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Tesis Doctoral presentada por

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Abstract

Economic insecurity has clearly a relevant impact on individual well-being and quality of life, even if it is only in recent years that social and economic researchers have started to pay attention to this important dimension. Economic insecurity can be understood as the stress that people experience when anticipating future economic distress. Both the reference to future periods as well as the psychological element that insecurity includes pose major difficulties when aiming to measure it, which is clearly a major drawback. Nonetheless, in the wake of the Great Recession a significant number of academics have recognised its importance in determining individual well-being and its potential effects on real economic variables and have proposed a variety of ways to assess its dimension and relevance in the social and economic functioning. Unfortunately, we are still at the starting point of many of these analyses and, consequently, still far from reaching a consensus on how it is best to measure economic insecurity and thus soundly interpret the results obtained.

The present dissertation hopes to contribute to this key debate in the assessment of economic insecurity through four relevant research studies that add to the measurement and empirical analysis of this phenomenon in Europe. More specifically, this thesis aims to construct a comprehensive methodology which allows to measure economic insecurity in Europe, drawing on a variety of dimensions and indicators that can be easily obtained from the information present in the European Union Statistics on Income and Living Conditions database (hereafter, EU-SILC). This data source is harmonised for more than 30 countries in Europe and produced on a regular basis, which is a major advantage to provide sound empirical analyses of insecurity over time.

In Chapter 2 we conduct a systematic review of current existing measures of economic insecurity and we conclude that surveys on subjective expectations are the best tool to approximate this phenomenon. However, these surveys are not widespread and multidimensional insecurity indices combining subjective and objective dimensions based on living conditions surveys arise as a valuable alternative. In this chapter we contribute to the literature by analysing four different methods to aggregate and weigh dimensions when computing a synthetic indicator of economic insecurity using data from the most popular living conditions survey in Europe (EU-SILC) for Spain. We find that

the evolution and distribution of economic insecurity are robust to the aggregation technique used, even if insecurity levels are different. We believe that a counting approach has the greatest advantages, as this method provides a straightforward economic interpretation and produces a more accurate measurement of insecurity levels in middle-classes in comparison with other procedures which give more relevance to extreme situations. Therefore, in Chapter 3 we deepen the analysis of the role of a variety of insecurity dimensions and we combine six different unidimensional indicators in a single index based on a counting approach strategy that proxies the subjective and objective determinants of the phenomenon, which allows us to identify its incidence and intensity separately. We then undertake an empirical illustration of this methodology in three European countries, finding that economic insecurity prevalence decreases as household disposable income grows. Furthermore, in Spain and France a significant proportion of insecure individuals are present in middle-income households while that is not the case in Sweden.

In Chapter 4 we extend our comparative analysis to the European context, clustering countries into five groups which aim to capture diverse welfare state regimes. Using the multidimensional economic insecurity index proposed in previous chapters, we find that Mediterranean and Eastern European countries show the largest levels of economic insecurity whereas social-democratic countries are the most secure. However, insecurity affects the population in the middle classes only in some countries but not in others. The contribution of dimensions to overall insecurity also differs by country group: the role of objective versus subjective dimensions is larger in post-transition Eastern European regimes than in long-standing capitalist countries and the level of insecurity in liberal regimes is more linked to large income losses than elsewhere. Furthermore, we conclude that the young, the less educated and the unemployed living in households with dependent children are the subpopulations that are most vulnerable to economic insecurity in all Europe.

Finally, in Chapter 5 we test if tax-benefit policies are helpful in reducing economic insecurity by acting as a public safety net in case economic risks materialise in a near future. We consider the impact of individuals' characteristics and macroeconomic variables on economic insecurity simultaneously by using multilevel modelling techniques. We confirm that the individual determinants of insecurity we found in the previous chapter are relevant, but we also discover a significant role of country-wide

variables. More generous social protection expenditure and larger personal tax revenue contributes to reduce economic insecurity, especially those social protection functions related to specific economic hazards. Moreover, the tax-benefit system shows an additional effect on the insecurity of households with dependent children beyond its general impact on insecurity for the population as a whole.

Resumen

No hay duda de que la inseguridad económica tiene un impacto relevante en el bienestar individual y en la calidad de vida. Sin embargo, solo en los últimos años los investigadores sociales y económicos han centrado su atención en esta importante dimensión. Esta inseguridad económica puede entenderse como el estrés que experimentan los individuos al anticipar futuros problemas económicos. Así, tanto la referencia a períodos futuros como el elemento psicológico que incluye la inseguridad plantean grandes dificultades a la hora de medirlo. No obstante, a raíz de la Gran Recesión, numerosos académicos han reconocido la importancia de este fenómeno en la determinación del bienestar individual además de sus posibles efectos sobre las variables económicas reales, proponiendo una amplia variedad de métodos para evaluar su dimensión y relevancia en el plano social y económico. Desafortunadamente, todavía estamos en el punto de partida de muchos de estos análisis, lo que supone que aún estamos lejos de llegar a un consenso sobre cuál es la mejor manera de medir la inseguridad económica y, por lo tanto, de interpretar de manera sólida los resultados obtenidos.

Esta disertación espera contribuir a este debate clave sobre la evaluación de la inseguridad económica a través de cuatro estudios de investigación relevantes que contribuyen la medición y al análisis empírico de este fenómeno en Europa. Más concretamente, esta tesis tiene como principal objetivo construir una metodología integral que permita medir la inseguridad económica en Europa, basándose en una variedad de dimensiones e indicadores que podrían obtenerse fácilmente de la información incluida en la Encuesta sobre Ingresos y Condiciones de Vida en la Unión Europea (EU-SILC). Esta fuente de datos está armonizada para más de 30 países en Europa y se produce de forma regular, lo que supone una gran ventaja para análisis empíricos sólidos de la inseguridad a lo largo del tiempo.

En el Capítulo 2 realizamos una revisión sistemática de las medidas de inseguridad económica existentes hasta el momento y concluimos que las encuestas sobre expectativas subjetivas son la mejor herramienta para aproximar este fenómeno. Sin embargo, la producción de estas encuestas no está generalizada, por lo que los índices multidimensionales que combinan tanto dimensiones subjetivas como objetivas basados en encuestas de condiciones de vida surgen como una valiosa alternativa. En este capítulo

contribuimos a la literatura a través del análisis de cuatro métodos distintos de agregación y ponderación de dimensiones para calcular un indicador sintético de inseguridad económica en España a través de la encuesta de condiciones de vida más utilizada en Europa (EU-SILC). Nuestros resultados indican que la evolución y distribución de la inseguridad económica son robustas a la técnica de agregación utilizada, a pesar de que los niveles de inseguridad son diferentes. Creemos que un enfoque de conteo ofrece mayores ventajas, ya que este método proporciona una interpretación económica directa y produce una medición más precisa de los niveles de inseguridad en las clases medias en comparación con otros procedimientos que dan más relevancia a situaciones extremas. Así, en el Capítulo 3 profundizamos en el análisis de las dimensiones de la inseguridad y combinamos seis indicadores unidimensionales diferentes que representan los determinantes subjetivos y objetivos de la inseguridad económica en un único índice basado en un enfoque de conteo, lo que nos permite medir la incidencia y la intensidad del fenómeno. Posteriormente, realizamos una ilustración empírica en tres países europeos, descubriendo que la incidencia de la inseguridad económica disminuye a medida que aumenta la renta del hogar. Además, localizamos una proporción significativa de personas inseguras en hogares de renta media tanto en España como en Francia, pero no en Suecia.

En el Capítulo 4, extendemos nuestro análisis comparativo de la inseguridad económica al contexto europeo, agrupando a los países en cinco grupos que representan diversos regímenes del Estado de Bienestar. Utilizando el índice de inseguridad económica multidimensional propuesto en capítulos anteriores, encontramos que los países mediterráneos y de Europa del Este muestran los mayores niveles de inseguridad económica, mientras que los países socialdemócratas son los más seguros. Sin embargo, la inseguridad afecta a la población de la clase media solo en algunos países. La contribución de las dimensiones a la inseguridad general también difiere según el grupo de países: el papel de las dimensiones objetivas frente a las subjetivas es mayor en los regímenes de Europa del Este que en los países capitalistas históricos y el nivel de inseguridad en los regímenes liberales está más vinculado a grandes pérdidas de renta que en otros lugares. Además, nuestros resultados sugieren que los jóvenes, los menos educados y los desempleados que viven en hogares con hijos dependientes son las subpoblaciones más vulnerables a la inseguridad económica en todo el contexto europeo.

Finalmente, en el Capítulo 5 comprobamos si las políticas de impuestos y prestaciones son útiles para reducir la inseguridad económica al actuar como una red de seguridad pública en caso de que diversos riesgos económicos se materialicen en un futuro cercano. En este caso, consideramos simultáneamente el impacto en la inseguridad económica tanto de características individuales como de variables macroeconómicas utilizando técnicas multinivel. Confirmamos los determinantes individuales de la inseguridad que encontramos en el cuarto capítulo y además encontramos un papel significativo de las variables específicas de país. Un gasto más generoso en protección social y mayores ingresos por impuestos personales contribuyen a reducir la inseguridad económica, especialmente aquellas funciones de protección social relacionadas con riesgos económicos específicos. Además, el sistema de impuestos y prestaciones muestra un efecto adicional sobre la inseguridad de los hogares con hijos dependientes más allá del impacto general sobre la inseguridad de la población en general.

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Chapter 1

Introduction

1.1 Background and motivation

When making economic decisions in our daily lives, individuals mainly take into account their current economic and financial situation and, to some extent, the expectations they have about different possible scenarios in the future. If our current circumstances are not the best but there are prospects of improvement in a later period, we will probably assume more economic risks than if our present situation was expected to be persistent in time. On the contrary, if we expect a financial distress in a foreseeable future, we will try to protect ourselves against its negative consequences. It seems obvious that individuals anticipate the future in addition to considering the present. People have internalised economic insecurity as a relevant determinant of well-being, but the literature has not paid too much attention to this phenomenon until recent years. How do we define and measure economic insecurity? To what extent do predictions about future economic hazards influence decision making and quality of life? Which are the main factors that determine economic insecurity in developed economies? Are some subpopulations more secure than others? Is insecurity related to another low well-being phenomena or does it extend to the entire population? Are there any public instruments that help reduce this problem? The four essays included in this doctoral dissertation try to answer many of these questions by proposing a multidimensional approach in the measurement of economic insecurity.

The economic security notion was already present in the Universal Declaration of Human Rights, which in its Article 25.1 recognised "(…) the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control" (United Nations, 1948). Sen (2000) also acknowledges the relevance of security for achieving development and claims that we must combat the insecurity that occasional economic downturns may cause to individual's well-being. Furthermore, this author notes that "trying to guarantee secure daily living in general, we need social and economic provisions (for example, for so-called "economic safety nets" and the guaranteeing of basic education and healthcare), but also political participation" (Sen, 2000, p.4). Economic insecurity can be therefore understood as one of the factors that reduce individuals' freedom to achieve their capabilities and control their lives.

Most people at some point in their lives have felt fear of future events associated with uncertain economic losses but, even though economic insecurity is strongly present in

society, there is still no academic consensus on its definition. Nonetheless, some common elements can be drawn from the existing literature. According to Hacker (2018), there are three fundamental components that form the economic insecurity concept: a) the probability of an adverse shock in the future; b) a negative economic result in case this event materialises; and c) the existence/absence of some protection against economic distress. Academics agree that economic insecurity must imply the expectation of an involuntary downward loss. Future financial gains are not of relevance, but rather the losses that individuals may face. Here, the concept of economic insecurity detaches from the notion of volatility, which treats gains in the same way as losses. Thus, we are interested in the exposure to significant downside risks, meaning that unfortunate situations in the future are probable but not completely certain (Osberg, 2018). Economic insecurity does neither fully correspond with uncertainty: while the former notion only implies involuntary vulnerability to negative forthcoming experiences, the individual could engage voluntarily in some decisions which imply ignorance of the result with certainty but not insecurity (Rohde and Tang, 2018). In addition, individuals facing an unintentional exposure to significant downward risk must lack of insurance against this financial distress. Thus, these references to future economic hazards pose serious difficulties in designing indicators to measure the phenomenon.

Researchers face an additional challenge when defining and measuring economic insecurity: personal well-being in this case is not only determined by the objective exposure to risk but also by the psychological impact of these negative financial expectations. In words of Rohde and Tang (2018), economic insecurity implies "an 'anxiety function' of which 'economic risk' is a key input". Economic insecurity entails that people suffer from anxiety or stress derived from negative economic prospects. Thereby, this notion gives a prominent role to idiosyncratic factors which transform objective risk exposure in a subjective response to financial hazards. That is, extremely optimistic individuals could feel economically secure although they may face large objective danger looms, while very pessimistic people could report a high level of insecurity when dealing with small future economic losses. This perceived subjective insecurity and the way individual decisions are affected are key to the quality of life.

Despite the importance that economic insecurity has in shaping individual well-being, this phenomenon has not received sufficient attention from the literature until recent years. In the wake of the Great Recession, a large number of people suffered from

negative financial shocks which led to a decrease in their quality of life. Individuals faced huge income losses, an increase in unemployment risk and a rise in household debt among other economic distresses, thereby increasing inequality, poverty and material deprivation. In this context, individuals' confidence in public institutions and political leaders declined sharply while there was a deterioration of future economic prospects. In other words, people worried more about financial shocks in later periods and the impossibility to overcome their negative consequences, that is, they became more economically insecure (Hacker, 2018). Thereby, the financial crisis rose attention of the economic insecurity notion which was included in the "Report by the Commission on the Measurement of Economic Performance and Social Progress" (Stiglitz, Sen and Fitoussi, 2009) as one of the dimensions that must be taken into consideration when assessing the development of societies. It is precisely then that economists became more and more interested in extending academic research in this field and a first step is being mostly focused on how to best measure economic insecurity.

The seminal works by Osberg (1998) and Osberg and Sharpe (2002, 2005) were the first in including an economic security index as one of the main components of economic well-being. These authors compute an aggregate index including unemployment, illness, family breakup and old age as the relevant objective economic risks causing insecurity. After that, Hacker et al. (2008, 2010, 2014) proposed to approximate economic insecurity by large income losses from one year to the next also considering out-of-pocket medical expenses and liquid financial wealth. Bossert and D'Ambrosio (2013) propose a measure of insecurity at the individual level with a combination of wealth stock and its past changes, as a proxy of a buffer against financial hazards and subjective expectations' formation. Also, within individual economic indices, Rohde et al. (2015) suggest that just one variable is not able to fully capture all economic insecurity aspects, and thus introduce a multidimensional framework in economic insecurity analysis that considers both subjective and objective aspects of the phenomenon. The methodological approach of the present dissertation lies within this multidimensional setting: our departure point is that one variable alone cannot represent the economic insecurity notion. It is rather the joint distribution of a series of indicators that is most useful to try to incorporate the psychological element of insecurity as well as the exposure to certain financial risks.

However, while most of research on economic insecurity arose from the experience of the Great Recession, this phenomenon is not exclusive of an economic downturn. Osberg

and Sharpe's (2005, 2014) index for most OECD countries was remarkably stable from 1984 to 2014, even though economic security levels differ considerably by country. Norway and Denmark are the most secure countries while Spain and the United States show a worrying degree of insecurity. However, economic security in Spain registered the largest decline in the period of analysis (security was a 18% higher in 1984 than in 2014) while the United States experience a huge improvement (62% increase). Hacker (2018) finds a general increase in the incidence of large income losses from 2000 to the financial crisis, followed by a downward trend due to the economic recovery. Thus, some countries and especially the United States, were already experiencing an increase in income falls' prevalence even before the Great Recession.

As mentioned before, most of the existing literature is focussed on discovering which is the best method to compute economic insecurity. Nevertheless, public institutions need empirical analyses together with theoretical approaches in order to broadly understand this phenomenon and design effective policies to mitigate it and improve individual well-being (Osberg, 2018). So far, empirical studies of economic insecurity are limited and narrow as most of them focus on a particular country while broad comparative analyses beyond two or more countries are rare, probably due to the lack of access to harmonised databases that provide information on key issues related to economic insecurity. We intend to fill this gap by analysing the level, evolution and distribution of economic insecurity in a wide context such as Europe. For this purpose, we propose an individual and multidimensional economic insecurity index based on the EU-SILC database, which is the main source for well-being analysis in the European context and allows for wide and sound comparative studies over time as it offers harmonised information on income and living conditions on a regular basis. Our approach provides a broad framework for researchers who wish to extend the economic insecurity assessment in the future using unified variables in Europe, while it could be easily adapted to other living conditions surveys as Understanding Society in the United Kingdom or the German Socio-Economic Panel (GSOEP).

Accordingly, we will first study which is the best method to measure economic insecurity from a multidimensional perspective. In Chapter 2 we will explore a variety of weighting and aggregation procedures of dimensions in order to compute a synthetic index of economic insecurity, while in Chapter 3 we will analyse which are the best indicators to capture several insecurity aspects and propose a multidimensional method

to assess the phenomenon at the individual level. Then, in Chapter 4 we will use this proposed index to study the level, evolution and distribution of insecurity in diverse welfare states and in Chapter 5 we will test whether tax-benefit policies reduce individual economic insecurity in an efficient manner.

1.2 Outline of the thesis

The main purpose of this doctoral dissertation is to provide a comprehensive and straightforward method to estimate economic insecurity in the European context, providing an overview of insecurity levels, evolution and distribution in recent years. To make this possible, we will conceive economic insecurity as a multifaceted phenomenon and adapt previous proposals on multidimensional insecurity indices to EU-SILC. This source of information enables us to make sound comparisons of economic insecurity in the European context since it offers harmonised data on income and living conditions of individuals and households for more than 30 countries. By proposing a particular multidimensional economic insecurity index at the individual level, we hope to fill the gap in the literature on this phenomenon by providing a wide empirical assessment of insecurity that will allow us to disentangle which are the most insecure subgroups in the population, the most relevant covariates of insecurity, if there are significant differences between regions or if public policy is an adequate instrument to mitigate this issue. We consider this investigation as an initial step in the study of economic insecurity in Europe and we hope that it will open new lines of research in this field.

Due to the lack of consensus in the definition and measurement of economic insecurity, we dedicate Chapters 2 and 3 to explore a methodological proposal to measure insecurity using currently existing living conditions surveys, namely EU-SILC, on the basis of the proposal on dimensions by Rohde et al. (2015). In the second chapter, we start with a systematic review of current existing measures of economic insecurity analysing which are the main advantages and drawbacks of each one of them. Generally, economic insecurity measures can be classified into aggregate and individual indices: while the former calculate the phenomenon for an entire population using macroeconomic information, individual measures compute economic insecurity for each person in a given society, allowing for the study of vulnerable subpopulations and the possibility to calculate an aggregate indicator in a later stage. It is also important the distinction between

objective measures –which capture the exposure of individuals to future economic hazards– and subjective indices –that show to what extent this exposure is translated to perceived insecurity–, as well as unidimensional versus multifaceted indicators.

In line with Rohde et al. (2015, 2017), we strongly believe that economic insecurity is a multidimensional phenomenon that reveals itself in a variety of indicators, none of which is able to capture the entire concept. We consider that the joint distribution of several objective and subjective dimensions will better represent economic insecurity. Nonetheless, the finest method to aggregate and weigh various insecurity dimensions remains unclear. This second chapter contributes to the literature in this area by comparing different aggregation methods to calculate a synthetic index of economic insecurity. In particular, we contrast a simple mean of dimensions as an example of a normative aggregation strategy; a principal component analysis (PCA) and a corrected polyserial correlation PCA as statistical weighting procedures; and a counting approach based on the Alkire and Foster (2011) method. In order to conduct our study, we first adapt the proposal on insecurity dimensions by Rohde et al. (2015) to the Spanish Survey of Living Conditions (*Encuesta de Condiciones de Vida*, ECV) and construct an economic insecurity index for Spain for the 2009–2017 period using all the aforementioned weighting and aggregation schemes.

We find that, even though economic insecurity levels differ by the method used, trends and distribution across subpopulations are similar whatever the procedure adopted to construct our composite indicator. Depending on the aggregation method used, the same society displays significantly different levels of economic insecurity, which underlines the relevance of a particular methodological choice. Using a counting approach with frequency weights –that is, giving more weight to those dimensions in which most of individuals lack security– implies obtaining the highest level of insecurity in Spain, while using the PCA approach implies the smallest one. Even though people situated in the first income decile are the most insecure, a relevant share of individuals in the middle class suffer from economic insecurity whatever the aggregation strategy used. Nevertheless, the counting approach method captures more insecurity in central deciles while PCA, polyserial correlations and simple mean give more emphasis to extreme positions. Although results are quite robust to all the aggregation and weighting procedures examined, we consider the counting approach with inverse frequency weights as the best option due to its numerous advantages. While a simple mean of dimensions could imply

double counting, PCA and polyserial correlations lack of clarity. A counting approach instead has a direct and transparent economic interpretation: the proportion of insecurity dimensions in which a person does not have security. In addition, this method allows us to adjust the distribution of the selected variables in any society and to calculate aggregate indicators which can be decomposed by dimensions or subpopulations.

Consequently, in Chapter 3 we use the counting approach to carefully examine the selection of insecurity dimensions when constructing a composite index of economic insecurity. As stated previously, we base our analysis on Rohde et al. (2015) proposal on insecurity indicators and explore the information that EU-SILC offers to capture the diverse aspects to which insecurity is strongly related. We choose to include both objective indicators to reflect risk exposure to certain negative financial events and subjective dimensions which represent people's perceptions of insecurity. Therefore, we will consider large income drops, unemployment risk and a probability of extreme expenditure distress as objective variables while the self-reported ability to face unanticipated expenses, financial dissatisfaction and changes in the ability to vacation try to approximate individuals' expectations about later periods. Even though we draw on Rohde et. al. (2015) dimensions, we consider new definitions for some indicators –as the comparison between needed income to make ends meet and current household disposable income to measure financial dissatisfaction– and we incorporate innovative variables such as the dynamics in the ability to go on a holiday to capture spending cuts as a proxy of perceived future distress. Furthermore, we consider a household perspective in the probability of unemployment by imputing an average household risk to inactive members. We also deviate from Rohde et al. (2015, 2017) in the aggregation strategy and we apply a counting approach to construct a synthetic index of economic insecurity at the individual level. We choose to weigh dimensions by the share of the population not insecure in that dimension first and an intermediate threshold (at least three out of six dimensions) to classify the individual as multidimensionally insecure. We believe that these inverse frequency weights are the best option as we can approximate subjective considerations of economic insecurity: people feel worse if they are insecure and acknowledge that most of individuals have security (Desai and Shah, 1988). Nonetheless, results are quite robust when using equal weights and frequency-based weights: the evolution and distribution of insecurity holds despite the weighting procedure used, even though insecurity levels differ. We obtain the same conclusion when considering only five dimensions and discard

changes in the ability to go on a holiday. Moreover, we opt for an intermediate multidimensional threshold as the union an intersection approaches reflect more extreme situations.

Chapter 3 therefore contributes to the economic insecurity field by proposing a straightforward method for the measurement of this phenomenon based on a harmonised and extensive database in the European context, i.e. EU-SILC. Moreover, this procedure can be easily extrapolated to other living conditions surveys with some minor adjustments, which are a generalised tool for well-being researchers and are broadly available in most of developed countries unlike subjective expectations' surveys. We also contribute to the comparative analysis in this research area by implementing our proposed measure in three European countries that present diverse patterns of economic insecurity according to the Osberg and Sharpe (2005, 2014) index: Spain, France and Sweden. We find that these three countries show structural differences in economic insecurity, with Spain being the most insecure region and Sweden the most secure. In line with the second chapter, we identify insecure individuals in middle-income positions, especially in Spain and to a lesser extent in France whereas in Sweden the phenomenon is essentially located in the lowest tail of income distribution. Furthermore, unemployment and job quality seem to be closely related to the probability of insecurity.

We extend the empirical analysis of economic insecurity to 27 European countries in Chapter 4. Thus, making use of the whole potential of the EU-SILC database, we replicate our individual economic insecurity measure proposed in the third chapter to undertake for a large comparative analysis of a broad range of countries grouped into five different welfare state regimes. With this study, we contribute to the scarce comparative literature on economic insecurity in Europe and enlarge studies of well-being outcomes by regions complementing those commonly focussed only on inequality and poverty. In this fourth chapter, we further exploit the decomposability of our insecurity index, analysing the level, trends and distribution of the phenomenon in a comprehensive manner in order to provide a guide to public policy in this area.

In line with previous studies, we find that social-democratic countries display higher levels of security while Mediterranean and Eastern European regions are the most insecure. In general, the Great Recession is associated with an increase in economic insecurity for all regions except for social-democratic countries in which this notion seems to be more of a structural problem. Furthermore, a significant group of middle-

income individuals suffer from insecurity only in Mediterranean and Eastern European countries while for other welfare regimes this phenomenon is concentrated in the lowest tail of the income distribution where individuals accumulate multiple low well-being problems. The role of insecurity dimensions on overall insecurity is not the same for all welfare regimes and it also significantly differs by income group. In addition, we discover that young individuals, those without higher education, single-parent households and the unemployed are the most vulnerable subpopulations to suffer from economic insecurity in Europe.

Finally, in Chapter 5 we go a step further and investigate if a more generous tax-benefit system helps reducing individual economic insecurity. We draw on the literature that documents the existence of an insurance component in progressive taxation. Therefore, if income has a significant random element, individuals will turn to private insurance markets in order to avoid uncertainty, but government policies can be useful when insurance markets are incomplete or do not exist (Varian, 1980, Eaton and Rosen, 1980, Sinn, 1995). Our main objective in this chapter is to test the hypothesis that tax and benefit policies are able to reduce economic insecurity by acting as a public safety net in case several economic hazards materialise. After analysing several microeconomic covariates of economic insecurity in previous chapters, we will check if macroeconomic variables have also a significant impact on economic insecurity. Moreover, we explore if diverse social protection policies have a differential effect for households with at least one dependent children, because of increasing concerns about minors as a vulnerable group in the population and their future impact on society's development.

To conduct the analysis in the fifth chapter, we exploit our economic insecurity measure in EU-SILC, considering the share of insecurity dimensions in which the individual does not have security so that we can incorporate the intensity of the phenomenon into our analysis. By using multilevel modelling techniques, we account for the hierarchical structure of the data and test our hypothesis by incorporating micro determinants as well as country specific factors in a single estimation. In accordance with the third and fourth chapters, we find that young individuals, those with low educational attainment, unemployed and bad self-assessed health are the most insecure as well as single parents. On the contrary, homeownership and living in a multigenerational household –at least one dependent child, one working-age adult and one adult over 65– reduce the proportion of insecurity dimensions the person faces. The effect of

macroeconomic variables is significant and countries with larger social protection expenditure or personal tax revenue are associated with lower levels of economic insecurity, confirming thus that public policy can decrease the anxiety people feels by anticipating future economic distress and alleviate both objective and subjective negative consequences of the phenomenon. We find that those policies related to specific economic risks are more adequate to reduce insecurity than those targeted to vulnerable subgroups of the population. Furthermore, the welfare system reduces more the insecurity for households with at least one dependent child as tax-benefit policies show an additional impact on the insecurity of this group beyond the general effect on insecurity for the whole population.

In sum, the present dissertation intends to deepen the study of economic insecurity in Europe both from a methodological and an empirical perspective. Nonetheless, this investigation is only the first step and researchers will need to continue exploring the numerous hypothesis open up by the analysis of this important and growing phenomenon. Furthermore, public policy should become aware of the importance of economic insecurity in countries' economic development and must track its evolution as well as the changing economic conditions of the most insecure subpopulations. We hope that this thesis will rise the attention on the economic insecurity notion and will encourage new lines of research in this area.

Chapter 2

Multidimensional measures of economic insecurity: the role of aggregation and weighting methods

2.1 Introduction

Economic well-being analyses have typically been focussed on individuals present financial situation: inequality, poverty and material deprivation are measured in relation to the moment they are experienced. Nevertheless, individuals also anticipate their future and these expectations partly determine their level of current well-being (Osberg, 2018). Thus, negative expectations about forthcoming economic problems lower current well-being and makes the study of economic insecurity essential.

Economic insecurity might worsen quality of life through many channels, as individuals' decisions could be modified to reduce the exposure to uninsurable risk. Insecurity could decrease consumption and housing investment decisions in the short term (Benito, 2006), while in the medium term it could alter labour market decisions, postpone fertility (Fiori et al., 2013; Mansour, 2018; Modena, Rondinelli and Sabatini, 2014) or increase the political support for right-wing parties (Bossert et al., 2020). Both physical and mental health could deteriorate (Rohde, Tang and Osberg, 2017; Rohde et al., 2016; Smith, Stoddard and Barnes, 2009; Staudigel, 2016; Watson, 2018) and future generations could be affected through the current reduction in children's education investment (Stiglitz, Sen and Fitoussi, 2009). Several papers confirm the negative impact of insecurity on health through an increase in tobacco consumption (Barnes and Smith, 2011), a rise in obesity (Rohde, Tang and Osberg, 2017; Smith, Stoddard and Barnes, 2009; Watson, 2018) or a worsening of mental health (Rohde et al., 2016). The relevance of economic insecurity is thus clear because of its effects on the individuals' sphere but its possible impact at the macro level is still to a large extent unknown.

We believe that economic insecurity is a multifaceted issue and a unidimensional approach is not able to fully capture the phenomenon. Therefore, the main purpose of this chapter is to investigate and compare different methods that allow researchers to best aggregate and weigh various dimensions when measuring economic insecurity in a synthetic index, highlighting each method's advantages and disadvantages. We specifically discuss an equal weighted mean as an example of a normative procedure; a principal component analysis (PCA) and a corrected polyserial correlation PCA as statistical weighting methods; and a counting approach following the Alkire and Foster (2011) technique which considers frequency-based weights and normative thresholds. All four strategies have arguments for and against: a simple mean is a straightforward method

but may involve double counting if dimensions are strongly correlated, while PCA and polyserial correlation PCA solve this problem but lack transparency. In addition, none of these three methods produce an economic insecurity index with direct economic interpretation, which makes the counting approach a particularly interesting option because it can be interpreted as the share of weighted insecurity dimensions in which individuals lack security. This approach allows for the estimation of aggregate measures of insecurity incidence or intensity. Moreover, it is decomposable by dimensions and subgroups which is of great advantage to best understand the drivers of a multidimensional phenomenon and its differential impact on diverse population groups.

To test the robustness of economic insecurity to different aggregation procedures, we compute economic insecurity with these four different methods using Spanish data over the 2009–2017 period. Our results show that the evolution and distribution of economic insecurity is robust whatever the strategy to combine insecurity dimensions, even though methods differ in insecurity levels. In essence, economic insecurity in Spain decreases as individual income grows and is positively correlated with the business cycle. A relevant result, is that a significant proportion of Spanish middle-class individuals suffer from economic insecurity, indicating that the phenomenon goes way beyond low-income groups, whatever way we measure it: an intermediate counting approach suggests that 14% of Spaniards are economically insecure, while a 32.3% of them are situated between the third and the seventh equivalent income decile, so clearly out of poverty.

The rest of the chapter is organized as follows: Section 2 discusses how the previous literature has approached the measurement of economic insecurity along with the main empirical results of the increasing body of research in this field. Section 3 gathers the proposal on dimensions and describes the different aggregation methods when constructing a synthetic economic insecurity index. Then, Section 4 includes an empirical illustration of these methods for Spain while Section 5 discusses our main conclusions.

2.2 Background

2.2.1 Understanding (and measuring) economic insecurity in rich countries

Individual well-being is a multifaceted concept. People are worried about their economic resources as much as other dimensions as health, social inclusion, environment or safety, among others. Thus, associating well-being with poverty and inequality exclusively is a huge mistake. In this framework, the notion of economic insecurity has become more important in recent years, especially because of the Great Recession, revealing itself as a threat to quality of life. Even though academics acknowledge its relevance, they have not yet been able to reach an agreement on how to define and, most importantly, how to measure this phenomenon. So far, there have been several attempts in the literature to measure the individual or country-averaged level of economic insecurity but each of them has established an ad-hoc definition of the phenomenon, leading to an absence of agreement on how to best measure the important role of insecurity in individual current well-being. However, although existing definitions of this phenomenon are imprecise and defined in rather general terms, they have some clearly common elements.

First, economic insecurity is not strictly related with realised risk but rather to individuals' exposure to certain economic hazards when they lack insurance against possible future shortfalls. This risk exposure must be involuntary, involving uncertainty about a forthcoming financial situation generating a sort of current anxiety (Rohde and Tang, 2018). Secondly, insecurity implies a downward economic loss unlike volatility which also includes the probability of the chance to experience well-being improvements (Osberg, 2018). Economic insecurity thus shows a relevant idiosyncratic component, as observable factors may not fully capture the psychological impact of uninsured future economic distress on individuals' welfare. As Rohde and Tang (2018) note, insecurity involves "an 'anxiety function' of which 'economic risk' is a key input".

The definitions for economic insecurity we find in the literature are vague and imprecise, although they always refer to downside future economic hazard and its psychological impact. Insecurity involves an involuntary exposure to uncertainty in future financial distress and the perception of uninsurable downside economic hazards.

Observed factors do not fully capture this notion and psychological effects become more relevant (Rohde and Tang, 2018). In other words, economic insecurity implies that individuals feel anxiety or stress arising from the exposure to several hazards which could have not yet materialised, but could lead to future economic losses and the inability to cope with them (Berloffa and Modena, 2014; D'Ambrosio and Rohde, 2014; Hacker et al., 2010; Osberg, 1998; Osberg and Sharpe, 2005; Rohde, Tang and Rao, 2014; Rohde and Tang, 2018). This, unlike poverty or inequality, is a dynamic concept, since risk exposure might cause a deterioration of individual well-being which is not strictly related with income distribution issues (Ranci et al., 2017). Therefore, an ideal index of economic insecurity must try to predict individuals' future economic situation, as expectations about forthcoming events shape the level of current insecurity (Osberg, 2015).

Due to the complexity of the issue, there is still no academic consensus on how one should best measure economic insecurity (see Table 2.1). The first attempts to measure it were based on an aggregate perspective and used macroeconomic data to compute indices at a national level. The work by Osberg (1998) introduced the notion of economic insecurity for the first time, being further developed by Osberg and Sharpe (2002, 2005, 2014) within the construction of a composite index of well-being which included insecurity as one of its dimensions. Initial efforts were concentrated mainly in comparing the degree of insecurity among countries as well as its evolution over time (Osberg and Sharpe, 2002, 2005; Hacker et al., 2010, 2014). In this context, these authors proposed an aggregate economic security index using macroeconomic data but considering the household as reference unit. Drawing on Article 25 of the Universal Declaration of Human Rights[1], they calculated a multidimensional security index as an average of four economic hazards that individuals may encounter –unemployment, sickness, widowhood and old age–, weighting each dimension by its frequency in a reference population. Berloffa and Modena (2014) later improved this index by introducing unemployment risk from a household approximation. As a major drawback, Osberg and Sharpe assumed that economic insecurity is proportional to realised risk and that subjective factors become negligible at an aggregate level (Rohde and Tang, 2018). Thus, their economic security

[1] Article 25.1 of the Universal Declaration of Human Rights provides: "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."

index is based on a retrospective approach as they only used past realised hazards to proxy the phenomenon and did not model individuals' future economic situation.

Economic insecurity was also discussed within the Commission on the Measurement of Economic Performance and Social Progress (Stiglitz, Sen and Fitoussi, 2009), proposing the use of risk of poverty rates to approximate this phenomenon. Despite its simplicity, we believe that this approach ignores relevant aspects of economic insecurity beyond the lack of resources, therefore denying the conception of this phenomenon as a separate dimension of well-being. For that matter, economic insecurity can be present along the entire income distribution and not only in its lower tail.

Also, within aggregate measures of insecurity, Hacker et al. (2010, 2014) associated economic insecurity with large income drops. These authors also followed a retrospective approach and computed economic insecurity as the percentage of individuals who experience a fall of at least 25% in their household disposable income from one year to the next, provided that they lack enough liquid financial wealth to cope with that loss and taking into consideration medical out-of-pocket spending, which is most relevant in the United States. These authors could not distinguish between large involuntary losses and voluntary declines linked to a desired reduction in individual labour supply, which may be an important issue at the individual level (Osberg, 2018).

Given the simplicity of aggregate economic insecurity calculations, they generally involve some assumptions which contradict key economic insecurity components, for instance the relevance of subjective factors is neglected at the aggregated level and exposure to risk is considered proportional to historically realised hazards (Rohde and Tang, 2018). Hence, unidimensional individual insecurity indices have emerged as an interesting alternative to these aggregate measures, allowing researchers to study the distribution of the phenomenon across different subpopulations and to compute an aggregate measure in a second step (Bossert and D'Ambrosio, 2013; Rohde, Tang and Rao, 2014). The main purpose of these indices is to approximate individuals' expectations, but they usually rely on retrospective data so that results are not robust to the selected dimension (Osberg, 2018). In this context, some authors developed multidimensional insecurity measures at the individual level, including perceptions about future financial situation as well as objective exposure to some risks (Rohde et al., 2015, 2016; Rohde, Tang and Osberg, 2017).

TABLE 2.1. Main economic insecurity measures

Paper	Index classification				Indicators	Aggregation method	Weighting procedure
	Unit of analysis	Nature of dimensions	Reference period	Number of dimensions			
Anderson (2001)	Individual	Subjective	Forward-looking	1	Perceptions of economic security	-	-
Bossert and D'Ambrosio (2013) D'Ambrosio and Rohde (2014)	Individual	Objective	Forward-looking	1	Wealth dynamics	-	-
Bucks (2011)	Household	Mixed	Mixed	4 12 indicators	Economic risks: Not covered by health insurance (O) Poor health (S) Recent unemployment spell (O) High probability of unemployment (O) Income drop (S) Income volatility (S) Income adequacy: Spending > income (O) Poverty level (O) Assets/savings adequacy: Low precautionary savings (S) Credit market experiences and debt burden: Credit constrained (O) Late debt payments (O) High debt payment-to-income ratio (O)	Counting approach	Equal weights Proportional by main dimension Hedonic weights
Espinosa, Friedman and Yevenes (2014)	Individual	Subjective	Forward-looking	1	Expectations about future economic situation	-	-
Hacker et al. (2010, 2014)	Aggregate	Objective	Retrospective	1	Large income drops (>25%)	-	-
Osberg and Sharpe (2005, 2014)	Aggregate	Objective	Retrospective	4	Risk from unemployment Financial risk from illness Risk from single-parent poverty Risk from poverty in old age	Weighted mean	Frequency weights
Rohde, Tang and Rao (2014)	Individual	Objective	Retrospective	1	Downward income instability	-	-

TABLE 2.1. Main economic insecurity measures (continued)

Paper	Index classification				Indicators	Aggregation method	Weighting procedure
	Unit of analysis	Nature of dimensions	Reference period	Number of dimensions			
Rohde et al. (2015)	Individual	Mixed	Mixed	6	Job insecurity (S) Overall financial dissatisfaction (S) Inability to raise emergency funds (S) Large income drops (O) Probability of expenditure distress (O) Unemployment risk (O)	PCA	Statistical weights
Rohde et al. (2016)	Individual	Mixed	Mixed	8	Job insecurity (S) Overall financial dissatisfaction (S) Inability to raise emergency funds (S) Large income drops (O) Income dynamics (O) Probability of unemployment (O) Probability of large income drop (O) Probability of expenditure related stress (O)	-	-
Rohde, Tang and Osberg (2017)	Individual	Mixed	Mixed	4	Job insecurity (S) Overall financial dissatisfaction (S) Inability to raise emergency funds (S) Income volatility (O)	PCA	Statistical weights
Romaguera-de-la-Cruz (2019)	Individual	Mixed	Mixed	6	Inability to face unexpected expenses (S) Financial dissatisfaction (S) Changes in the ability to go on a holiday (S) Large income drops (O) Unemployment risk (O) Probability of extreme expenditure distress (O)	Counting approach	Inverse frequency weights
Stiglitz, Sen and Fitoussi (2009)	Individual	Objective	Retrospective	1	Poverty risk	-	-
Watson (2018)	Individual	Objective	Forward-looking	1	Probability of large income drops	-	-

Note: (S) Subjective indicator, (O) Objective indicator.
Source: Authors' own elaboration.

