	0.0363
	(0.0513)	(0.0513)	(0.0513)
Occupation 9 $_{t-1}$	0.166***	0.163***	0.166***
	(0.0441)	(0.0441)	(0.0441)
Occupation 10 $_{t-1}$	-1.084***	-1.085***	-1.084***
	(0.291)	(0.292)	(0.291)
Bad health $_{t-1}$	0.227***	0.228***	0.227***
	(0.0686)	(0.0687)	(0.0686)

TABLE A3. Unemployment risk. Probit model (continued).

	(1) Model 1	(2) Model 2	(3) Model 3
Chronic illness $_{t-1}$	0.0343	0.0336	0.0342
	(0.0279)	(0.0278)	(0.0279)
Number of HH members $_{t-1}$	0.0207**	0.0187	0.0213**
	(0.00964)	(0.0134)	(0.00878)
Number of children $_{t-1}$	0.00253		
	(0.0160)		
Type of HH 1 $_{t-1}$		0.0306	
		(0.0596)	
Type of HH 3 $_{t-1}$		0.00443	
		(0.0657)	
Type of HH 4 $_{t-1}$		0.00727	
		(0.119)	
Type of HH 5 $_{t-1}$		0.000513	
		(0.0698)	
Type of HH 6 $_{t-1}$		0.0526	
		(0.0804)	
Year 2010	-0.104**	-0.103**	-0.104**
	(0.0515)	(0.0515)	(0.0515)
Year 2011	-0.0862*	-0.0855*	-0.0861*
	(0.0496)	(0.0496)	(0.0496)
Year 2012	0.102**	0.104**	0.102**
	(0.0480)	(0.0480)	(0.0480)
Year 2013	0.0463	0.0482	0.0464
	(0.0492)	(0.0493)	(0.0492)
Year 2014	0.00742	0.00939	0.00763
	(0.0487)	(0.0488)	(0.0488)
Year 2015	-0.0619	-0.0593	-0.0617
	(0.0474)	(0.0474)	(0.0474)
Constant	-1.076***	-1.083***	-1.083***
	(0.171)	(0.179)	(0.166)
Observations	52,065	52,065	52,065
χ^2	8957.11	8967.85	8955.76
Prob. > χ^2	0.0000	0.0000	0.0000
Pseudo R^2	0.3666	0.3667	0.3667

Notes: (1) We present probit coefficients for three different estimations in which the unemployment at period t is the dependent variable. (2) We include dummies for the 19 Spanish regions as a control, though their coefficients are not shown in the Table. (3) Dummies based on the variable *Occupation* are: 1=Managers, 2=Professionals, 3=Technicians and Associate Professionals, 4=Clerical Support Workers, 5=Services and Sales Workers, 6=Skilled Agricultural, Forestry and Fishery Workers, 7=Craft and Related Trades Workers, 8=Plant and Machine Operators and Assemblers, 9=Elementary Occupations, 10=Armed Forces Occupations. (4) Dummies based on the variable *Type of HH* are: 1=One adult without dependent children, 2=Two adults without dependent children, 3=Other HH without dependent children, 4=One adult with dependent children, 5=Two adults with dependent children, 6=Other HH with dependent children. These estimations are robust to heteroscedasticity (Huber-White estimator). (4) Robust standard errors are presented in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's own elaboration from longitudinal EU-SILC dataset.

TABLE A4. Extreme expenditure distress. Ordered probit model.