Individual indices are more advantageous as they enable for the analysis of the economic insecurity distribution, its incidence in specific subpopulations and for the identification of key covariables. Moreover, individual measures can be aggregated in a second stage to generate population indices (Bossert and D'Ambrosio, 2013; D'Ambrosio and Rohde, 2014; Osberg, 2015). In this vein, Bossert and D'Ambrosio (2013) associated economic security with the concept of wealth as an emergency buffer stock. Focussing on the psychological component of insecurity and with a forward-looking strategy, they approximated economic insecurity as a weighted sum of current wealth and past changes on wealth stock, giving more weight to past declines and recent events. Current wealth can be turned to an income flow in case of an economic loss in the future, while past changes on this dimension shape individuals' expectations. However, this index is only based on private stocks and does not consider the role of public and private entitlements (Osberg, 2018). On other hand, Rohde, Tang and Rao (2014) measured insecurity as downward income instability. Using panel data, they estimated downward deviations from trend in households' incomes discarding upwards volatility. Even though their purpose is to capture people's perceptions, they also use retrospective data. Inspired by the Hacker et al. (2010) aggregate indicator, Watson (2018) used a forward-looking approach to proxy insecurity through the predicted individual probability of experiencing a large income loss.

As we have seen so far, most of academics only consider objective dimensions to proxy economic insecurity. Nevertheless, this phenomenon involves an important psychological component as it is related with people's expectations about future economic distress. Some authors have approximated insecurity with individuals' opinion about their future financial situation (Anderson, 2001; Espinosa, Friedman and Yevenes, 2014). Surveys on subjective expectations are the most effective method to measure perceived risk but its production is not widespread, so multidimensional indices of economic insecurity combining objective and subjective dimensions at the individual level have emerged in recent papers. These measures aim to deal with the lack of agreement about which should be the nature of insecurity dimensions and retrieve the idea that economic insecurity is a complex and multifaceted phenomenon which cannot be fully captured in a unidimensional setting. Also, these indices do not give up on the key advantages of constructing an individual measure.

Rohde et al. (2015) analysed a variety of economic insecurity indicators in a separate way: perceived job security, financial satisfaction and inability to raise emergency funds as subjective indicators as well as large income drops, a probability of extreme expenditure distress and a probability of unemployment as objective dimensions. Nevertheless, these authors recognised that there can be inconsistent results when using a different range of variables to study insecurity, so they computed the first principal component of all the dimensions in Rohde et al. (2015) to investigate the relationship between insecurity and individual socioeconomic characteristics. In this vein, Rohde, Tang and Osberg (2017) believe that dimensions of insecurity by themselves represent some undesirable facet of risk but ignore other possible relevant sources. Economic insecurity can be thereby considered as a latent variable which can be inferred from a variety of indicators and a synthetic index to measure it is required.[2] Based on this conception and taking advantage of the broad availability of living conditions surveys in developed countries, the novelty of Romaguera-de-la-Cruz (2019) proposal is that it adapts the approach on insecurity dimensions from Rohde et al. (2015) to the European Union Statistics on Income and Living Conditions (EU-SILC), allowing for sound and wide comparisons of individual economic insecurity in the European context.

Given that there is no previous paper that analyses the role of weighting and aggregation procedures in insecurity levels, trends and distribution, the main aim of this chapter is to fill this gap in the literature by exploring differences in the results for economic insecurity when using four different methods to aggregate and weigh dimensions. Thus, we test the robustness of multidimensional insecurity indices to the way we combine dimensions, highlighting the main advantages of each procedure as well as its major drawbacks. Our approach includes subjective dimensions which try to capture individuals' negative expectations about future economic distress: household's inability to face unexpected expenses, financial dissatisfaction and changes in the ability to go on a holiday. It also incorporates objective indicators that capture uninsured financial risks: large income drops from one year to another, unemployment risk and a probability of extreme expenditure distress. Insecurity is hence an abstract phenomenon and it is

[2] They measured the phenomenon using the same dimensions as in Rohde et al. (2015), although they used income volatility as an objective indicator instead of large income drops. To compute income volatility, Rohde, Tang and Osberg (2017) estimate a fixed effects model from which they extract the error component and use its square as an indicator of income risk. Rohde et al. (2016) added a level-and-change index of income dynamics, in line with the Bossert and D'Ambrosio (2013) measure.

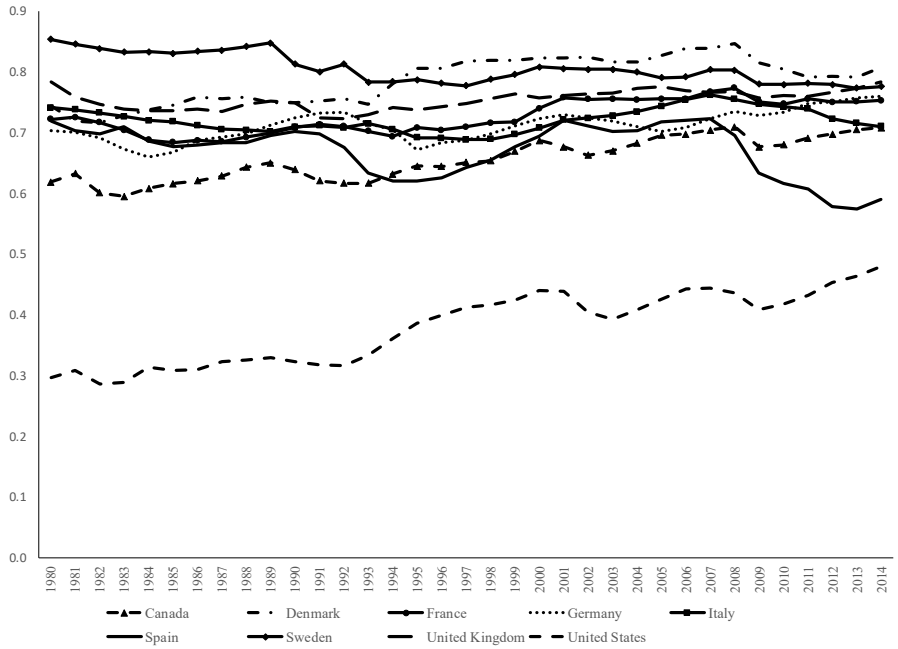
necessary to combine the selected dimensions in a composite index, for which Romaguera-de-la-Cruz (2019) uses a counting approach. This framework can be extrapolated to other living conditions surveys with some minor adjustments.

2.2.2 Main empirical findings regarding economic insecurity in rich countries

So far, comparative empirical analysis on economic insecurity is still scarce and narrow, as most of the papers focus on insecurity in a small number of countries. Nevertheless, it is worth summarizing the main results of these analyses so far. In their seminal papers on economic insecurity in rich economies and using an aggregate economic security index for 14 OECD countries, Osberg and Sharpe (2005, 2014) found that within most developed economies Nordic countries were the most secure, whereas the United States, Canada and Spain had the largest levels of insecurity (Figure 2.1). In general, economic security displayed an upward trend everywhere in the period from 1980 to 2005 but slowed down or turned into a downward trend since the Great Recession. Since then there has been a significant rise in the levels of economic insecurity in Mediterranean countries, especially in Spain, where economic security has had persistent falls over the last three decades and experienced a large reduction of more than 15% since 2008.

The main factors contributing to the rise of insecurity in Spain were upward trends in unemployment rates and single-parent poverty levels, while public pensions had the opposite role by mitigating old-age poverty. Thus, similarly to what Ayala and Cantó (2018) have concluded for inequality levels, economic insecurity is more strongly correlated with the business cycle in Spain than in other developed countries. Reasons for this are generally related to the functioning of the labour market and the relatively low redistributive capacity of public policies. When analysing the unemployment risk in Osberg and Sharpe's (2005) index taking a household perspective, Berloffa and Modena (2014) also found that Spain is among the most insecure countries together with Italy and the United Kingdom.

FIGURE 2.1. Evolution of Osberg and Sharpe's aggregate Economic Security Index. 1980 - 2014



Source: Index of Economic Security, one of the four dimensions of the Index of Economic Well-Being (IEWB), see Osberg and Sharpe (2002, 2005, 2014).

Hacker et al. (2010, 2014) analysed economic insecurity in the United States approximated by large income drops from one year to the next. Since 1986, insecurity had a steady increase and this trend was more intense during the Great Recession, with more than a fifth of US citizens suffering from large income falls in 2009. Furthermore, these authors note that, although insecurity reduces after an economic recession, it does not return to pre-crisis levels implying a sustained gradual rise. Household with dependent children –especially lone-parent households– as well as those individuals of African American and Hispanic origin are the most insecure groups, while insecurity decreases with age and education.

There are also some empirical comparative studies that make use of individual economic insecurity indices. Using the Bossert and D'Ambrosio (2013) index on wealth, D'Ambrosio and Rohde (2014) found that the US had higher levels of security compared to Italy due to greater accumulation of financial assets. However, the economic crisis had a larger impact on US households because of the fall in assets' prices, with an increase of the percentage of individuals suffering from extreme insecurity while the percentage of those enjoying large levels of security remained constant. On other hand, Rohde, Tang

and Rao (2014) reached different conclusions when studying downward income instability: the US is the most insecure country if we consider the role of the government through tax and benefits, whereas the UK and Germany had greater insecurity considering market income. As we can see, the choice of the insecurity indicator in a unidimensional framework is crucial and can lead us to opposite results.

Rohde et al. (2015) studied economic insecurity in Australia using a multidimensional approach and confirmed its correlation with economic growth as well as to the evolution of the unemployment rate. Insecurity in this country followed a downward trend from 2001 to 2007, increasing very slightly since then. In line with Hacker et al. (2010, 2014), young individuals are the most affected by insecurity, since older individuals are more able to obtain emergency funds due to the accumulation of assets. Moreover, highly educated individuals as well as those with greater incomes benefit from lower levels of this phenomenon.

In the same line of research, Romaguera-de-la-Cruz (2019) found that economic insecurity decreases across the income ladder and there exists a significant group of insecure middle-income individuals in Spain and to a lesser extent in France. However, economic insecurity in Sweden is a relevant phenomenon only for poor individuals. In all three countries, a higher educational attainment and a good labour market situation are strongly correlated to a lower probability of suffering insecurity in at least three out of six dimensions. Cantó et al. (2019) have extended the analysis to 27 European countries identifying the young, the less educated, the unemployed and those individuals in households with at least one child to be the most insecure subgroups in all regions. Nonetheless, the middle-class is only affected by economic insecurity in Mediterranean and Eastern European countries.

2.3 Measuring economic insecurity using living conditions surveys

2.3.1 Economic insecurity dimensions

If we agree that economic insecurity is a multidimensional concept which reveals itself in a series of indicators that cannot fully account for the phenomenon when analysed separately, we need a comprehensive insecurity index. Romaguera-de-la-Cruz (2019) develops a broad setting of six insecurity indicators, adjusting the dimensions' proposal

developed by Rohde et al. (2015) to the information available in EU-SILC[3]. This framework includes some subjective dimensions which try to capture expectations about individuals' future financial situation as well as objective indicators that reflect their exposition to certain economic risks, including probabilities of a series of economic hazards with a forward-looking strategy. In this chapter, we explore a variety of methods that allow us to weigh and aggregate various dimensions in order to create a composite index of economic insecurity.

As subjective dimensions, we consider three indicators: (a) *household's incapacity of facing unexpected expenses*, which is a dichotomous variable that takes the value one if the household does not own the resources to afford an unexpected expenditure; (b) *household's financial dissatisfaction*, calculated as the difference between household disposable income and the lowest needed annual income; and (c) *changes in the ability to go on a holiday*, meaning that the household is currently unable to go on a holiday while it was able to afford one week away from home the previous year.[4] In order to capture the exposition to some adverse risks, we consider three objective dimensions: (d) short-term *income drops* over 25%; (e) *unemployment risk* including the risk of losing current employment and the risk of not finding a job[5]; and a (f) *probability of extreme expenditure distress* to capture household's difficulties to meet standard expenses which may exacerbate future economic distress.[6]

[3] For a detailed description of insecurity dimensions see Table A3.1 in the Appendix of Chapter 3.

[4] Changes in this indicator will reflect the perception of a strain in the household and individuals will save money allocated to holidays to cope with the uncertainty of a future economic loss (Deutsch et al., 2014).

[5] This unemployment risk is calculated through a probit estimation with lagged explanatory variables for active individuals in the household. Then a household's unemployment probability computed as a weighted average of previous predicted probabilities is imputed to inactive individuals.

[6] The probability of extreme expenditure distress is calculated with an ordered probit model at the household level. The dependent variable is an indicator from 0 to 3 counting a series of arrears. Subsequently, the probability of experiencing two or three of these overdue payments is computed and imputed to each member.

2.3.2 Constructing a composite indicator of economic insecurity: four different methods

To compute a multidimensional index of economic insecurity using the information provided by the aforementioned dimensions, the literature has considered several ways to summarize all the relevant information: Osberg and Sharpe (2005, 2014) use a weighted average, Rohde et al. (2015, 2017) use principal component analysis (PCA) and Bucks (2011) applies a counting approach (Atkinson, 2003; Alkire and Foster, 2011). In this chapter, we explore a variety of aggregation procedures discussing their advantages and disadvantages and evaluating if there are substantial differences in the obtained results depending on the procedure chosen to summarize the information within dimensions. In particular, we will compare four different strategies: (i) a normative procedure –mean with equal weights–, (ii) two methods with statistical weights –standard PCA and polyserial correlation PCA–, and (iii) a mixed scheme which incorporates frequency-based weights and a normative element through the choice of a multidimensional threshold –counting approach.

A natural way to proceed when building a multidimensional economic insecurity index is to use a straightforward method that calculates the average of all normalised insecurity dimensions using equal weights[7]:

$$EI_i^{EW} = \frac{\sum_{j=1}^{D} X_{ij}}{D} \tag{2.1}$$

where X_{ij} is a specific value for individual i and dimension j and D is the total number of dimensions (in our case, $D = 6$). This method follows a normative approach as weights depend on value judgements which are generally independent from correlations between dimensions. Even though setting weights equal to one implies greater simplicity in calculations, it also involves the consideration of indicators as equally important (Decancq and Lugo, 2013). Of course, this statement might not be valid as dimensions may not actually have the same relevance. In this setting, we would be duplicating the common information in dimensions if they are strongly correlated (double counting

[7] We normalise economic insecurity dimensions between zero and one by using the max-min transformation: $z_{ij} = \frac{x_{ij} - min(x_j)}{max(x_j) - min(x_j)}$, where z_i and x_i are normalised and actual outcomes for individual i and dimension j, respectively.

problem). However, this does not appear to be an issue in our empirical analysis for the case of Spain as none of the correlation coefficients between dimensions is larger than 0.5 (see Table A2.2).

A second approach is based on multivariate statistical methods which reduce the dimensionality of simple indicators by using statistical weights to compute a composite indicator. In particular, we apply a standard principal component analysis as we believe that economic insecurity is a latent variable which could be inferred from the dimensions explained above. This method transforms the initial set of dimensions into a set of uncorrelated linear combinations of indicators. In this case, we obtain the first principal component of the data matrix –which explains the greatest data variability– and then predict an individual economic insecurity indicator. We also normalise the achieved results to produce a bounded index between zero and one:

$$EI_i^{PCA} = \sum_{j=1}^{D} \alpha_j X_{ij} \tag{2.2}$$

where α_j are the coefficients obtained when calculating the first principal component of the data matrix, with a number of rows equal to the number of individuals (N) and a number of columns equal to the number of dimensions ($D = 6$). This aggregation method may solve the double counting problem, as we are capturing the highest possible variation among dimensions using only one factor. Nevertheless, standard PCA has also some relevant drawbacks: first, the correlations do not necessarily represent the actual impact of dimensions on insecurity (Nardo et al., 2005), so we cannot be sure that we are capturing economic insecurity or other underlying phenomena present in the data. Furthermore, the final indicator is typically hard to interpret and does not have a clear economic meaning (Srinivasan, 1994). This procedure also lacks simplicity and transparency while it is not robust to the way one defines dimensions or to outliers and the multidimensional index is not decomposable in dimensions.

Besides these limitations, standard PCA has been used to produce composite indices regardless the type of indicators available, which are often measured by ordinal or dichotomous scales. Due to complexity in modelling this kind of variables, it is often assumed that the distance between points in an ordinal scale is constant. This simplification can generate asymmetric distributions (with high kurtosis) which would violate the normality assumption. In that case standard PCA would not be a proper

technique since it was originally designed for Pearson correlation matrices obtained from multivariate normal continuous variables, thus causing an underestimation of data correlations (Kolenikov and Angeles, 2009). Hence, when having a set of ordinal indicators, it would be more adequate to apply PCA to the polychoric correlations matrix. However, to obtain this polychoric correlations, one must assume that each variable is continuous and follows a normal distribution while both must follow a bivariate normal one. When ordinal and continuous variables are combined, we must use the related concept of polyserial correlation. Given that two of our proposed insecurity dimensions are dichotomous variables while the rest are continuous, we also compute the first principal component from the polyserial correlation matrix. The individual economic insecurity index would be expressed in a similar way to (2), even though coefficients from the linear combination of insecurity dimensions are obtained with this polyserial approach.

An interesting alternative to the three previous methods is to use a counting approach (Atkinson, 2003), commonly adopted in the literature focussed on measuring multidimensional poverty (Alkire and Foster, 2011) and conveniently used in this area by Bucks (2011) and Romaguera-de-la-Cruz (2019). This method involves setting two thresholds to carry out the identification of the economically insecure: first, one must establish a threshold in each of the indicators to locate individuals who lack of security in a given dimension and, subsequently, one must use a further multidimensional threshold to classify individuals as economically insecure or not (*double cut* strategy). In our particular case, we establish the mean as the most adequate threshold for unemployment risk and for probability of extreme expenditure distress, whereas we consider that an individual lacks security in inability to meet unexpected expenses, financial dissatisfaction, income drops and changes in the ability to go on holidays when the specific indicator is different from zero. The resulting individual economic insecurity index (EI_i) will count the number of weighted dimensions in which the individual lacks security:

$$EI_i = \sum_{j=1}^{D} w_j I_{ij} \tag{2.3}$$

where I_{ij} takes the value 1 if individual i lacks security in dimension j and 0 otherwise. D is the total number of dimensions ($D = 6$) and w_j is the weight given to each

dimension.[8] We also explore the robustness of this counting approach method to different weighting specifications. If all insecurity dimensions have the same relevance, we may consider equal weights ($w_j = 1$). However, it is also reasonable to consider prevalence weights so that we can introduce a relative perspective that allows us to adapt the index to the distribution of dimensions in a specific society. These prevalence weights w_j can be expressed as:

$$w_j = \frac{D * P_j}{\sum_{j=1}^{D} P_j} \tag{2.4}$$

where P_j is the share of individuals who lack (do not lack) security in dimension j and D is the total number of dimensions. The use of frequency weights allows us to obtain a more absolute perspective of economic insecurity, since we give greater importance to those dimensions in which a larger share of the population lacks security (Osberg, 2002, 2005). On the contrary, by weighting indicators by the share of individuals not lacking security in a certain dimension (inverse frequency weights), we can introduce objective indicators of subjective feelings of insecurity in the way that people feel worse if they observe that a huge proportion of the population has security when they are among those who are insecure (Desai and Shah, 1988; Romaguera-de-la-Cruz, 2019). Furthermore, in order to compare this method with the other aggregation procedures, we present normalised results for the counting approach which are obtained by dividing EI_i by the total number of dimensions D.

In a second stage, we must fix a multidimensional threshold (k) to identify economically insecure individuals. We here explore three possible thresholds: (i) an union approach, which implies that an individual is economically insecure if he/she lacks security in one out of six weighted dimensions ($k \geq 1$); (ii) an intermediate approach, with which an individual is insecure if he/she lacks security at least in half of the sum of weighted dimensions ($k \geq 3$), and (iii) the intersection approach, with which the individual must lack security in all dimensions ($k = 6$).

It is our understanding that a counting approach following the Alkire and Foster (2011) method is the most appropriate technique to analyse multidimensional economic

[8] The thresholds and prevalence weights (w_j) are not time-specific and are calculated by pooling all observations for our nine-year period.

insecurity for several reasons. First, this counting approach individual index has a direct and straightforward economic interpretation: EI_i is the number of weighted dimensions in which individuals lack security. Likewise, this procedure is more transparent and is not influenced by the way dimensions are defined or by outliers, while equal weighting and PCA are more sensitive to these issues. We are also able to adapt the index to a given context by incorporating the distribution of dimensions in a society through frequency weights and the union and intersection approach enable the study of economic insecurity from a broad perspective. Nonetheless, this counting approach has also some drawbacks, as it ignores inequality among those economically insecure and implicitly assumes perfect substitutability among dimensions below the multidimensional threshold, while the same indicators are perfect complements from this threshold onwards (Rippin, 2017; Espinoza-Delgado and Silber, 2018).

2.3.3 An aggregate social measure of insecurity: the advantages of using a counting approach

Using Alkire and Foster's (2011) multidimensional threshold to identify economically insecure individuals allows us to study aggregate insecurity in any specific population. This method provides us with an adequate social measure of this phenomenon that considers incidence and intensity at the same time and allows for a sound comparison between several countries or subpopulations as well as different periods of time.

Thus, the incidence of economic insecurity (H_{EI}) is the proportion of economically insecure people among all individuals in a given population:

$$H_{EI} = \frac{\sum_{i=1}^{N} I(EI_i \geq k)}{N} = \frac{q_{EI}}{N} \tag{2.5}$$

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

$$\mu_{EI}^{q_{EI}} = \frac{\sum_{i=1}^{N} EI_i I(EI_i \geq k)}{\sum_{i=1}^{N} I(EI_i \geq k)} \rightarrow A = \frac{\mu_{EI}^{q_{EI}}}{D} \tag{2.6}$$

where $\mu_{EI}^{q_{EI}}$ is the mean of the variable EI_i, within the group of economically insecure. A is standardised intensity, namely the share of possible insecurity dimensions D in which average economically insecure individual lacks security. Therefore, we can calculate the economic insecurity adjusted rate (M_{EI}), which is the total weighted sum of those dimensions in which economically insecure individuals lack security divided by the maximum insecurity dimensions that the entire population could experience. This indicator can be expressed as the product of incidence and normalized intensity:

$$M_{\mathrm{EI}} = \frac{\sum_{i=1}^{N} EI_i I(EI_i \geq k)}{ND} = \frac{q_{EI}}{N}\frac{\mu_{EI}^{q_{EI}}}{D} = H_{EI}A \tag{2.7}$$

Additionally, the economic insecurity adjusted rate can be decomposed by dimensions to obtain the contribution of each element to overall insecurity within our study population:

$$M_{EI} = \sum_{j=1}^{D} \frac{w_j \cdot H_{EIj}}{D} \tag{2.8}$$

where H_{EIj} is the share of economically insecure people who lack security in the j dimension and w_j is its correspondent weight. Similarly, M_{EI} can be decomposed by specific subgroups of the population and can be expressed as a weighted sum of each subpopulations' insecurity adjusted rates:

$$M_{EI} = \sum_{x=1}^{S} \frac{N_x}{N} \cdot M_{EIx} \tag{2.9}$$

where N_x is the size of subgroup x and M_{EIx} is its corresponding economic insecurity adjusted rate.

2.4 An empirical application of different aggregation and weighting methods to the measurement of economic insecurity in Spain

As stated previously, economic insecurity is a dynamic phenomenon which involves expectations about individuals' future economic situation. This complexity leads us to believe that economic insecurity is a latent variable that shows up in a variety of indicators, none of which captures this phenomenon to its full extent. In this context, we use different weighting and aggregation procedures described in detail in Section 3 to

provide a variety of measures of economic insecurity over the 2009-2017 period in Spain, a country with relatively high levels of insecurity and an upward trend[9]. This analysis will allow us to compare the results on economic insecurity when using different methods to construct a composite economic insecurity index and will additionally provide us with interesting new empirical evidence on insecurity levels, evolution and distribution in a large developed country in recent years.

2.4.1 Data

To calculate all our different indices of economic insecurity, we use the Survey of Living Conditions (ECV). This data set is the Spanish version of EU-SILC, a standardized source of income and socioeconomic data in the European Union which allows for sound comparisons on European countries' well-being. This database is produced by national statistical institutions following an integrated design in order to collect harmonised variables that allow broad comparative analyses on well-being. Furthermore, it is supplied annually from 2004 which enables the monitoring of welfare indicators in all Europe as the at-risk-of-poverty rate, the material deprivation prevalence or the Gini index. Therefore, EU-SILC contains data on housing conditions and resources collected at the household level and multiple individual variables such as income, employment, education or health which is provided by persons above 16 years of age.

In 2013, a new method for household income measurement was introduced in the Spanish version of the 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. 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 increased significantly after the new system was introduced. For this reason, in this chapter, we are only using a consistent income data series covering the period from 2008 to 2017 in which the new method is used.

[9] Economic security in Spain, as measured by the *IEWB Economic Security Index* (Osberg and Sharpe, 2005, 2014), dropped 17.9% between 1980 and 2014. This is a significantly different result to what has happened in other European countries, in which economic security either barely changed in that period or even increased.

As economic insecurity is a dynamic phenomenon, we are using the longitudinal version of the survey. To take into consideration attrition bias, this longitudinal EU-SILC is designed as a four-year rotating panel that follows individuals for a maximum of four waves. Nonetheless, there are exceptions for some countries: in France it is designed as a nine-year rotating panel, Norway has an eight-year rotating strategy and Luxembourg offers a pure panel with no rotation design. We use the individual as the unit of analysis, even if we use household information to compute some insecurity dimensions. Only when analysing the individual determinants of economic insecurity, we impute socioeconomic characteristics of the head of the household to children as there is no information on personal variables for those individuals below 16. However, we must be aware that income variables are referred to the prior year of interview, while demographic and socioeconomic information are related to interview year. Our income variable is real household equivalized disposable income, deflated by Consumer Price Index at constant 2015 prices and adjusted for household size and composition by using the OECD modified scale.

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 single wave, due to the dynamic nature of certain dimensions. Our final dataset includes 254,723 observations corresponding to individuals observed from two to four times during the 2008–2017 period (Table A2.1).

2.4.2 Economic insecurity dimensions

Table 2.2 displays descriptive statistics of our proposed economic insecurity dimensions for the whole period of analysis. Incapacity to face unexpected expenses and financial dissatisfaction are the most common subjective dimensions in Spain, with an incidence above 35%. Moreover, annual household disposable income for an average individual should increase 11.6% in order to be satisfactory, whereas this percentage more than doubles when we only consider dissatisfied individuals. On the contrary, changes in the ability to go on a holiday only affects an 8% of the population, as this indicator is expected to affect more those individuals in middle-income groups who are also related with lower levels of insecurity than low-income classes. Regarding objective indicators, almost a 13% of Spaniards suffer from short-term income losses with an average gap of

44.1%. Also, the probability of unemployment is higher than that of extreme expenditure distress, which reveals the malfunctioning of the Spanish labour market but some capacity in covering expenditure needs.

TABLE 2.2. Individual economic insecurity dimensions - Descriptive statistics

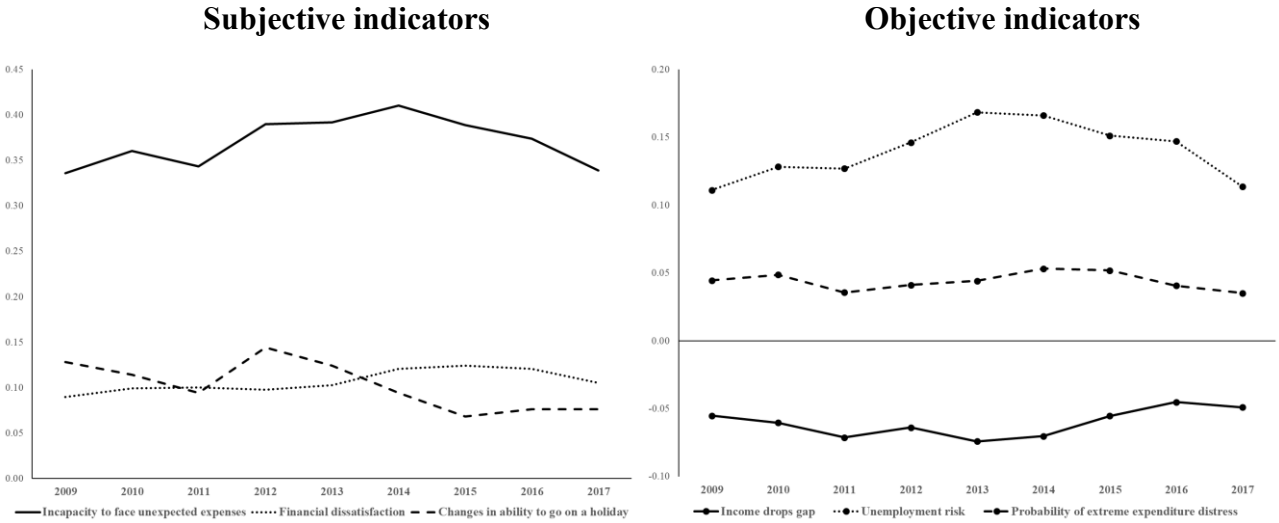
	Overall					Individuals affected	
	Mean	**Median**	**Standard deviation**	**Min**	**Max**	**Incidence**	**Mean**
Incapacity to face unexpected expenses	0.386 (0.001)	0	0.487	0	1	38.56%	-
Financial dissatisfaction	0.116 (0.001)	0	0.201	0	0.992	36.20%	0.303 (0.001)
Changes in ability to go on a holiday	0.078 (0.001)	0	0.269	0	1	7.82%	-
Income drops gap	-0.060 (0.001)	0	0.162	-0.985	0	12.96%	-0.441 (0.001)
Unemployment risk	0.143 (0.001)	0.053	0.212	0	0.936	-	-
Probability of extreme expenditure distress	0.039 (0.000)	0.015	0.060	0	0.610	-	-

Notes: (1) We present descriptive statistics of the dimensions of economic insecurity. The overall mean includes indicator values equal to zero. (2) Results correspond to the nine-year period and should be interpreted as a mean for the whole time-window. (3) Affected individuals are defined as those who do not present a value of zero in a certain insecurity dimension, and the incidence is calculated by dividing the observations of affected individuals by the total for each indicator. (4) We do not display statistics for affected individuals with regards to unemployment risk and extreme expenditure distress, as these dimensions are probabilities (we do not observe zero values), neither do we display the means of affected individuals for binary variables (incapacity to face unexpected expenses and inability to go on a holiday). (5) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal ECV dataset.

Population averages of our insecurity dimensions for the 2009–2017 period are shown in Figure 2.2. Recent economic activity in Spain was characterised by a decrease in Gross Domestic Product (GDP) from 2008 to 2010, followed by a positive growth rate in 2011 and a subsequent fall for two more years. In general, all indicators worsened during the Great Recession and recovered since 2014. Incapacity to face unexpected expenses rose more than seven percentage points with the economic crisis, whereas financial dissatisfaction displays a steadier evolution with only a slight increase. Due to the second recession in economic activity, changes in the ability to go on a holiday increased in 2012 probably as a result of the deterioration in expectations which led individuals to reduce some expenses to cope with possible future hazards. The remarkable rise in unemployment rates as well as households' debt levels because of negative economic

growth is reflected in a huge increase of the probability of unemployment and the income drops indicator, both recovering in recent years. In fact, the income drops dimension has the same evolution as the GDP, thus being the most correlated with the economic cycle[10]. On the contrary, the probability of extreme expenditure distress is rather stable over time.

FIGURE 2.2. Evolution of subjective and objective economic insecurity dimensions



Source: Author's calculations based on longitudinal ECV data set.

2.4.3 Results on economic insecurity levels, trends and distribution

In this section, we study the joint distribution of insecurity dimensions by exploring different ways to weigh and aggregate our proposed simple indicators into a composite index (Table 2.3). Within the counting approach, the Spanish population suffers from 30% of insecurity dimensions when we use the share of population lacking security in a given indicator to weight dimensions (frequency weights). In other words, the average number of weighted dimensions in which individuals lack security is approximately 1.8 out of 6 dimensions. On the contrary, individual insecurity is lower when considering inverse frequency weights: on average, Spaniards are insecure in a 23.7% of insecurity dimensions, this is 1.4 out of 6 dimensions. All three versions of this method show a larger standard deviation than the simple mean or the statistical aggregation methods.

[10] In this case, a positive correlation exists, as the index is defined in negative terms: when the economic cycle experiences a decrease, income drops are larger.

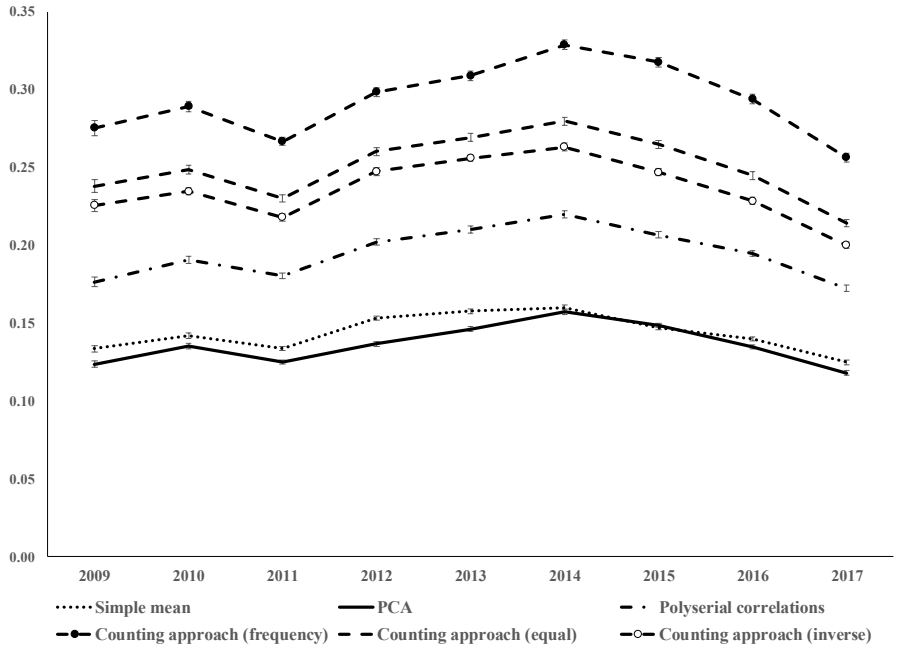
TABLE 2.3. Individual economic insecurity index - Descriptive statistics

		Mean	Median	Standard deviation	Min	Max
Simple mean		0.144 (0.001)	0.090	0.147	0	0.802
PCA		0.137 (0.001)	0.100	0.143	0	1
Polyserial correlations		0.197 (0.001)	0.100	0.202	0	1
Counting approach (EI_i)	**Frequency weights**	0.295 (0.001)	0.239	0.289	0	1
	Equal weights	0.251 (0.001)	0.167	0.244	0	1
	Inverse frequency weights	0.237 (0.001)	0.171	0.231	0	1

Notes: (1) Results correspond to the nine-year period and should be interpreted as a mean for the whole time-window. (2) Bootstrap standard errors (1000 replications) for the means are shown in brackets.
Source: Author's calculations based on longitudinal ECV data set.

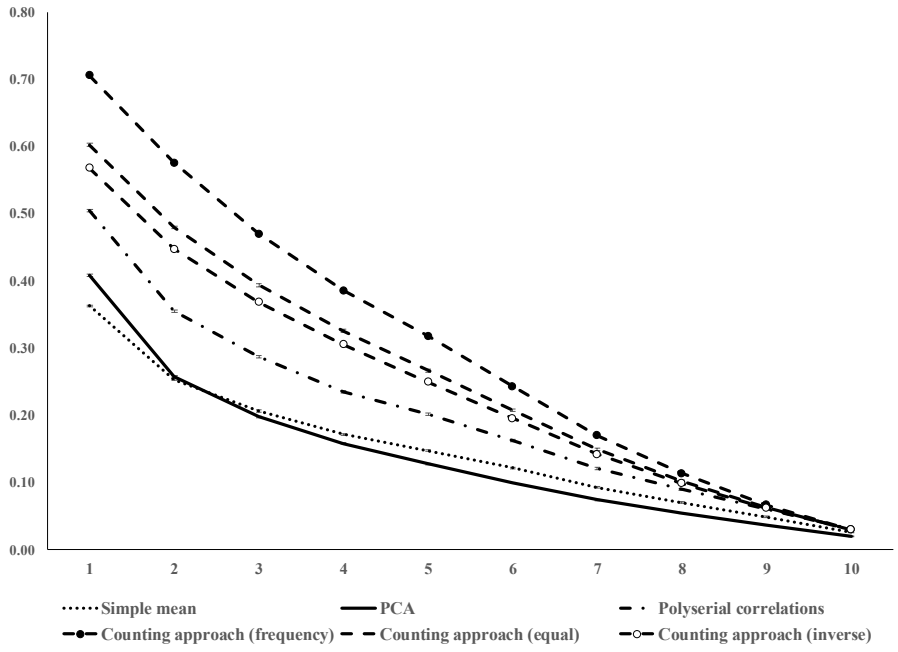
The evolution of economic insecurity is robust to the aggregation method we use (Figure 2.3). All six methods indicate a similar pattern: insecurity increased in 2010 due to the fall in GDP growth, with a brief recovery the following year and rose again for three more periods. From 2014 onwards, the economic insecurity index had a steep downward trend achieving pre-crisis levels in recent years. Certainly, economic insecurity appears to be correlated with the economic cycle despite the aggregation procedure used: negative GDP growth rates as well as the failure of labour market institutions, the loss of unemployment benefits for long-term unemployed and austerity measures during the Great Recession have been related with the large increase in economic insecurity through subjective and objective indicators. The return to positive growth rates and the reduction of unemployment brought about by the economic recovery also resulted in a decrease of this phenomenon. Thus, it seems that our economic insecurity indices capture reductions in economic activity relatively quickly, but the subsequent recovery is reflected with some delay. This is probably because it is more difficult to recover individuals' expectations after an economic crisis than to lose them at the beginning of a strong recession.

FIGURE 2.3. Evolution of economic insecurity index. 2009 – 2017



Notes: Confidence intervals are presented in vertical lines.
Source: Author's calculations based on longitudinal ECV data set.

FIGURE 2.4. Economic insecurity index by disposable income decile



Notes: Confidence intervals are presented in vertical lines.
Source: Author's calculations based on longitudinal ECV data set.

Figure 2.4 displays the distribution of the economic insecurity index by income decile. Regardless of the aggregation procedure used, economic insecurity decreases with income: poorer individuals are suffering from anxiety about future financial distress in addition to other threats to well-being. We must highlight that individuals situated in middle-income deciles (from the third to the seventh decile) register significant levels of economic insecurity.[11] Thus, not only poor individuals suffer from this phenomenon in Spain and just those situated in the highest deciles (from the eighth decile onwards) are able to avoid insecurity. Between the counting approach indices, the one with frequency weights dominates the rest along the distribution. The equal weighting index is closer to the one using inverse frequency weights.

Table 2.4 displays individual economic insecurity indices by socioeconomic characteristics with respect to overall insecurity. We find no differences between aggregation procedures in the characterisation of individuals most at risk of insecurity regarding gender and basic activity status, but we do find some other differences regarding age, level of education, employment situation, household type or income decile.

In general, we observe that young individuals (those between 16 and 30) are the most insecure whatever approach we use to measure economic insecurity: their insecurity level is between 14 and 16% above that of the whole population, while those above 30 show less insecurity probably due to a sounder and less precarious labour market situation. Older individuals are the most secure because of access to lifetime savings and public pension benefits. This age pattern is observable regardless of the weighting and aggregation procedure, even though we do observe that the differential insecurity risk between young and old individuals is somewhat larger using a standard PCA approach. Interestingly, other methods such as the simple mean strategy and polyserial PCA smooth insecurity across the age distribution more than PCA or the counting approach. The results on insecurity of different methods show a larger variation when we focus on older individuals: while they are approximately 23% less insecure than the average population with a standard PCA and a frequency weighted counting approach, they are only 10.4% less insecure when computing the index with a simple mean. In turn, we find that children

[11] This result is consistent with Ródenas et al. (2019) study about economic stress of non-poor vulnerable households during the Great Recession in Spain.

are more likely to be insecure with respect to the overall population when using a counting approach with frequency weights compared to other methods.

Despite the aggregation strategy, we find that insecurity decreases as the level of education grows and its reduction is large when individuals hold tertiary education. Individuals who reached tertiary education are between 40% and 43% more secure than the whole population. However, relative insecurity for those with the lowest educational attainment is smaller when using a counting approach strategy than any other. Moreover, differences between the weighting procedures within the counting approach are somewhat larger than those for other levels of education.

Regarding individual labour market situation, the unemployed are the most insecure whatever method we use. However, relative insecurity for employed people is somewhat lower when using a counting approach than other aggregation methods. Furthermore, insecurity for the unemployed more than doubles insecurity for the whole population when applying a simple mean of dimensions as well as both standard and polyserial PCA, while relative indicators are slightly smaller for the counting approach. Interestingly, individuals with a medium-level occupation display a slightly higher index of individual insecurity when computed with a counting approach (especially when using frequency weights) than a PCA approach.

With respect to household typology, we find that single-parent families suffer from the highest levels of insecurity, followed by other households with more than two adults and at least one dependent child. Clearly, many of these individuals had to turn to their families to combat the effects of the economic crisis. Nevertheless, individuals living alone also show large economic insecurity levels, as their insecurity cannot be mitigated by the safety of any other household member and they cannot benefit from the economies of scale of a larger household. For these three household types, the standard PCA approach seems to report larger insecurity levels than for the whole population in comparison to other procedures. Also, the weighting procedure we choose within the counting approach method appears to have higher relevance in this case: while single-parent households display 43.7% more insecurity than the population when considering frequency weights, this percentage is only 35.9% when applying inverse frequency weights. Homeowners are more secure than tenants, especially when considering PCA.

TABLE 2.4. Relative economic insecurity index by socioeconomic characteristics

	Simple mean	PCA	Polyserial correlation	Counting approach		
				Frequency weights	Equal weights	Inverse frequency weights
Age						
< 16	1.014	1.066	1.030	1.081	1.060	1.046
16 – 30	1.139	1.161	1.142	1.136	1.147	1.148
31 – 45	1.007	1.022	0.995	1.017	1.020	1.017
46 – 65	0.931	0.891	0.919	0.885	0.892	0.890
> 65	0.896	0.774	0.868	0.769	0.805	0.819
Gender						
Female	1.000	1.000	0.995	1.000	1.000	0.996
Male	1.007	1.007	1.000	0.997	1.000	1.000
Level of education						
Primary or less	1.354	1.336	1.371	1.305	1.303	1.300
Secondary	1.146	1.168	1.147	1.169	1.163	1.160
Tertiary	0.597	0.577	0.574	0.573	0.586	0.591
Basic activity status						
Inactive	1.014	0.985	1.010	0.990	0.996	0.996
Employed	0.806	0.796	0.797	0.827	0.825	0.819
Unemployed	2.042	2.182	2.066	1.942	1.976	1.983
Level of occupation						
Without occupation	1.208	1.204	1.203	1.163	1.179	1.181
High	0.507	0.496	0.487	0.498	0.510	0.511
Medium	1.035	1.022	1.025	1.041	1.036	1.030
Low	1.500	1.555	1.533	1.525	1.510	1.502
Type of household						
One adult, no children	1.056	1.080	1.051	1.075	1.044	1.025
Two adults, no children	0.951	0.912	0.939	0.922	0.924	0.920
Other HH, no children	0.958	0.912	0.939	0.898	0.920	0.928
One adult, children	1.417	1.504	1.457	1.437	1.382	1.359
Two adults, children	0.903	0.934	0.904	0.966	0.952	0.941
Other HH, children	1.285	1.350	1.299	1.315	1.307	1.295
Homeowner						
No	1.521	1.664	1.563	1.563	1.538	1.523
Yes	0.875	0.839	0.858	0.861	0.869	0.869
Income decile						
1	2.521	2.978	2.558	2.393	2.402	2.397
2	1.757	1.883	1.802	1.949	1.912	1.890
3	1.431	1.445	1.457	1.593	1.570	1.553
4	1.194	1.153	1.193	1.305	1.295	1.287
5	1.028	0.934	1.025	1.078	1.064	1.051
6	0.840	0.723	0.822	0.824	0.825	0.823
7	0.646	0.540	0.614	0.576	0.594	0.599
8	0.486	0.401	0.452	0.386	0.406	0.418
9	0.340	0.270	0.310	0.224	0.251	0.262
10	0.181	0.146	0.152	0.098	0.120	0.127

Notes: (1) We present the ratio between individual the economic insecurity index for a given subgroup and the one for the whole Spanish population. (2) Results correspond to the nine-year period and should be interpreted as a mean for the whole time-window. (3) *Level of occupation* includes the following categories: Without occupation (none), High (1=Managers; 2=Professionals; 3=Technicians and Associate Professionals; 10=Armed Forces Occupations), Medium (4=Clerical Support Workers; 5=Services and Sales Workers; 7=Craft and Related Trades Workers; 8=Plant and Machine Operators and Assemblers) and Low (6=Skilled Agricultural, Forestry and Fishery Workers; 9=Elementary Occupations).
Source: Author's calculations based on longitudinal EU-SILC data set.

TABLE 2.5. Economic insecurity determinants (OLS regressions)

	Simple mean	PCA	Polyserial correlation	Individual economic insecurity		
				Frequency weights	Equal weights	Inverse weights
Male	0.001	0.001	0.002	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Age						
< 16	-0.008***	-0.008***	-0.009***	-0.014***	-0.013***	-0.011***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
31 - 45	-0.003*	-0.001	-0.005**	0.000	0.001	0.001
	(0.002)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)
46 - 65	-0.003***	-0.005***	-0.003**	-0.011***	-0.011***	-0.012***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
> 65	-0.002	-0.005***	-0.006**	-0.006*	-0.009***	-0.019***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Level of education						
Secondary	-0.010***	-0.004***	-0.018***	-0.004**	-0.006***	-0.009***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Tertiary	-0.023***	-0.013***	-0.039***	-0.030***	-0.035***	-0.049***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
Basic activity status						
Inactive	-0.012***	-0.014***	-0.019***	-0.025***	-0.026***	-0.032***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Unemployed	0.071***	0.070***	0.097***	0.098***	0.099***	0.104***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Married	-0.013***	-0.008***	-0.020***	-0.011***	-0.011***	-0.013***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Bad health status	0.029***	0.022***	0.044***	0.036***	0.040***	0.052***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Status in employment						
Never worked	0.002	0.005***	0.003	0.018***	0.019***	0.023***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
Temporary employee or without contract	0.033***	0.039***	0.047***	0.076***	0.078***	0.086***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Employer	-0.009***	-0.005***	-0.021***	-0.007**	-0.011***	-0.021***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Independent worker	-0.005***	-0.004***	-0.012***	-0.001	-0.002	-0.007**
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Level of occupation						
High	-0.012***	-0.004**	-0.017***	-0.013***	-0.015***	-0.019***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
Medium	-0.005**	-0.008***	-0.008***	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Low	0.006**	0.002	0.011***	0.015***	0.017***	0.024***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)
Homeowner	-0.024***	-0.033***	-0.040***	-0.039***	-0.044***	-0.059***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
HH disposable income	-0.126***	-0.149***	-0.174***	-0.208***	-0.222***	-0.262***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Type of household						
Two adults without children	0.003	-0.002	0.004	0.000	-0.003	-0.013**
	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)
Other HH without children	-0.007**	-0.014***	-0.010***	-0.020***	-0.028***	-0.051***
	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)
One adult with children	0.008**	0.005	0.020***	0.009	0.012*	0.019**
	(0.004)	(0.003)	(0.006)	(0.006)	(0.006)	(0.008)
Two adults with children	-0.009***	-0.011***	-0.009**	-0.011**	-0.013***	-0.021***
	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)
Other HH with children	-0.005*	-0.009***	-0.003	-0.008*	-0.013***	-0.026***
	(0.003)	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)
Constant	1.378***	1.592***	1.903***	2.266***	2.416***	2.863***
	(0.009)	(0.008)	(0.012)	(0.014)	(0.015)	(0.019)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	123550	123550	123550	123550	123550	123550
R-squared	0.527	0.705	0.562	0.584	0.599	0.604

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

When analysing economic insecurity by income decile, we find that whatever the method we use, it decreases as income grows in line with Figure 2.4. Spaniards situated in the first income decile have always a larger insecurity index than the whole population. However, it is interesting to note that the magnitude of this ratio differs depending on the aggregation method: those in the first decile show almost three times more insecurity than total population with a standard PCA strategy, while this ratio decreases to 2.4 when using a counting approach. From the second to fifth decile, the counting approach displays more economic insecurity than the rest of methods. On the contrary, simple mean and polyserial correlations PCA give more relevance to higher-income groups (from the seventh decile onwards) in comparison to other procedures. Thus, the counting approach method seems to be able to best capture insecurity levels in middle-classes in comparison with other aggregation procedures that give more relevance to extreme situations.[12]

To determine whether a given individual characteristic contributes similarly to economic insecurity irrespective of the aggregation and weighting method we have also estimated multivariate regressions (Table 2.5). Results show that our previous conclusions generally hold: the young, the unemployed and the low educated have a higher level of economic insecurity, whatever the method we use. However, these regressions suggest that the counting approach discriminates more by occupation, so that individuals in higher occupations have significantly lower levels of economic insecurity compared to those in middle ones, probably because this method detects more insecure individuals in the middle-income deciles. Whatever the aggregation or weighting method we find that a higher household disposable income is negatively related to economic insecurity, coefficients are nevertheless larger in the counting approach than elsewhere.

Even though our main empirical results on economic insecurity are robust to different aggregation procedures, we believe that the counting approach is the most advantageous of the all. This is because, first, this method is not influenced by the way we define the

[12] In order to check the external validity of our results for Spain we have also used information from another two big EU countries (UK and France). The main conclusions of our analysis hold: even though economic insecurity levels differ by country and method, the evolution and distribution of the phenomenon is robust to the aggregation and weighting procedure. Economic insecurity in France seems to be a structural phenomenon with little variation, even though we can observe a slight increase in 2013 and a subsequent decrease linked to economic recovery. The correlation of economic insecurity with the business cycle is stronger in the UK, where the increase in insecurity due to the Great Recession is larger. If we analyze results by income decile, insecurity decreases as we move to higher income deciles in both countries too whatever the aggregation method used.

dimensions or by the presence of outliers and by weighting the simple indicators by the population affected (not affected) by the specific phenomenon we are introducing varying degrees of relativity of the insecurity concept, capturing the social and economic context in which the index is calculated. Secondly, the counting approach strategy helps to better capture economic insecurity in middle-income groups, those individuals with secondary education and those employed with a medium-level occupation in contrast with other aggregation methods which only locate insecure individuals within the lowest income deciles and the most vulnerable subgroups (for instance, the unemployed or the less educated). And finally, and most importantly, the individual index obtained with this method is not only a way of summarizing the insecurity dimensions in a composite indicator but has a clear economic interpretation: the number of weighted dimensions in which individuals lack security with respect to the total number of dimensions considered.

Using a counting approach, we can study both the incidence and intensity of economic insecurity (Table 2.6). More than half of the population in Spain is considered economically insecure when we apply a multidimensional threshold of one dimension (union approach) and inverse frequency weights, whereas the incidence of this phenomenon is 58.2% with frequency weights and 61.5% when all dimensions are considered equally important. This pattern is repeated when we use an intermediate strategy, meaning that the individual is at least insecure in three dimensions. Notwithstanding, even though incidence is larger when using an equal weighting strategy, intensity is lower than that when applying frequency weights. Only when dimensions are weighted by the population not affected by each simple indicator –inverse frequency weights–, the normalised intensity is higher in the union approach than the intermediate strategy (0.64 vs. 0.42). These results demonstrate how useful is the analysis of the economic insecurity adjusted rate (M_{EI}), as this indicator combines incidence and intensity and enables us to conduct more sound comparisons. The M_{EI} is higher when using a union approach regardless the weighting scheme used. On the other hand, when comparing different weighting strategies, the frequency-based adjusted rate is larger both in the union and intermediate approach. Finally, incidence is close to zero with an intersection strategy, which indicates that considering only individuals who lack security in all six dimensions is a remarkably restrictive criterion.

TABLE 2.6. Aggregate indicators of economic insecurity – Counting approach

			Union approach	Intermediate approach	Intersection approach
Frequency weights	**Incidence**	H_{EI}	0.582	0.243	0.001
			(0.002)	(0.002)	(0.000)
	Normalised intensity	A	0.492	0.718	1.000
			(0.001)	(0.001)	(0.000)
	Economic insecurity adjusted rate	M_{EI}	0.286	0.174	0.001
			(0.001)	(0.001)	(0.000)
Equal weights	**Incidence**	H_{EI}	0.615	0.256	0.001
			(0.002)	(0.002)	(0.000)
	Normalised intensity	A	0.397	0.600	1.000
			(0.001)	(0.001)	(0.000)
	Economic insecurity adjusted rate	M_{EI}	0.244	0.153	0.001
			(0.001)	(0.001)	(0.000)
Inverse frequency weights	**Incidence**	H_{EI}	0.510	0.139	0.001
			(0.002)	(0.001)	(0.000)
	Normalised intensity	A	0.654	0.423	1.000
			(0.001)	(0.001)	(0.000)
	Economic insecurity adjusted rate	M_{EI}	0.216	0.091	0.001
			(0.001)	(0.001)	(0.000)

Notes: (1) Results correspond to the nine-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.
Source: Author's calculations based on longitudinal ECV data set.

2.5 Concluding remarks

Economic insecurity is a key dimension of individual well-being. Nevertheless, academics have not reached an agreement on its definition or the best procedure to measure it. In this chapter, we have thoroughly reviewed the existing literature on this field, analysing different insecurity measures and the main empirical results for developing countries. Even though current definitions of insecurity are vague and imprecise, we can find two common elements: (i) insecurity implies uninsured downside economic risks and (ii) involves anxiety steaming from people's financial perceptions. The focus on expectations about the future and how these expectations affect individuals' well-being makes the measurement of this phenomenon a challenging task.

All current measurement approaches to insecurity have advantages and drawbacks: aggregate indicators stand out for simplicity in its calculations and may be useful if our focus is to measure insecurity at a national level but rely on historical realised risks rather than modelling future distress, while unidimensional individual indices allow for the

analysis of subpopulations and key covariates, but choosing different variables can lead to non-robust results. Due to the idiosyncratic nature of this notion, information from subjective expectations' surveys seems to be the best approach, but the lack of availability on this data makes necessary to investigate other measurements. A good alternative could be the computation of multidimensional indices of economic insecurity which include some subjective indicators along with the objective exposure to several economic hazards.

In this chapter, we start from the idea that economic insecurity is a multifaceted phenomenon and cannot be fully captured with a single variable. Rather, insecurity can be understood as a latent variable present in the joint distribution of a variety of indicators. In this context, we consider both subjective and objective dimensions within a household perspective with the individual as the unit measure and it could be easily implemented for other living conditions surveys with minor adjustments. In this chapter, we have explored different aggregation and weighting procedures when computing a composite index of insecurity to try to understand the differences between them. We have compared an equal weighted average of insecurity dimensions, a standard PCA, a polyserial correlation PCA and a counting approach.

Comparing the results on economic insecurity using data for Spain over the 2009–2017 period, we show that the evolution and distribution of the phenomenon is robust to the aggregation procedure, even though the relative relevance of some sociodemographic characteristics in increasing the risk of insecurity are different depending on the method. First, the differential insecurity risk between young and old individuals is somewhat larger using a standard PCA approach. Second, relative insecurity for those with the lowest educational attainment is smaller when using a counting approach strategy than any other while differences between the weighting procedures within the counting approach are somewhat larger than those for other levels of education. The insecurity of the unemployed more than doubles insecurity for the whole population when applying a simple mean of dimensions as well as both standard and polyserial PCA, while results are smaller for the counting approach. Interestingly, individuals with a medium-level occupation display a slightly higher individual insecurity when computed with a counting approach (especially when using frequency weights) than using a PCA approach. Finally, it is interesting to note that when analysing the incidence of insecurity by income decile there are relevant differences by aggregation method: those in the first decile show almost

three times more insecurity than total population with a standard PCA strategy, while this ratio decreases when using a counting approach. From the second to fifth decile, the counting approach displays more economic insecurity than the rest of methods. On the contrary, simple mean and polyserial correlations PCA give more relevance to higher-income groups in comparison to other procedures. Thus, the counting approach method seems to be able to best capture insecurity levels in middle-classes in comparison with other aggregation procedures that give more relevance to extreme situations.

All methods present strengths and weaknesses but a counting approach seems to be the most useful because it has a direct and straightforward economic interpretation and is not influenced by the way dimensions are defined or by outliers. In fact, we can conclude that both the simple mean and the PCA have some major drawbacks: both resulting indices do not have a direct economic interpretation and are very sensitive to the definition of insecurity dimensions. On the contrary, the individual index constructed using a counting approach can be interpreted as the number of weighted dimensions in which individuals lack security. Moreover, by weighting the dimensions by the share of individuals who lack (do not lack) security allows for the introduction of a relative notion and captures the influences of the social context. The counting method also enables us to compute aggregate indicators as the economic insecurity adjusted rate, which combines incidence and intensity and is decomposable by dimensions and by subpopulations.

2.6 Appendix

TABLE A2.1. Sample observations

Year	Interview				Total	
	1	2	3	4	Frequency	Percentage
2008	9,279	0	0	0	9,279	3.64%
2009	8,802	9,692	0	0	18,494	7.26%
2010	8,159	9,191	8,892	0	26,242	10.30%
2011	7,165	8,566	8,241	7,914	31,886	12.52%
2012	6,773	8,192	7,904	7,645	30,513	11.98%
2013	6,410	7,960	7,423	7,208	29,002	11.39%
2014	6,732	7,881	7,447	7,040	29,100	11.42%
2015	6,995	7,966	7,760	7,340	30,062	11.80%
2016	6,356	7,817	7,754	7,409	29,336	11.52%
2017	0	7,119	6,933	6,757	20,809	8.17%
Total	66,672	74,383	62,354	51,314	254,723	

Source: Author's own elaboration based on longitudinal ECV data set.

TABLE A2.2. Correlation between insecurity dimensions by country

	D1	D2	D3	D4	D5	D6
D1	1					
D2	0.282	1				
D3	0.149	0.029	1			
D4	-0.118	-0.441	-0.040	1		
D5	0.295	0.206	-0.002	-0.110	1	
D6	0.441	0.394	0.002	-0.107	0.406	1

Notes: (1) We display Pearson correlation coefficient between insecurity dimensions. (2) D1 = Incapacity to face unexpected expenses; D2 = Financial dissatisfaction; D3 = Changes in the ability to go on a holiday; D4 = Income drops; D5 = Unemployment risk; D6 = Probability of extreme expenditure distress.
Source: Author's own elaboration based on longitudinal ECV data set.

TABLE A2.3. Unemployment risk. Probit model

Dependent variable: Unemployed $_t$			
Unemployed $_{t-1}$	1.498***	**Without occupation $_{t-1}$**	0.349***
	(0.025)		(0.094)
Male $_{t-1}$	-0.006	**Occupation 2 $_{t-1}$**	-0.023
	(0.021)		(0.066)
Age $_{t-1}$	-0.021***	**Occupation 3 $_{t-1}$**	0.243***
	(0.007)		(0.067)
Age^2 $_{t-1}$	0.000***	**Occupation 4 $_{t-1}$**	0.268***
	(0.000)		(0.064)
Married $_{t-1}$	-0.081***	**Occupation 5 $_{t-1}$**	0.305***
	(0.022)		(0.060)
Secondary education $_{t-1}$	-0.123***	**Occupation 6 $_{t-1}$**	0.142*
	(0.027)		(0.082)
Tertiary education $_{t-1}$	-0.275***	**Occupation 7 $_{t-1}$**	0.488***
	(0.035)		(0.061)
Experience $_{t-1}$	-0.012***	**Occupation 8 $_{t-1}$**	0.285***
	(0.004)		(0.066)
Experience^2 $_{t-1}$	-0.000	**Occupation 9 $_{t-1}$**	0.439***
	(0.000)		(0.063)
Never worked $_{t-1}$	0.371***	**Occupation 10 $_{t-1}$**	-0.682***
	(0.097)		(0.192)
Temporary employee $_{t-1}$	0.619***	**Number of HH members $_{t-1}$**	0.016**
	(0.062)		(0.008)
Permanent employee $_{t-1}$	0.059	**Bad health $_{t-1}$**	0.237***
	(0.060)		(0.059)
Independent worker $_{t-1}$	0.124*	**Chronic illness $_{t-1}$**	0.043*
	(0.065)		(0.025)
Employee without contract $_{t-1}$	0.706***	**Constant**	-1.346***
	(0.094)		(0.161)
Year dummies	YES		
Regional dummies	YES		
Observations	68,829		
Pseudo R^2	0.368		

Notes: (1) We present probit coefficients for Spain in which the unemployment at period t is the dependent variable. (2) We include dummies for country regions and the year of the interview 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) Standard errors are clustered by individuals. (5) *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's own elaboration based on longitudinal ECV data set.

TABLE A2.4. Extreme expenditure distress. Ordered probit model

	Dependent variable: Number of arrears $_t$		
Age (HH head) $_{t-1}$	-0.015***	**% of unemployed $_{t-1}$**	0.005***
	(0.001)		(0.000)
Male (HH head) $_{t-1}$	-0.022	**% of temporary workers $_{t-1}$**	0.002***
	(0.021)		(0.000)
HH disposable income $_{t-1}$	-0.000***	**% of permanent workers $_{t-1}$**	-0.001*
	(0.000)		(0.000)
External aid $_{t-1}$	0.194***	**% with bad health $_{t-1}$**	0.064***
	(0.028)		(0.014)
Capital income $_{t-1}$	-0.464***	**% with chronic illness $_{t-1}$**	0.003***
	(0.024)		(0.001)
Property with mortgage $_{t-1}$	0.235***	**% with primary educ. $_{t-1}$**	0.002***
	(0.032)		(0.000)
Rent (= market price) $_{t-1}$	0.464***	**% with secondary educ. $_{t-1}$**	-0.000
	(0.046)		(0.001)
Free accommodation $_{t-1}$	-0.170***	**% with tertiary educ. $_{t-1}$**	0.001**
	(0.044)		(0.001)
Type of HH 2 $_{t-1}$	0.005	**Number of members $_{t-1}$**	-0.001*
	(0.041)		(0.001)
Type of HH 3 $_{t-1}$	0.042		
	(0.053)		
Type of HH 4 $_{t-1}$	0.091		
	(0.085)		
Type of HH 5 $_{t-1}$	0.023		
	(0.060)		
Type of HH 6 $_{t-1}$	0.107		
	(0.071)		
Constant cut 1	0.536***		
	(0.114)		
Constant cut 2	1.111***		
	(0.115)		
Constant cut 3	1.868***		
	(0.116)		
Year dummies	YES		
Regional dummies	YES		
Observations	65,965		
Pseudo R^2	0.159		

Notes: (1) We present ordered probit coefficients for Spain in which the number of arrears at period t is the dependent variable. (2) We include dummies for country regions and the year of the interview 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) Standard errors are clustered by individuals. (5) *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's calculations from longitudinal ECV data set.

TABLE A2.5. Aggregate indicators of economic insecurity by year – Intermediate counting approach

	Frequency weights			Equal weights			Inverse frequency weights		
	H_{EI}	A	M_{EI}	H_{EI}	A	M_{EI}	H_{EI}	A	M_{EI}
2009	0.22	0.701	0.154	0.233	0.597	0.139	0.123	0.661	0.081
	(0.007)	(0.005)	(0.005)	(0.007)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)
2010	0.239	0.705	0.169	0.25	0.595	0.149	0.130	0.655	0.085
	(0.005)	(0.003)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
2011	0.21	0.71	0.149	0.221	0.595	0.131	0.118	0.650	0.077
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
2012	0.246	0.714	0.175	0.261	0.604	0.157	0.150	0.655	0.098
	(0.004)	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)
2013	0.254	0.721	0.183	0.274	0.604	0.166	0.158	0.655	0.104
	(0.005)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
2014	0.283	0.735	0.208	0.3	0.616	0.185	0.181	0.663	0.120
	(0.005)	(0.003)	(0.004)	(0.005)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)
2015	0.276	0.719	0.198	0.285	0.593	0.169	0.142	0.651	0.092
	(0.005)	(0.003)	(0.003)	(0.005)	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)
2016	0.249	0.722	0.18	0.258	0.596	0.154	0.135	0.648	0.087
	(0.004)	(0.002)	(0.003)	(0.004)	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)
2017	0.193	0.711	0.137	0.2	0.59	0.118	0.099	0.650	0.064
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)

Note: Standard errors are shown in brackets.

Source: Author's calculations based on longitudinal ECV data set.

Chapter 3

Measuring economic insecurity using a counting approach

3.1 Introduction

Traditionally, the study of individual well-being has focussed on the measurement of inequality and poverty in a static and a dynamic perspective and 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 well-being, given a level of inequality and poverty. However, since the seminal works of Osberg (1998), Osberg and Sharpe (2005) and Hacker (2005), academics have become increasingly aware of the prominent role of insecurity in the measurement of well-being and have begun to study its dimensions and evolution and, most importantly, have continued to discuss the way economic insecurity should best be measured.

There is not yet a consensus on the definition of economic insecurity, even if some common elements may be already drawn from the relevant literature. Insecurity can be understood as the anxiety produced by anticipating future economic losses and the awareness of not being capable of overcoming them (Berloffa and Modena, 2014, Bossert and D'Ambrosio, 2013, 2016, D'Ambrosio and Rohde, 2014, Hacker et al., 2010, Ivlevs, 2014, Osberg, 1998, 2018, Osberg and Sharpe 2002, 2005, Rohde, Tang, Osberg and Rao, 2015, Rohde, Tang and Rao, 2014, Rohde and Tang, 2018). Starting from this idea, economic insecurity has implications for individual well-being and should be analysed beyond inequality and poverty. Even if economic insecurity could show a positive correlation with other indicators of economic well-being, this phenomenon is not based on current financial strain but on future economic distress. Furthermore, while inequality indices are based on a static perspective and analyse the income distribution in a given point in time, economic insecurity is based on the dynamics of certain economic hazards, which could potentially impact their feelings and behaviour. Given that economic insecurity involves future situations and individuals' perspectives, its measurement is a complex issue. Our main purpose in this chapter is to evaluate the level and evolution of economic insecurity in three European countries in recent years (from 2009 to 2016), focussing on its determinants and main changes during the Great Recession. We build a variety of indicators based on a counting approach and follow a comprehensive method put forward by Rohde et al. (2015) 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).

To illustrate the functioning of our proposed measure of economic insecurity, we analyse three European countries that show different levels and trends of this phenomenon based on the *IEWB Economic Security Index* (Osberg and Sharpe, 2002, 2005; see Figure A3.1). Our final selection includes Spain as a country with low levels of economic security and a downward trend (the *IEWB Economic Security Index* has dropped 17.9% between 1980 and 2014), France as a country with an intermediate level of economic security in the EU context which, in contrast with Spain, has increased in the last 30 years (with a positive growth rate of 4.2% between 1980 and 2014), and Sweden, a country with high levels of security and a downward trend, even if smaller than that observed in Spain (a negative growth rate of 9.1% between 1980 and 2014). Thus, the empirical part of this chapter aims to contribute to the analysis of economic insecurity in European countries, where analyses on this matter are still scarce (Rohde et al., 2014, D'Ambrosio and Rohde, 2014), and focusses on three of them in which insecurity has different patterns. Moreover, we aim to provide an improvement in the measurement of insecurity by considering objective and subjective indicators as determinants of the phenomenon and by analysing the impact of the probabilities of certain hazards from a household perspective. We also provide guide for researchers aiming to estimate insecurity measures for EU countries using the currently available longitudinal data sets from the European Union Statistics on 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. Furthermore, the measurement of economic insecurity has relevant policy implications, as it can help identify the most insecure subgroups in the population and the kind of policies that should be carried out to reduce insecurity levels.

Our index of economic insecurity can be classified within an individual multidimensional approach to its measurement along the lines of Rohde et al. (2015, 2016), which combines objective and subjective dimensions and adopts a mixed strategy between forward-looking (Rohde et al., 2015, Bossert and D'Ambrosio, 2013, 2016) and retrospective approaches (Hacker et al., 2010, 2014, Rohde, Tang and Rao, 2014). Therefore, it will include indicators based on previous experiences and probabilities of future events. The inclusion of objective and subjective measures gives us a more complete picture, as we will capture the individual's perceptions of his future economic situation and the risks he currently faces. As measures of perceived insecurity, we are

analysing the inability to face unexpected financial expenses, a measure of financial dissatisfaction and changes in the ability to go on a holiday, while income drops, the probability of future unemployment and the probability of extreme expenditure distress are our objective indicators.

We use a counting approach (Atkinson, 2003) to aggregate our six insecurity dimensions into a single indicator, in line with Alkire and Foster (2011) in the study of multidimensional poverty, Bucks (2011) within the insecurity context and Peichl and Pestel (2013a, 2013b) in the multidimensional affluence field. We are particularly interested in building an individual measure that allows us to study the distribution of economic insecurity within the population. We find that a counting approach that considers an intermediate threshold and weights the simple indicators by the proportion of the population not affected by a particular insecurity dimension is the most adequate method. Although this method does not capture the magnitude of economic insecurity in each dimension (we only consider whether an individual is insecure in each dimension and not the size of the gap), this approach has a large number of advantages: it is more robust to the presence of outliers and it allows for the study of the incidence and the intensity of the phenomenon through an aggregate indicator (M_{EI}), which is decomposable by population subgroups and dimensions. Thus, we will be able to analyse the determinants of economic insecurity depending on the individuals' position in the income distribution. Furthermore, once we have classified individuals as insecure or secure, we will study the correlation of several sociodemographic characteristics with the probability of being economically insecure by using a probit estimation.

The chapter is organised 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 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 discusses our main conclusions.

3.2 Background

Even though there is not yet a consensus in the literature about what the definition of economic insecurity is, this phenomenon affects individuals' lives in many aspects, conditioning their economic and political decisions. In the short term, 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, Sen and Fitoussi (2009) point out, a currently high level of economic insecurity may impact future generations because, for instance, it is significantly harder for families suffering from economic distress to invest in their children's education, which is a key determinant of future individual well-being. Moreover, labour market and fertility decisions may be affected by insecurity and may impact current and future physical and mental health (Smith, Stoddard and Barnes, 2009, Barnes and Smith, 2011, Modena, Rondinelli and Sabatini, 2014, Rohde et al., 2016, Staudigel, 2016, Rohde, Tang and Osberg, 2017, Watson, 2018). Therefore, insecurity should be included in any analysis of well-being, as current and future inequality could be affected by the dynamics of individual 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). Regarding the first classification, most of the economic insecurity indicators have been constructed from an aggregate perspective, resulting in measures for a whole population using macro data (Osberg, 1998, Osberg and Sharpe, 2002, 2005, 2014, Berloffa and Modena, 2014, Hacker et al., 2010, 2014). 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, summarising 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 in the population allows the researcher to study the distribution of this phenomenon and its incidence in specific sociodemographic subgroups in addition to changes over time. It also allows for the possibility of identifying key covariates to design effective policies to fight against high levels of insecurity. Bossert and D'Ambrosio (2013) developed an individual measure of economic insecurity, which 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. Another individual measure is the one proposed by Rohde, Tang and Rao (2014), which considers insecurity as downward income instability.

We cannot find an agreement in the literature about which should be the nature of the dimensions included in an economic insecurity measure. Some authors have proposed the use of objective indicators (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), due to a lack of reliability of subjective measures.[13] Nevertheless, economic insecurity is referred to people's expectations about their financial future, revealing that this phenomenon has a relevant psychological component which one cannot deny. In addition, the validity of subjective indicators to predict individuals' behaviour has been checked in several studies (Manski, 1990, 2004, Zafar, 2011a, 2011b), and the results contradict the idea that subjective measures are not reliable enough to be used in economic analysis. In the insecurity context, a variety of authors have chosen to use individuals' opinions about their future economic situation to approximate this phenomenon (Anderson, 2001, Espinosa, Friedman and Yevenes, 2014). Clearly, these perspectives will be capturing different parts of economic insecurity that are equally important: the subjective dimensions will capture expectations, whereas the objective indicators will establish which is the standard of insecurity in a given society.

Recently, some other papers have focussed on building an individual economic insecurity indicator that combines objective and subjective measures. Economic insecurity is a multifaceted phenomenon which cannot be identified with only one variable. Rohde et al. (2015) introduce an individual multidimensional approach using the Household, Income and Labour Dynamics in Australia (HILDA) data, identifying economic insecurity with a variety of dimensions. As subjective indicators, 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 et al. (2010, 2014), the probability of extreme expenditure distress as a proxy for the inability to meet standard expenses and the probability of unemployment.[14] When analysing the effect of economic insecurity on mental health, Rohde et al. (2016) add a level-and-change index of income dynamics, which is inspired by the Bossert and D'Ambrosio (2013) indicator and which

[13] Traditionally, some authors have denied the reliability of subjective indicators, as they are influenced by culture or people's aspirations. Also, they argue that when studying well-being, there is a weak correlation between subjective and objective measures (Krueger and Schkade, 2008, Jahedi and Méndez, 2014).

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

approximates insecurity as a function of current income and a weighted sum of its past changes. Following the same approach, Rohde et al. (2017) use income volatility instead of large income losses as an objective estimate of economic insecurity. The authors point out that a single indicator is not enough to capture economic insecurity and that there is a need to combine these dimensions into a synthetic index which potentially reflects this abstract phenomenon. Hence, their index is calculated by aggregating the different insecurity dimensions using a Principal Components Analysis. We may highlight that composite measures allow us to study the joint distribution of those variables in which we believe insecurity reveals itself,[15] considering those situations in which an individual is simultaneously facing insecurity in several dimensions.

Furthermore, the notion of economic insecurity refers not only to current well-being but to future situations and people's perspectives, making its measurement much more difficult than that of other well-being phenomena. For that reason, it is most common in the literature to use a backward-looking approach, considering that past experiences would determine 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 et al., 2017).

Our index of economic insecurity can be classified within an individual multidimensional approach to the measurement of economic insecurity that combines objective and subjective dimensions which gives us a more complete picture of the situation, as we will be capturing the individuals' perceptions of their future economic situation and the risks they are facing. It also 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 overall economic insecurity in the selected countries but to study the distribution of the phenomenon among relevant population subgroups. Although our measure can be classified within the individual indices, we

[15] The separate analysis of these dimensions may lead us to obtain different conclusions about the insecurity level of a given individual, as that individual may lack security in one indicator but not in other. The joint analysis of these dimensions through a synthetic measure allows us to avoid this issue and reduces the information they provide.

include several dimensions, which are determined at a household level, due to the existence of economies of scale and a shared decision-making process.

3.3 Methodology

3.3.1 Economic insecurity dimensions

To construct a multidimensional index of economic insecurity, we must consider several issues: the selection of the dimensions of insecurity, the creation of an economic insecurity index selecting the weighting and aggregation method and the identification of individuals who are economically insecure. Our measure of economic insecurity is based on the dimensions' proposal developed by Rohde et al. (2015) using HILDA with some unavoidable adjustments to adapt it to the information available in the EU-SILC.

Unfortunately, there are fewer questions in EU-SILC than in HILDA related to people's appreciations about their future economic situation. Nevertheless, we develop three subjective indicators of insecurity. The first one is *household's incapacity of facing unexpected expenses*, a binary variable that takes the value of 1 if the household does not own the resources to afford an unexpected required expenditure. As our second indicator, we consider the *household's financial dissatisfaction*, which 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 would an ordered scale of dissatisfaction. We construct this measure with respect to the needed income level, and we assign a value of 0 for individuals who are not financially dissatisfied:

$$financial\ dissatisfaction_{it} = \begin{cases} \dfrac{w_{it} - y_{it}}{w_{it}} & if\ w_{it} > y_{it} \\ 0 & otherwise \end{cases} \tag{3.1}$$

where w_{it} is the lowest annual equivalized income needed to make ends meet and y_{it} is 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.

When an individual suffers from an economic disorder or believes that he will be prone to suffer from it in the relatively near future, it is very likely that expenses for 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 ability to go on a holiday*, meaning the household's incapacity to afford one annual week away from home, even if household members would like to (t), provided they enjoyed such a holiday the previous year ($t-1$). Having a week of holiday away from home is important for social inclusion in Europe, as it is one of the items included in the Eurostat's material deprivation index. Changes in this indicator will reflect the perception of a strain in the household, meaning that if individuals think they are prone to suffering a financial hardship in the near future, they will save the intended holiday expense to cope with this economically uncertain situation (Deutsch et al., 2014). We believe that the dynamics of the ability to go on a holiday indicator capture changes in individual economic insecurity for many households, particularly those over median income.[16]

Our economic insecurity measure also includes three objective indicators: income drops, unemployment hazard and the probability of extreme expenditure distress. We consider that an individual suffers an *income drop* if his household's disposable income has experienced at least a 25% decline from the previous year and if its level is below his permanent income, following Hacker et al.'s (2010) approach and in the same manner as Rohde et al. (2015):[17]

$$income\ drop_{it} = \begin{cases} \dfrac{y_{it} - y_{it-1}}{y_{it-1}} & if\ y_{it} < 0.75 y_{it-1}\ \ and\ \ y_{it} < \bar{y}_i \\ 0 & otherwise \end{cases} \quad (3.2)$$

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.

[16] As a robustness check, we have also calculated our individual economic insecurity index (EI_i) and aggregate indicators without the changes in the ability to go on a holiday indicator. We do not find significant differences in the results of our analysis, and the main conclusions hold (see Tables A3.10 and Figures A3.3 and A3.7 in the Appendix).

[17] Certainly, a level-and-change index of income dynamics (Bossert and D'Ambrosio, 2013, Rohde et al., 2016) would be a better option to measure the actual risk of a fall in income, as we would be also capturing income changes beyond the prior year. Unfortunately, the dimension of attrition in EU-SILC data does not allow us to include income drops two or three years before t as many individuals only remain in the sample for two interviews.

All income measures are deflated by the Harmonised Consumer Price Index provided by Eurostat for each of the countries in the analysis.

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. We believe that being currently insecure regarding future employment implies 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). Thus, to calculate *unemployment risk*, we adopt a forward-looking strategy following Rohde et al.'s (2015) example. For active individuals in the household, we estimate a probit model for each country in which the dependent variable takes the value 1 if the individual is unemployed in period t, according to the ILO definition, and lagged individual characteristics (those at $t-1$) are used as explanatory variables (see Table A3.3). After predicting this unemployment risk, we introduce a household perspective: we compute a household unemployment risk as a weighted average between the unemployment probabilities of the active members of the household. These weights capture the relative importance of each market income in the total household market income for a given year t. 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 of zero to all negative values:

$$\bar{p_h}(u_{it}) = \frac{\sum_{i=1}^{k} u_{it} \cdot m_{it}}{\sum_{i=1}^{k} m_{it}} \tag{3.3}$$

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 members, who do not have any value in this dimension but who suffer from a similar risk.

The *probability of extreme expenditure distress* allows us to focus our attention on certain household overdue payments: arrears on mortgage or rental payments, arrears on utility bills and arrears on hire purchase instalments or other loan payments. We create an indicator from 0 to 3 that counts the number of these difficulties experienced by the household and consider it to be the dependent variable in an ordered probit model (see

Table A3.4).[18] Based on this estimation, individual probabilities of obtaining a score of 2 or 3 are predicted and combined to obtain the household's probability of extreme expenditure distress in the short term, which is imputed to each member in it.

3.3.2 Multidimensional index of economic insecurity

3.3.2.1 Individual index

Our goal is to create a composite indicator that gathers all the information supplied by the six dimensions of insecurity described above (see Table A3.2 for complete information on the correlations between dimensions in each country). Although there are several ways to summarise the information provided by different variables (Nardo et al., 2005), it is not yet clear in the literature if there is an advantage in using one particular method.

The counting approach method (Atkinson, 2003) is commonly used in multidimensional poverty analyses (Alkire and Foster, 2011) and has been adapted to other fields, such as labour precariousness (García-Pérez et al., 2017) or multidimensional affluence (Peichl and Pestel, 2013a, 2013b), among others. In line with Bucks (2011), we adapt this strategy to produce an economic insecurity index. Alkire and Foster (2011) propose to use a dual cut-off approach that needs a threshold to be set to identify individuals who lack security in a given dimension and, subsequently, a multidimensional threshold to classify individuals as economically insecure. Regarding the incapacity to face unexpected expenses, financial dissatisfaction, the ability to go on a holiday and income drops, we consider that an individual lacks security in any of these if the dimension's value is different from zero. With respect to the unemployment risk and the probability of extreme expenditure distress, we establish the mean as a threshold (see Table A3.1). 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:

$$EI_i^A = \sum_{j=1}^{D} w_j I_{ij} \tag{3.4}$$

[18] The pseudo R^2 of unemployment risk estimations is 0.378 for Spain, 0.344 for France and 0.304 for Sweden. Regarding the probability of extreme expenditure distress estimations, the pseudo R^2 is 0.157 for Spain, 0.181 for France and 0.149 for Sweden.

$$0 \leq EI_i = \frac{\sum_{j=1}^{D} w_j I_{ij}}{D} \leq 1 \tag{3.5}$$

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 where D is the total number of dimensions (in this case, $D = 6$). We weight each dimension j by w_j, obtained as follows:

$$w_j = \frac{D * P_j}{\sum_{j=1}^{D} P_j} \tag{3.6}$$

where D is the total number of dimensions and P_j is the proportion of individuals who do not lack security in 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 (Decanq and Lugo, 2013), 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. These weights can be identified as objective indicators of subjective feelings of insecurity, meaning that people feel worse if they observe that a large part of the population has security when they are among those who are insecure (Desai and Shah, 1988). 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. As a robustness check, we have also calculated our individual economic insecurity index (EI_i) and aggregate indicators with an equal weight of the insecurity dimensions. Even though insecurity levels are somewhat higher, the main conclusions of the analysis hold (see Table A3.11 and Figures A3.2 and A3.6 in the Appendix).