Dependent variable: number of arrears $_t$	(1) Model 1	(2) Model 2	(3) Model 3
Age (HH head) $_{t-1}$	-0.00971***	-0.00998***	-0.0100***
	(0.00123)	(0.00121)	(0.00121)
Gender (HH head) $_{t-1}$	-0.0157	-0.0146	-0.0163
	(0.0247)	(0.0247)	(0.0247)
HH disposable income $_{t-1}$	-3.15e-05***	-3.15e-05***	-3.13e-05***
	(2.40e-06)	(2.40e-06)	(2.40e-06)
External aid $_{t-1}$	0.126***	0.126***	0.126***
	(0.0320)	(0.0321)	(0.0321)
Capital income $_{t-1}$	-0.413***	-0.414***	-0.415***
	(0.0275)	(0.0275)	(0.0275)
Property with mortgage $_{t-1}$	0.611***	0.610***	0.610***
	(0.0335)	(0.0335)	(0.0335)
Rent (= market price) $_{t-1}$	0.635***	0.634***	0.632***
	(0.0424)	(0.0424)	(0.0425)
Rent (< market price) $_{t-1}$	0.740***	0.739***	0.738***
	(0.0518)	(0.0519)	(0.0520)
Free accommodation $_{t-1}$	0.205***	0.205***	0.204***
	(0.0526)	(0.0525)	(0.0525)
Type of HH 2 $_{t-1}$	0.0869**	0.0838*	0.0372
	(0.0442)	(0.0442)	(0.0469)
Type of HH 3 $_{t-1}$	0.233***	0.227***	0.105*
	(0.0440)	(0.0438)	(0.0607)
Type of HH 4 $_{t-1}$	0.150	0.147	0.0978
	(0.0917)	(0.0916)	(0.0936)
Type of HH 5 $_{t-1}$	0.101*	0.0961*	-0.0132
	(0.0542)	(0.0542)	(0.0675)
Type of HH 6 $_{t-1}$	0.293***	0.286***	0.113
	(0.0535)	(0.0534)	(0.0811)
% of unemployed $_{t-1}$	0.00459***	0.00509***	0.00504***
	(0.000457)	(0.000374)	(0.000375)
% of temporary workers $_{t-1}$	0.00189***	0.00190***	0.00184***
	(0.000413)	(0.000412)	(0.000413)
% of permanent workers $_{t-1}$	-0.000670*	-0.000673*	-0.000717**
	(0.000365)	(0.000365)	(0.000366)
% with bad health $_{t-1}$	0.00277***	0.00275***	0.00281***
	(0.000642)	(0.000643)	(0.000643)
% with chronic illness $_{t-1}$	0.00213***	0.00213***	0.00219***
	(0.000485)	(0.000484)	(0.000486)
% with primary educ. $_{t-1}$	-0.000455	-0.000476	-0.000246
	(0.000610)	(0.000611)	(0.000620)
% with secondary educ. $_{t-1}$	0.000661	0.000631	0.000910
	(0.000627)	(0.000628)	(0.000637)
% with tertiary educ. $_{t-1}$	-0.00221***	-0.00226***	-0.00199**
	(0.000811)	(0.000811)	(0.000816)

TABLE A4. Extreme expenditure distress. Ordered probit model (continued).

Dependent variable: number of arrears $_t$	(1) Model 1	(2) Model 2	(3) Model 3
Number of members $_{t-1}$			0.0476***
			(0.0163)
Unemployed (HH head) $_{t-1}$	0.0685*		
	(0.0405)		
Year 2010	0.0586	0.0593	0.0602
	(0.0571)	(0.0572)	(0.0572)
Year 2011	-0.162***	-0.161***	-0.160***
	(0.0573)	(0.0573)	(0.0573)
Year 2012	-0.0708	-0.0706	-0.0689
	(0.0571)	(0.0571)	(0.0572)
Year 2013	-0.106*	-0.105*	-0.102*
	(0.0560)	(0.0560)	(0.0560)
Year 2014	-0.0545	-0.0532	-0.0497
	(0.0562)	(0.0562)	(0.0562)
Year 2015	-0.0685	-0.0670	-0.0646
	(0.0570)	(0.0570)	(0.0570)
Constant cut1	0.941***	0.920***	0.995***
	(0.128)	(0.128)	(0.130)
Constant cut2	1.523***	1.503***	1.578***
	(0.129)	(0.129)	(0.132)
Constant cut3	2.263***	2.243***	2.318***
	(0.129)	(0.129)	(0.132)
Observations	49,738	49,738	49,738
χ^2	3058.39	3044.64	3054.53
Prob. > χ^2	0.0000	0.0000	0.0000
Pseudo R^2	0.1713	0.1712	0.1715