In a second step, we set a multidimensional threshold (k) to identify which individuals are economically insecure. Several strategies exist for choosing this threshold: the union approach considers an individual to be economically insecure if he is lacking security at least in one dimension, whereas the intersection approach requires lacking security in all indicators. In this chapter, we will focus on an intermediate approach (an individual is economically insecure if he is not secure at least in 50% of the sum of weighted dimensions: $k \geq 3$, see Tables A3.8, A3.9 and A3.10 in the Appendix for a sensitivity analysis of the choice of multidimensional threshold on our aggregate indicators using a union and an intersection approach as well as several intermediate thresholds).

We believe that there are several reasons why the approach above described is the most adequate method for analysing the multidimensional economic insecurity phenomenon: this method is not influenced by the way we define the dimensions or by the presence of outliers. Also, by weighting the simple indicators by the population less affected by the specific phenomenon, we are capturing the social and economic context in which the index is calculated. Furthermore, it allows us to calculate some interesting aggregated indicators, taking into consideration both the incidence and the intensity of economic insecurity.

3.3.2.2. Aggregate index

Once we have classified individuals as insecure or secure, the approach we follow allows us to calculate aggregate indicators of insecurity for each society, so we can study the level of economic insecurity for any country or subpopulation and its evolution over time. The incidence of economic insecurity (H_{EI}) in a given population is calculated as follows:

$$H_{EI} = \frac{\sum_{i=1}^{N} I\left(EI_i^A \geq k\right)}{N} = \frac{q_{EI}}{N} \tag{3.7}$$

where $I\left(EI_i^A \geq k\right)$ 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:

$$\mu_{EI}^{q_{EI}} = \frac{\sum_{i=1}^{N} EI_i^A I\left(EI_i^A \geq k\right)}{\sum_{i=1}^{N} I(EI_i^A \geq k)} \;\rightarrow\; A = \frac{\mu_{EI}^{q_{EI}}}{D} \tag{3.8}$$

where $\mu_{EI}^{q_{EI}}$ measures the mean value of the variable EI_i^A among the economically insecure and A is the standardisation of this indicator by the number of dimensions. After that, we can calculate the economic insecurity adjusted rate (M_{EI}), an adequate social measure of economic insecurity that considers the incidence and the intensity of the phenomenon. Moreover, it easily allows for comparisons in the dimension and trend of economic insecurity between different countries or subpopulations over time and is decomposable both by subgroups and by insecurity dimensions (Alkire and Foster, 2011):

$$M_{\mathrm{EI}} = \frac{\sum_{i=1}^{N} EI_i^A I\left(EI_i^A \geq k\right)}{ND} = \frac{q_{EI}}{N}\frac{\mu_{EI}^{q_{EI}}}{D} = H_{EI}A \tag{3.9}$$

3.3.3 Data

To calculate our index of economic insecurity, we use the EU-SILC dataset. This is a standardised source of income and socioeconomic data in the European Union that allows for sound comparisons of EU countries' populations' well-being. It contains annual individual and household data on multiple variables, such as income, employment, education, material deprivation or health. We use the longitudinal version of the survey, which is a four-year rotating panel that has been conducted by Eurostat since 2004 and that follows individuals in a maximum of four waves. Due to the change in the methodology for household income measurement in the Spanish version of the database, in this chapter we are only using a consistent income data series covering the period from 2008 to 2016. Moreover, we find that focussing on the crisis period and evaluating how the economic downturn and recovery is reflected in economic insecurity in our selected countries 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 single wave due to the dynamic nature of certain dimensions. Our final data set includes 247,181 observations corresponding to individuals observed from two to four times during the 2008–2016 period. A total of 106,503 observations correspond to Spain (43.1%), 113,713 to France (46%) and 26,965 to Sweden (10.9%).

3.4 Results

3.4.1 Dimensions of economic insecurity

Focussing on the entire period of analysis, on average, all insecurity dimensions are higher in Spain than in the other two countries, whereas Sweden presents the lowest values (see Table 3.1). We find that the incapacity to face unexpected expenses is above 30% of the population in Spain and France (37.9% and 31.6%, respectively), while in Sweden, this indicator does not reach 14%. The average gap of financial dissatisfaction is 0.11 in Spain (for the mean individual, household income should increase by an 11% to be satisfactory), and nearly 37% of the population declares needing more than its

current income to make ends meet. The incidence of this phenomenon is approximately 28% in France and much lower in Sweden, where only 5.5% of the individuals are financially dissatisfied (although the average gap among those not satisfied with their income is higher than in France). The inability to go on a holiday indicator shows the same pattern: while 10% of Spaniards are affected by this dimension, only 6.4% and 2.7% of individuals in France and Sweden experience a worsening in their capability of having one week away from home. Thus, from a subjective point of view, Spain is the most insecure country of the three we analyse.

TABLE 3.1. Descriptive statistics - dimensions of economic insecurity

		Incapacity to face unexpected expenses	Financial dissatisfaction	Inability to go on a holiday	Income drops	Unemployment risk	Extreme expenditure distress
ES	Mean	0.379 (0.002)	0.110 (0.001)	0.100 (0.001)	-0.062 (0.001)	0.149 (0.001)	0.046 (0.000)
	Incidence	37.9%	36.5%	10.0%	14.2%	23.8%	30.5%
	Mean (D = 1)	-	0.300 (0.001)	-	-0.436 (0.002)	0.476 (0.001)	0.119 (0.000)
FR	Mean	0.316 (0.002)	0.047 (0.000)	0.064 (0.001)	-0.032 (0.000)	0.051 (0.000)	0.038 (0.000)
	Incidence	31.6%	27.8%	6.4%	8.1%	15.1%	25.2%
	Mean (D = 1)	-	0.171 (0.001)	-	-0.402 (0.002)	0.234 (0.000)	0.116 (0)
SE	Mean	0.136 (0.003)	0.011 (0.000)	0.027 (0.001)	-0.028 (0.001)	0.025 (0.001)	0.017 (0.000)
	Incidence	13.6%	5.5%	2.7%	6.5%	16.6%	22.8%
	Mean (D = 1)	-	0.191 (0.006)	-	-0.425 (0.005)	0.115 (0.001)	0.054 (0.000)

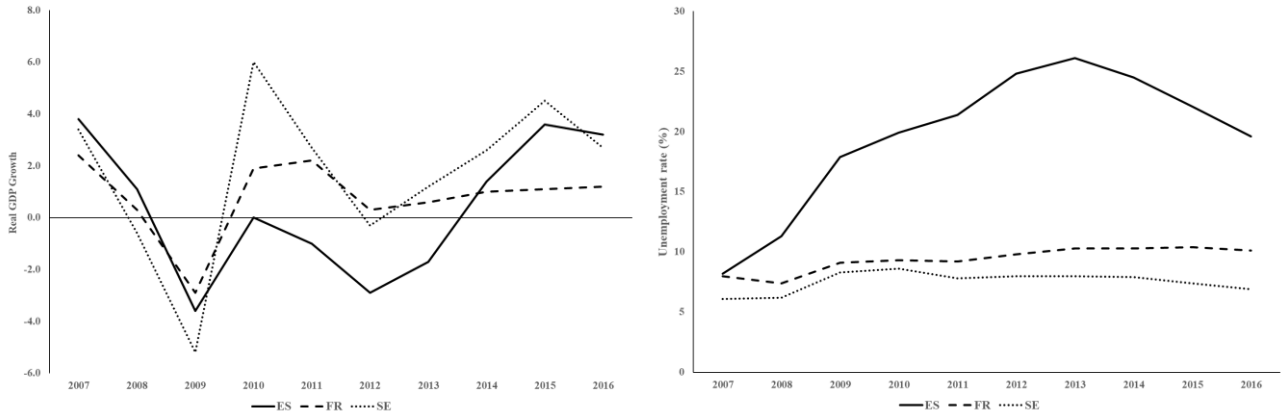
Notes: (1) We present the descriptive statistics of the dimensions of economic insecurity. The mean includes indicator values equal to zero. (2) Incidence is calculated by dividing the observations of affected individuals (D = 1) by the total for each indicator. (3) D = 1 refers to affected individuals, defined as those situated above the dimensional threshold. (4) We do not display the means of affected individuals for binary variables (incapacity to face unexpected expenses and inability to go on a holiday). (5) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

Regarding our objective indicators of insecurity, a similar pattern holds. The mean income drop is higher in Spain (6.2%), followed by France (3.2%). In this case, differences in the mean income drop are mainly due to differences in the incidence of this indicator: the percentage of individuals who have experienced a large income fall in Spain (14.2%) is six percentage points higher than in France (8.1%) and more than double than in Sweden (6.5%), even though the mean income drop for those affected is around 40%

in all countries. France and Spain show similar results with respect to the probability of extreme expenditure distress, the incidence being a bit lower in the latter, whereas in Sweden, this indicator is less frequent. Especially interesting are the results for the unemployment risk: in Spain, nearly 24% of the population has an above-average probability of unemployment, whereas the incidence of this dimension is 15.1% and 16.6% in France and Sweden, respectively. Clearly, the labour market crisis during the recession in Spain is directly reflected in this indicator.

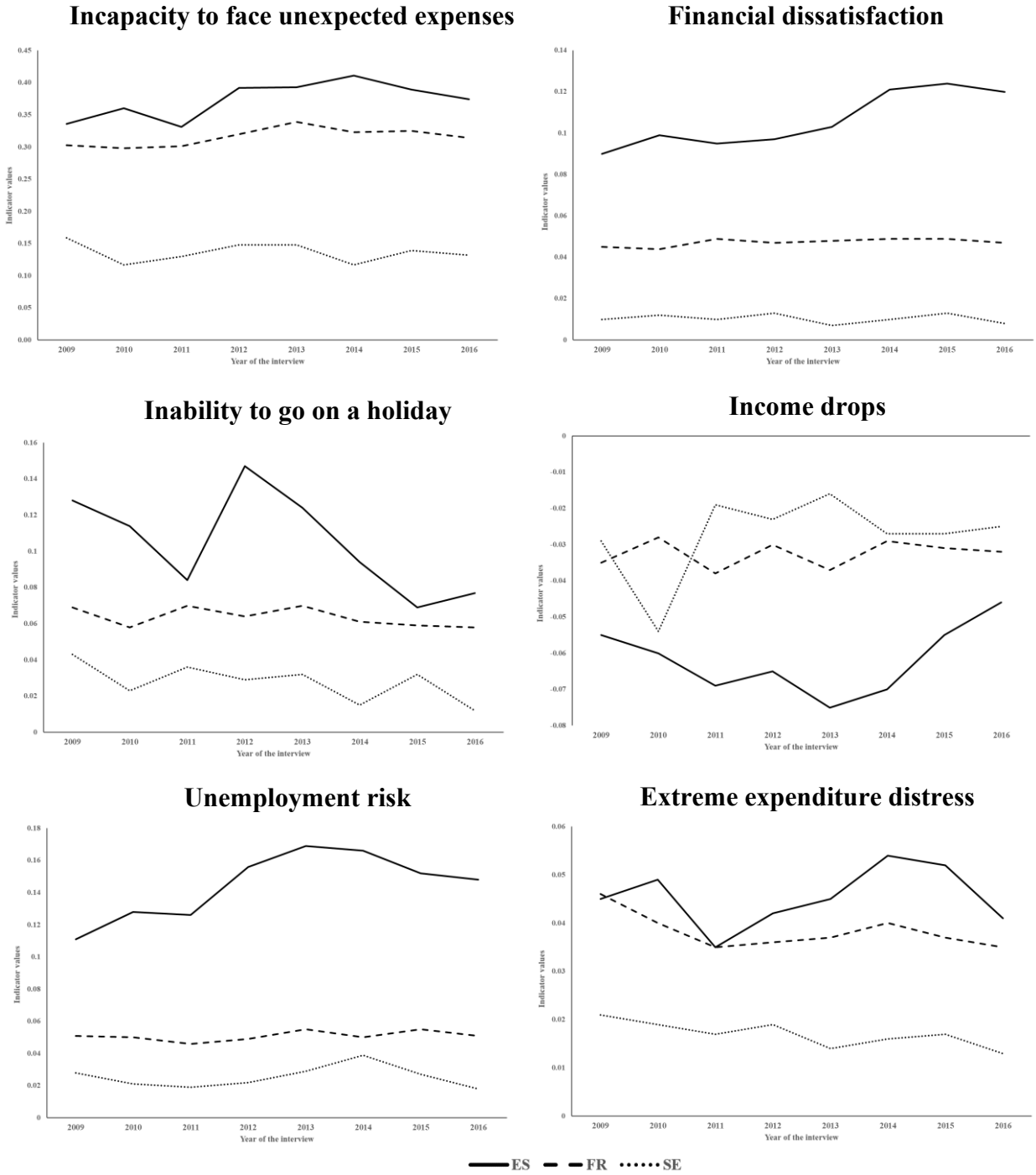
All previous results belong to the mean of each dimension for the entire period of analysis, whereas dimensions may have various yearly averages depending on their correlations with the economic cycle (Figure 3.1). Spain was characterised by a negative Gross Domestic Product (GDP) growth from 2009 to 2013, recovering briefly from the recession in 2011 but suffering again from GDP falls 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 increase in private debt as a result of the housing bubble. France and Sweden experienced negative GDP growth at the beginning of the recession but recovered positive rates shortly after (except for Sweden in 2012). This GDP growth was moderate in France (with a maximum rate of 2.2%), whereas there was more growth volatility in Sweden (with a maximum rate of 6% in 2010). Unemployment rates increased around two points in these two countries, and by 2016, they had not yet returned to their pre-crisis levels. The results of our insecurity dimensions seem to reflect the different impact of the Great Recession in these three countries.

FIGURE 3.1. Real GDP growth rate and unemployment rate. 2007 - 2016.



Source: Eurostat database. Available at https://ec.europa.eu/eurostat/web/ products-datasets.

FIGURE 3.2. Evolution of economic insecurity dimensions. 2009 - 2016



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

Figure 3.2 displays the population averages of our insecurity dimensions by country and year for the 2009–2016 period. In general, the incapacity to face unexpected expenses raised during the first period of the crisis (except for 2010 in Sweden and 2011 in Spain),

with a slight recovery in the last years. Financial dissatisfaction has been more stable in France and Sweden, whereas it has persistently grown in Spain from 2011 to 2015, with a slight decrease in 2016. The inability to go on a holiday indicator presents more volatility than others, and we must highlight its large increase in 2012 in Spain, precisely when GDP fell in a second recession period, as well as its improvement with economic recovery. In general, it seems that individuals' expectations are clearly influenced by economic activity. Income drops show more correlation with the economic cycle in Spain, where it is worth noting the 'W' shape in this indicator, reflecting the large GDP drop in 2010.[19] As it could be expected, unemployment risk rose notably in Spain in 2012 and 2013 due to the labour market crisis when unemployment rate reached 24.8% and 26.1%, respectively. However, this probability also increased in Sweden and France from 2010 to 2014, even though it showed a more stable trend in France. In contrast, the probability of extreme expenditure distress shows a slight downward trend in France and Sweden while in Spain it clearly reflected the economic cycle trend, falling after the first recovery of economic activity in 2011 and experiencing a large increase during the worst years of the recession up to 2014, when it reached its maximum. This may be strongly linked to the increase in unemployment risk and its concentration in some households so that when all active members become unemployed, the household has large difficulties in keeping up with previous consumption levels.

3.4.2 Individual economic insecurity index

Table 3.2 displays the evolution of our individual economic insecurity index (EI_i). These results are in line with the idea that economic insecurity is related to the evolution of economic activity in each of the three countries analysed. This correlation seems to be stronger in Spain, where insecurity reached its maximum in 2014 and has not yet returned its 2009 level. In this country, we can clearly distinguish various sub-periods in accordance to GDP growth: the increase of insecurity in 2010 is related to the large reduction of economic activity at the beginning of the Great Recession, followed by a slight recovery in 2011 (the EI_i decreases 9.9%). Then, the worsening of the Spanish labour market, the loss of unemployment benefits for long-term unemployed people

[19] In this case, a positive correlation exists, as the index is defined in negative terms: when the economic cycle experiences a decrease, income drops are larger.

(which may cause a rise in the income drops indicator) and the reduction of public spending (which could cause a deterioration of subjective dimensions) are reflected in a large increase in insecurity that lasted until 2014. Subsequently, the return to positive GDP growth rates improves security from 2015 onwards. Thus, it appears that our economic insecurity index captures decrease in economic activity relatively quickly, but the subsequent rebound is reflected with a certain delay. This is probably because it takes more time to recover individuals' confidence after an economic crisis than to lose it when a deep recession begins.

TABLE 3.2. Descriptive statistics - individual economic insecurity index (EI_i)

	Mean EI_i			Variation rate of the mean (%)		
	ES	**FR**	**SE**	**ES**	**FR**	**SE**
2009	0.223 (0.004)	0.187 (0.002)	0.142 (0.003)	-	-	-
2010	0.232 (0.003)	0.173 (0.002)	0.120 (0.003)	4.0%	-7.5%	-15.5%
2011	0.209 (0.003)	0.175 (0.002)	0.098 (0.003)	-9.9%	1.2%	-18.3%
2012	0.250 (0.003)	0.177 (0.002)	0.110 (0.003)	19.6%	1.1%	12.2%
2013	0.253 (0.002)	0.188 (0.002)	0.101 (0.004)	1.2%	6.2%	-8.2%
2014	0.260 (0.003)	0.178 (0.002)	0.110 (0.004)	2.8%	-5.3%	8.9%
2015	0.245 (0.002)	0.179 (0.002)	0.099 (0.004)	-5.8%	0.6%	-10.0%
2016	0.227 (0.002)	0.172 (0.002)	0.084 (0.004)	-7.6%	-3.9%	-15.3%

Notes: (1) We present descriptive statistics by year of the individual economic insecurity index (EI_i), this individual index is the standardised weighted sum of dimensions in which the individual lacks security. (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

Conversely, economic insecurity in France shows a remarkably stable trend (Figure 3.3). Positive GDP growth rates in 2010 pushed insecurity downwards (with a decrease of 7.5% from the previous year) while the recession led to a modest increase up to 2013. It seems that moderate GDP growth rates were not sufficient to mitigate insecurity during a period where unemployment rates were steadily rising. Once the recovery strengthens and unemployment stabilises, insecurity decreases again. In contrast, in Sweden we find a general downwards trend of individual economic insecurity in this period. The volatility of GDP growth is reflected on the Swedish economic insecurity index: there was a reduction of insecurity in 2011, corresponding with a large and positive GDP growth rate,

but this insecurity increased again due to the slowdown of economic activity that lasted until 2014.[20]

3.4.3 Aggregate indicators of economic insecurity

As we stated in the methodology section, the approach we follow has the key advantage of allowing us to study several indicators regarding the incidence and intensity of economic insecurity, as well as the contribution of our six dimensions to the overall insecurity adjusted rate. The incidence of economic insecurity (H_{EI}) is 14.3% in Spain, more than double the incidence in France (6.5%) and far from that in Sweden, where only 2.3% of the population suffer from this phenomenon (see Table 3.3). This pattern holds when looking at the economic insecurity adjusted rate (M_{EI}), which combines the information on the incidence and intensity of economic insecurity.[21] Therefore, differences in M_{EI} among countries seem to stem from differences in the incidence of the phenomenon more than in its intensity, since all three countries present a normalised intensity around 0.65 (which approximately corresponds to 4 dimensions out of 6).

For all the three countries, four indicators mainly drive our results on economic insecurity by participating 20% each in the insecurity adjusted rate: unemployment risk, extreme expenditure distress and two subjective indicators (the incapacity to face unexpected expenses and financial dissatisfaction, see Table 3.3). It is worth noting that the relative contribution of these dimensions is fairly consistent among countries: in general, the previous dimensions are the most frequent in each of the analysed countries, even though the higher contribution to overall insecurity does not necessarily correspond with the higher intensity in the population, as we modulate the results by giving more weight to dimensions that are less frequent in the population. The inability to go on a holiday indicator and income drops are the two insecurity dimensions contributing the least to overall insecurity in all three countries. In Spain, however, income drops contribute slightly more to insecurity than in the other two countries, 14.2% in comparison with 13% (Sweden) and 10.6% (France), while changes in the ability to go

[20] Note, however, that the economic insecurity indices for Sweden in 2012 and 2013 are not statistically different.

[21] We may recall that the economic insecurity adjusted rate is defined as the total weighted sum of insecure dimensions among economically insecure individuals divided by the maximum number of dimensions in the population.

on a holiday is relatively more important to determine insecurity in Sweden (12%) than in France (10.4%) or Spain (8.5%).

TABLE 3.3. Aggregate economic insecurity indicators and decomposition by dimensions

		ES	FR	SE
Incidence	H_{EI}	0.143 (0.001)	0.065 (0.001)	0.023 (0.001)
Normalised intensity	A	0.653 (0.001)	0.643 (0.001)	0.660 (0.005)
Economic insecurity adjusted rate	M_{EI}	0.093 (0.001)	0.042 (0.001)	0.015 (0.001)
		Contribution to M_{EI}		
Incapacity to face unexpected expenses	M_{EI}^1	18.8%	19.5%	21.1%
Financial dissatisfaction	M_{EI}^2	18.7%	19.4%	17.1%
Inability to go on a holiday	M_{EI}^3	8.5%	10.4%	12.0%
Income drops	M_{EI}^4	14.2%	10.6%	13.0%
Unemployment risk	M_{EI}^5	20.4%	20.1%	19.7%
Extreme expenditure distress	M_{EI}^6	19.3%	20.0%	17.1%

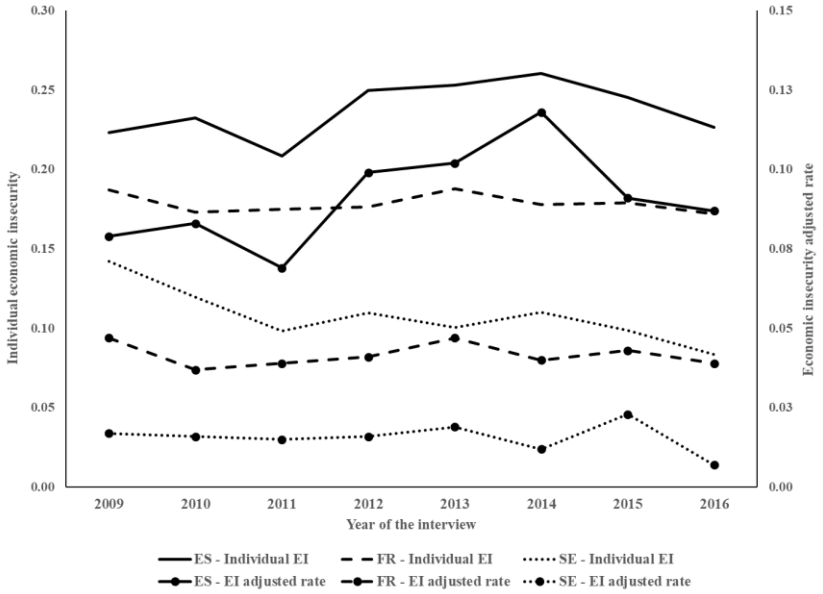
Notes: (1) We present aggregate economic insecurity indicators using an intermediate multidimensional threshold. (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

Interestingly, when we analyse the evolution of the previous indicators by year, we find that increases in incidence do not always correspond to increases in intensity (for instance, in Spain, the incidence of insecurity grew from 10.6% in 2011 to 15.2% in 2012, while the difference in intensity between these two years was not significant). In all three countries, changes in economic insecurity incidence seem to be the main drivers of changes in M_{EI}, as normalised intensity is mostly stable in time (see Table A3.5).

Figure 3.3 displays the evolution of M_{EI} from 2009 to 2016, showing that the three countries present structural differences regarding overall insecurity. The M_{EI} displays a similar evolution to that of the individual index, even though the adjusted rate emphasises differences between periods. Spain is the country with the highest level of insecurity whatever year we consider. However, insecurity trends in this country are linked to the economic cycle so they reached a maximum in 2014 and decreased with recovery even if not yet at pre-crisis levels. France, in turn, shows an intermediate insecurity level with a

stable trend in time (the economic insecurity adjusted rate fluctuates between 0.06 and 0.07). Sweden registers very low levels of economic insecurity making it a very limited social problem. This country also shows a stable evolution of insecurity in time, with a slight increase since the beginning of the Great Recession and somewhat more variability in recent years. The Swedish economic insecurity adjusted rate dropped from 0.023 in 2014 to 0.007 in 2016 (with an incidence of 3.4% and 1.1% of individuals, respectively).

FIGURE 3.3. Evolution of the individual economic insecurity index (EI_i) and the economic insecurity adjusted rate (M_{EI}). 2009 - 2016



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

3.4.4 Characterising the risk of being economically insecure

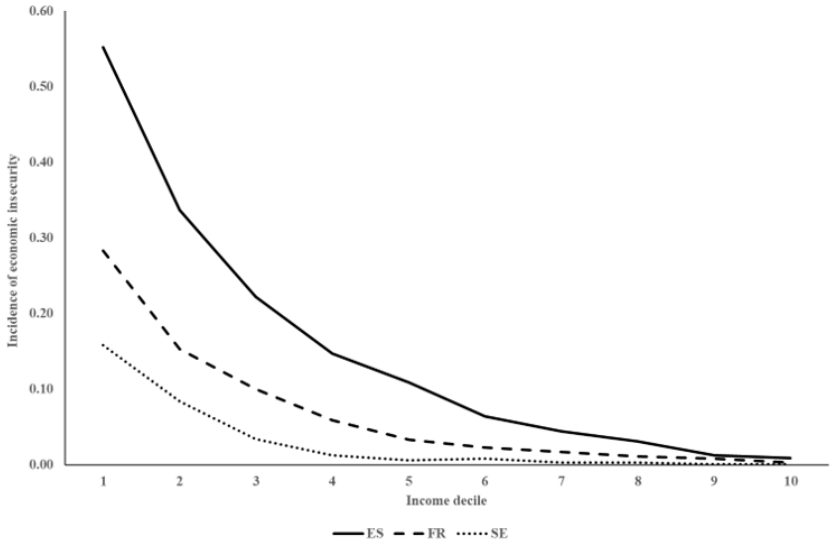
The main purpose of this analysis is to establish a profile of insecure individuals to determine where and how policy makers should focus public action, characterising those individuals with a higher risk of insecurity and checking whether these characteristics differ for those individuals in different socioeconomic positions.

Figure 3.4 presents the incidence of economic insecurity by individual income decile.[22] As it could be expected, insecurity decreases as the level of income grows in all three

[22] Income deciles are calculated based on a measure of permanent income. Due to the limits imposed by data attrition in our dataset, we have proxied this permanent income with the average between current

countries. Spain has the highest incidence in the first decile (55.2%), followed by France, where 28.3% of the population in the first income group is insecure, and Sweden with only 16%. However, in Spain and France, economic insecurity affects a significant group of individuals who are not placed in the first two deciles but in upper-low or middle-low deciles of the income distribution. In Spain, we can clearly distinguish one group of individuals who have relatively high values of economic insecurity (situated in the three first deciles), many individuals who still suffer from moderated levels of insecurity located in the fourth, fifth and sixth deciles, and another group of individuals whose levels of insecurity are almost inexistent (from the seventh decile onwards). On the other hand, France shows significant levels of this phenomenon until the fourth decile. This result suggests that, even though economic insecurity is positively correlated with poverty, it may not be enough to focus on a poverty analysis when aiming to study individual lack of well-being. In Spain, 31.2% of insecure individuals would not be classified as poor and more than half of the individuals below the poverty line, 54.2%, are found not to be economically insecure.[23] Consistently with our results, insecurity in Sweden appears to be more correlated with poverty (70% of insecure individuals are also poor).

FIGURE 3.4. Incidence (H_{EI}) of economic insecurity by income decile

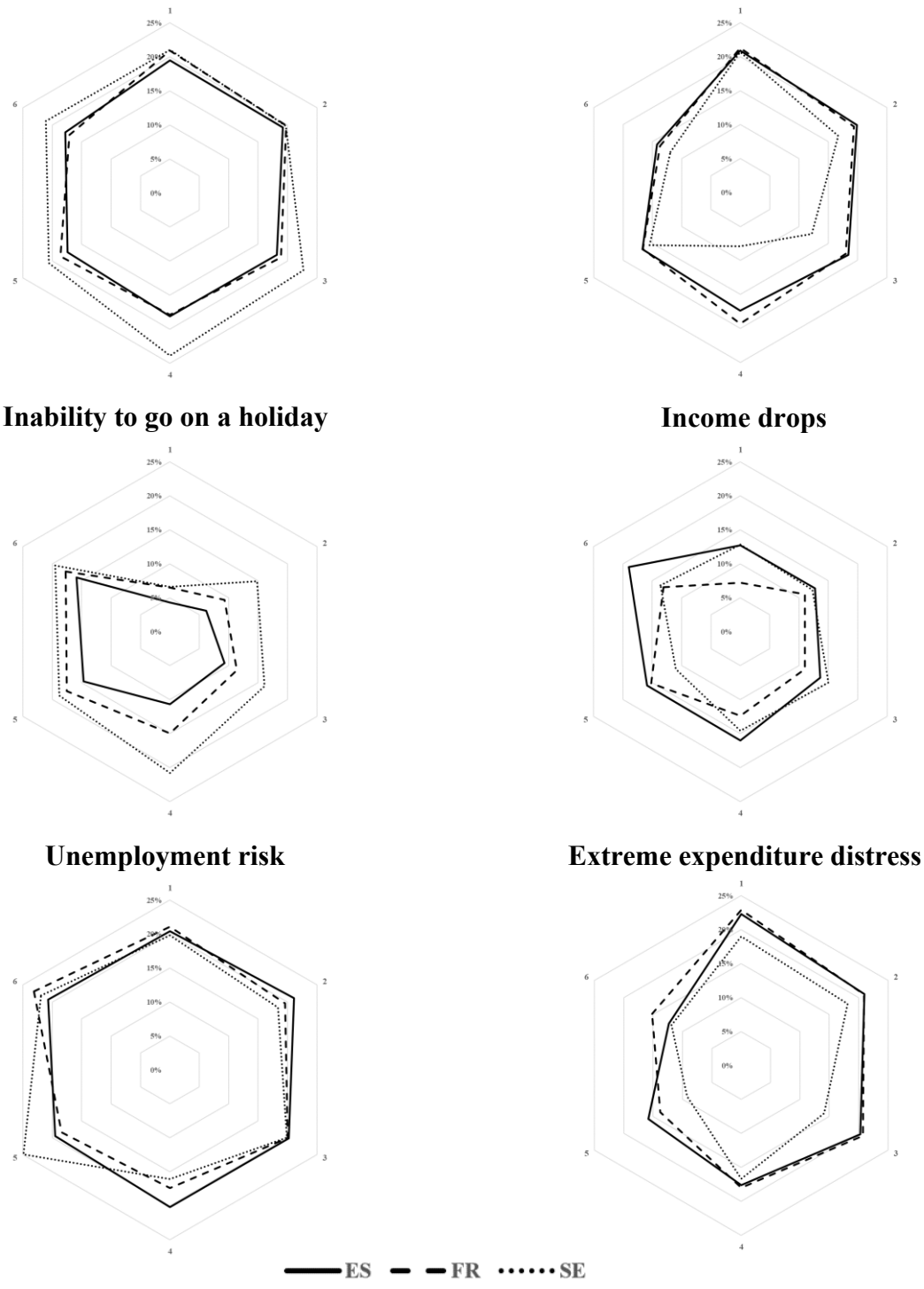


Source: Author's calculations based on longitudinal EU-SILC data set.

income and that in the prior year (t and $t-1$). As a robustness check, we present results based on annual income in the Appendix (Figure A3.8).

[23] We consider poor those individuals whose household equivalent disposable income (calculated with the OECD modified scale) is below 60% of their country's median equivalent household disposable income, using the usual EU definition of individuals at risk of poverty.

FIGURE 3.5. Contribution of dimensions to the economic insecurity adjusted rate (M_{EI}) by income decile



Note: We display contributions by dimensions to the economic insecurity adjusted rate up to the sixth decile, as this phenomenon is negligible for high-income individuals.
Source: Author's calculations based on longitudinal EU-SILC data set.

In this context, taking advantage of the M_{EI} decomposability property, we can also check which dimensions are more important to individual insecurity depending on the

individual's position on the income distribution (see Figure 3.5). Focussing our attention on the incapacity to face unexpected expenses, we find that its contribution to overall insecurity is rather constant by income decile. A similar result is obtained for the contribution of unemployment risk, suggesting that its participation in economic insecurity is more equally distributed in the population. In contrast, the contributions to the economic insecurity adjusted rate of either financial dissatisfaction or extreme expenditure distress decrease as we move from lowest to highest income deciles. These results reveal that the incapacity to face unexpected expenses and unemployment risk capture difficulties in facing expenditure emergencies, which can be understood as transitory distress regarding the position in the income distribution. Financial dissatisfaction and expenditure distress capture difficulties in covering basic needs, which is more a structural problem that mainly affects those individuals living in households with low incomes. As we could expect, changes in the ability to go on a holiday are more relevant for middle-income deciles than for lower ones, 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. In contrast to what we find for other dimensions, there seems to be no clear pattern of the contribution of income drops to economic insecurity by income decile. In Sweden, this dimension is more relevant for individuals situated in the lowest deciles, while in Spain and France, the contribution is slightly higher for individuals situated in middle-income deciles.

We are also interested in studying the relationship between insecurity and several sociodemographic individual characteristics, as well as possible differences in this relationship between countries. Table 3.4 displays the average marginal effects of the probability of being economically insecure. We find that insecurity is higher for individuals between 26 and 35 years of age in all countries. Individuals below 26 (as children and students) could be generally more secure due to financial dependence on other older household members while those over 35 could be more secure both due to a more stable labour status and an increasing probability of accessing life-time savings. Nevertheless, age is not significantly correlated with the incidence of insecurity in Sweden (except for those older than 60). In general, we believe that the fact that individual characteristics are less predictive in Sweden than in the other two countries could be suggesting a higher protection against insecurity provided by its welfare system.

TABLE 3.4. Determinants of incidence of economic insecurity (H_{EI}) by country. Average marginal effects

	ES	FR	SE
Male	0.002	-0.001	-0.002
	(0.002)	(0.002)	(0.002)
Age			
< 16	-0.018***	-0.012***	-0.004
	(0.004)	(0.003)	(0.004)
16 – 25	-0.012**	-0.009**	-0.003
	(0.005)	(0.004)	(0.004)
36 – 45	-0.007*	-0.015***	-0.003
	(0.004)	(0.003)	(0.004)
46 – 60	-0.029***	-0.017***	0.007*
	(0.004)	(0.003)	(0.004)
> 60	-0.024***	-0.019***	-0.010**
	(0.006)	(0.005)	(0.005)
Level of education			
Secondary	-0.008**	-0.015***	-0.025**
	(0.003)	(0.004)	(0.012)
Tertiary	-0.042***	-0.026***	-0.027***
	(0.004)	(0.003)	(0.010)
HH disposable income (ln)	-0.178***	-0.152***	-0.064***
	(0.002)	(0.003)	(0.004)
Basic activity status			
Inactive	-0.031***	-0.005	-0.000
	(0.004)	(0.003)	(0.005)
Unemployed	0.099***	0.053***	0.028***
	(0.005)	(0.006)	(0.009)
Marital status			
Married	-0.006*	-0.013***	-0.007***
	(0.003)	(0.002)	(0.002)
HH composition			
Number of members	-0.009***	-0.003***	-0.009***
	(0.001)	(0.001)	(0.002)
Number of children	0.003*	-0.000	0.005**
	(0.002)	(0.001)	(0.002)
Health			
Bad health	0.025***	0.027***	0.031***
	(0.006)	(0.005)	(0.010)
Status in employment			
Never worked	0.031***	0.007	0.006
	(0.006)	(0.005)	(0.007)
Temporary employee or without contract	0.092***	0.090***	0.019***
	(0.004)	(0.004)	(0.004)
Employer	-0.047***	-0.028***	-0.005
	(0.006)	(0.010)	(0.008)
Independent worker	-0.019***	-0.007*	-0.000
	(0.004)	(0.004)	(0.006)
Observations	100126	92457	20601

Notes: (1) We present average marginal effects for probit estimations in which the dependent variable takes the value 1 if the individual is economically insecure and 0 otherwise, computed by the counting approach method with an intermediate threshold. (2) ES = Spain, FR = France and SE = Sweden. (3) Standard errors are clustered by individual. (4) References of categorical variables are the following: between 26 and 35 years (age), primary (education), working (basic labour status), not married (marital status), good health (bad health) and permanent employee (employment status). (5) Average marginal effects for discrete variables are the discrete change from the base level. (6) For continuous variables, average marginal effects are calculated using the mean.

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

TABLE 3.5. Determinants of incidence of economic insecurity (H_{EI}) by income groups. Average marginal effects

	Total	Low income	Middle income	High income
Male	-0.001	-0.005	0.003	0.000
	(0.002)	(0.005)	(0.002)	(0.001)
Age				
< 16	-0.012***	-0.043***	-0.004	-0.001
	(0.002)	(0.008)	(0.004)	(0.002)
16 – 25	-0.012***	-0.030***	-0.012***	0.000
	(0.003)	(0.009)	(0.004)	(0.002)
36 – 45	-0.013***	-0.039***	-0.011***	-0.001
	(0.002)	(0.008)	(0.003)	(0.002)
46 – 60	-0.019***	-0.053***	-0.017***	-0.002*
	(0.002)	(0.008)	(0.003)	(0.001)
> 60	-0.020***	-0.078***	-0.017***	-0.001
	(0.003)	(0.010)	(0.004)	(0.002)
Level of education				
Secondary	-0.012***	-0.030***	-0.015***	-0.002
	(0.003)	(0.008)	(0.004)	(0.002)
Tertiary	-0.029***	-0.071***	-0.027***	-0.007***
	(0.003)	(0.008)	(0.003)	(0.002)
HH disposable income (ln)	-0.143***	-0.320***	-0.189***	-0.048***
	(0.002)	(0.006)	(0.006)	(0.002)
Basic activity status				
Inactive	-0.012***	-0.040***	-0.012***	0.001
	(0.003)	(0.008)	(0.004)	(0.002)
Unemployed	0.069***	0.123***	0.071***	0.040***
	(0.004)	(0.009)	(0.008)	(0.005)
Marital status				
Married	-0.012***	-0.029***	-0.009***	-0.002*
	(0.002)	(0.005)	(0.002)	(0.001)
HH composition				
Number of members	-0.005***	-0.010***	-0.006***	-0.001
	(0.001)	(0.002)	(0.001)	(0.001)
Number of children	0.002*	0.007**	0.000	-0.001
	(0.001)	(0.003)	(0.002)	(0.001)
Health				
Bad health	0.029***	0.065***	0.028***	0.007**
	(0.004)	(0.012)	(0.007)	(0.003)
Status in employment				
Never worked	0.021***	0.050***	0.031***	0.000
	(0.004)	(0.011)	(0.007)	(0.002)
Temporary employee or without contract	0.091***	0.196***	0.083***	0.027***
	(0.003)	(0.008)	(0.006)	(0.004)
Employer	-0.028***	-0.083***	-0.028***	-0.001
	(0.004)	(0.012)	(0.004)	(0.004)
Independent worker	-0.006**	-0.032***	-0.005	0.005*
	(0.003)	(0.009)	(0.005)	(0.003)
Observations	213184	55887	66429	90868

Notes: (1) Low-income includes individuals situated in deciles one to three, middle-income refers to deciles four to six and high-income contains individuals located in deciles seven to ten. (2) Standard errors are clustered by individual. (3) References of categorical variables are the following: between 26 and 35 years (age), primary (education), working (basic labour status), not married (marital status), good health (bad health) and permanent employee (employment status). (4) We control for regional differences by including country dummies. (5) Average marginal effects for discrete variables are the discrete change from the base level. (6) For continuous variables, average marginal effects are calculated using the mean.
Source: Author's calculations from longitudinal EU-SILC data set.

For all countries, having a tertiary education shows a large negative correlation with being insecure than when the individual only reaches a secondary education level. Regarding household composition, we find that an additional member in the household is negatively related to the likelihood of being insecure, whereas an additional child shows a small and positive interaction in Spain and Sweden. Clearly, larger households have a greater ability to pool insecurity risk, so an additional adult in the household contributes to increasing disposable income, while children, on the contrary, increase household needs. As we would have expected, being currently unemployed implies a positive correlation (9.9 pp in Spain, 5.3 pp in France and 2.8 pp in Sweden) with respect to those who are employed, regardless of the country analysed. Furthermore, employees with temporary contracts also show a higher positive correlation with insecurity, reflecting the anxiety stemming from the instability of temporary contracts or unregulated jobs and the anticipation of losses due to the termination of work.

It is also worthwhile to investigate if the previous socioeconomic characteristics are diversely related to the probability of being insecure, depending on the individuals' position in the income distribution (Table 3.5). We divide individuals into three groups: low-income (those situated below the fourth decile), middle-income (individuals positioned from the fourth to the sixth decile) and high-income (from the seventh decile onwards). Results show that the higher probability of being insecure of individuals between 26 and 35 years of age mainly arises from individuals located in the lowest deciles and the previous negative correlation of age with insecurity is only significant for those above 35 that are placed in the middle-income group. Moreover, age has no significant correlation with economic insecurity for high-income individuals. Education level is negatively related to insecurity, with a higher relevance of tertiary rather than secondary education and for those located in the lowest tail of income distribution. As expected, household disposable income shows a negative correlation with insecurity, and this relationship is larger for low-income individuals, followed by the middle-income group. Regarding labour market variables, the positive relationship between unemployment and insecurity is larger for individuals situated below the fourth decile (12.3 pp), even though it is also significant for middle- (7.1 pp) and high-income (4 pp) groups. In the first two groups, employees without a contract, temporary employees and individuals who have never worked have a larger positive correlation with insecurity than

those with a permanent contract. In contrast, only temporary employment increases insecurity for high-income individuals.

3.5 Conclusions

This chapter proposes the use of a counting approach to study economic insecurity and analyse its nature and evolution from 2009 to 2016 in three developed countries. This procedure allows researchers to characterise insecure individuals along the entire income distribution. Our empirical analysis makes a sound proposal for an advantageous method to measure economic insecurity using the EU-SILC data set, which may allow for further empirical analyses of this phenomenon in the European context. We calculate a multidimensional individual index of economic insecurity, capturing subjective and objective dimensions, and we follow a mixed strategy between a retrospective and a forward-looking approach. In particular, we measure the incapacity to face unexpected financial expenses, financial dissatisfaction and changes in the ability to go on a holiday as proxies for self-assessed insecurity, in addition to large income drops, unemployment risk and extreme expenditure distress probability as objective indicators. Although we base our analysis on Rohde et al.'s (2015) proposal on dimensions, we introduce new definitions for some of these, such as the comparison between necessary and current household income to measure financial dissatisfaction or the introduction of a household perspective regarding the probability of unemployment. In addition, we consider the use of new indicators, such as the ability to go on a holiday. Especially relevant in our proposal is the use of the counting approach with a dual cut-off strategy as a method of interest in insecurity analysis. This approach shows a variety of advantages: it is less sensitive to the presence of outliers; it highlights differences in time or by income decile and it allows us to analyse incidence and intensity through the economic insecurity adjusted rate and its decomposition by dimensions or subpopulations. Our work provides an empirical example of the use of a counting approach in the insecurity context, suggesting that its further development in this field may have significant advantages. Furthermore, our empirical results may help policy makers target insecure social groups and design social policies that aim to reduce the increasingly high levels of economic insecurity in some developed countries.

The approach we follow enables us to use aggregate indicators to analyse the level and intensity of economic insecurity in a society. Using this method, we undertake an empirical illustration in three European countries. On average, economic insecurity affects 14.3% of the population in Spain and 6.5% in France, whereas Sweden is the most secure country with an incidence of around 2.3%, showing that the three countries present structural differences regarding overall insecurity. Nevertheless, the evolution of economic insecurity between 2009 and 2016 reveals a negative correlation with the economic cycle particularly in Spain. In sum, even if economic insecurity is related to countries' socioeconomic status, its level differs from that of other well-being indicators because it is capturing the dynamics of a variety of economic hazards that may affect individuals in a mixed way. In fact, our index includes subjective indicators that proxy individuals' expectations about their financial situation that could be rather different from any other objective well-being measure. By identifying the groups that have been most affected by the increase in economic insecurity in recent years, this chapter contributes to the measurement of economic insecurity as another relevant dimension of well-being in the European context, where previous analyses of this kind are scarce.

We find that there is a significant proportion of middle-income individuals that suffer from insecurity in some countries (economic insecurity is relevant up to the sixth decile in Spain and the fourth decile in France), proving that our index is capturing a different well-being concept to that of poverty. Moreover, the relevance of our six insecurity dimensions is different by income decile. While the contributions to economic insecurity of dimensions such as 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. In contrast, changes in the ability to go on a holiday is a more important dimension for individuals in middle-income deciles. In addition, disposable household income, unemployment and the quality of the job are the most correlated variables with the probability of being economically insecure. These correlations seem to be larger for individuals located in the lowest tail of the income distribution.

3.6 Appendix

TABLE A3.1. Definition of insecurity dimensions.

	Indicator	Variable	Description	Threshold
Subjective	D1	Incapacity to face unexpected expenses	Household cannot afford an unexpected required expense and pay through its own resources, meaning not asking for financial help, the account must be debited within the required period and the situation regarding potential debts is not deteriorated.	Household cannot face unexpected expenses (= 1)
	D2	Financial dissatisfaction	Difference between lowest annual income to make ends meet (to pay usual necessary expenses) and current household disposable income in relation to needed income. This indicator has a value of zero when the difference is negative (disposable income is larger than needed income).	Household is financially dissatisfied (> 0). Disposable income is smaller than needed income.
	D3	Changes in ability to go on a holiday	Household's incapacity to afford one week away from home in the current period (t), while the household could afford this vacation the previous period ($t-1$).	Household cannot afford holidays in t while it was able in $t-1$ (= 1).
Objective	D4	Income drops	Fall in household equivalised disposable income from one year ($t-1$) to another (t). This indicator takes a value of zero if this fall is not at least of a 25% and current income is not below permanent income.	Household has a large income drop (< 0).
	D5	Unemployment risk	Probability of unemployment (not finding a job or losing the current one).	Individual has a probability of unemployment above the society mean.
	D6	Probability of extreme expenditure distress	Probability of having at least two arrears in the following household payments: (1) mortgage or rent, (2) utility bills, (3) hire purchase instalments or other loans.	Individual has a probability of extreme expenditure distress above the society mean.

Source: Author's own elaboration based on longitudinal EU-SILC data set.

TABLE A3.2. Correlation between insecurity dimensions by country

	D1	D2	D3	D4	D5	D6
			Spain			
D1	1					
D2	0.293	1				
D3	0.141	0.037	1			
D4	0.110	0.257	0.032	1		
D5	0.308	0.176	0.003	0.099	1	
D6	0.446	0.340	0.016	0.086	0.384	1
			France			
D1	1					
D2	0.323	1				
D3	0.186	0.093	1			
D4	0.032	0.156	0.032	1		
D5	0.219	0.102	0.032	0.031	1	
D6	0.449	0.219	0.086	0.007	0.308	1
			Sweden			
D1	1					
D2	0.193	1				
D3	0.211	0.058	1			
D4	0.069	0.205	0.046	1		
D5	0.179	0.123	0.098	0.099	1	
D6	0.374	0.177	0.129	0.044	0.294	1

Notes: (1) We display Pearson correlation coefficient between insecurity dimensions. (2) D1 = Incapacity to face unexpected expenses; D2 = Financial dissatisfaction; D3 = Changes in the ability to go on a holiday; D4 = Income drops; D5 = Unemployment risk; D6 = Probability of extreme expenditure distress.
Source: Author's calculations based on longitudinal EU-SILC data set.

TABLE A3.3. Unemployment risk. Probit model

	ES	FR	SE
Unemployed $_{t-1}$	1.484***	1.804***	1.554***
	(0.033)	(0.038)	(0.111)
Male $_{t-1}$	-0.003	0.137***	0.087
	(0.022)	(0.028)	(0.065)
Age $_{t-1}$	-0.022***	0.003	-0.010
	(0.008)	(0.011)	(0.025)
Age^2 $_{t-1}$	0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)
Married $_{t-1}$	-0.066***	-0.105***	-0.261***
	(0.025)	(0.030)	(0.064)
Secondary education $_{t-1}$	-0.114***	0.015	-0.212
	(0.029)	(0.054)	(0.173)
Tertiary education $_{t-1}$	-0.288***	-0.161**	-0.203
	(0.038)	(0.063)	(0.182)
Experience $_{t-1}$	-0.007*	-0.035***	-0.026*
	(0.004)	(0.005)	(0.014)
Experience^2 $_{t-1}$	-0.000*	0.000***	0.000
	(0.000)	(0.000)	(0.000)
Never worked $_{t-1}$	0.445***	0.883***	0.096
	(0.083)	(0.255)	(0.434)
Temporary employee $_{t-1}$	0.707***	1.122***	0.806***
	(0.070)	(0.217)	(0.280)
Employer $_{t-1}$	0.130*	0.608***	0.132
	(0.069)	(0.215)	(0.273)
Independent worker $_{t-1}$	0.160**	0.469**	-0.054
	(0.074)	(0.225)	(0.299)
Employee without contract $_{t-1}$	0.765***		
	(0.106)		
Without occupation $_{t-1}$	0.390***	-0.180	0.460
	(0.078)	(0.158)	(0.373)
Occupation 2 $_{t-1}$	-0.075	-0.346***	-0.039
	(0.077)	(0.066)	(0.135)
Occupation 3 $_{t-1}$	0.178**	-0.199***	0.031
	(0.075)	(0.061)	(0.139)
Occupation 4 $_{t-1}$	0.224***	-0.121*	0.331**
	(0.074)	(0.067)	(0.149)
Occupation 5 $_{t-1}$	0.292***	-0.048	0.196
	(0.070)	(0.063)	(0.142)
Occupation 6 $_{t-1}$	0.127	-0.229**	0.868***
	(0.096)	(0.102)	(0.225)
Occupation 7 $_{t-1}$	0.444***	-0.030	0.393***
	(0.069)	(0.065)	(0.151)
Occupation 8 $_{t-1}$	0.241***	-0.063	0.455***
	(0.075)	(0.067)	(0.156)
Occupation 9 $_{t-1}$	0.405***	-0.064	0.511***
	(0.072)	(0.064)	(0.174)
Occupation 10 $_{t-1}$	-0.934***	-0.444**	0.670*
	(0.295)	(0.176)	(0.376)
Bad health $_{t-1}$	0.229***	0.218***	-0.069
	(0.067)	(0.059)	(0.160)

TABLE A3.3. Unemployment risk. Probit model (continued)

	ES	FR	SE
Chronic illness $_{t-1}$	0.029	0.076***	0.016
	(0.027)	(0.029)	(0.061)
Number of HH members $_{t-1}$	0.013	0.004	-0.017
	(0.009)	(0.012)	(0.033)
Number of children $_{t-1}$	-0.000	-0.002	-0.042
	(0.016)	(0.019)	(0.046)
Constant	-1.372***	-2.388***	-1.848***
	(0.178)	(0.309)	(0.590)
Year dummies	YES	YES	YES
Region dummies	YES	YES	YES
Observations	54,695	60,298	15,287
Pseudo R^2	0.378	0.344	0.304

Notes: (1) We present probit coefficients for the selected countries (ES = Spain, FR = France and SE = Sweden) in which the unemployment at period t is the dependent variable. (2) We include dummies for country regions and the year of the interview 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) In France and Sweden, we exclude the employee without contract category, as there are not observations in this group. (5) Standard errors are clustered by individuals. (6) *** p<0.01, ** p<0.05, * p<0.1.

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

TABLE A3.4. Extreme expenditure distress. Ordered probit model

	ES	FR	SE
Age (HH head) $_{t-1}$	-0.015***	-0.013***	-0.010***
	(0.001)	(0.002)	(0.001)
Male (HH head) $_{t-1}$	-0.009	-0.055*	0.120***
	(0.027)	(0.030)	(0.040)
HH disposable income $_{t-1}$	-2.78e-05***	-1.76e-05***	-1.71e-05***
	(2.28e-06)	(1.99e-06)	(2.95e-06)
External aid $_{t-1}$	0.169***	0.113***	0.163***
	(0.032)	(0.031)	(0.055)
Capital income $_{t-1}$	-0.452***	-0.598***	-0.580***
	(0.028)	(0.030)	(0.046)
Property with mortgage $_{t-1}$	0.238***	0.440***	0.209***
	(0.042)	(0.037)	(0.048)
Rent (= market price) $_{t-1}$	0.471***	0.464***	-0.082
	(0.054)	(0.036)	(0.275)
Rent (< market price) $_{t-1}$	-0.148***	0.105	
	(0.054)	(0.069)	
Free accommodation $_{t-1}$	0.003	-0.057	-0.009
	(0.052)	(0.046)	(0.069)
Type of HH 2 $_{t-1}$	0.017	0.021	0.000
	(0.068)	(0.073)	(0.120)
Type of HH 3 $_{t-1}$	0.135	0.181**	0.493***
	(0.094)	(0.076)	(0.128)
Type of HH 4 $_{t-1}$	0.024	-0.003	0.025
	(0.073)	(0.072)	(0.127)
Type of HH 5 $_{t-1}$	0.046	0.103	-0.189
	(0.085)	(0.087)	(0.158)
Type of HH 6 $_{t-1}$	0.005***	0.005***	0.004***
	(0.000)	(0.000)	(0.001)
% of unemployed $_{t-1}$	0.002***	0.001*	0.003***
	(0.000)	(0.001)	(0.001)
% of temporary workers $_{t-1}$	-0.000	-0.001***	-0.001**
	(0.000)	(0.000)	(0.001)
% of permanent workers $_{t-1}$	0.002***	0.003***	0.005***
	(0.001)	(0.000)	(0.001)
% with bad health $_{t-1}$	0.002***	0.002***	0.002***
	(0.001)	(0.000)	(0.001)
% with chronic illness $_{t-1}$	-0.000	-0.003**	-0.001
	(0.000)	(0.001)	(0.002)
% with primary educ. $_{t-1}$	0.002**	-0.001	0.004***
	(0.001)	(0.001)	(0.001)
% with secondary educ. $_{t-1}$	-0.002*	-0.003***	0.002
	(0.001)	(0.001)	(0.002)
% with tertiary educ. $_{t-1}$	-0.015***	-0.013***	-0.010***
	(0.001)	(0.002)	(0.001)

TABLE A3.4. Extreme expenditure distress. Ordered probit model (continued)

	Model 1	Model 2	Model 3
Number of members $_{t-1}$	0.071***	0.075***	0.068*
	(0.018)	(0.020)	(0.036)
Constant cut1	0.562***	0.223	1.011***
	(0.147)	(0.153)	(0.186)
Constant cut2	1.133***	0.800***	1.566***
	(0.148)	(0.152)	(0.186)
Constant cut3	1.878***	1.451***	2.142***
	(0.147)	(0.154)	(0.194)
Year dummies	YES	YES	YES
Region dummies	YES	YES	YES
Observations	57,947	66,628	28,332
Pseudo R^2	0.157	0.181	0.149

Notes: (1) We present ordered probit coefficients for the selected countries (ES = Spain, FR = France and SE = Sweden) in which the number of arrears at period t is the dependent variable. (2) We include dummies for country regions and the year of the interview 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) In Sweden, we exclude the rent below market price category, as there are not observations in this group. (5) Standard errors are clustered by individuals. (6) *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's calculations from longitudinal EU-SILC data set.

TABLE A3.5. Aggregate economic insecurity indicators by year (intermediate approach)

	ES			FR			SE		
	H_{EI}	A	M_{EI}	H_{EI}	A	M_{EI}	H_{EI}	A	M_{EI}
2009	0.120	0.660	0.079	0.072	0.649	0.047	0.026	0.647	0.017
	(0.006)	(0.005)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)	(0.01)	(0.002)
2010	0.128	0.653	0.083	0.058	0.647	0.037	0.024	0.652	0.016
	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.013)	(0.002)
2011	0.106	0.651	0.069	0.062	0.640	0.039	0.022	0.670	0.015
	(0.004)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.014)	(0.002)
2012	0.152	0.648	0.099	0.063	0.644	0.041	0.024	0.681	0.016
	(0.005)	(0.003)	(0.003)	(0.002)	(0.033)	(0.002)	(0.003)	(0.016)	(0.002)
2013	0.156	0.655	0.102	0.073	0.646	0.047	0.030	0.635	0.019
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)	(0.013)	(0.003)
2014	0.178	0.662	0.118	0.062	0.645	0.040	0.019	0.657	0.012
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)	(0.016)	(0.003)
2015	0.141	0.649	0.091	0.068	0.642	0.043	0.034	0.675	0.023
	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.005)	(0.011)	(0.003)
2016	0.134	0.648	0.087	0.062	0.635	0.039	0.011	0.662	0.007
	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.024)	(0.002)

Notes: (1) We present aggregate economic insecurity indicators using an intermediate multidimensional threshold by year and country. (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

TABLE A3.6. Descriptive statistics - Determinants of incidence of economic insecurity (H_{EI}) by country

	ES		FR		SE	
	Mean	**Standard deviation**	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**
EI index	0.143	0.350	0.065	0.246	0.023	0.151
Male	0.510	0.500	0.496	0.500	0.525	0.499
Age						
< 16	0.198	0.399	0.201	0.401	0.329	0.470
16 – 25	0.118	0.323	0.131	0.337	0.108	0.311
26 – 35	0.154	0.361	0.132	0.338	0.140	0.347
36 – 45	0.189	0.392	0.192	0.394	0.158	0.365
46 – 60	0.235	0.424	0.279	0.449	0.189	0.391
> 60	0.105	0.306	0.065	0.246	0.077	0.266
Level of education						
Primary	0.164	0.371	0.071	0.257	0.011	0.103
Secondary	0.511	0.500	0.589	0.492	0.488	0.500
Tertiary	0.324	0.468	0.339	0.474	0.501	0.500
HH disposable income (ln)	9.517	0.652	9.999	0.443	10.151	0.395
Basic activity status						
Inactive	0.270	0.444	0.223	0.416	0.141	0.348
Working	0.613	0.487	0.736	0.441	0.836	0.370
Unemployed	0.117	0.322	0.041	0.199	0.023	0.149
Marital status						
Married	0.606	0.489	0.532	0.499	0.467	0.499
Not married	0.394	0.489	0.468	0.499	0.533	0.499
HH composition						
# members	3.552	1.257	3.490	1.402	3.267	1.429
# children	0.870	0.982	1.153	1.194	1.273	1.195
Health						
Bad health	0.960	0.195	0.954	0.209	0.977	0.150
Good health	0.040	0.195	0.046	0.209	0.023	0.150
Status in employment						
Never worked	0.182	0.386	0.100	0.299	0.095	0.293
Temporary	0.214	0.410	0.113	0.316	0.079	0.270
Permanent	0.484	0.500	0.717	0.450	0.758	0.428
Employer	0.037	0.188	0.010	0.099	0.025	0.157
Independent worker	0.084	0.277	0.061	0.239	0.043	0.202

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

TABLE A3.7. Descriptive statistics - Determinants of incidence of economic insecurity (H_{EI}) by income group

	Total		Low income		Middle income		High income	
	Mean	**Standard deviation**	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**
EI index	0.080	0.271	0.212	0.409	0.050	0.218	0.013	0.113
Male	0.500	0.500	0.486	0.500	0.500	0.500	0.509	0.500
Age								
< 16	0.204	0.403	0.258	0.437	0.208	0.406	0.165	0.371
16 – 25	0.128	0.334	0.164	0.371	0.130	0.337	0.101	0.301
26 – 35	0.137	0.343	0.122	0.327	0.148	0.355	0.138	0.345
36 – 45	0.191	0.393	0.189	0.392	0.196	0.397	0.188	0.391
46 – 60	0.268	0.443	0.218	0.413	0.252	0.434	0.314	0.464
> 60	0.073	0.260	0.049	0.216	0.066	0.249	0.095	0.293
Level of education								
Primary	0.089	0.285	0.143	0.350	0.089	0.284	0.053	0.225
Secondary	0.571	0.495	0.711	0.453	0.634	0.482	0.430	0.495
Tertiary	0.341	0.474	0.147	0.354	0.278	0.448	0.517	0.500
HH disposable income (ln)	9.904	0.530	9.350	0.442	9.839	0.260	10.329	0.331
Basic activity status								
Inactive	0.230	0.421	0.290	0.454	0.214	0.410	0.202	0.402
Working	0.714	0.452	0.594	0.491	0.742	0.438	0.773	0.419
Unemployed	0.056	0.230	0.116	0.321	0.044	0.206	0.025	0.155
Marital status								
Married	0.545	0.498	0.478	0.500	0.526	0.499	0.605	0.489
Not married	0.455	0.498	0.522	0.500	0.474	0.499	0.395	0.489
HH composition								
# members	3.497	1.375	3.882	1.596	3.505	1.300	3.230	1.194
# children	1.098	1.160	1.458	1.307	1.096	1.098	0.856	1.029
Health								
Bad health	0.956	0.205	0.935	0.246	0.955	0.207	0.971	0.168
Good health	0.044	0.205	0.065	0.246	0.045	0.207	0.029	0.168
Status in employment								
Never worked	0.117	0.322	0.166	0.372	0.110	0.312	0.092	0.289
Temporary	0.134	0.340	0.232	0.422	0.126	0.331	0.076	0.265
Permanent	0.668	0.471	0.513	0.500	0.695	0.460	0.747	0.435
Employer	0.016	0.126	0.012	0.107	0.013	0.113	0.021	0.145
Independent worker	0.065	0.247	0.077	0.267	0.056	0.231	0.064	0.245

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

TABLE A3.8. Aggregate economic insecurity indicators (union and intersection approaches)

		Union approach		
		ES	**FR**	**SE**
Incidence	H_{EI}	0.518	0.403	0.225
		(0.002)	(0.002)	(0.003)
Normalised intensity	A	0.424	0.383	0.360
		(0.001)	(0.001)	(0.002)
Economic insecurity adjusted rate	M_{EI}	0.219	0.155	0.081
		(0.001)	(0.001)	(0.001)
		Intersection approach		
		ES	**FR**	**SE**
Incidence	H_{EI}	0.001	0.000	0.000
		(0.000)	(0.000)	(0.000)
Normalised intensity	A	1.000	1.000	1.000
		(0.000)	(0.000)	(0.000)
Economic insecurity adjusted rate	M_{EI}	0.001	0.000	0.000
		(0.000)	(0.000)	(0.000)

Notes: (1) We display aggregate indicators of economic insecurity using two different multidimensional thresholds. The union approach considers an individual as economically insecure if he lacks security at least in one dimension, whereas the intersection approach requires lacking security in all indicators. (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations from longitudinal EU-SILC data set.

TABLE A3.9. Aggregate economic insecurity indicators and decomposition by dimensions. $k = 2$

		ES	**FR**	**SE**
Incidence	H_{EI}	0.320	0.208	0.089
		(0.002)	(0.001)	(0.002)
Normalised intensity	A	0.527	0.498	0.499
		(0.001)	(0.001)	(0.003)
Economic insecurity adjusted rate	M_{EI}	0.169	0.103	0.044
		(0.001)	(0.001)	(0.001)
		Contribution to M_{EI}		
Incapacity to face unexpected expenses	M_{EI}^1	20.2%	22.4%	23.7%
Financial dissatisfaction	M_{EI}^2	19.9%	20.9%	16.1%
Inability to go on a holiday	M_{EI}^3	9.7%	10.1%	8.1%
Income drops	M_{EI}^4	13.0%	9.8%	11.5%
Unemployment risk	M_{EI}^5	17.2%	15.3%	19.8%
Extreme expenditure distress	M_{EI}^6	20.0%	21.5%	20.9%

Notes: (1) We display aggregate indicators of economic insecurity using an intermediate multidimensional threshold equal to $k = 2$. (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

TABLE A3.10. Aggregate economic insecurity indicators and decomposition by dimensions. $k = 4$

		ES	FR	SE
Incidence	H_{EI}	0.037	0.011	0.006
		(0.001)	(0.000)	(0.001)
Normalised intensity	A	0.793	0.787	0.786
		(0.001)	(0.002)	(0.009)
Economic insecurity adjusted rate	M_{EI}	0.029	0.009	0.005
		(0.001)	(0.000)	(0.000)
		Contribution to M_{EI}		
Incapacity to face unexpected expenses	M_{EI}^1	16.3%	16.5%	18.9%
Financial dissatisfaction	M_{EI}^2	17.2%	17.6%	20.4%
Inability to go on a holiday	M_{EI}^3	10.8%	15.9%	14.8%
Income drops	M_{EI}^4	20.9%	17.9%	16.8%
Unemployment risk	M_{EI}^5	17.6%	16.1%	16.0%
Extreme expenditure distress	M_{EI}^6	17.1%	16.1%	13.2%

Notes: (1) We display aggregate indicators of economic insecurity using an intermediate multidimensional threshold equal to $k = 4$. (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

TABLE A3.11. Aggregate economic insecurity indicators (equal weighting of dimensions)

		ES	FR	SE
Incidence	H_{EI}	0.262	0.169	0.070
		(0.002)	(0.001)	(0.002)
Normalised intensity	A	0.600	0.565	0.557
		(0.001)	(0.001)	(0.003)
Economic insecurity adjusted rate	M_{EI}	0.157	0.096	0.039
		(0.001)	(0.001)	(0.001)

Notes: (1) We display aggregate indicators of economic insecurity with an equal weighting of dimensions. In this case, we calculate the individual economic insecurity index (EI_i) by counting the number of dimensions in which the individual lacks security with respect to the total number of dimensions, weighting each dimension equally. Then, an intermediate multidimensional threshold is applied ($k \geq 0.5$). (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations from longitudinal EU-SILC data set.

TABLE A3.12. Aggregate economic insecurity indicators (excluding changes in the ability to go on a holiday)

		ES	FR	SE
Incidence	H_{EI}	0.123	0.049	0.020
		(0.001)	(0.001)	(0.001)
Normalised intensity	A	0.795	0.779	0.756
		(0.001)	(0.001)	(0.006)
Economic insecurity adjusted rate	M_{EI}	0.098	0.039	0.015
		(0.001)	(0.001)	(0.001)

Notes: (1) We display aggregate indicators of economic insecurity excluding changes in the ability to go on a holiday as a relevant dimension. In this case, we consider an individual as economically insecure if he lacks security at least in 3 out of 5 weighted dimensions ($k \geq 0.6$). (2) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations from longitudinal EU-SILC data set.

TABLE A3.13. Incidence of economic insecurity by income decile

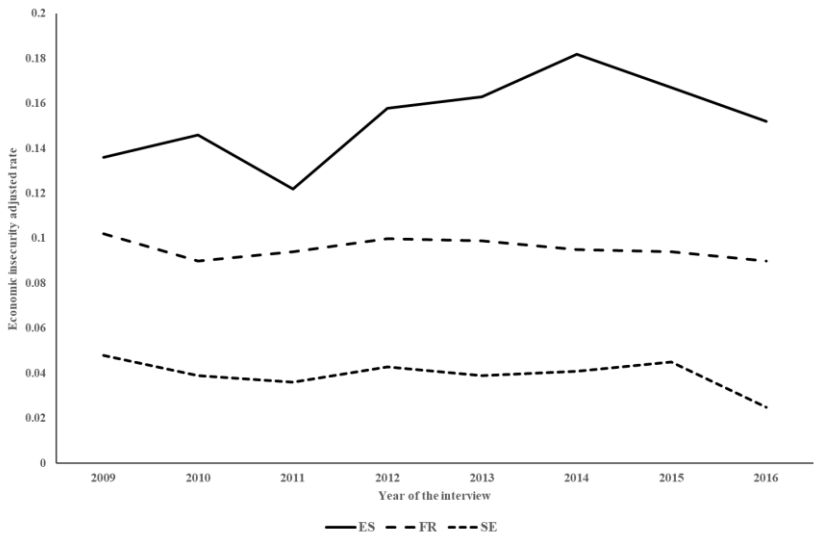
	All dimensions			Excluding changes in the ability to go on a holiday		
	ES	**FR**	**SE**	**ES**	**FR**	**SE**
1	0.552	0.283	0.158	0.538	0.249	0.154
	(0.007)	(0.006)	(0.012)	(0.007)	(0.005)	(0.012)
2	0.337	0.153	0.084	0.309	0.123	0.066
	(0.006)	(0.004)	(0.008)	(0.006)	(0.004)	(0.007)
3	0.222	0.100	0.034	0.195	0.071	0.026
	(0.006)	(0.004)	(0.005)	(0.006)	(0.003)	(0.004)
4	0.147	0.059	0.013	0.121	0.037	0.008
	(0.005)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)
5	0.109	0.033	0.006	0.077	0.017	0.006
	(0.004)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)
6	0.064	0.023	0.008	0.043	0.013	0.006
	(0.003)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)
7	0.044	0.017	0.003	0.024	0.008	0.004
	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
8	0.031	0.011	0.003	0.013	0.006	0.002
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
9	0.013	0.008	0.001	0.005	0.005	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
10	0.009	0.003	0.001	0.003	0.002	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)

Notes: (1) We display the incidence of economic insecurity by income decile. (2) Income deciles are calculated using a measure of permanent income based on household equivalised disposable income. (3) Bootstrap standard errors for the means are shown in brackets.
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.1. IEWB Economic Security Index. 1980 - 2014

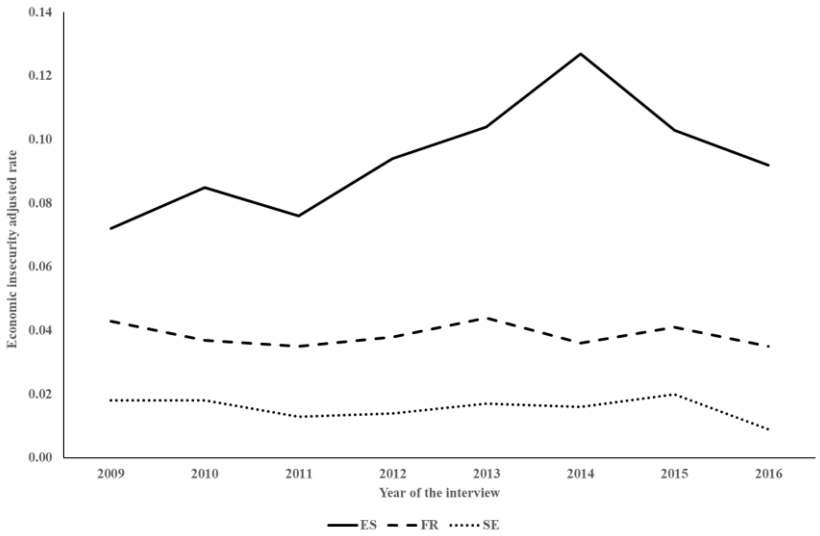
Source: Author's own elaboration from IEWB Economic Security Index results from Osberg and Sharpe. Available at: http://www.csls.ca/iwbtool.asp

FIGURE A3.2. Evolution of the economic insecurity adjusted rate (equal weighting of dimensions). 2009 - 2016



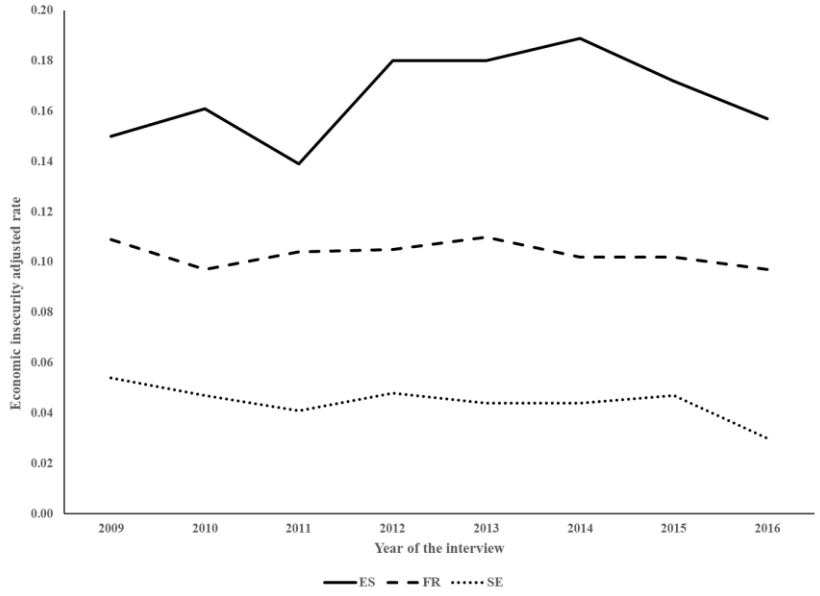
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.3. Evolution of the economic insecurity adjusted rate (excluding changes in the ability to go on a holiday). 2009 - 2016



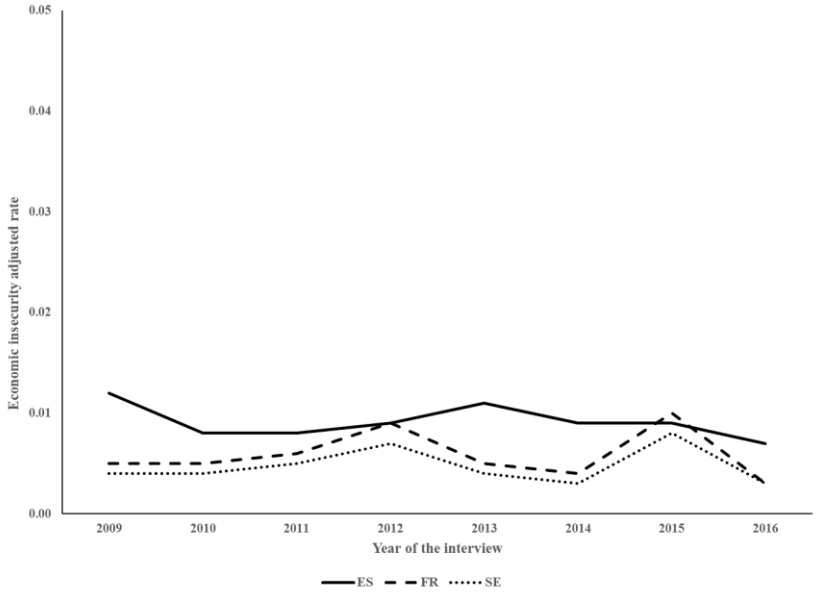
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.4. Evolution of the economic insecurity adjusted rate ($k = 2$). 2009 - 2016



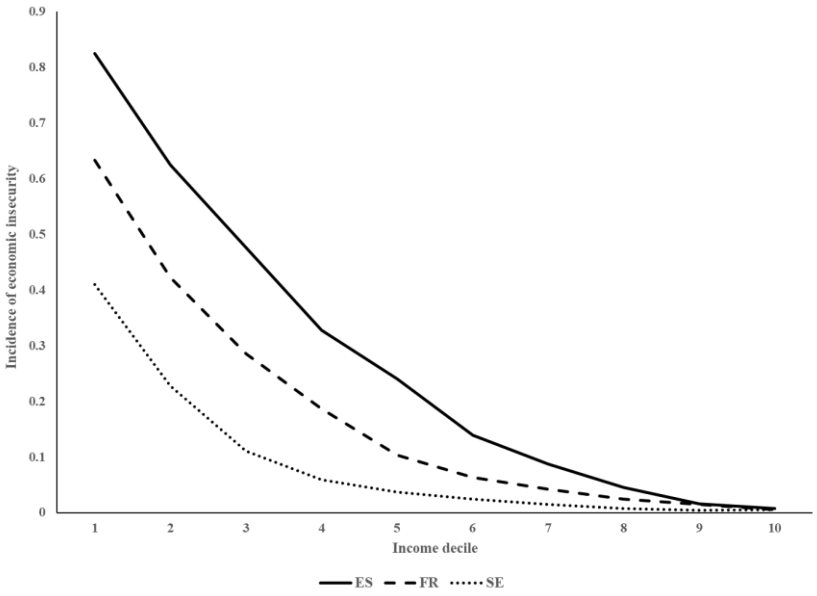
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.5. Evolution of the economic insecurity adjusted rate ($k = 4$). 2009 - 2016



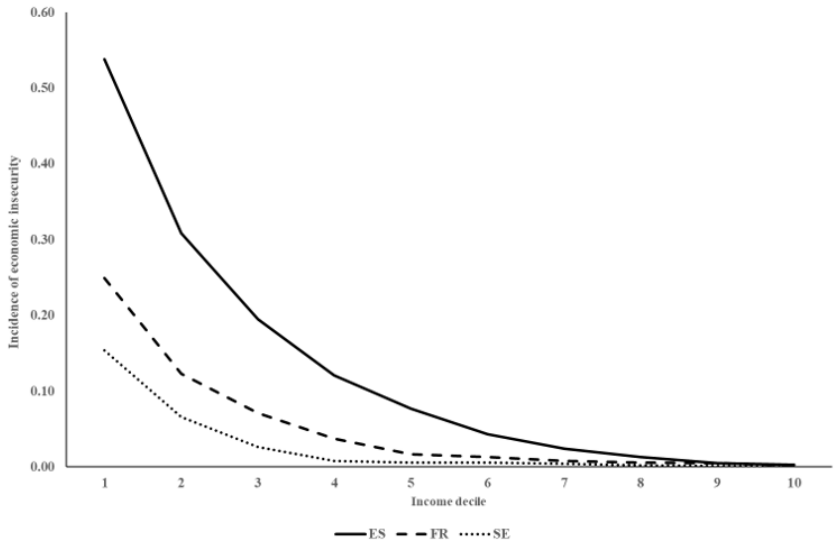
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.6. Incidence of economic insecurity by income decile (equal weighting of dimensions)



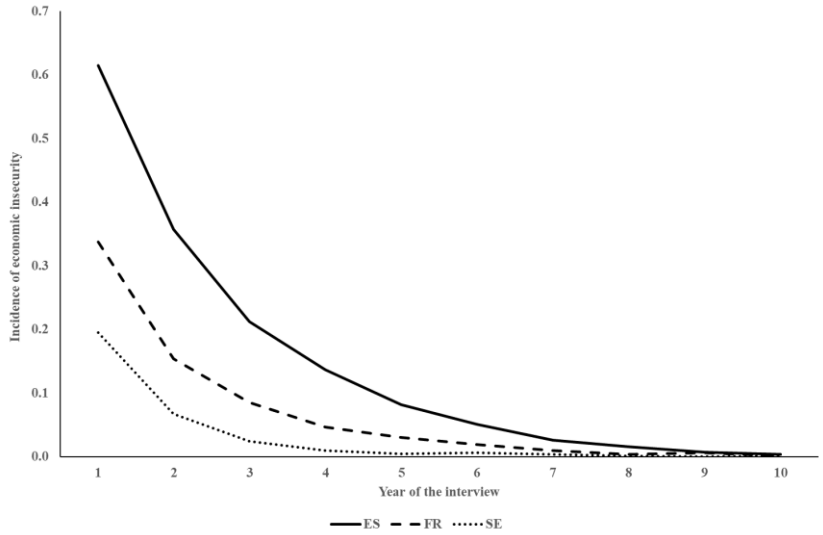
Note: Income deciles are calculated using a measure of permanent income based on household equivalised disposable income.
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.7. Incidence of economic insecurity by income decile (excluding changes in the ability to go on a holiday)



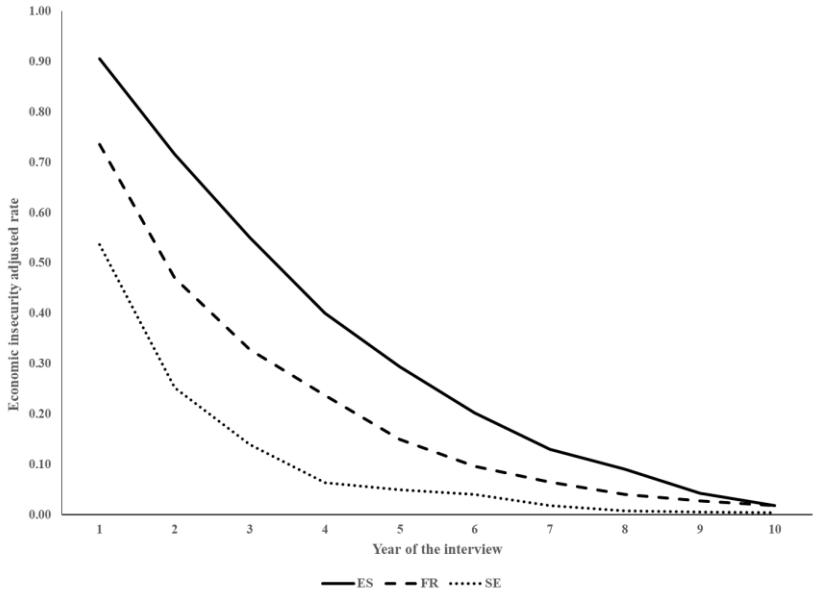
Note: Income deciles are calculated using a measure of permanent income based on household equivalised disposable income.
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.8. Incidence of economic insecurity by income decile (based on annual income)



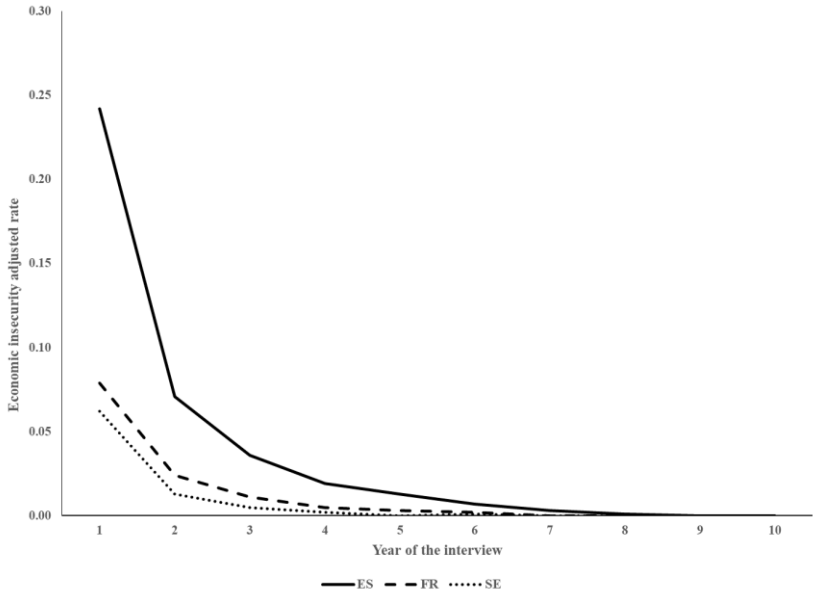
Note: Income deciles are calculated using annual household equivalised disposable income.
Source: Author's calculations from longitudinal EU-SILC data set.