Notes: (1) We present ordered probit coefficients for three different estimations in which the number of arrears at period t is the dependent variable. (2) We include dummies for the 19 Spanish regions as a control, though their coefficients are not shown in the Table. (3) Dummies based on the variable *Type of HH* are: 1=One adult without dependent children, 2=Two adults without dependent children, 3=Other HH without dependent children, 4=One adult with dependent children, 5=Two adults with dependent children, 6=Other HH with dependent children. (4) These estimations are robust to heteroscedasticity (Huber-White estimator). (5) Robust standard errors are presented in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's own elaboration from longitudinal EU-SILC dataset.

TABLE A5. Descriptive statistics - Determinants of Economic Insecurity Index.

Variable	Overall		Low income		Midde income		High income	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
EI index	0.139	0.346	0.388	0.487	0.091	0.288	0.014	0.118
Gender	0.510	0.500	0.511	0.500	0.508	0.500	0.511	0.500
Age								
<16	0.199	0.399	0.245	0.430	0.198	0.398	0.172	0.377
16-30	0.183	0.387	0.208	0.406	0.193	0.395	0.160	0.367
31-45	0.283	0.450	0.260	0.439	0.274	0.446	0.304	0.460
46-65	0.273	0.445	0.236	0.425	0.266	0.442	0.300	0.458
>65	0.062	0.241	0.051	0.220	0.069	0.254	0.064	0.245
Level of education								
Primary	0.170	0.375	0.256	0.437	0.191	0.393	0.101	0.301
Secondary	0.511	0.500	0.602	0.489	0.576	0.494	0.409	0.492
Tertiary	0.319	0.466	0.141	0.348	0.234	0.423	0.490	0.500
Disp. Income	15577.86	8982.820	6457.105	2304.38	12582	1889.937	23898.2	7318.817
Basic activity status								
Inactive	0.284	0.451	0.341	0.474	0.299	0.458	0.237	0.426
Working	0.610	0.488	0.446	0.497	0.602	0.489	0.719	0.450
Unemployed	0.106	0.308	0.213	0.410	0.098	0.298	0.044	0.204
Marital status								
Married	0.598	0.490	0.572	0.495	0.596	0.491	0.616	0.486
Single / widowed	0.329	0.470	0.326	0.469	0.330	0.470	0.329	0.470
Separ. / divorced	0.052	0.222	0.075	0.263	0.051	0.219	0.038	0.191
HH composition								
# members	3.572	1.264	3.914	1.426	3.611	1.223	3.328	1.122
# children	0.674	0.891	0.836	0.960	0.661	0.865	0.581	0.847
Health								
Bad health	0.039	0.195	0.050	0.217	0.043	0.202	0.031	0.173
Good health	0.939	0.239	0.923	0.266	0.935	0.247	0.953	0.212
Chronic illness	0.213	0.409	0.220	0.414	0.224	0.417	0.201	0.401
Occupation								
No occupation	0.413	0.492	0.503	0.500	0.417	0.493	0.354	0.478
High	0.193	0.394	0.067	0.250	0.131	0.338	0.315	0.464
Medium	0.300	0.458	0.274	0.446	0.345	0.475	0.286	0.452
Low	0.094	0.292	0.156	0.363	0.107	0.309	0.046	0.209
Status in employment								
Never worked	0.202	0.402	0.272	0.445	0.212	0.408	0.153	0.360
Temporary	0.201	0.401	0.325	0.469	0.208	0.406	0.118	0.323
Permanent	0.479	0.500	0.255	0.436	0.460	0.498	0.631	0.482
Employer	0.036	0.187	0.038	0.192	0.035	0.185	0.036	0.186
Independent	0.082	0.274	0.110	0.313	0.084	0.278	0.062	0.241

Source: Author's own elaboration from longitudinal EU-SILC dataset.