FIGURE A3.9. Incidence of economic insecurity by income decile ($k = 2$)



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

FIGURE A3.10. Incidence of economic insecurity by income decile ($k = 4$)



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

Chapter 4

The dimension, nature and distribution of economic insecurity in European countries: Are there differences between welfare states?

4.1 Introduction

The Great Recession caused an increase in inequality, poverty and material deprivation in several European countries but also brought to light the importance of another dimension of well-being: economic insecurity. Although there is yet no general consensus in a definition of insecurity in the relevant literature, this phenomenon can be generally understood as the anxiety or stress that individuals feel when they anticipate future economic hazards and the impossibility to recover from them (Bossert and D'Ambrosio, 2013, 2016; D'Ambrosio and Rohde, 2014; Hacker et al., 2010; Osberg, 1998; Osberg and Sharpe, 2002, 2005; Rohde et al., 2015; Rohde, Tang and Rao, 2014; Rohde and Tang, 2018). Research on economic insecurity has been growing in recent years, as the anticipation of future economic distress reveals itself as a threat to current well-being. This decrease in an individual's quality of life may impact many spheres, as their behavior will be modified to mitigate the risk they are currently facing: for instance, by reducing private spending (Benito, 2006; Bowman, 2013), by postponing fertility and altering labor market decisions (Fiori et al., 2013; Mansour, 2018), by decreasing investment in children's education (Boarini and Osberg, 2014; Stiglitz, Sen and Fitoussi, 2009) or even by increasing the political support for right-wing parties (Bossert et al., 2020). Economic insecurity may also lead to a worsening of physical and mental health (Modena et al., 2014; Smith, Stoddard and Barnes, 2009; Staudigel, 2016; Rohde, Tang and Osberg, 2017; Rohde et al., 2016; Watson, 2018). Thus, the effect of this phenomenon could transcend from the individual to the macroeconomic level and the political sphere.

So far, comparative analyses on economic insecurity are still scarce and are based either on multidimensional approaches that use aggregate indices on different insecurity dimensions (Berloffa and Modena, 2014; Osberg and Sharpe, 2005, 2014) or are essentially unidimensional when considering individuals or households (D'Ambrosio and Rohde, 2014; Nichols and Rehm, 2014; Rohde, Tang and Rao, 2014). Most often, approaches to the measurement of insecurity are based only on subjective measures linked to employment or job insecurity (Probst et al., 2018; Sverke et al., 2006) but fail to consider other individual objective risks. Indeed, comparative approaches on individual insecurity usually focus on employment or job security but avoid approaching economic insecurity as a comprehensive phenomenon.

The main basis for the development of strong welfare regimes in many European countries and in the United States (US) during the last century was the necessity to reduce both the objective and subjective perceptions of insecurity for post-war populations that frequently suffered from unemployment, low wage, retirement and other life-cycle or business-cycle episodes. As Ranci et al. (2017) underline, the spread of economic insecurity through the middle class in the US in the last decade (Frank, 2013; Hacker, 2008) is a true threat to this post-war consensus on the role of the welfare state. Unfortunately, the evidence on the level, extent and distribution of economic insecurity in European societies is still scarce. Ranci et al. (2017) seem to support the idea that insecurity in Europe is experienced not only by the poor but also by the middle class and across diverse welfare regimes. However, these authors base their analysis in a concept that is nearer to economic strain —financial strain, over-indebtedness and material deprivation— which is related more to income volatility and chronic poverty than to a broad measure of insecurity including objective and subjective dimensions.

To provide a comprehensive measure of economic insecurity that allows us to learn about the demographic and socioeconomic characteristics of the most insecure individuals in our societies, Romaguera-de-la-Cruz (2019) has underlined the advantages of using a multidimensional individual economic insecurity index in the European context. She follows Rohde et al.'s (2015) proposal on insecurity dimensions for Australian data and considers both subjective and objective dimensions, as well as past experiences and predictions. In this vein, she proposed adapting Rohde et al.'s (2015) methodology to measure individual insecurity in Europe in a multidimensional way, using longitudinal data from the European Union Statistics of Income and Living Conditions (EU-SILC). This approach adapts the counting method to the economic insecurity field, allowing for the study of both incidence and intensity in one indicator and also its decomposition by dimensions or subpopulations.

To proxy objective hazards that individuals may face, we consider large income drops from one year to another, unemployment risk and a probability of extreme expenditure distress. Additionally, subjective indicators of economic insecurity are based on the household's inability to face unexpected expenses, a measure of financial dissatisfaction and an indicator of any changes in the ability to go on a holiday. Subsequently, we aggregate these simple indicators using a counting approach (Atkinson, 2003; Alkire and Foster, 2011) traditionally used in multidimensional poverty analysis but useful in

measuring economic insecurity (Bucks, 2011) and other phenomena, such as multidimensional affluence (Peichl and Pestel, 2013a, 2013b) or labor precariousness (García-Pérez et al. 2017). We believe this is a comprehensive method with a simple implementation that has several advantages. First, it allows us to compute a series of aggregate indicators that facilitate the analysis of insecurity in time and to compare insecurity levels and its nature between regions, considering both incidence and intensity in a single measure by using an economic insecurity adjusted rate, M_{EI}. And second, it is generally more robust to the way we define dimensions and to the presence of outliers in comparison to other possible aggregation methods.

This multidimensional individual perspective enables us to identify the most insecure subgroups, the major source of insecurity for the population and the discrepancy between perceptions and objective indicators in each of the welfare state clusters considered, allowing us to better understand the phenomenon to guide social policy design to fight insecurity in Europe. Furthermore, we will also be able to analyze the distribution of insecurity by income decile and the relative importance of each dimension according to the individual's position on the income ladder by welfare state regime.

This chapter aims to contribute to the literature on comparative analysis of well-being outcomes by welfare state regimes that has traditionally focused only on impacts on income inequality and poverty and has not yet provided enough evidence on the dimension and nature of individual economic insecurity in developed countries with different welfare regimes. Our first hypothesis is that, in line with the US, the incidence of economic insecurity affects European middle classes as recent papers seem to show using a proxy to economic insecurity that focuses on income volatility and economic strain. We will check if this result is independent of the measure used to proxy economic insecurity and has a more general basis while being intimately linked to some insecurity's key dimensions more than others. For that purpose, we will use a comprehensive measure of insecurity that includes subjective and objective dimensions, as well as past experiences and risk predictions and is dimension decomposable.

Nevertheless, even if we may confirm that economic insecurity affects European middle classes, it is most likely that there are significant differences by country. This could be essentially linked to the characteristics of the population, to those of the labor market or to those of the welfare state regime. Our second hypothesis is that the impact

of economic insecurity on middle classes in the last decade is more similar for countries within the same welfare state regime than for countries in a different one and the level and contribution of different insecurity dimensions to total insecurity is also diverse by regime.

The empirical novelty of our study consists in constructing a comprehensive decomposable measure of economic insecurity for 27 European countries grouped into five welfare state regime clusters. The decomposability property both in insecurity dimensions and in population subgroups allows us to provide a more general discussion about the extent and distribution of insecurity in different countries and to understand in detail the true nature of changes in individual levels of insecurity by identifying the role of each dimension. Moreover, we make all our calculations using a largely comparable and readily available data for Europe, so that future studies of this sort can be easily compared to ours.

The chapter is structured as follows: Section 2 presents a review of previous results of comparative research on economic insecurity, while Section 3 defines the methodology to construct our insecurity dimensions as well as an insecurity multidimensional index. Section 4 describes the data, presents a brief analysis of the evolution of economic key variables and discusses our main results. The last section concludes.

4.2 Background

Using aggregate multidimensional measures of economic insecurity, Osberg and Sharpe (2002, 2005, 2014) have measured the levels of economic security in 14 OECD countries within their well-being index (IEWB, Index of Economic Well-Being). Their results show that Nordic countries (Denmark and Sweden) have the lowest levels of insecurity, while the US, Spain and Canada are within the most insecure of that group. In addition, these authors find that economic security (linked to security from unemployment, illness, single-parent poverty and old age poverty) has had a generally increasing trend since the 1980s up to 2005 in most countries, while since the last recession there are some worrying falling trends. Security levels have decreased in two Nordic countries, Denmark and Sweden; a Central-European country, The Netherlands; and two Mediterranean countries, Italy and Spain. Denmark and Sweden had registered high levels of security for decades, so these recent reductions still preserve their high

positions in the general ranking. However, this was not the case for Mediterranean countries. Spain, for instance, with a relatively low security level since the 1980s has experienced small but persistent reductions of security up to 2000 (3.5% from 1980 up to 2000) and then a large reduction from 2007 up to 2013 (a 15% drop). In general, it appears that this negative trend is strongly linked to the large decrease in the security of employment and to some decrease in security from single-parent poverty, cushioned by some increase in the security of old age poverty.

Unfortunately, an aggregate measure of security for each society has strong limitations to identify the different socioeconomic or demographic characteristics of the most insecure populations and to analyze the contribution of different dimensions to the total security index. To improve this, Nichols and Rehm (2014) undertake a unidimensional individual approach to the study of income risk by using gross and net income as a reference variable and, in line with aggregate multidimensional measures, find that Nordic countries have the lowest levels of economic insecurity while Italy, Spain, France and Germany show the highest when considering gross incomes. As it could be expected, the US reveals itself as the most inefficient tax-benefit system in reducing insecurity, as it is the country with a lower level of security when considering a household's net income. In a similar pattern, Rohde, Tang and Rao (2014) analyze insecurity levels by using downward income instability in Britain, the US and Germany and obtain that insecurity levels based on pre-government incomes are highest in Britain and lowest in Germany, while results for post-government incomes are highest in the US. Given that insecurity estimates based upon pre-government incomes are heavily concentrated at the lower end of the distribution, they find that some regimes are more effective at smoothing the income streams of these households. Thus, despite austerity and all the pressures to which European welfare states are exposed, regime differences in economic insecurity remain quite resilient.

However, other unidimensional studies of insecurity reach very different conclusions. For example, D'Ambrosio and Rohde (2014), who use information on changes in household wealth to measure insecurity —i.e., focusing on wealth as a buffer stock—, find that US households have a higher level of economic security, on average, compared to Italian ones because they own a larger stock of financial assets. Consequently, they find that this has also meant that the large falls in assets' prices during the last economic crisis had a greater impact on US households than on Italian ones. That is, low asset prices

had a much larger impact on insecurity for individuals in the lowest tail of the US wealth distribution than for those in the lowest tail of the Italian one. Clearly, in this analysis the omitted role of the public contributory pension system in Italy, which reduces the acquisition of wealth as a buffer stock during employment years to then cover retirement, is a key issue.

Consequently, main conclusions of unidimensional approaches on the level and trend of economic insecurity are highly conditioned to the dimension selected to measure insecurity, which suggests that a multidimensional approach could be advantageous. Indeed, the multidimensional nature of well-being has been widely emphasized by fuzzy sets approaches which have made valuable contributions to the efficient and stable measurement of poverty and deprivation in a variety of countries conceiving these phenomena as a continuous variable of which individuals in the population have different degrees of, rather than an attribute that is simply present or absent (Betti et al., 2015; Verma et al., 2017). Moreover, comparative analysis of economic insecurity using multidimensional individual indices is still scarce, mainly due to the absence of comparable datasets with individualized information on the relevant dimensions that potentially contribute to it. This chapter contributes to fill this gap by presenting a comparative study of economic insecurity for 27 European countries clustered in five welfare state regimes.

Our analysis searches for significant differences in the level, evolution and distribution of economic insecurity between European welfare regimes during the Great Recession and the subsequent economic recovery that certainly had an important macroeconomic impact (with large deficits and persistent debt crisis). We choose to classify our 27 countries into five welfare regime clusters, trying to capture the diversity of institutional settings on the basis of Amable (2003) models of capitalism and also considering the more traditional classification of welfare systems by Esping-Andersen (1990).[24] Our groups are liberal welfare state regimes (Ireland and UK); corporatist regimes (Austria, Belgium, Czech Republic, France, Luxembourg, The Netherlands, Slovakia and Slovenia); Mediterranean regimes (Greece, Italy, Portugal and Spain); social-democratic

[24] We exclude three countries (Cyprus, Malta and Serbia), due to their limited population and their small sample size in EU-SILC.

regimes (Denmark, Finland, Iceland, Norway and Sweden); and Eastern European regimes (Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland and Romania).

The basis of the classification follows the idea that liberal regimes are based in a limited state intervention with (often relatively low) means-tested benefits that transfer risk coverage to individuals. These regimes rely on active measures aiming to improve the employability of the unemployed and have weak trade unions and relatively large wage disparities. In general, the redistributive role of liberal regimes is more equilibrated between generations, due to the intensive use of non-contributory and means-tested benefits and a more limited use of contributory benefits that favor younger generations with limited employment records and low monthly wages. In turn, corporatist, Continental or Bismarckian welfare state regimes are designed on the basic principle of covering risks through employment relying on insurance-based benefits and old-age pensions, while the influence of unions remains relatively strong (Kretsos and Livanos. 2016). Within them, we can distinguish Mediterranean countries, where the protection role is shared by insurance-based benefits and family aid and where social spending concentrates on old-age pensions, while collective bargaining has traditionally maintained a highly compressed wage structure. As Flaquer (2000) notes, "these nations' commonalities relate to the family as an institution. They are characterized both by very strong family-orientated values associated with a low degree of individualization and by the lack of an explicit family policy as evidenced by a very limited number of family-friendly social provisions". In contrast, social-democratic regimes are characterized by the highest level of social protection with a rather universal welfare provision that transfers risk coverage from the individuals to the state, active policies for the reduction of familial determinants of well-being and effective institutional cooperation promoting adequate individual employment match for the unemployed.

4.3 Methodology

4.3.1 An individual economic insecurity index

In this chapter, economic insecurity is understood as a multidimensional concept, which allows us to use the counting approach method (Atkinson, 2003; Alkire and Foster, 2011) to produce a composite indicator of insecurity as proposed in Bucks (2011) and Romaguera-de-la-Cruz (2019), in a similar methodology to that used by Peichl and Pestel

(2013a and 2013b) for the measurement of multidimensional affluence and by García-Pérez et al. (2017) to quantify labor precariousness. Thereby, we will consider the joint distribution of a series of dimensions in which we believe insecurity reveals itself, a different strand to unidimensional analyses of economic insecurity (D'Ambrosio and Rohde, 2014; Nichols and Rehm, 2014; Rohde, Tang and Rao, 2014) or those that focus on the marginal distribution of certain indicators (Ranci et al., 2017). Other options to aggregate dimensions different from the counting approach are latent variables techniques such as PCA. The main reason to choose a counting technique is that results have a direct and simple economic interpretation. Nevertheless, the counting approach has other advantages as that of being less affected by outliers and the possibility of measuring the incidence and the intensity of the phenomenon separately. To better build our case we provide a comparable set of results using PCA (also using percentile ranks as a transformation of dimensions to eliminate outliers) in the Appendix (Table A4.5 and Figures A4.1 and A4.2).

We compute the economic insecurity index proposed in Romaguera-de-la-Cruz (2019), using Rohde et al.'s (2015) proposal on key insecurity dimensions. This index adopts a mixed strategy between subjective and objective indicators and includes past experiences, as well as predictions about certain risks. As the EU-SILC dataset does not contain people's appreciations regarding their future economic situations, we proxy subjective insecurity by (a) *household's incapacity to face unexpected expenses*; (b) *household's financial dissatisfaction*, as a measure of discrepancy between disposable income and the lowest annual necessary income, assigning a value 0 to satisfied individuals, and (c) *changes in the ability to go on a holiday*, as this is the first expenditure that individuals reduce when anticipating an economic disorder conversely to other basic items (Deutsch et al., 2014).[25] This indicator is a dichotomous variable that takes the value 1 if the household is unable to afford one week away from home within a year (t), while they reported to be able to do so the previous year $(t-1)$.

The index also includes several objective measures of economic insecurity. In the first place, it considers (d) *income drops* following Hacker et al.'s approach (2010, 2014). That is, insecurity in this dimension means that the individual has experienced a large income fall (equal or over 25% of household disposable income) and current household income

[25] For further information about the definition of subjective and objective dimensions, see Romaguera-de-la-Cruz (2019).

is below a proxy for permanent income (understood as mean income of all observations in our panel data). As economic insecurity reduces current well-being by anticipating a future economic distress, our index includes probabilities of suffering certain hazards, which could compromise an individual's financial situation. The index considers (e) *unemployment risk* for active individuals in the household through a probit estimation with lagged explanatory variables, accounting for both the risk of not finding a job or losing the current one.[26] In addition, to account for difficulties in consumption of basic needs beyond large downward income losses, our economic insecurity index includes a (f) *probability of extreme expenditure distress*, calculated with and ordered probit model at the household level, in which the dependent variable is an indicator from 0 to 3, counting a series of arrears.[27] This household's probability of extreme consumption distress is obtained by summing up the probability of experiencing two or three of these overdue payments, and it is imputed to each household member.

After selecting the dimensions of economic insecurity, a specific threshold must be established to consider that an individual lacks security in a dimension if situated below it. Thus, if X_{ij} is the observation of individual i in dimension j with $i = 1, \dots, N$ and $j = 1, \dots, D$ and Z_j is the threshold for dimension j, then individual i is insecure in dimension j if $X_{ij} < Z_j$. For the specific case of dichotomous variables, an individual lacks security in a given dimension if the individual meets a certain condition (see Table A3.1 for detailed information about the definition and thresholds of dimensions). Once single indicators for each dimension are available, given w_j as weights, we can construct an individual indicator EI_i that counts the number of weighted dimensions in which an individual lacks security:

$$EI_i = \sum_{j=1}^{D} w_j I_{ij} \tag{4.1}$$

where I_{ij} is a variable that takes the value 1 if the individual i lacks security in the dimension j and 0 otherwise. Each dimension j is weighted by w_j, the relative proportion of the population that does not lack security in that dimension, thus giving more

[26] Once this unemployment probability is obtained, a household unemployment risk is imputed to all inactive members. This household unemployment risk is computed as a weighted average between the probabilities of active individuals, giving more weight to those individuals with a higher market income.

[27] Arrears on mortgage or rental payments, arrears on utility bills and arrears on hire purchase instalments or other loan payments.

importance to less frequent dimensions in a reference population. 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 national distributions.

The identification of insecure individuals from a multidimensional perspective requires the establishment of a second threshold (k), so that an individual i is considered multidimensionally insecure if $EI_i \geq k$. In practice, it is possible to use different multidimensional thresholds that go from the union criteria —considering an individual as insecure if he lacks security in at least one dimension ($k \geq \min\{w_1, \dots, w_D\}$)— to the intersection criteria —an individual must lack security in all indicators ($k = D$). In this research, we have chosen an intermediate approach: an individual is economically insecure if he is not secure at least in 50% of the sum of weighted dimensions (in this case, $k \geq 3$).

4.3.2 Aggregate decomposable economic insecurity indices

From an aggregate perspective, we can summarize the information on economic insecurity in a country or welfare regime by one scalar using a subgroup-decomposable index. First, we can measure the *incidence* of insecurity in a given population using the multidimensional insecurity rate (H_{EI}), calculated as the number of people classified as economically insecure (q_{EI}), and thus above the threshold k, divided by the total population (N). Second, we can report on the *intensity* of economic insecurity by using $\mu_{EI}^{q_{EI}}$ —i.e., the mean value of the variable EI_i among the economically insecure— as well as its standardized mean A —$\mu_{EI}^{q_{EI}}$ divided by the number of dimensions—. Moreover, we can calculate the *economic insecurity adjusted rate* (M_{EI}), an adequate social measure of economic insecurity that considers both the incidence and the intensity of the phenomenon:

$$M_{EI} = \frac{q_{EI}}{N}\frac{\mu_{EI}^{q_{EI}}}{D} = H_{EI}A \tag{4.2}$$

A relevant characteristic of M_{EI} is that it is decomposable by dimensions and by subgroups of a population.[28] The decomposition into dimensions allows us to express the adjusted multidimensional insecurity rate as:

$$M_{EI} = \sum_{j=1}^{D} \frac{w_j S_j}{D} \tag{4.3}$$

where P_j is the proportion of multidimensional insecure people that lack security in dimension *j* within the total population and D is the total number of dimensions ($D = 6$). Given that we consider the country distribution of insecurity dimensions, we use inverse frequency weights w_j to construct aggregate indicators of economic insecurity.

Additionally, given T subpopulations we can express M_{EI} as a weighted sum of the adjusted multidimensional insecurity rates of each subgroup $M_{\mathrm{EI}h}$:

$$M_{\mathrm{EI}} = \sum_{l=1}^{T} \frac{n_h}{n} M_{\mathrm{EI}h} \tag{4.4}$$

where n_h is the size of subpopulation h and $M_{\mathrm{EI}h}$ is the adjusted multidimensional insecurity rate of the corresponding subpopulation h. In this case, a large contribution to overall insecurity of a certain subgroup can be driven by its huge size and not necessarily by a relevant level of insecurity. Thus, only those individuals belonging to subgroups with a contribution to total insecurity above their population weight will have a substantial economic insecurity that policy makers should try to mitigate. Therefore, we calculate a differential contribution as the rate between the adjusted multidimensional insecurity rate of subpopulation h and overall insecurity (or relative contribution of subgroup h with respect to its frequency in the population):

$$DC_{\mathrm{EI}} = \frac{M_{\mathrm{EI}h}}{M_{EI}} \tag{4.5}$$

In this chapter, we first calculate aggregate indicators and relative contributions of each dimension and subgroup by country. Then, results for each welfare regime are calculated as a population-weighted average of country indicators, thereby giving more

[28] For more details, see Alkire and Foster (2011).

importance to those countries with larger size (Bambra, 2006; Ebbinghaus, 2012; Isakjee, 2017).

Finally, estimating the individual-level probability of being insecure allows us to integrate all previous results in a more overall picture and helps us to identify the competing drivers of individual insecurity levels. The probability P_{it} that an individual i is insecure at moment t can be expressed as:

$$P_{it} = \mathrm{P}(y_{it} = 1 \mid X_{it}, \alpha_C, \gamma_W, \delta_t) = G(\beta X_{it} + \alpha_C + \gamma_W + \delta_t) \qquad (4.6)$$

where y_{it} is a dichotomous variable identifying the economically insecure with a 1 and the secure with a 0, X_{it} are individual socioeconomic and demographic characteristics, α_C and γ_W are country or welfare state regime fixed effects and δ_t are time dummies. We estimate the individual-level probability of being insecure using a logistic regression model.

4.4 Results

We use information from the longitudinal data of EU-SILC, a standardized survey on income and other demographic and socioeconomic variables at a household and individual level. As our main purpose is to undertake a comparative analysis of economic insecurity in the European context, we found this dataset to be the most adequate because it gathers homogeneous variables for all countries, thus enabling for sound comparisons between diverse social contexts. To deal with attrition bias, the longitudinal EU-SILC survey is designed as a four-year rotational panel, with few exceptions.[29] We use all available waves in EU-SILC containing information from 27 countries from 2008 to 2016.[30]

[29] For France, the dataset has a nine-year rotating strategy, whereas Norway has an eight-year rotating panel. Furthermore, Luxembourg offers a pure panel with no rotation design. However, given that we construct dynamic indicators from t-1 to t, a different panel design for a country does not significantly affect our analysis.

[30] All our income variables are referred to the previous calendar year, while other information is related to the year of the interview. We pool all waves from the longitudinal EU-SILC data set containing information from 2008 to 2016 and discard duplicated observations. An individual can only be observed for a maximum of four consecutive waves due to the rotational design of the panel (except for France, Luxembourg and

Our income variable is real household equivalized disposable income, deflated by the Harmonized Consumer Price Index at constant 2015 prices and adjusted for household size and composition by using the OECD modified scale. We trim the data by eliminating the 1% tails of this income distribution (Cowell and Victoria-Feser, 2006) and discard those individuals remaining in the survey only for a single wave (as we need dynamic indicators). Our final pool of data includes 2,113,914 individual observations and all our results are estimated using sample representativity weights.[31]

Table 4.1 displays our aggregate indicators of economic insecurity by welfare state regime for the whole period of analysis. Economic insecurity is most frequent in Mediterranean and Eastern European welfare regimes: 12.5% of the population living in the Mediterranean region and 10.5% of those individuals in Eastern Europe suffer from insecurity, whereas this happens to only half (6.6%) of those living in corporatist countries and to one third (3.4%) of those living in social-democratic ones. Nevertheless, the fact that only a small percentage of the population suffers from economic insecurity does not imply a lower intensity among those insecure. Intensity is actually very similar in all regimes —on average, individuals suffer approximately from 3.6 insecurity dimensions—, except for Eastern countries where this intensity is slightly lower. Thus, if we focus our attention on the economic insecurity adjusted rate (M_{EI}) that combines incidence and intensity when comparing the phenomena across welfare state regimes, results are almost identical to those when analyzing incidence.[32]

Norway). Our eight-year window sample consists of a cumulation of waves from various years constructed with the four-wave panel of different individuals corresponding to different interview years.

[31] Most of our aggregate indicators analyse economic insecurity in an eight-year time-window and not in a specific year. Standard errors for countries' results have been computed accordingly using the personal base weight (RB060) provided by Eurostat and with the Stata command *mpi*. These are calibrated design weights for the first wave and are subsequently adjusted for the inverse probability of response in subsequent waves, thereby taking attrition into account. Our sample is comprehensive and includes all-age individuals in the population. See Romaguera-de-la-Cruz (2019) for details on how we have used the household as the unit of measurement even if the unit of analysis of interest is the individual. Most of economic insecurity dimensions are based on household information as we consider that all members face the same living conditions.

[32] This result may be influenced by the selection of our multidimensional threshold: to be classified as insecure, an individual must lack security at least in 3 out of 6 dimensions. Thus, normalized intensity of economic insecurity in this setting must be always above 0.5. To check its robustness, we have calculated the variability of intensity when the multidimensional threshold is smaller (see Appendix tables A4.2 and A4.3). Results show that when the threshold reduces either to 2 or to 1 there is more variability among countries regarding intensity. However, our main result still holds, incidence is the most relevant difference in economic insecurity among countries.

TABLE 4.1. Aggregate indicators of economic insecurity

	Corporatist	Eastern	Liberal	Mediterranean	Social-democratic
Incidence (H_{EI})	0.066	0.105	0.048	0.125	0.034
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Intensity (A)	0.641	0.612	0.638	0.647	0.650
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Economic insecurity adjusted rate (M_{EI})	0.042	0.064	0.031	0.081	0.022
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

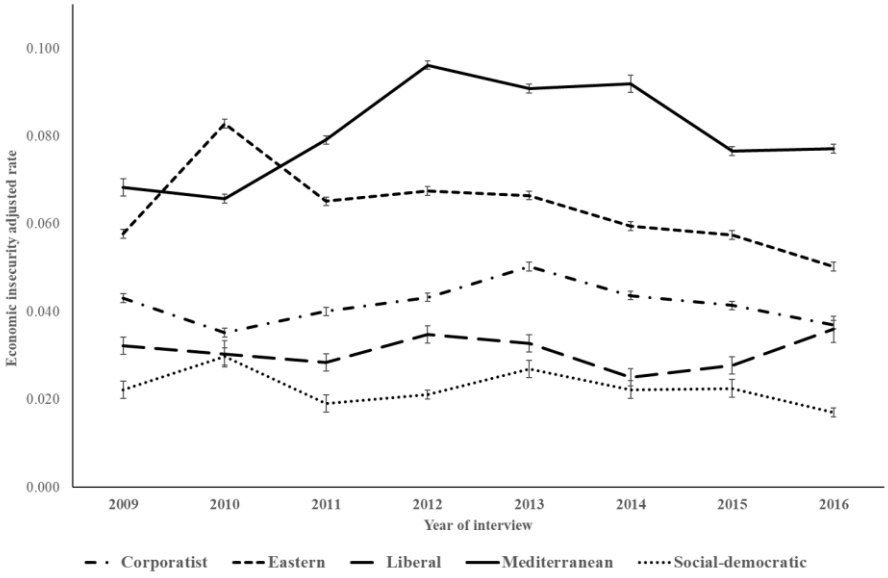
Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC dataset.

The evolution of insecurity over time is also different depending on the welfare state regime we analyze (Figure 4.1). In all corporatist, liberal and Mediterranean regimes, the Great Recession was associated with an increase in economic insecurity, even though the rise was relatively larger among the Mediterranean countries. In this region, individuals suffered from relevant household income losses, and there was a large increase in unemployment rates. These two objective dimensions together, with the implementation of large austerity measures in this region and the relatively small size and low efficacy of the tax-benefit systems in improving disposable incomes, has led to a boost in individual anxiety about future economic distress during the crisis. Nevertheless, economic recovery has pushed these countries' insecurity downwards, even if they have not yet returned to their pre-crisis insecurity levels. In contrast, Eastern European regimes display a steady downward trend in insecurity since 2010, which is probably due to positive GDP growth rates as well as a consistent fall in unemployment rates, so that large macroeconomic improvements in the region have helped improve objective insecurity dimensions. Social-democratic countries stand out as the regions with low and very stable levels of economic insecurity since 2009, which suggests that this phenomenon is more of a structural issue in this region and is less subject to changes in the business cycle than in other country groups.

All these results are largely consistent if we were to use a PCA approach to the aggregation of dimensions instead of a counting approach as reported in Table A4.5 and Figures A4.1 and A4.2 in the Appendix. Using the first principal component of dimensions, we find that Eastern Europe is the most insecure region followed by the Mediterranean while countries in socio-democratic regimes show the highest security. These positions in the ranking are maintained when computing EI_i by using equal weights

(see Table A4.5 in the Appendix). On the contrary, Mediterranean countries become the most insecure when weighting dimensions by the proportion of the population who do not lack security in a specific indicator (inverse frequency weights), even though the difference with Eastern Europe is quite small. The use of these inverse frequency weights allows us to obtain a relative perspective of economic insecurity, since we give greater importance to those dimensions in which a smaller share of the population lacks security, thus introducing objective indicators of subjective feelings of insecurity as people feel worse if a huge proportion of the population has security when they are among those who are insecure (Desai and Shah, 1988; Romaguera-de-la-Cruz, 2019). Therefore, the small differences we find in the rank of regions are not due to the aggregation technique used to calculate our synthetic economic insecurity index but rather on the conception of insecurity as a more relative phenomenon.

FIGURE 4.1. Evolution of economic insecurity adjusted rate (M_{EI}). 2009 - 2016



Note: Confidence intervals are presented in vertical lines.
Source: Author's calculations based on longitudinal EU-SILC dataset.

For an effective public policy design, discovering the major source of insecurity is key. For this purpose, we calculate the relative contribution of each dimension to the overall insecurity adjusted rate for each of our country groups (Table 4.2).[33] Even if one cannot

[33] In Table A4.4 in the Appendix we report the average correlation matrices of insecurity dimensions by country group. Our six selected indicators seem to capture diverse aspects of economic insecurity, as all correlations are below 0.5. In general, the highest correlation is found between the inability to face unexpected expenses (which is a subjective indicator) and the probability of extreme expenditure distress (objective dimension). This relation is strongest in the liberal region and lowest in Eastern Europe countries.

identify just one dimension that strongly contributes to insecurity in all regions, some patterns are clear. In general, the relative contribution of subjective versus objective dimensions is well-balanced in all regimes, except for Eastern European countries where objective dimensions seem to be more relevant contributing 62.1% to overall insecurity. Particularly, unemployment risk and the probability of extreme expenditure distress have a larger role in Eastern regimes and account for almost half of their overall economic insecurity adjusted rate. In turn, these low well-being levels seem to have undermined individual's appreciations of insecurity, as subjective indicators show a higher incidence in these societies, 53% of Eastern European population declare incapacity to face unexpected expenses, whereas 45.3% are financially dissatisfied. Therefore, even though around half of the population suffers from these two subjective dimensions, they contribute less to global insecurity, as we consider it more relevant to lack security in those indicators in which most of the population is secure.[34]

Even if Mediterranean and Eastern Europe countries are the most insecure regions, the pattern of relative contributions to insecurity by dimensions is rather different. In Mediterranean regimes, four indicators have a similar contribution while income drops and changes in the ability to go on a holiday are less relevant. In this case, insurance-based benefits helping cover short-term income drops are better than in liberal regimes but the lack of low means-tested benefits, as well as active employment measures, may increase the role of unemployment risk and extreme expenditure distress in overall insecurity, also influencing subjective indicators.

Large income losses have a relatively higher role for those in liberal countries in contrast with the unemployment risk contribution. Individuals in this region suffer more from short-term income losses that are not well-covered by its welfare system, which focuses on active measures to prevent unemployment. In general, except for liberal regimes, the dimension contributing the least is changes in the ability to go on holiday. This result underlines that this dimension is also related to diverse household consumption lifestyles probably conditioned by the different levels of income per capita

Mediterranean countries also show a somewhat larger correlation than other regions between income drops and financial dissatisfaction.

[34] We may recall that we are weighting our insecurity dimensions by the proportion of the population not affected by each one of them. Thus, we are giving less importance to frequent events when producing our insecurity indicators.

between regions and, as it could be expected, affects households at diverse points of the income and wealth distribution in a different way.

TABLE 4.2. Contributions to the economic insecurity adjusted rate (M_{EI}) by dimensions

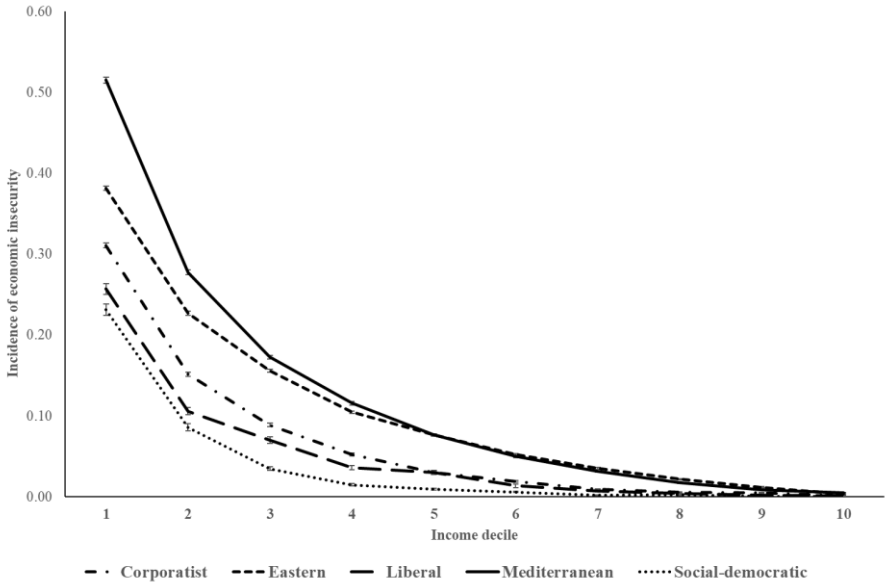
	Corporatist	Eastern	Liberal	Mediterranean	Social-democratic
Incapacity to face unexpected expenses	0.193	0.158	0.160	0.188	0.201
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Financial dissatisfaction	0.201	0.177	0.174	0.182	0.190
	(0.001)	(0.000)	(0.003)	(0.001)	(0.003)
Changes in ability to go on a holiday	0.102	0.071	0.144	0.101	0.116
	(0.001)	(0.001)	(0.003)	(0.001)	(0.004)
Income drops	0.113	0.167	0.171	0.149	0.140
	(0.001)	(0.001)	(0.003)	(0.001)	(0.004)
Unemployment risk	0.196	0.217	0.166	0.189	0.185
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
Probability of extreme expenditure distress	0.195	0.211	0.185	0.192	0.168
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)

Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC dataset.

Figure 4.2 displays the incidence of economic insecurity by income decile, which allows us to examine if there are significant differences between regions related to the diverse welfare systems in place. As expected, insecurity decreases as the level of income grows, despite the region analyzed. In social-democratic countries, insecurity is only relevant for the first and the second income decile, becoming negligible from the fourth decile onwards. In this region, economic insecurity appears to have a stronger correlation with poverty, which is related to a larger universality and effectiveness of welfare provision than in other regimes. For corporatist and liberal regimes, insecurity is an important phenomenon only for those individuals with low and low-middle income. It seems that, even though the configurations of those welfare systems are different, these countries are succeeding in preventing economic insecurity beyond the third decile. Conversely, we can observe that in Eastern Europe and Mediterranean regimes economic insecurity is not only present in low-income deciles but also in middle-income ones. Both regions show a higher incidence of economic insecurity until the fourth decile in comparison with other regions, and we must also highlight the existence of a relevant group of insecure individuals situated in middle-income deciles because insecurity is

noteworthy until the sixth decile. Moreover, this figure clearly suggests that in Mediterranean and Eastern European countries even relatively rich individuals are significantly more insecure than other poorer ones in social-democratic regimes. This result puts forward that, for several European countries, focusing only on income-poor groups when studying low well-being in their societies is not enough.

FIGURE 4.2. Incidence of economic insecurity (H_{EI}) by income decile



Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Confidence intervals are presented in vertical lines.
Source: Author's calculations based on longitudinal EU-SILC dataset.

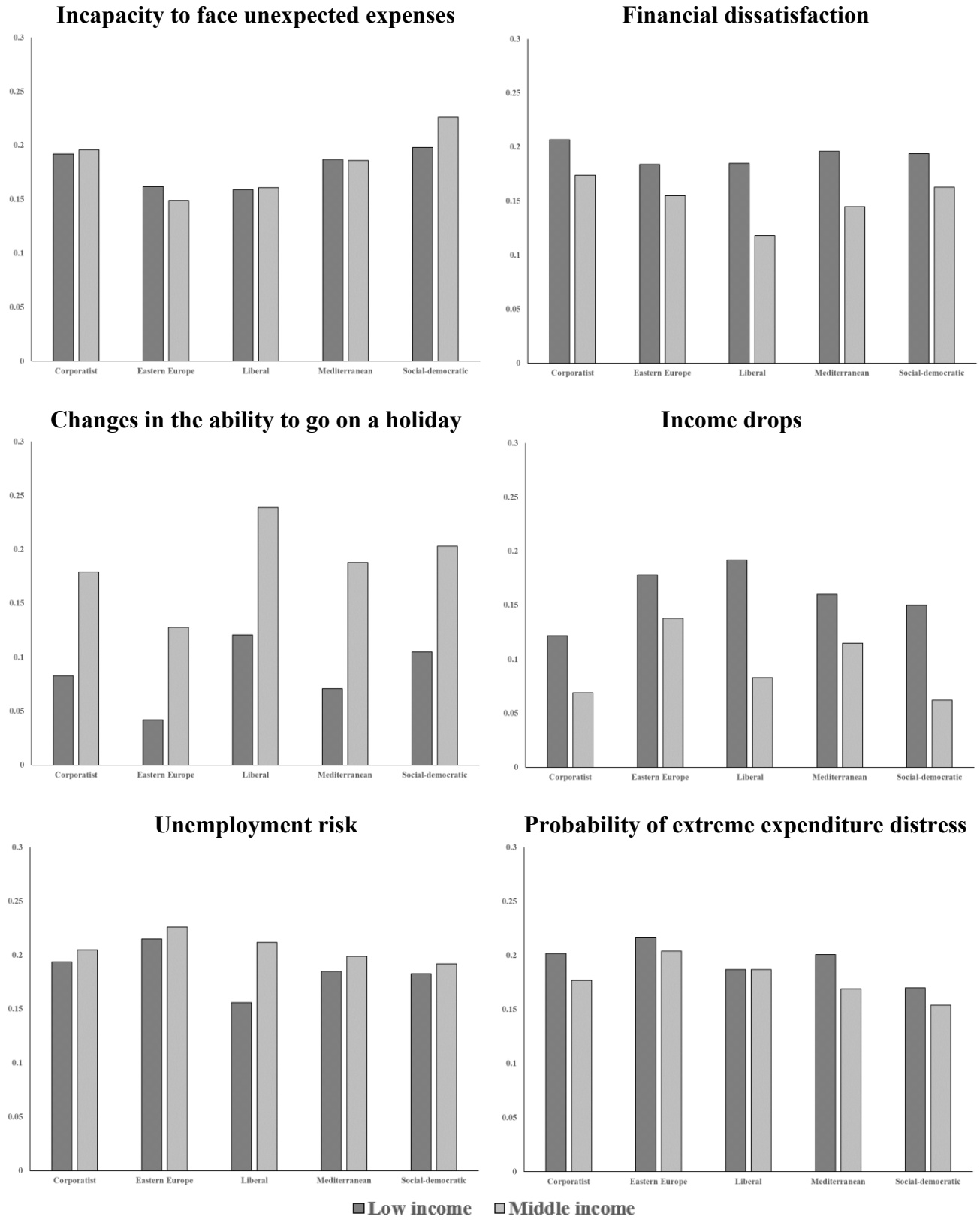
The role of dimensions may also be different for individuals situated in diverse positions of the income distribution. Figure 4.3 shows the contribution of dimensions to the economic insecurity adjusted rate of two groups: low-income individuals (including those situated up to the third decile) and middle-income individuals (from the fourth to the sixth decile).[35] The contribution of the incapacity to face unexpected expenses is rather similar for both income groups, as opposed to the contribution of financial dissatisfaction, which is more relevant for the insecurity of low-income individuals. These results suggest that the first indicator captures difficulties in facing expenditure emergencies, which can be understood as transitory distress regarding the individual's position in the income distribution. Nevertheless, financial dissatisfaction captures

[35] We do not include high-income individuals as a relevant group, as the economic insecurity is negligible from the seventh decile onwards.

difficulties in obtaining basic needs, which is a structural problem that affects those with less monetary resources. Also, among the subjective dimensions and, as we would expect, changes in the ability to go on a holiday is more relevant for middle-income deciles than for lower ones. Poor individuals do not cut down this expense, as they probably are not able to ever afford a holiday. Income drops are more important in the lower tail of the income distribution, even though the difference between groups is smaller for Mediterranean and Eastern European regimes, which can be related to the lack of significant means-tested policies in their welfare systems. There is not much divergence between groups in the relative contribution of unemployment risk and the probability of extreme expenditure distress, although we clearly see that the former is more relevant for individuals situated in the middle class, whereas the latter contributes more to the insecurity of the low-income group.

In countries classified within Mediterranean and Eastern European welfare-regimes the level of protection from insecurity is significantly lower than in countries classified within social-democratic, liberal and corporatist regimes, in this order. However, this level of protection also depends on individual characteristics such as gender, age, education, labor market status or household structure. Tables 4.3 and 4.4 show that in all welfare regimes, women are likely to be more insecure than men, except for Mediterranean and to some extent Eastern countries where there are only small gender differences. In general, as it would be expected, insecurity generally decreases with age, and individuals above 60 are the most secure in all regions. In contrast, the level of insecurity of young individuals between 16 and 35 years of age is the highest, even though it is relatively lower in Mediterranean and Eastern European regions. Clearly, the role of family aid in these welfare-regimes is quite relevant: young individuals who anticipate future economic losses choose to continue cohabiting with their parents or relatives to cope with these expectations. This is not the case in social-democratic regimes, where emancipation takes place despite future financial distress.

FIGURE 4.3. Contribution of dimensions to the economic insecurity adjusted rate (M_{EI}) by income groups



Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC dataset.

TABLE 4.3. Differential contribution (DC_{EI}) by socioeconomic characteristics

	Corporatist	Eastern	Liberal	Mediterranean	Social-democratic
Gender					
Female	1.064	1.000	1.039	1.025	1.029
Male	0.935	1.000	0.961	0.975	0.973
Age					
< 16	1.138	1.368	1.240	1.155	0.660
16 – 25	1.379	1.429	1.665	1.370	1.897
26 – 35	1.465	1.167	1.151	1.261	1.735
36 – 45	0.978	1.007	0.963	1.069	0.919
46 – 60	0.762	0.744	0.667	0.827	0.777
> 60	0.425	0.437	0.358	0.465	0.448
Level of education					
Primary	1.685	1.558	7.231	1.218	0.991
Secondary	1.210	1.151	1.296	1.177	1.243
Tertiary	0.452	0.412	0.607	0.450	0.618
Basic activity status					
Inactive	0.978	0.900	1.018	0.871	1.227
Employed	0.809	0.836	0.791	0.708	0.705
Unemployed	4.502	4.139	4.324	3.303	5.865
Type of household					
One adult without children	1.541	0.738	1.203	1.063	2.349
Two adults without children	0.672	0.571	0.512	0.692	0.630
Other HH without children	0.632	0.728	0.675	0.806	0.667
One adult with children	2.505	2.031	2.209	1.860	2.096
Two adults with children	0.967	1.269	1.060	1.066	0.578
Other HH with children	1.124	1.346	1.530	1.441	0.600
Property					
Tenant	2.315	2.018	2.285	1.986	2.874
Owner	0.416	0.871	0.383	0.707	0.381

Note: Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window.

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

TABLE 4.4. Estimation of the probability of being insecure: Odds ratio

	Total	Total	Corporatist	Eastern Europe	Liberal	Mediterranean	Social-democratic
Gender (man)	0.923***	0.925***	0.867***	0.945***	0.885**	0.997	0.899*
	(0.012)	(0.012)	(0.026)	(0.014)	(0.044)	(0.016)	(0.053)
Age							
< 16	0.914***	0.914***	0.925	0.942**	0.934	0.896***	0.571***
	(0.021)	(0.021)	(0.050)	(0.026)	(0.080)	(0.028)	(0.054)
16 – 25	0.858***	0.857***	0.846***	0.964	1.341***	0.828***	1.345***
	(0.021)	(0.021)	(0.051)	(0.029)	(0.135)	(0.025)	(0.138)
36 – 45	0.863***	0.865***	0.769***	0.885***	1.067	0.923***	0.669***
	(0.019)	(0.019)	(0.041)	(0.023)	(0.094)	(0.026)	(0.067)
46 – 60	0.792***	0.790***	0.740***	0.755***	0.989	0.826***	0.598***
	(0.017)	(0.017)	(0.038)	(0.019)	(0.088)	(0.023)	(0.055)
> 60	0.463***	0.464***	0.493***	0.427***	0.736**	0.457***	0.372***
	(0.013)	(0.013)	(0.040)	(0.015)	(0.092)	(0.017)	(0.056)
Level of education							
Secondary	0.682***	0.694***	0.612***	0.769***	0.760*	0.720***	0.628*
	(0.014)	(0.014)	(0.033)	(0.022)	(0.126)	(0.017)	(0.149)
Tertiary	0.284***	0.292***	0.233***	0.319***	0.537***	0.289***	0.351***
	(0.008)	(0.008)	(0.016)	(0.011)	(0.090)	(0.009)	(0.085)
Labor activity status							
Inactive	0.909***	0.933***	0.756***	1.076***	0.948	0.971	1.482***
	(0.019)	(0.019)	(0.039)	(0.028)	(0.071)	(0.028)	(0.150)
Unemployed	3.822***	3.979***	2.946***	5.509***	3.053***	3.992***	4.494***
	(0.076)	(0.078)	(0.151)	(0.154)	(0.258)	(0.100)	(0.507)
Married	0.736***	0.721***	0.666***	0.770***	0.716***	0.823***	0.416***
	(0.011)	(0.011)	(0.024)	(0.014)	(0.043)	(0.016)	(0.032)
Bad health status	1.523***	1.494***	1.779***	1.622***	0.930	1.382***	1.677***
	(0.035)	(0.034)	(0.095)	(0.041)	(0.093)	(0.043)	(0.206)
Status in employment							
Never worked	1.820***	1.730***	1.785***	1.432***	0.965	2.260***	1.485***
	(0.041)	(0.038)	(0.111)	(0.040)	(0.084)	(0.070)	(0.179)
Temporary or no contract	3.575***	3.400***	3.817***	3.591***	1.470***	3.764***	2.347***
	(0.067)	(0.061)	(0.150)	(0.080)	(0.130)	(0.088)	(0.193)
Employer	0.955	0.926**	0.663***	0.944	1.495*	1.027	1.806***
	(0.037)	(0.035)	(0.093)	(0.054)	(0.326)	(0.051)	(0.360)
Independent worker	1.673***	1.625***	1.629***	1.881***	1.341***	1.652***	2.452***
	(0.034)	(0.032)	(0.096)	(0.049)	(0.105)	(0.045)	(0.325)
Homeowner	0.323***	0.339***	0.237***	0.480***	0.229***	0.376***	0.308***
	(0.004)	(0.004)	(0.008)	(0.010)	(0.013)	(0.006)	(0.022)

TABLE 4.4. Estimation of the probability of being insecure: Odds ratio (continued)

	Total	Total	Corporatist	Eastern Europe	Liberal	Mediterranean	Social-democratic
Number of HH members	1.024***	1.025***	1.011	1.040***	1.060**	1.015*	0.742***
	(0.006)	(0.006)	(0.017)	(0.007)	(0.031)	(0.008)	(0.038)
Number of dependent children	1.229***	1.231***	1.205***	1.294***	1.145***	1.270***	1.598***
	(0.011)	(0.010)	(0.027)	(0.013)	(0.040)	(0.015)	(0.095)
Group of country							
Eastern Europe		1.926***					
		(0.032)					
Liberal		0.676***					
		(0.020)					
Mediterranean		1.847***					
		(0.031)					
Social-democratic		0.581***					
		(0.019)					
Country dummies	Yes	No	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1663711	1663711	491431	562468	85972	404117	119723

Notes: (1) We present odds ratio for logit estimations in which the dependent variable takes the value 1 if the individual is economically insecure and 0 otherwise, computed by the counting approach method with an intermediate threshold. (2) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (3) Standard errors are clustered by individual. (4) References of categorical variables are the following: between 26 and 35 years (age), primary (education), working (basic labor status), not married (marital status), good health (bad health), permanent employee (employment status) and corporatist (country group).
Source: Author's calculations from longitudinal EU-SILC data set.

Our results also underline that countries within a social-democratic regime are likely to prevent child insecurity more effectively than countries in any other welfare state regime. In general, insecurity for households with children is larger than overall insecurity, especially for single-parent households; even though this result is smaller in Mediterranean regimes, pointing to the important role of family aid. For corporatist and social-democratic regimes, where early emancipation is more frequent, adults living alone suffer from more insecurity with respect to the total population than in other regions. The lack of family support and the incapacity to benefit from economies of scale that provide bigger household structures may be driving this result. Homeownership also seems to matter for economic insecurity: the differential contribution for tenants is above one in all regimes, but it is smaller in those regions where property status is more extended (Mediterranean and Eastern European countries).

Education appears to have an important role in preventing economic insecurity in all European regions. Although the differential contribution for those individuals with secondary education is rather low, only those who reach tertiary education have a lower level of economic insecurity with respect to the whole population. Interestingly, this is significantly less often the case in liberal regimes where tertiary education prevents insecurity to a more limited degree than in other regimes.

Unsurprisingly, unemployed individuals show the highest economic insecurity adjusted rate in all regions. Even though insecurity among unemployed individuals in Mediterranean countries is high, the differential contribution is relatively lower with respect to other welfare regimes, probably due to the large size of this group caused by the huge loss of employment during the Great Recession (especially in Greece and Spain). In social-democratic regimes where unemployment is less frequent, insecurity is more concentrated among those who lack employment.

4.5 Conclusions

In this chapter, we have analyzed economic insecurity by welfare state regime in a comparative perspective using a counting approach methodology proposed in Romaguera-de-la-Cruz (2019). We use a multidimensional individual index of economic insecurity considering both subjective and objective indicators, as well as past experiences and predictions of future states. These include the incapacity to face unexpected expenses, a measure of financial dissatisfaction and changes in the ability to go on a holiday as subjective dimensions together with other objective indicators such as large income drops, unemployment risk and the probability of extreme expenditure distress.

An individual approach to measuring insecurity allows for a detailed comparative analysis of the level and evolution of insecurity in European countries, studying the relationship between insecurity and the level of income, as well as the contribution of each dimension and different subpopulations to overall insecurity in several welfare regimes. Our analysis provides a sound comparison of economic insecurity levels and evolution in time within a European context using the EU-SILC dataset. The methodology allows us to identify which are the most insecure subgroups in the

population and which are the principal sources of insecurity in general and in each region to discover where to focus public action.

Interestingly, similar demographic and socioeconomic characteristics imply a relatively higher contribution to general insecurity in all regimes: young individuals, those who have not reached tertiary education, the unemployed and individuals living in households with dependent children. This result calls for broader public programs of support for young low educated persons as a key policy recommendation. Nevertheless, results show the important role of family aid in Mediterranean and Eastern Europe countries, where individuals who anticipate future economic distress rely on relatives to cope with this expectation. Moreover, the fact that social-democratic regimes are succeeding in preventing insecurity for households with children appears to be related to the universality of its welfare system. Also, homeownership seems to be key everywhere in helping individuals avoid economic insecurity.

Results clearly show that Mediterranean and Eastern European countries are the most insecure regions, while social-democratic countries have the lowest levels of economic insecurity. On average, the economic crisis is associated with an increase in insecurity levels in corporatist, liberal and Mediterranean regimes, while remaining largely stable in social-democratic countries. We also confirm our first hypothesis about the relevant incidence of economic insecurity on European middle classes and we find that this result is largely independent of the measure used to proxy economic insecurity and has a more general basis. A key novel result is that this is however not the case in all countries, it is only in Eastern European and Mediterranean welfare-state regimes that a relevant group of insecure individuals are placed in intermediate income deciles. This implies that, in contrast with social-democratic, corporatist and liberal regimes, economic insecurity in Eastern European and Mediterranean countries affects a significant part of the middle class.

Nevertheless, regarding our second hypothesis, we confirm that the role of insecurity dimensions on overall insecurity levels differs between welfare state regimes. In general, the contribution of objective versus subjective dimensions is well-balanced, except for Eastern European countries, where objective dimensions are more relevant. Therefore, the role of objective versus subjective dimensions is larger in post-transition Eastern European regimes than in long-standing capitalist countries. Short-term income losses are relatively more important to liberal regimes, the opposite to the unemployment risk,

revealing that its welfare state system is able to avoid insecurity by promoting employment through active employment measures but fails to cover some of the needs due to low means-tested benefits. Changes in the ability to go on a holiday is the least relevant indicator for all regions, as it affects those individuals in middle-income positions that are suffering from lower economic insecurity levels more.

We also find that the contribution of each insecurity dimension to overall insecurity differs by income group. There are no large differences between low- and middle-income individuals when analyzing the role of the incapacity to face unexpected expenses, which is more of a transitory distress in contrast with financial dissatisfaction. Income drops instead contribute more to poor individuals' insecurity, even though the distance between income groups is smaller in Eastern European and Mediterranean regimes, where non-means tested benefits and contributory pensions play an important role.

4.6 Appendix

TABLE A4.1. Contribution of dimensions to the economic insecurity adjusted rate (M_{EI}) by income groups

		Corporatist	Eastern	Liberal	Mediterranean	Social-democratic
Incapacity to face unexpected expenses	**Low income**	0.192	0.162	0.159	0.187	0.198
		(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
	Middle income	0.196	0.149	0.161	0.186	0.226
		(0.001)	(0.001)	(0.004)	(0.001)	(0.006)
Financial dissatisfaction	**Low income**	0.207	0.184	0.185	0.196	0.194
		(0.001)	(0.000)	(0.004)	(0.001)	(0.003)
	Middle income	0.174	0.155	0.118	0.145	0.163
		(0.003)	(0.001)	(0.007)	(0.002)	(0.012)
Changes in ability to go on a holiday	**Low income**	0.083	0.042	0.121	0.071	0.105
		(0.001)	(0.001)	(0.004)	(0.001)	(0.004)
	Middle income	0.179	0.128	0.239	0.188	0.203
		(0.004)	(0.002)	(0.007)	(0.002)	(0.015)
Income drops	**Low income**	0.122	0.178	0.192	0.160	0.150
		(0.001)	(0.001)	(0.003)	(0.001)	(0.004)
	Middle income	0.069	0.138	0.083	0.115	0.062
		(0.003)	(0.002)	(0.007)	(0.002)	(0.011)
Unemployment risk	**Low income**	0.194	0.215	0.156	0.185	0.183
		(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
	Middle income	0.205	0.226	0.212	0.199	0.192
		(0.003)	(0.002)	(0.006)	(0.002)	(0.010)
Probability of extreme expenditure distress	**Low income**	0.202	0.217	0.187	0.201	0.170
		(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
	Middle income	0.177	0.204	0.187	0.169	0.154
		(0.003)	(0.001)	(0.005)	(0.002)	(0.010)

Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.

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

TABLE A4.2. Aggregate indicators of economic insecurity ($k = 1$)

	Corporatist	Eastern	Liberal	Mediterranean	Social-democratic
Incidence (H_{EI})	0.382	0.595	0.489	0.528	0.288
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Intensity (A)	0.391	0.358	0.335	0.408	0.361
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Economic insecurity adjusted rate (M_{EI})	0.149	0.213	0.164	0.215	0.104
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC dataset.

TABLE A4.3. Aggregate indicators of economic insecurity ($k = 2$).

	Corporatist	Eastern	Liberal	Mediterranean	Social-democratic
Incidence (H_{EI})	0.201	0.292	0.188	0.310	0.118
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Intensity (A)	0.500	0.480	0.487	0.513	0.501
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Economic insecurity adjusted rate (M_{EI})	0.100	0.139	0.091	0.159	0.059
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Standard errors are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC dataset.

TABLE A4.4. Average correlations of economic insecurity dimensions by country group.

	Corporatist					
	D1	**D2**	**D3**	**D4**	**D5**	**D6**
D1	1					
D2	0.235	1				
D3	0.171	0.056	1			
D4	-0.032	-0.274	-0.033	1		
D5	0.198	0.098	0.023	-0.032	1	
D6	0.437	0.183	0.052	0.003	0.377	1
	Eastern					
	D1	**D2**	**D3**	**D4**	**D5**	**D6**
D1	1					
D2	0.233	1				
D3	0.021	-0.022	1			
D4	-0.053	-0.259	-0.039	1		
D5	0.142	0.093	-0.024	-0.038	1	
D6	0.261	0.195	-0.03	-0.043	0.334	1
	Liberal					
	D1	**D2**	**D3**	**D4**	**D5**	**D6**
D1	1					
D2	0.041	1				
D3	0.202	0.029	1			
D4	-0.004	-0.384	-0.046	1		
D5	0.145	0.004	0.009	0.016	1	
D6	0.472	0.029	0.04	0.042	0.308	1
	Mediterranean					
	D1	**D2**	**D3**	**D4**	**D5**	**D6**
D1	1					
D2	0.278	1				
D3	0.111	0.022	1			
D4	-0.103	-0.411	-0.053	1		
D5	0.211	0.137	-0.005	-0.071	1	
D6	0.416	0.349	-0.016	-0.079	0.35	1
	Social-democratic					
	D1	**D2**	**D3**	**D4**	**D5**	**D6**
D1	1					
D2	0.107	1				
D3	0.242	0.046	1			
D4	-0.062	-0.227	-0.060	1		
D5	0.174	0.088	0.061	-0.113	1	
D6	0.381	0.113	0.135	0.000	0.404	1

Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) D1 = Incapacity to face unexpected expenses; D2 = Financial dissatisfaction; D3 = Changes in the ability to go on a holiday; D4 = Income drops; D5 = Unemployment risk; D6 = Probability of extreme expenditure distress.

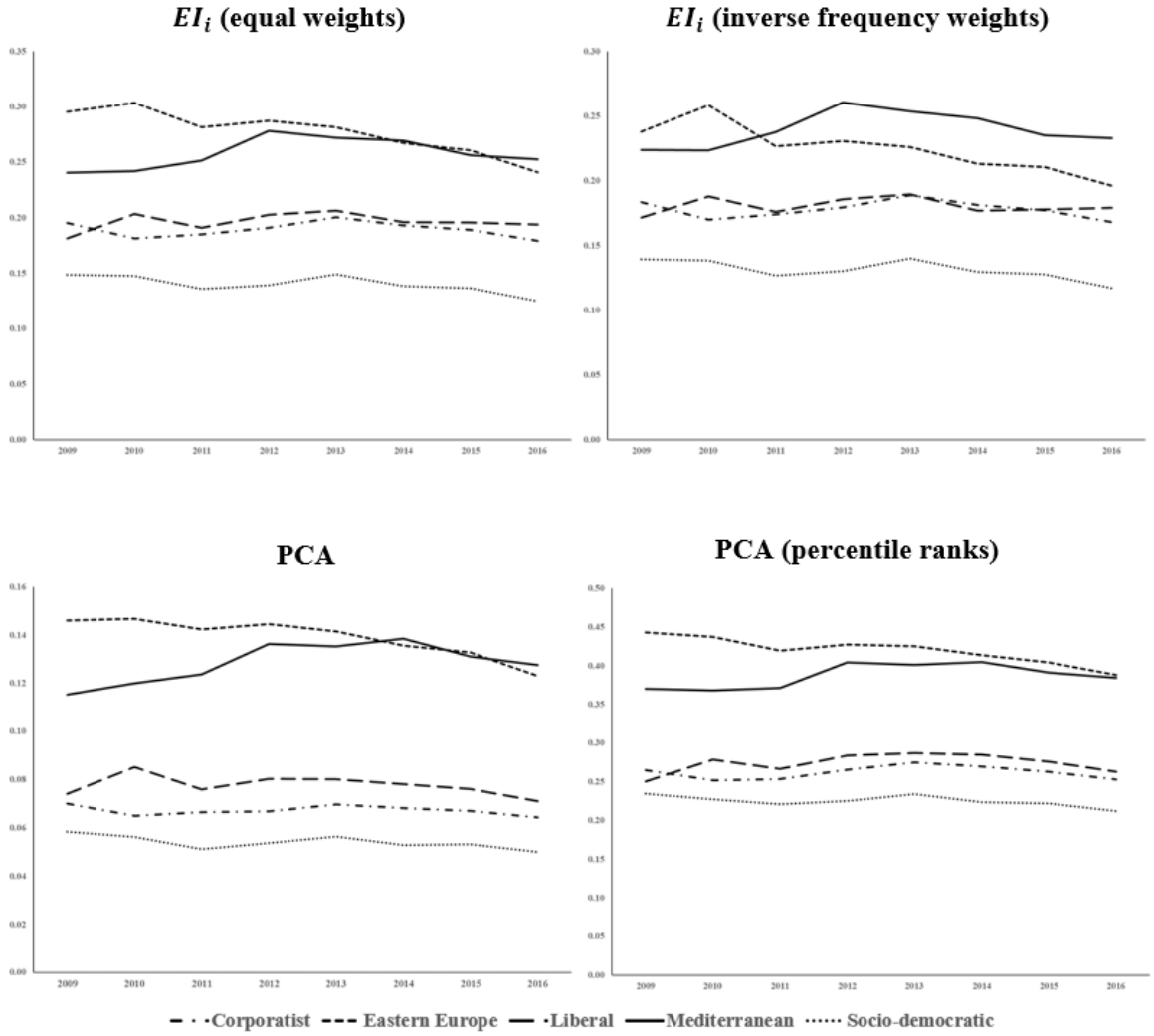
Source: Author's calculations based on longitudinal EU-SILC dataset.

TABLE A4.5. Individual economic insecurity index by country group

			EI_i		
	PCA	**PCA (percentile ranks)**	**Inverse frequency weights**	**Equal weights**	**Frequency weights**
Corporatist	0.067	0.262	0.178	0.19	0.238
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Eastern Europe	0.148	0.443	0.236	0.292	0.417
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Liberal	0.078	0.275	0.18	0.197	0.262
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Mediterranean	0.128	0.386	0.239	0.257	0.306
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Socio-democratic	0.054	0.224	0.131	0.139	0.191
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)

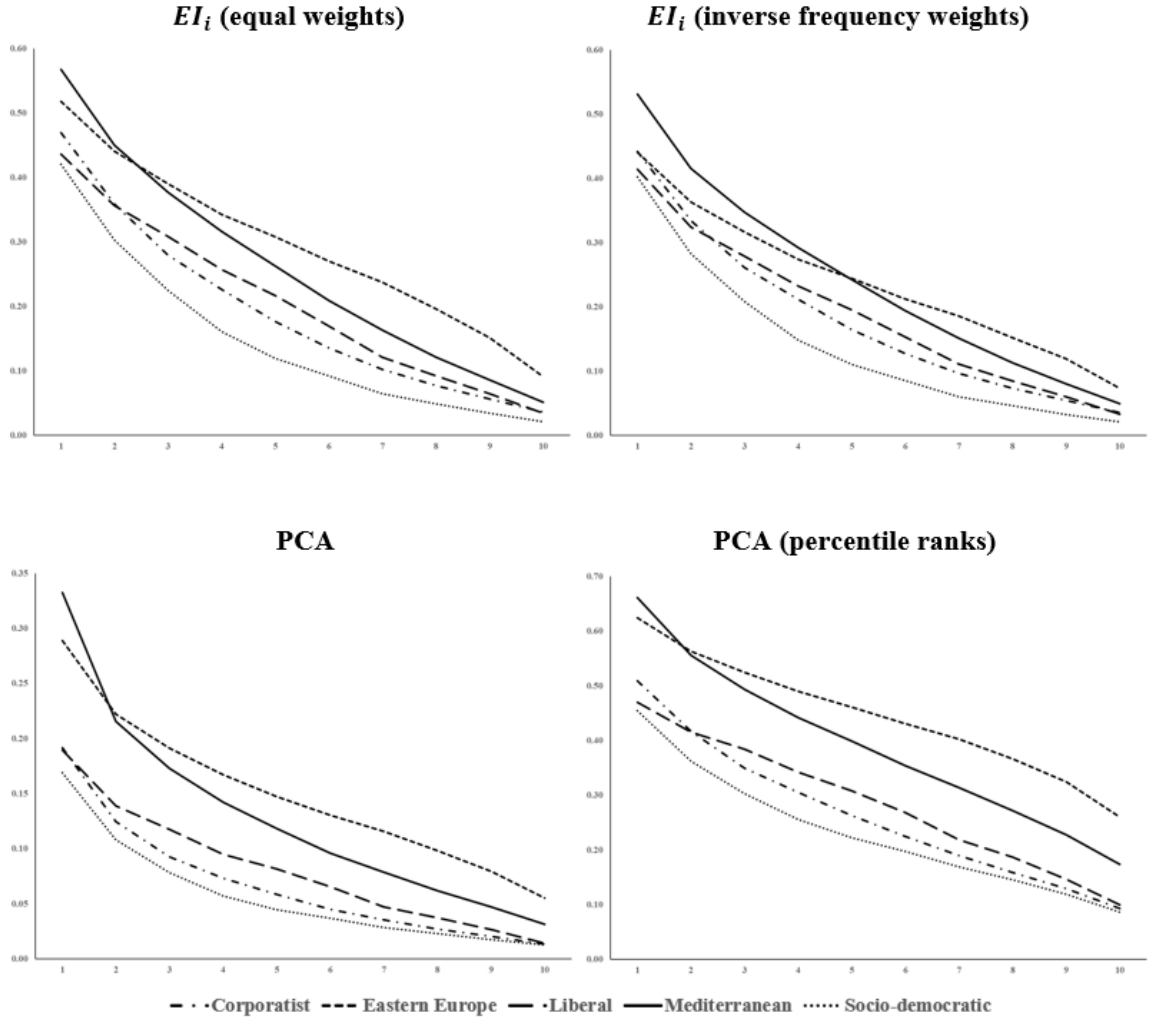
Notes: (1) Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window. (2) Bootstrap standard errors (1000 replications) are shown in brackets.
Source: Author's calculations based on longitudinal EU-SILC data set.

FIGURE A4.1. Evolution of individual economic insecurity by country group



Note: Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window.
Source: Author's calculations based on longitudinal EU-SILC dataset.

FIGURE A4.2. Distribution of individual economic insecurity by country group



Note: Results correspond to the eight-year period and should be interpreted as a mean for the whole time-window.
Source: Author's calculations based on longitudinal EU-SILC dataset.

Chapter 5

The role of tax-benefit systems in shaping economic insecurity in the EU

5.1 Introduction

In the last decade, economic insecurity has revealed itself as one of the main threats to individual's well-being (Stiglitz, Sen and Fitoussi, 2009). This phenomenon, understood as the uncertainty about future economic hazards and the impossibility to recover from them (D'Ambrosio and Rohde, 2014; Hacker et al., 2014; Osberg, 1998; Osberg and Sharpe, 2005; Rohde and Tang, 2018), has increased as a consequence of the Great Recession. The rise in inequality and poverty in several European countries, as well as more precariousness in the labour market and a reduction in public expenditure –due to the austerity measures adopted to reduce countries' fiscal deficits– have worsened individuals' expectations about their financial situation in the near future. We must highlight that this economic insecurity may have relevant impacts in the short term, through a reduction in consumption and household investment which may have macroeconomic effects, as well as in the medium term, affecting labour market, fertility or political decisions beside causing a deterioration of physical and mental health (Bossert et al., 2020; Smith, Stoddard and Barnes, 2009; Modena et al., 2014; Rohde et al., 2016). Furthermore, present economic insecurity might cause a reduction of future generations' well-being: individuals who believe they will experience an economic distress in a foreseeable future may save and reduce investment in their children's education to cope with this negative expectation.

Economic insecurity is a dynamic phenomenon, which captures the belief of an economic risk's materialization, focusing on possible changes in economic status rather than current financial strain. It is well known that one of the functions of modern welfare states in Europe is social insurance: public policy should provide security by reducing the risk of several hazards or by shifting the risk relocating the costs of an adverse event from one economic agent to another (Western et al., 2012). Many papers have shown that the characteristics of the tax-benefit system in a given country play a crucial role in shaping its income distribution and thus its level of inequality, poverty and intra and intergenerational mobility smoothing the impact of the economic cycle (Gottschalk and Joyce, 1998; Esping-Andersen and Myles, 2011; Van Kerm and Pi Alperin, 2013). Moreover, differences in poverty and material deprivation among countries can be explained by disparities in their welfare systems (Bárcena-Martín et al., 2014; Bárcena-Martín et al., 2018). Nevertheless, there is no previous work studying the relationship between countries' welfare state and their level of economic insecurity.

Our main purpose in this chapter is to assess if economic insecurity can be explained by differences in European countries' tax-benefit systems beyond the effect of individual sociodemographic characteristics. To this end, we construct a multidimensional economic insecurity index proposed in Romaguera-de-la-Cruz (2019), which follows Rohde et al.'s (2015) proposal on dimensions. This method considers insecurity as a latent variable with an important psychological component and it is referred to future states; hence, this index incorporates both subjective and objective indicators in which we believe insecurity reveals itself. As subjective dimensions we consider the household's inability to face unexpected expenses, a measure of financial dissatisfaction and changes in the ability to go on a holiday. On the other hand, we include large income drops, unemployment risk and a probability of extreme expenditure distress as objective dimensions. Although we compute this economic insecurity index at an individual level, we adopt a household perspective, due to the possibility of risk pooling and economies of scale and as we believe an individual's well-being can be shaped by the situation of another household member. Once we have computed our insecurity dimensions, we aggregate them by using the counting approach method: we count the number of indicators in which an individual does not lack security weighting these dimensions by the country's population not affected in each one of them (EI_i). These frequency weights enable us to adopt our insecurity index to a given society and they can be considered as objective indicators of subjective feelings of insecurity.

After calculating the individual economic insecurity index for 29 European countries, we explore the effect of countries' social protection generosity on this phenomenon. We focus our analysis on 2015, as we would like to study tax-benefits systems in a period without an economic downturn, when automatic stabilizers may play an important role. To determine which factors may cause economic insecurity, we explore the effect of micro and macro variables on economic insecurity making use of multilevel modelling techniques. Being young, low educated and unemployed has a positive effect on economic insecurity, while owning a house and being in a multigenerational household reduces our insecurity index. At a macro level, those countries with a larger Gross Domestic Product (GDP) with respect to EU-28 average show a lower level of insecurity, whereas unemployment rate increases our index. Regarding the tax-benefit system impact, a higher country's social protection expenditure as a percentage of GDP as well as a larger personal tax revenue have a negative impact on economic insecurity, meaning

that a more generous welfare state helps mitigate uncertainty about future economic losses. Both means and non-means tested benefits as a percentage of GDP reduce economic insecurity as well as cash and in-kind benefits. When looking at the impact of social protection functions separately, we find a significant negative effect of health expenditure, survivors and old age pensions, unemployment benefits and social exclusion benefits.

Furthermore, it is interesting to study if a more generous social protection system mitigates insecurity for some vulnerable groups in the population. In this chapter we focus on households with dependent children. The presence of dependent children in the household supposes higher expenditure that can exacerbate economic distress. Likewise, current economic insecurity can have a negative impact on children's development: if their parents expect a future financial hardship, they will reduce investment in children's needs and education leading to a lower well-being in adult life. When analysing cross-country comparisons, we find that higher levels of social protection expenditure have a negative impact for households with children, thus a more generous tax-benefit system is reducing more economic insecurity for those households where at least a child is present beyond the negative impact for all population.

This chapter has the following structure: Section 2 presents a review of previous research on the insurance component of progressive taxation as well as the impact of tax-benefit systems on some well-being dimensions. Section 3 describes the data source, our economic insecurity measure and the hierarchical model used for our analysis. Section 4 presents and discusses our main results, while Section 5 gathers our major conclusions and policy recommendations.

5.2 Background

5.2.1 Redistribution and insurance in welfare states

One of the essential features of modern welfare states is the redistribution of incomes through taxes and benefits to mitigate disparities between individuals. It has been demonstrated that progressive taxation leads to a more equal distribution by transferring income from richer people to the poorer, as rich individuals have a larger share of tax liabilities than their proportion of factor incomes (Lambert, 2001). Consequently, this

redistributive effect reduces inequality and poverty levels. In this context, many papers have shown empirically that both progressivity and a higher generosity of tax-benefit policies have a crucial role in shaping a country's income distribution and therefore its degree of inequality, poverty and mobility (Atkinson, Rainwater and Smeeding, 1994; Esping-Andersen and Myles, 2011; Jäntti, 1997; Van Kerm and Pi Aperin, 2013).

Nevertheless, another relevant function of the welfare state is to provide security by reducing the risk of diverse hazards or by relocating the costs of an adverse event from one individual to another (Western et al., 2012). There are several reasons that justify the public provision of social insurance: on one hand, government intervention can be explained by a lack of efficiency when there are market failures (as moral hazard or adverse selection) or it is necessary to relocate risk among generations. Moreover, public security can be based on distributional reasons as insurance also compresses the distribution of disposable income (Lindbeck, 2006). The insurance component of tax-benefit systems can also be understood as individual long-run redistribution, as incomes will be smoothed over a person's life cycle by paying more taxes in periods of abundance and receiving benefits when an economic shock takes place (Bartels, 2012, Bartels and Neumann, 2018; Björklund and Palme, 2002; Haan et al., 2018). Atkinson (1991) also points out another justification for social insurance: the absence of full private insurance markets only explains partially why the government supplies security to individuals, which arose as a response to labour force segmentation and the discretization of unemployment and retirement as adverse events.

Literature on optimal taxation has acknowledged this insurance component of progressive taxes and benefits beyond its redistributive effect. Academics start from the idea that income at a certain point in time has a large random component which is exogenous, thus not depending on unobserved characteristics or preferences (Varian, 1980). Individuals will then turn to private insurance markets in order to avoid this uncertainty, however these markets may be incomplete or even might not exist due to moral hazard, adverse selection or asymmetric information. In that case, people will need to save more than desired to raise a buffer stock that helps them in case of an economic downturn, but if individuals do not have enough wealth to purchase private coverage or to self-insure in case these markets are incomplete, government policies can be a relevant instrument to reduce unpredictable income dispersion providing security against individual risk (Buchanan and Tullock, 1962; Eaton and Rosen, 1980; Sinn, 1995; Varian,

1980). In this vein, differences in present incomes arise due to disparities in luck and social insurance implies a redistribution of resources from lucky individuals to those unlucky (Floden, 2001; Sinn, 1995). Although public insurance may be a useful tool by collectivizing risk, we must not forget the trade-off between distortionary effects via reduced incentives and the redistributive and insurance effects of progressive taxation when designing tax and benefit policies. Also, we must be aware that this social insurance provision might lead to a redistribution paradox: insurance may induce individuals to assume more risk, thus increasing inequality in pre-tax incomes and reducing the equalizing effect of modern welfare states.

There are several empirical analyses which document the existence of an insurance element in progressive taxation. In this framework, Gruber (1997) studies the smoothing effect of unemployment benefits on consumption, showing that complete private insurance markets for this hazard do not exist, as consumption decreases when individuals lose their jobs. This fall in consumption is mitigated by the generosity of unemployment insurance, especially in the short-term. In addition, there is evidence of an insurance component against divorce risk of some US family policies (Gruber, 2000). On other hand, Grant et al. (2010) find that a more redistributive tax system diminishes consumption variance providing social insurance to households. When studying public transfers, Floden (2001) demonstrates that a more generous transfer system implies a larger insurance effect in a country with higher risk (US) rather than in a low-exposed region (Sweden). Hoynes and Luttmer (2011) decompose the tax-benefit value into a redistributive component which is based on predictable variations in income and an insurance element due to unexpected income fluctuations. In this case, insurance is considered to redistribute incomes from individuals who achieved their expected income to those who suffered an income shock within those with the same previous expectations. There is significant evidence of this insurance value, which increases with income in contrast to the redistributive effect.

Another strand of research analyses social insurance as redistribution among individual income streams over their lifetime (Bartels, 2012; Bartels and Neumann, 2018; Björklund and Palme, 2002; Haan et al., 2018). In this vein, public insurance is not understood as a mechanism to reduce income dispersion at a given period, but a smoothing instrument of resources from different periods within the same person. Therefore, by contributing to public finances through taxes when obtaining higher

incomes, individuals will be entitled to receive public transfers when an economic risk is materialized. If private insurance markets were complete, redistribution will only make sense between individuals with different lifetime incomes and tax-benefit systems must offer coverage against temporary economic distress (Björklund and Palme, 2002). People have a preference for stable income over time rather than unpredictable resources and intra-individual redistribution can be an important determinant of progressive taxation support: individuals will be willing to contribute to annual redistribution from rich to the poor in exchange of income smoothing (Bartels and Neumann, 2018).

In this context, Björklund and Palme (2002) find significant long-run redistribution in Sweden, mainly driven by taxes even though the insurance effect of benefits is non-negligible. Also, income smoothing appears in all lifetime income quartiles, but it is larger for individuals with low levels of resources. Bartels (2012) documents that the German welfare system prefers insurance over annual redistribution as it is more focussed on means-tested benefits oriented to provide security and stabilize income over the life cycle –for instance, retirement pensions, sickness benefits and unemployment insurance. Beveridgean systems redistribute more between individuals in a longer time horizon while Bismarkian welfare states encourage intra-personal redistribution (Bartels and Neumann, 2018).