TABLE A6. Determinants of the Economic Insecurity Index.

Dependent variable: EI Index	(1) Model 1 Counting approach Probit estimation	(2) Model 2 PCA OLS	(3) Model 3 Equal weighting OLS
Sex	0.0342**	0.00219***	0.00227***
	(0.0169)	(0.000641)	(0.000853)
Age			
<16	-0.141***	-0.0105***	-0.00850***
	(0.0360)	(0.00157)	(0.00204)
16-30	-0.0189	-0.000285	0.000613
	(0.0306)	(0.00138)	(0.00181)
46-65	-0.190***	-0.00743***	-0.00547***
	(0.0332)	(0.00137)	(0.00183)
>65	-0.213***	-0.0120***	-0.00604**
	(0.0494)	(0.00175)	(0.00240)
Level of education			
Secondary	0.0171	-0.00340***	-0.0106***
	(0.0235)	(0.00109)	(0.00139)
Tertiary	-0.200***	-0.00948***	-0.0245***
	(0.0318)	(0.00126)	(0.00163)
HH disposable income (ln)	-1.223***	-0.144***	-0.122***
	(0.0174)	(0.000844)	(0.000851)
Basic activity status			
Inactive	-0.136***	-0.0105***	-0.00976***
	(0.0322)	(0.00138)	(0.00180)
Unemployed	0.521***	0.0696***	0.0752***
	(0.0276)	(0.00153)	(0.00182)
Marital status			
Single or widowed	0.00789	0.00727***	0.0109***
	(0.0232)	(0.000928)	(0.00123)
Separated or divorced	0.0781**	0.0208***	0.0277***
	(0.0347)	(0.00158)	(0.00201)
HH composition			
Number of members	-0.0755***	-0.00233***	-0.00106**
	(0.00806)	(0.000351)	(0.000440)
Number of children	0.0685***	0.00362***	0.00116*
	(0.0129)	(0.000542)	(0.000685)
Health			
Bad health	0.126***	0.0175***	0.0246***
	(0.0421)	(0.00180)	(0.00229)
Chronic illness	0.0499**	0.00821***	0.0105***
	(0.0224)	(0.000870)	(0.00113)

TABLE A6. Determinants of the Economic Insecurity Index (continued).

Dependent variable: EI Index	(1) Model 1 Counting approach Probit estimation	(2) Model 2 PCA OLS	(3) Model 3 Equal weighting OLS
Occupation			
High	-0.0816**	0.000440	-0.00741***
	(0.0366)	(0.00114)	(0.00156)
Medium	0.0494*	-0.00263**	-0.000722
	(0.0277)	(0.00111)	(0.00148)
Low	0.120***	0.00799***	0.0128***
	(0.0337)	(0.00157)	(0.00201)
Status in employment			
Temporary employee or without contract	0.352***	0.0334***	0.0313***
	(0.0291)	(0.00141)	(0.00178)
Permanent employee	-0.256***	-0.00915***	-0.00734***
	(0.0348)	(0.00140)	(0.00188)
Employer	-0.522***	-0.0180***	-0.0250***
	(0.0608)	(0.00206)	(0.00279)
Independent worker	-0.289***	-0.0146***	-0.0161***
	(0.0432)	(0.00173)	(0.00225)
Constant	10.06***	1.460***	1.266***
	(0.178)	(0.00877)	(0.00908)
Observations	95,989	95,989	95,989
χ^2 / F	9865.84	1555.12	1404.17
Prob > χ^2 / F	0.0000	0.0000	0.0000
Pseudo R^2 / R^2	0.3581	0.6708	0.4933

Notes: (1) We present three different estimations in which the Economic Insecurity Index is the dependent variable. We show probit coefficients for the counting approach index, while OLS coefficients are presented for PCA and the simple mean indices. (2) We include dummies for the 19 Spanish regions and for the years of interview as a control, though their coefficients are not shown in the Table. (3) References of categorical variables are the following: age between 16 and 30 years (age), primary (education), working (basic labour status), married (marital status), good health (bad health), without occupation (occupation) and never worked (status in employment). (4) These estimations are robust to heteroscedasticity (Huber-White estimator). (5) Robust standard errors are presented in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's own elaboration from longitudinal EU-SILC dataset.

TABLE A7. Determinants of the Economic Insecurity Index by income groups.

Dependent variable: EI Index (counting approach)	(1) Overall	(2) Low income	(3) Middle income	(4) High income
Gender	0.0342**	0.0174	0.0670**	0.0364
	(0.0169)	(0.0229)	(0.0301)	(0.0485)
Age				
<16	-0.141***	-0.199***	-0.0315	-0.220**
	(0.0360)	(0.0471)	(0.0666)	(0.110)
16-30	-0.0189	-0.0177	0.0318	-0.169*
	(0.0306)	(0.0421)	(0.0543)	(0.0879)
46-65	-0.190***	-0.224***	-0.0832	-0.295***
	(0.0332)	(0.0452)	(0.0592)	(0.0913)
>65	-0.213***	-0.343***	-0.0872	-0.0790
	(0.0494)	(0.0636)	(0.0873)	(0.146)
Level of education				
Secondary	0.0171	0.0141	0.0588	-0.0717
	(0.0235)	(0.0287)	(0.0445)	(0.0904)
Tertiary	-0.200***	-0.268***	-0.0111	-0.247**
	(0.0318)	(0.0427)	(0.0572)	(0.0984)
HH disposable income (ln)	-1.223***	-0.910***	-1.589***	-1.204***
	(0.0174)	(0.0268)	(0.111)	(0.129)
Basic activity status				
Inactive	-0.136***	-0.163***	-0.149***	-0.0556
	(0.0322)	(0.0408)	(0.0571)	(0.111)
Unemployed	0.521***	0.521***	0.428***	0.676***
	(0.0276)	(0.0351)	(0.0533)	(0.0849)
Marital status				
Single or widowed	0.00789	-0.00548	0.0585	-0.0419
	(0.0232)	(0.0311)	(0.0418)	(0.0686)
Separated or divorced	0.0781**	0.0884**	0.0510	0.0641
	(0.0347)	(0.0442)	(0.0640)	(0.105)
HH composition				
Number of members	-0.0755***	-0.0651***	-0.126***	-0.0693**
	(0.00806)	(0.00967)	(0.0157)	(0.0308)
Number of children	0.0685***	0.0669***	0.0822***	0.00809
	(0.0129)	(0.0161)	(0.0243)	(0.0479)
Health				
Bad health	0.126***	0.113**	0.135*	0.110
	(0.0421)	(0.0538)	(0.0809)	(0.124)
Chronic illness	0.0499**	0.0616**	0.0996**	-0.141**
	(0.0224)	(0.0302)	(0.0394)	(0.0665)

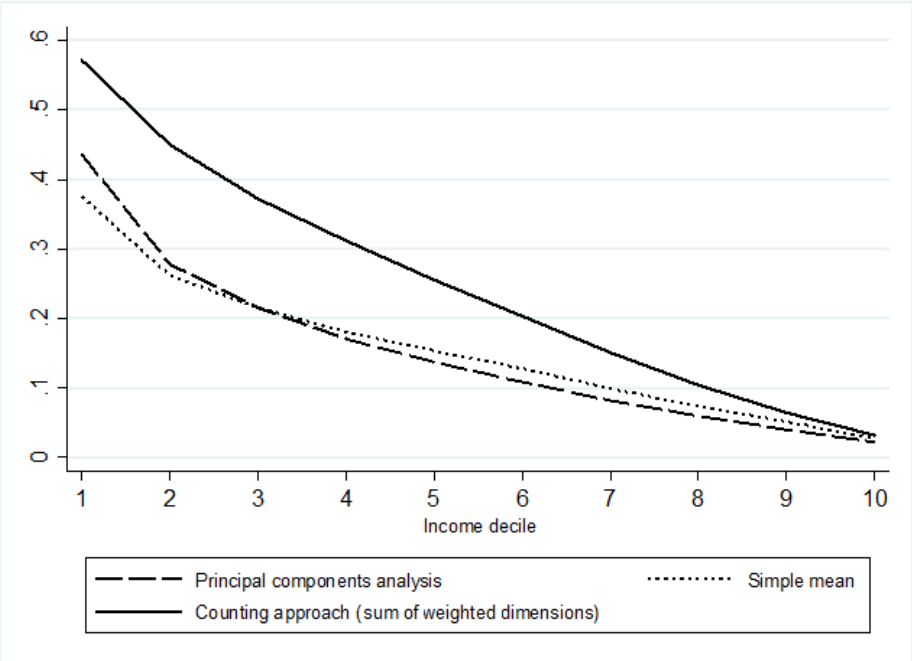
TABLE A7. Determinants of the Economic Insecurity Index by income groups (continued).

Dependent variable: EI Index (counting approach)	(1) Overall	(2) Low income	(3) Middle income	(4) High income
Occupation				
High	-0.0816**	-0.0776	-0.00813	-0.121
	(0.0366)	(0.0555)	(0.0662)	(0.0880)
Medium	0.0494*	-0.00561	0.138***	-0.000106
	(0.0277)	(0.0386)	(0.0500)	(0.0800)
Low	0.120***	0.0564	0.117*	0.246**
	(0.0337)	(0.0431)	(0.0613)	(0.119)
Status in employment				
Temporary employee or without contract	0.352***	0.347***	0.304***	0.580***
	(0.0291)	(0.0385)	(0.0537)	(0.0899)
Permanent employee	-0.256***	-0.223***	-0.369***	0.0202
	(0.0348)	(0.0451)	(0.0640)	(0.106)
Employer	-0.522***	-0.580***	-0.525***	0.0814
	(0.0608)	(0.0741)	(0.101)	(0.188)
Independent worker	-0.289***	-0.349***	-0.314***	0.248*
	(0.0432)	(0.0541)	(0.0785)	(0.127)
Constant	10.06***	7.412***	13.51***	9.660***
	(0.178)	(0.254)	(1.051)	(1.312)
Observations	95,989	25,705	28,447	41,837
χ^2 / F	9865.84	3189.16	1103.12	573.43
Prob > χ^2 / F	0.0000	0.0000	0.0000	0.0000
Pseudo R^2 / R^2	0.3581	0.1826	0.1243	0.1738

Notes: (1) We present three different estimations in which the Economic Insecurity Index (counting approach) is the dependent variable for diverse income groups. Group 1 includes deciles 1 to 3 of the income distribution, Group 2 contains deciles 4 to 6 and Group 3 is formed by deciles 7 to 10. (2) We include dummies for the 19 Spanish regions and for the years of interview as a control, though their coefficients are not shown in the Table. (3) References of categorical variables are the following: age between 16 and 30 years (age), primary (education), working (basic labour status), married (marital status), good health (bad health), without occupation (occupation) and never worked (status in employment). (4) These estimations are robust to heteroscedasticity (Huber-White estimator). (5) Robust standard errors are presented in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's own elaboration from longitudinal EU-SILC dataset.

FIGURE A1. Economic Insecurity Index by income deciles.



Source: Author's calculation from longitudinal EU-SILC dataset.