As far as we know, there is no previous work that analyses directly the impact of tax-benefit policies on economic insecurity. In this chapter, we consider insecurity as the exposure to economic risks that implies anxiety from the anticipation of future economic losses and the inability to recover from them. We believe that progressive taxation can help to reduce this anxiety stemming from bad expectations as individuals acknowledge that the welfare system will act as a safety net in case those economic risks are materialized while the objective exposure to economic distress is also mitigated. Therefore, our first and main research hypothesis is:

H1: *More generous tax-benefit policies can help to reduce economic insecurity by acting as a public safety net in case economic risks materialise.*

5.2.2 Determinants of individual well-being

5.2.2.1 Individual sociodemographic characteristics

One goal of this chapter is to analyse if country differences regarding economic insecurity levels can be explained by differences in the individual characteristics or by differences in institutional factors. Thus far, comparative analysis of economic insecurity is scarce and does not investigate the possible causes of the phenomenon (D'Ambrosio and Rohde, 2014; Nichols and Rehm, 2014; Osberg and Sharpe, 2005, 2014). Even though not in a comparative perspective, Rohde et al. (2015) explored some of the micro determinants of economic insecurity in Australia, concluding that factors causing insecurity are similar to those for other low well-being phenomena: in general, age decreases insecurity dimensions as well as higher levels of educational attainment, the fact of being employed in a full-time job and working in the industrial sector. Moreover, married individuals and those with good health conditions suffer from less insecurity. Household disposable income is associated with lower economic insecurity levels as expected, whereas unemployment status increases the phenomenon. Furthermore, there are large dynamic effects of economic insecurity over time, even if this is more of a transitory issue for individuals without tertiary education or high-income levels.

Within a multidimensional and individual perspective, Romaguera-de-la-Cruz (2019) also investigated the correlation between several sociodemographic characteristics and economic insecurity in three European countries representing different welfare systems: France, Spain and Sweden. She found that economic insecurity decreases as household disposable income grows and a significant group of middle-class individuals suffer from this phenomenon in Spain and to a lesser extent in France while insecurity in Sweden is essentially a low-income circumstance which accumulates to poverty. Individuals between 26 and 35 years of age are the most insecure in all three countries, while reaching tertiary education and being employed with a permanent contract are associated with a lower probability of insecurity. Household composition seems to be also relevant as an additional member contributes negatively to insecurity through an increase in disposable income. Cantó et al. (2019) confirm these results when analysing economic insecurity in 27 European countries, finding that young individuals with low educational attainment and a bad labour market situation –especially, the unemployed– as well as households with at least one dependent child are the most insecure in all regions, while middle-

income individuals are considerably affected by this phenomenon only in Mediterranean and Eastern European countries.

Economic insecurity is a rather distinct phenomenon than material deprivation or poverty –while the latter are referred to the moment they are experienced, insecurity incorporates dynamics as the anticipation of economic risks is not completely related to the income distribution (Ranci et al., 2017; Rohde and Tang, 2018; Osberg, 2018). Nonetheless, previous work analysing the relationship between other well-being phenomena and sociodemographic characteristics may help us to disentangle possible variables that also influence economic insecurity. Thus, in line with the results for economic insecurity, the literature has found a negative relation between age and material deprivation or poverty, since old individuals accumulate lifetime savings and assets (Bárcena-Martín, et al., 2014; 2018). Old people are usually homeowners conversely to the young (Figari, 2012) and tend to have a better position in the labour market with permanent contracts and higher wages (Dewilde, 2008). As expected, households whose head has only a low educational attainment are related with higher levels of material deprivation and poverty (Bárcena-Martín et al., 2017; Brady et al., 2009; Chzhen and Bradshaw, 2012; Figari, 2012; Fusco, et al., 2010; Whelan et al., 2004).

Labour market situation is closely related with economic strain, as the unemployed, inactive individuals and those with a temporary contract have a larger probability of deprivation and poverty (Bárcena-Martín et al., 2017; Dewilde, 2008; Figari, 2012; Whelan et al., 2004). In this context, Fusco et al. (2010) show that work intensity in the household is a major determinant of suffering from poverty and deprivation at the same time and not only the fact of being unemployed. Bad health status has a significant negative impact on deprivation and poverty due to the loss of income associated with medical costs and the impossibility to work (Figari, 2012; Fusco, et al., 2010; Whelan et al., 2004). Furthermore, household composition is a relevant determinant of well-being: people living alone as well as single-parents households display higher financial strain (Boarini and Mira d'Ercole, 2006; Dewilde, 2008; Figari, 2012). The number of children in the household increase the probability of being poor conversely to the number of adult members (Reinstadler and Ray, 2010), while having more than three dependent children and being separated or divorce contribute positively to the risk of poverty and deprivation (Dewilde, 2008; Whelan et al., 2004).

5.2.2.2 Country-specific characteristics

Regarding macroeconomic determinants, we were not able to find any previous work exploring the correlation between country-specific factors and economic insecurity levels. Nevertheless, it has been demonstrated that the institutional context has a significant impact on material deprivation indices (Figari, 2012). Macroeconomic variables influence individual well-being through a change in personal characteristics: for instance, higher unemployment rates could lead to the loss of employment of an individual and a disposable income decline contributing to a lack of necessary resources whereas a boost in economic activity may have the opposite effect. In this context, the literature has confirmed the negative effect of long-term unemployment on well-being (Bárcena-Martín et al., 2014; Whelan et al., 2003), while the association between low well-being and GDP as a proxy of average welfare in a given society is unclear: Dewilde (2008) does not find a significant effect on multidimensional poverty, whereas larger GDP per capita is associated with lower material deprivation levels (Bárcena-Martín, 2014; Whelan and Maître, 2012) and also reduces the probability of poverty (Reinstadler and Ray, 2010). There is a vast literature documenting the association between social benefits generosity and lower levels of deprivation and poverty (Brady et al., 2009; Bárcena-Martín, 2014; Dewilde, 2008; Nelson, 2012; Whelan et al., 2004), even though we ignore which is the effect on economic insecurity. In view of these considerations, we expect macroeconomic conditions as well as social protection expenditure to show a relevant impact on individual insecurity:

H2: *Country-specific factors have a significant effect on economic insecurity beyond individual sociodemographic characteristics.*

Furthermore, once we have tested if tax-benefit policies are mitigating economic insecurity as formulated in our first research hypothesis, we would like to analyse if this impact is different depending on the type of social protection function. We are especially interested in exploring the impact of means tested vs. non-means tested benefits on insecurity. In this vein, we cannot find agreement in the literature regarding which is the most adequate type of policies to combat low well-being: while Korpi and Palme (1998) note that those regions characterised by larger welfare states based on non-means tested benefits help more to mitigate poverty and inequality, other authors believe that means-tested benefits are more effective to the redistribution of incomes (Kenworthy, 2011).

Moreover, even though non-means tested benefits reduce poverty and deprivation more on absolute terms, means tested benefits are a better option on relative terms as they also reduce low well-being but with a lower cost (Figari et al., 2011). In addition, social protection expenditure targeted to children has been proven to effectively reduce child poverty and deprivation (Bárcena-Martín et al., 2017, 2018; Chzhen and Bradshaw, 2012) but we ignore its effects on economic insecurity. In this regard, we will interact social protection expenditure variables with a dummy for households with dependent children to test our third research hypothesis:

H3: *More generous tax-benefit policies mitigate economic insecurity more for those households with at least one dependent children, especially through social benefit functions aimed at children.*

5.3 Methodology

5.3.1 Economic insecurity measure

In this chapter, we consider economic insecurity as a multidimensional phenomenon: the anxiety that individuals may feel because of expected future economic losses cannot be identified with a unique indicator; on the contrary, is manifested in a variety of variables. Therefore, the Romaguera-de-la-Cruz (2019) insecurity measure seems the most appropriate choice. This index is calculated at the individual level and accounts for the joint distribution of a series of subjective and objective dimensions based on Rohde et al.'s (2015) proposal that combines past events and forecasts about some financial risks.[36] This economic insecurity index proxies subjective insecurity by (a) *household's incapacity to face unexpected expenses*; (b) *household's financial dissatisfaction* –as a measure of discrepancy between disposable income and the lowest annual necessary income, assigning a value zero to satisfied individuals–, and (c) *changes in the ability to go on a holiday* –a binary variable which takes the value one if the household is unable to afford one week away from home provided they were able in the previous year. As objective measures, this index includes (d) *large income drops*, meaning that the

[36] For further information about the definition and computation of subjective and objective insecurity dimensions see Romaguera-de-la-Cruz (2019).

individual must experience a 25% or more fall in household disposable income; (e) *unemployment risk*, which is the probability of both the risk of not finding a job or losing the current one, and a (f) *probability of extreme expenditure distress* –household's probability of experiencing two or three overdue payments which is assigned to each household member.

After computing the aforementioned insecurity dimensions, the Romaguera-de-la-Cruz (2019) measure applies a counting approach (Alkire and Foster, 2011; Bucks, 2011) to construct a composite index of economic insecurity. As we are only interested in individual economic insecurity and its intensity, in this chapter we only apply the dimensional thresholds and discard the multidimensional threshold. Thereby, we consider that an individual lacks security in a dimension if he is situated below a specific dimensional threshold: if X_{ij} is the observation of individual i in dimension j with $i = 1, \dots, N$ and $j = 1, \dots, D$ and Z_j is the threshold for dimension j, then individual i is insecure in dimension j if $X_{ij} < Z_j$. We establish the threshold at zero for all dimensions except for the unemployment risk and the probability of extreme expenditure distress for which we set the country's mean (see Table A3.1).

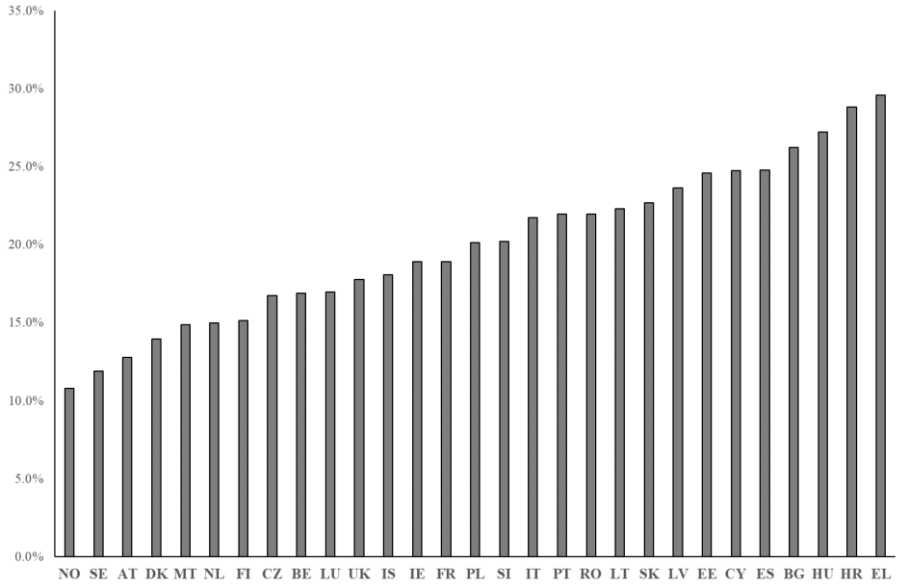
Once dimensional thresholds are applied, Romaguera-de-la-Cruz (2019) defines an individual indicator EI_i that counts the number of weighted dimensions in which an individual lacks security with respect to the total number of dimensions, $EI_i = \sum_{j=1}^{D} w_j I_{ij}$, where I_{ij} is a variable that takes the value one if the individual i lacks security in the dimension j and zero otherwise, where D is the total number of dimensions ($D = 6$). This index therefore enables us to consider the intensity of economic insecurity for each individual in the sample. Dimension j is weighted by w_j, which is the share of the population that does not lack security in that given indicator (inverse frequency weights). In that manner, the index EI_i gives more importance to less frequent indicators in a reference population and adapts to national distributions of dimensions[37].

In this work, we replicate the Romaguera-de-la-Cruz (2019) insecurity index for 29 European countries. As in Figari (2012) and Bárcena-Martín et al. (2014), we normalise EI_i by the sum of weights to allow for countries' comparisons and transform this index

[37] Inverse frequency weights can be identified as objective indicators of subjective feelings of insecurity: people feel worse if they observe that a large part of the population has security when they are among those who are insecure (Desai and Shah, 1988).

into a percentage of insecurity dimensions in which the individual lacks security (if $EI_i = 0$, a person does not lack security in any of the dimensions considered; conversely, if $EI_i = 100$, an individual lacks security in all insecurity indicators). We observe a significant variation in EI_i across countries in 2015 (Figure 5.1), with a minimum of 10.8% of weighted insecurity dimensions in Norway and a maximum of 29.6% in Greece. In general, Eastern and Southern European countries display the largest individual economic insecurity, while the lowest EI_i can be found in Nordic countries. On average, the intensity of individual economic insecurity is around 20%.

FIGURE 5.1. Individual economic insecurity (EI_i) by country.



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

5.3.2 Data and explanatory variables

We make use of longitudinal data from EU-SILC to replicate the Romaguera-de-la-Cruz (2019) economic insecurity index. This is a standardized survey that provides annual data about income and socioeconomic information at a household and individual level, thus allowing for sound comparisons in the European context. To deal with attrition bias, this longitudinal EU-SILC database is designed as a four-year rotational panel, with exceptions for some countries. For the construction of the individual measure of economic insecurity (EI_i), we use all waves of EU-SILC containing information from 2008 to 2016 and, subsequently, we use the 2015 results to analyse the impact of tax-

benefit systems on insecurity.[38] Institutional and contextual variables are drawn from Eurostat statistics with the exception of personal income revenue which is obtained from the European Commission database.

Our income variable is real household equivalised disposable income, deflated by the Harmonised Consumers Price Index at constant 2015 prices and adjusted for household size and composition by using the OECD modified scale. We trim the data eliminating the 1% tails of this income distribution (Cowell and Victoria-Feser, 2006) and discard those individuals remaining in the survey only for a single wave (as we need dynamic indicators). Our final pool of data includes 265,965 individual observations from 29 different countries. We use the individual as the unit of analysis and all our results are estimated by using sample weights.

In line with the literature, we have chosen different demographic and socioeconomic characteristics to assess the effect of individual variables (level 1) on economic insecurity. We include the individual's gender through the binary variable *male*, five categories regarding his *age group*, the *level of education* achieved, his self-perceived health status (*bad health*) as well as personal labour market situation (*basic activity status*). To account for household composition, we include the *type of household* with six different categories depending on the number of adults and children. As we also want to test the influence of housing on economic insecurity, we include a dummy variable that indicates if the tenure status of the household (*homeowner*). Although our unit of analysis is the individual, we have chosen to include several variables reflecting household's characteristics, namely if all members are below 40 (*young household*) or if the individual is living in a *multigenerational household* defined as those formed at least by one child, one working-age adult and one person above 65. Finally, we also consider the *percentage of unemployed* household members.

[38] We pool all waves from longitudinal EU-SILC dataset from 2008 to 2016 and discard duplicated observations. An individual can only be observed for a maximum of four consecutive waves due to the rotational design of the panel (except for France, Luxembourg and Norway). Our final sample consists of a four-wave panel of individuals corresponding to different interview years.

TABLE 5.1. Descriptive statistics

	Mean	Standard deviation
Micro-determinants		
Male	0.50	0.50
Age groups		
< 16	0.19	0.39
16 - 30	0.19	0.39
31 - 45	0.24	0.43
46 - 65	0.33	0.47
> 65	0.06	0.23
Level of education		
Primary or less	0.08	0.27
Secondary	0.60	0.49
Tertiary	0.32	0.47
Bad health	0.07	0.25
Basic activity status		
Employed	0.47	0.50
Unemployed	0.04	0.20
Inactive	0.49	0.50
% unemployed in household	6.20	18.95
Multigenerational household	0.01	0.10
Young household	0.19	0.40
Homeowner	0.74	0.44
Type of household		
One adult without children	0.07	0.26
Two adults without children	0.18	0.38
Other household without children	0.23	0.42
One adult with children	0.03	0.17
Two adults with children	0.33	0.47
Other household with children	0.16	0.37
Macro-determinants		
Unemployment rate	9.29	4.91
GDP	100	44.86
Social protection expenditure	22.85	5.47
Personal tax revenue	11.68	5.35
Social protection functions		
Means tested	2.16	2.17
Non-means tested	20.70	4.91
Cash benefits	15.23	3.53
In-kind benefits	7.64	2.82
Health care	6.31	1.70
Disability	1.98	1.01
Old age	9.52	2.56
Survivors	1.22	0.79
Unemployment	1.03	0.73
Family / children	2.01	0.75
Housing	0.27	0.31
Social exclusion	0.49	0.40

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

To assess the impact of the tax-benefit system, we include diverse measures as *social protection* expenditure and *personal tax revenue* as a percentage of GDP, Using expenditure measures as a proxy for welfare state has been criticized by the literature, arguing that a large amount of social protection expenditure may be due to a higher tax-benefit system generosity or to a greater number of recipients, only capturing the size of the budget and ignoring other crucial aspects as entitlement or benefits' size (Korpi and Palme, 1998; Kunißen, 2019). Even though net replacement rates are preferred by a large extent in the literature, cross-national variation in these measures is rather limited for some programs as health care and education spending while variation is spending is quite higher (Jensen, 2011). Taking this consideration in mind and recognising the importance of budget size, we decide to proxy countries' welfare system by their protection expenditure. To disentangle deeply the impact of tax-benefit policies on economic insecurity, we distinguish between *means* vs. *non-means tested* benefits, *cash* vs. *in-kind* protection expenditure and several social protection functions.

We also consider the *unemployment rate* to control for business-cycle and *GDP* per capita as a percentage of EU-28 average to account for average country wealth.[39] We can observe that the standard deviation of contextual factors is non-negligible (Table 5.1), particularly social protection benefits vary widely across European countries.

5.3.3 Econometric model

The purpose of this chapter is twofold: we want to corroborate if tax-benefit systems have a significant impact on individual economic insecurity and test if country factors can explain differences in insecurity levels beyond individual characteristics. Both goals request dealing with the hierarchical structure of our data as we have individuals (level 1) clustered into countries (level 2). In this context, the most convenient method is multilevel analysis (Goldstein, 2003; Rabe-Hesketh and Skrondal, 2012; Snijders and Bosker, 1999). With this data structure, observations of the error term would not be independent when applying an OLS estimation as observations within countries will be correlated. This violation leads to an underestimation of standard errors, notably at higher levels of aggregation. On other hand, separate country regressions do not allow for the

[39] GDP per capita is expressed in Purchasing Power Parity (PPP).

consideration of country-level explanatory variables and the inclusion of country fixed effects does not allow to estimate the impact of second-level variables since this country factors can be expressed as a linear function of country dummies. Therefore, multilevel regressions are especially useful and enable to estimate separately the variance between individuals within the same country and the variance between countries. Nonetheless, data sets often used in this kind of analyses contain a large sample of individuals in a small number of countries, which can lead to a downward bias on country parameters. Thereby, a minimum of 25 countries is needed for linear multilevel estimations to obtain reliable country results (Bryan and Jenkins, 2016).[40]

In this particular case, we first adopt a random intercept model in which the intercept is allowed to vary randomly across countries ($\beta_{0c} = \beta_0 + u_{0c}$). Our data has a two-level structure where individuals i (first level) are nested into countries c (second level). Let EI_{ic} be the level of economic insecurity for a given individual i in country c. We estimate four specifications to study the effect of individual vs. country-specific factors on the differences across countries regarding economic insecurity. Firstly, we estimate a null model which does not contain any explanatory variable and reveals if there exist any country differences:

$$EI_{ic} = \beta_0 + u_{0c} + e_{0ic} \tag{5.1}$$

where u_{0c} is the random intercept that gathers the difference between the average insecurity in a given country c and the overall mean, while e_{0ic} are the individual-level residuals which are assumed to be independent.[41] Total variance is divided into two components: the variance of economic insecurity between countries (σ^2_{u0}) and that between individuals within countries (σ^2_e). Thus, the correlation of errors between two individuals or *intraclass correlation coefficient* (ICC) is defined as followed:

$$ICC = \frac{\sigma^2_{u0}}{\sigma^2_{u0} + \sigma^2_{e0}} \tag{5.2}$$

In the case of random-intercept models, this intraclass correlation coefficient measures the proportion of total variance due to differences between countries and it is also known as *variance partition coefficient* (VPC). For models with random coefficients beyond a random intercept, the ICC is not equivalent to the proportion of the variance due to the

[40] We satisfy this requirement as there are 29 countries included in our sample.
[41] Both measurement errors, u_{0c} and e_{0ic}, are assumed to follow zero-mean normal distributions.

higher level. If a non-negligible intraclass correlation exists, standard OLS cannot be applied as there is more than one error term (Goldstein, 2003).

Subsequently, we incorporate sociodemographic regressors to analyse if the differences in economic insecurity levels among countries can be explained by individual factors:

$$EI_{ic} = \beta_0 + \beta_1 X_{ic} + u_{0c} + e_{0ic} \tag{5.3}$$

where X_{ic} is the set of explanatory variables at level 1. Additionally, our main goal is to determine if country-specific variables (welfare systems in particular) have a significant impact on differences in insecurity levels among countries:

$$EI_{ic} = \beta_0 + \beta_2 Z_c + u_{0c} + e_{0ic} \tag{5.4}$$

where Z_c contains explanatory variables at the level 2. Finally, we consider both individual and country-level variables jointly:

$$EI_{ic} = \beta_0 + \beta_1 X_{ic} + \beta_2 Z_c + u_{0c} + e_{0ic} \tag{5.5}$$

To test our third hypothesis, we include cross-level interactions between our tax-benefit proxies and a dummy that reflects if the individual lives in a household where at least one dependent child is present. In this case, omitting the random slope corresponding to the lower-level variable could lead to a downward bias in standard errors of the cross-level interaction as well as the first-level estimator, while the main effects for country-specific determinants are not affected (Heisig and Schaeffer, 2019). We could only apply a random intercept model if the variance for the random slope was statistically not significant. As we do not satisfy this condition, we estimate cross-level interactions with a random coefficient model of our interest variable –households with children.[42] Thus, we now relax the assumption that the slope is the same for all countries and include heteroskedasticity in the error term (Snijders and Bosker, 1999):

$$EI_{ic} = \beta_0 + \beta_1 X_{ic} + \beta_2 Z_c + u_{0c} + u_{1c} x_{ic} + e_{0ic} \tag{5.6}$$

[42] Estimates for micro determinants of the random intercept variables are not likely to be affected by the omission of a random slope for households with children, as they would remain statistically significant even if the standard error increased by 50 per cent (Heisig and Schaeffer, 2019).

5.4 Results

5.4.1 Social protection and economic insecurity in the EU

Results of multilevel estimations with random intercept are displayed in Table 5.2. According to the ICC of the null model (Model 1), 6.2% of the variation in economic insecurity is due to disparities between countries. However, when adding first-level variables, this percentage of the variation of insecurity due to country-specific factors increases to 6.7% suggesting that there exists a certain compositional effect and that individual characteristics are not homogeneously distributed across countries.

Subsequently, we first estimate the impact of individual sociodemographic characteristics on EI_i without contextual factors (Model 2), adding later institutional variables that control for countries' economic cycle (unemployment rate) and average wealth (GDP as a percentage of EU-28) as well as two proxies for the welfare state: social protection expenditure (Model 3) and personal tax revenue (Model 4). Our results are in line with previous evidence and very similar for all three specifications. We can observe that younger individuals (those between 16 and 30) experience a higher economic insecurity than those at later stages in life. Being an individual above 65 reduces the percentage of insecurity dimensions more than 6.9 percentage points, probably due to a lower need of income as well as the access to life-time savings and public or private pensions. Educational attainment shows a negative and significant effect, meaning that individuals with a level of education above primary school have a lower economic insecurity. It is worth noting the huge impact of tertiary education, which decreases economic insecurity around 14 percentage points. On the other hand, bad self-assessed health has a positive and significant impact on insecurity, performing mainly through two channels: insecurity increases due to the limitations of income production (for instance, due to a sick leave at work) as well as due to the raise in medical expenses. As expected, being unemployed clearly increases economic insecurity (around 9.3 percentage points regarding inactive individuals) as opposed to being employed, as labour income is the major source of income in the European context. Also, homeownership displays a large negative impact on economic insecurity (-11.9 percentage points) as individuals avoid the uncertainty that fluctuating rental expenses may produce.

TABLE 5.2. Random intercept multilevel linear model for EI_i. Micro determinants

	1	2	3	4
Male		-0.896***	-0.896***	-0.896***
		(0.120)	(0.120)	(0.120)
Age group				
< 16		-0.297	-0.293	-0.292
		(0.404)	(0.404)	(0.404)
16 - 30		3.559***	3.561***	3.561***
		(0.343)	(0.343)	(0.343)
46 - 65		-1.749***	-1.747***	-1.747***
		(0.215)	(0.215)	(0.215)
> 65		-6.886***	-6.886***	-6.885***
		(0.669)	(0.669)	(0.669)
Level of education				
Secondary		-5.077***	-5.075***	-5.077***
		(0.677)	(0.678)	(0.678)
Tertiary		-13.941***	-13.936***	-13.937***
		(0.861)	(0.862)	(0.862)
Bad health		5.903***	5.905***	5.904***
		(0.415)	(0.415)	(0.415)
Basic activity status				
Employed		-2.109***	-2.108***	-2.108***
		(0.433)	(0.433)	(0.433)
Unemployed		9.293***	9.294***	9.295***
		(0.690)	(0.691)	(0.690)
% unemployed in the household		0.175***	0.175***	0.175***
		(0.010)	(0.010)	(0.010)
Multigenerational household		-3.082***	-3.087***	-3.087***
		(1.155)	(1.155)	(1.155)
Young household (all members < 40)		1.671***	1.672***	1.672***
		(0.320)	(0.321)	(0.321)
Homeownership		-11.877***	-11.878***	-11.876***
		(0.702)	(0.702)	(0.702)
Type of household				
One adult without children		-8.176***	-8.176***	-8.178***
		(0.623)	(0.625)	(0.625)
Two adults without children		-11.959***	-11.966***	-11.966***
		(0.515)	(0.518)	(0.517)
Other household without children		-11.440***	-11.452***	-11.450***
		(0.573)	(0.576)	(0.575)
Two adults with children		-9.145***	-9.151***	-9.151***
		(0.539)	(0.540)	(0.540)
Other household with children		-5.969***	-5.980***	-5.978***
		(0.626)	(0.628)	(0.627)
Constant	20.285***	46.585***	57.118***	51.971***
	(0.953)	(1.147)	(2.934)	(2.650)
Macro determinants	No	No	Yes	Yes
Var (intercept)	25.30	20.99	6.54	8.44
Var (residual)	382.32	290.71	290.71	290.71
ICC	0.062	0.067	0.022	0.028
Observations	265965	214975	214975	214975
Country groups	29	29	29	29
Log likelihood	-754327.57	-606138.35	-606121.60	-606125.27

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

Regarding household's characteristics, age composition of the household is significant to shape economic insecurity: if different generations are living together (at least one child, one working-age adult and one adult above 65), insecurity is reduced approximately 3 percentage points, whereas being present in a young household (all members below 40) has a positive impact on the phenomenon. All types of households show a negative and significant effect on insecurity with respect to single-adult households with one dependent children. Nevertheless, this impact is higher for households where no children is present, except for those formed by only one person due to the absence of economies of scale and risk-sharing. The percentage of unemployed members in the household with respect to working-age members increases economic insecurity.

TABLE 5.3. Random intercept multilevel linear model for EI_i. Macro determinants

	3	4	5	6
Unemployment rate	0.285***	0.204**	0.533***	0.457***
	(0.099)	(0.100)	(0.097)	(0.091)
GDP	-0.042***	-0.040**	-0.036**	-0.030
	(0.012)	(0.016)	(0.018)	(0.020)
Social protection expenditure	-0.398***		-0.349***	
	(0.075)		(0.091)	
Personal tax revenue		-0.290***		-0.310***
		(0.112)		(0.120)
Constant	57.118***	51.971***	26.487***	22.330***
	(2.934)	(2.650)	(2.567)	(2.324)
Micro determinants	Yes	Yes	No	No
Var (intercept)	6.54	8.44	6.40	7.10
Var (residual)	290.71	290.71	382.32	382.32
ICC	0.022	0.028	0.016	0.018
Observations	214975	214975	265965	265965
Country groups	29	29	29	29
Log likelihood	-606121.60	-606125.27	-754307.79	-754309.29

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

When adding country-specific variables (Table 5.3), the percentage of insecurity variation due to differences across countries falls to 2.8% to 1.6% depending on the specification, showing the relevance of institutional factors in explaining economic insecurity. Unemployment rate has a positive and significant impact on insecurity (Models 5 and 6), although this effect is reduced when individual characteristics are considered jointly with contextual variables (Models 3 and 4). We also find that countries with a higher GDP per capita are associated with lower percentage of insecurity dimensions. Regarding welfare state, we conclude that countries with more generous

social protection systems and larger personal tax revenue have lower economic insecurity levels. Results suggest that tax-benefit systems in Europe are effective with respect to social insurance of economic risks. In other words, the welfare state is providing security to individuals, who would have a higher uncertainty about recovering from future financial distress if no public safety net existed.

To achieve a deeper understanding of the relationship between tax-benefit systems and economic insecurity, we estimate the impact on this phenomenon of several social protection functions as a percentage of country's GDP. We first consider the influence of means and non-means tested benefits as well as cash and in-kind benefits and then we estimate the effect for eight disaggregated functions (Table 5.4). We find that countries with a higher percentage of means tested benefits with respect to GDP have lower individual economic insecurity (around -0.44 percentage points; Model 7). The impact of non-means tested benefits generosity is also negative and significant (Model 8). Moreover, both cash and in-kind benefits significantly reduce individual economic insecurity (Models 9 and 10). Regarding social protection functions, we find that health care, old age benefits, unemployment benefits and those aimed to mitigate social exclusion reduce insecurity, whereas there is no significant impact of disability, survivors' benefits, housing and family/children benefits. In this sense, social protection functions which are targeted to certain risks where economic insecurity may reveal itself are more effective in decreasing the negative effects of this phenomenon, rather than benefits for certain vulnerable groups. Thus, public expenditure in health improves the uncertainty that sickness may bring to individuals, as income drops will be lower the more effective is the public health care system in recovering people from illness. The negative impact on insecurity of old age and unemployment benefits is probably due to the replacement by public institutions of labour income in the case of retirement or the loss of employment. Again, possible income falls and economic distresses these events may cause are smoothed by the knowledge that the welfare system will make financial strain more tolerable. We know that poor individuals are those showing a larger economic insecurity, though in several European countries it is also present in middle-income groups (Cantó et al., 2019; Romaguera-de-la-Cruz, 2019). Thus, the generosity of social exclusion benefits increases security for those situated in the lower part of the income distribution, who suffer from different negative well-being phenomena at the same time. On the other hand, policies specifically targeted to vulnerable groups of the population

rather than on economic hazards do not display a significant impact on insecurity: the situation of disabled people or families with children will depend on many other household factors. In addition, the small size of housing benefits is probably not enough to palliate the larger insecurity suffered from tenants versus homeowners. These results are in line with the idea that what matters for a good welfare system is to provide universal social insurance policies which allow people to obtain security against risks rather to redistribute incomes from richer individuals to the poorer (Kenworthy, 2011).

5.4.2 Social protection and households with children

It is also of interest to analyse if diverse welfare systems are protecting vulnerable households differently against economic insecurity. For that purpose, we include interactions of our tax-benefit variables as well as social protection functions with a dummy that indicates whether the household has at least a dependent child or not. In general, households with children present higher levels of economic insecurity due to the increase in expenditure associated with minors. Also, previous evidence has confirmed that suffering from financial difficulties during childhood can affect development of children, who might have lower well-being in the future. If parents believe they are going to suffer from an economic distress in the near future and they are not going to be able to recover from it, they will save and cut down some current expenses that may affect children in later stages of their lives –for instance, a reduction in education investment in the present due to parents' insecurity will involve a lower educational attainment of children and thus more difficulties to get higher wages.

Table 5.5 displays the impact of cross-level interactions between welfare variables and living in a household where dependent children are present. Countries with larger social protection generosity protect more households with children beyond total effect. Nevertheless, the overall impact of personal tax revenue becomes non-significant while but the cross-level interaction with households with children show a negative effect on insecurity, meaning that the lowering impact of personal tax on insecurity performs mainly through households with children. We also find the same pattern for means tested and social exclusion benefits. On other hand, country differences in insecurity can also be explained by non-means tested generosity, which decrease insecurity even more for our group of interest, as well as cash and in-kind benefits.

TABLE 5.4. Random intercept multilevel linear model for EI_i. Social protection functions

	7	8	9	10	11	12	13	14	15	16	17	18
Unemployment rate	0.240**	0.279**	0.385***	0.159	0.185**	0.224**	0.319**	0.350***	0.394***	0.213**	0.210**	0.213*
	(0.098)	(0.109)	(0.117)	(0.097)	(0.093)	(0.107)	(0.127)	(0.122)	(0.094)	(0.106)	(0.105)	(0.109)
GDP	-0.053***	-0.048***	-0.045***	-0.047***	-0.048***	-0.055**	-0.059***	-0.055**	-0.037**	-0.055**	-0.055**	-0.051***
	(0.019)	(0.017)	(0.016)	(0.014)	(0.013)	(0.023)	(0.015)	(0.024)	(0.017)	(0.025)	(0.022)	(0.018)
Social protection functions												
Means tested	-0.435*											
	(0.226)											
Non-means tested		-0.381***										
		(0.107)										
Cash benefits			-0.609***									
			(0.137)									
In-kind benefits				-0.638***								
				(0.163)								
Health care					-1.007***							
					(0.293)							
Disability						-0.439						
						(0.670)						
Old age							-0.824***					
							(0.195)					
Survivors								-1.272				
								(0.838)				
Unemployment									-2.329***			
									(0.639)			
Family / children										-0.477		
										(1.048)		
Housing											-1.825	
											(1.620)	
Social exclusion												-3.095**
												(1.220)
Constant	50.530***	56.482***	56.613***	54.562***	55.885***	50.784***	57.251***	50.196***	49.027***	50.979***	50.548***	51.191***
	(2.841)	(3.251)	(3.065)	(2.757)	(2.926)	(3.112)	(3.336)	(3.327)	(2.579)	(3.447)	(3.103)	(2.999)
Micro determinants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Var (intercept)	9.53	7.50	6.73	8.10	8.11	10.30	6.48	9.84	7.85	10.38	10.16	9.19
Var (residual)	290.71	290.71	290.71	290.71	290.71	290.71	290.71	290.71	290.71	290.71	290.71	290.71
ICC	0.032	0.025	0.023	0.027	0.027	0.034	0.022	0.033	0.026	0.034	0.034	0.031
Observations	29	29	29	29	29	29	29	29	29	29	29	29
Country groups	214975	214975	214975	214975	214975	214975	214975	214975	214975	214975	214975	214975
Log likelihood	-606127.03	-606123.53	-606121.99	-606124.67	-606124.72	-606128.11	-606121.4	-606127.45	-606124.22	-606128.22	-606127.92	-606126.48

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

TABLE 5.5. Random coefficient multilevel linear model for EI_i. Interactions with household with children

	1	2	3	4	5	6	7
Household with children	7.751***	5.416***	3.886***	7.224***	6.495***	6.356***	7.447***
	(1.501)	(0.862)	(0.565)	(1.511)	(1.677)	(1.044)	(1.673)
Social protection expenditure	-0.309***						
	(0.069)						
HH with children*social protection	-0.192***						
	(0.066)						
Personal tax revenue		-0.220**					
		(0.098)					
HH with children*personal tax		-0.176***					
		(0.065)					
Social protection functions							
Means tested			-0.344*				
			(0.183)				
HH with children*means tested			-0.244				
			(0.152)				
Non-means tested				-0.294***			
				(0.096)			
HH with children*non-means tested				-0.187***			
				(0.073)			
Cash benefits					-0.495***		
					(0.130)		
HH with children*cash benefits					-0.205*		
					(0.106)		
In-kind benefits						-0.456***	
						(0.126)	
HH with children*in-kind benefits						-0.398***	
						(0.144)	
Health care							-0.739***
							(0.267)
HH with children*health care							-0.658**
							(0.279)
Constant	44.407***	40.384***	39.316***	43.881***	44.244***	42.190***	43.239***
	(2.760)	(2.343)	(2.318)	(2.948)	(2.763)	(2.638)	(2.874)
Var (coefficient)	4.21	4.25	5.00	4.50	4.74	4.14	4.09
Var (intercept)	5.45	6.73	7.33	6.08	5.38	6.67	6.63
Var (residual)	293.26	293.26	293.26	293.26	293.26	293.26	293.26
ICC	0.018	0.022	0.024	0.020	0.018	0.022	0.022
Log likelihood	-606779.7	-606782.58	-606785.96	-606782	-606781.08	-606782.09	-606781.93

TABLE 5.5. Random coefficient multilevel linear model for EI_i. Interactions with household with children (continued)

	8	9	10	11	12	13	14
Household with children	5.160***	5.402***	2.803***	4.386***	4.688***	3.661***	5.187***
	(0.938)	(1.432)	(0.884)	(0.729)	(1.424)	(0.529)	(0.527)
Social protection functions							
Disability	0.020						
	(0.531)						
HH with children*disability	-0.913*						
	(0.467)						
Old age		-0.668***					
		(0.178)					
HH with children*old age		-0.215					
		(0.143)					
Survivors			-1.505*				
			(0.803)				
HH with children*survivors			0.442				
			(0.485)				
Unemployment				-1.896***			
				(0.508)			
HH with children*unemployment				-0.899**			
				(0.429)			
Family / children					-0.571		
					(0.849)		
HH with children*family/ children					-0.683		
					(0.678)		
Housing						-1.957	
						(1.409)	
HH with children*housing						-1.204	
						(1.236)	
Social exclusion							-1.157
							(1.109)
HH with children*social exclusion							-3.696***
							(0.909)
Constant	39.022***	44.767***	39.090***	38.068***	40.002***	39.441***	39.452***
	(2.681)	(2.935)	(2.556)	(2.128)	(2.933)	(2.539)	(2.603)
Var (coefficient)	4.57	4.93	5.30	4.73	5.12	5.19	3.25
Var (intercept)	7.99	5.26	7.09	6.14	7.83	7.59	7.78
Var (residual)	293.26	293.26	293.26	293.26	293.26	293.26	293.26
ICC	0.027	0.018	0.024	0.021	0.026	0.025	0.026
Log likelihood	-606785.72	-606781.27	-606785.97	-606782.81	-606786.99	-606786.82	-606781.15

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

TABLE 5.6. Random coefficient multilevel linear model for EI_i. Interactions with single parents

	1	2	3	4	5	6	7
Single parent	7.693***	7.845***	8.392***	8.866***	8.753***	7.478***	7.376***
	(1.879)	(1.245)	(0.732)	(2.479)	(2.807)	(1.613)	(2.272)
Social protection expenditure	-0.409***						
	(0.075)						
Single parent*social protection	0.059						
	(0.074)						
Personal tax revenue		-0.303***					
		(0.114)					
Single parent*personal tax		0.101					
		(0.092)					
Social protection functions							
Means tested			-0.468**				
			(0.220)				
Single parent*means tested			0.290				
			(0.262)				
Non-means tested				-0.388***			
				(0.104)			
Single parent*non-means tested				0.009			
				(0.107)			
Cash benefits					-0.629***		
					(0.134)		
Single parent*cash benefits					0.019		
					(0.170)		
In-kind benefits						-0.651***	
						(0.160)	
Single parent*in-kind benefits						0.206	
						(0.202)	
Health care							-1.037***
							(0.295)
Single parent*health care							0.266
							(0.368)
Constant	48.594***	43.343***	41.845***	47.872***	48.108***	45.939***	47.343***
	(3.086)	(2.814)	(2.904)	(3.302)	(3.105)	(2.999)	(3.177)
Variance in coefficient	9.18	8.88	8.76	9.24	9.29	8.80	8.96
Variance in intercept	6.42	8.33	9.48	7.48	6.57	8.09	8.05
Variance residual	294.25	294.25	294.25	294.25	294.25	294.25	294.25
ICC	0.021	0.028	0.031	0.025	0.022	0.027	0.027
Log likelihood	-607003.93	-607007.43	-607009.17	-607006.23	-607004.37	-607007.02	-607007.12

TABLE 5.6. Random coefficient multilevel linear model for EI_i. Interactions with single parents (continued)

	8	9	10	11	12	13	14
Single parent	7.935***	8.125**	9.146***	9.634***	8.927***	8.736***	8.996***
	(1.321)	(3.233)	(1.109)	(1.074)	(1.940)	(0.794)	(1.132)
Social protection functions							
Disability	-0.458						
	(0.647)						
Single parent*disability	0.556						
	(0.666)						
Old age		-0.842***					
		(0.187)					
Single parent*old age		0.097					
		(0.316)					
Survivors			-1.378				
			(0.843)				
Single parent*survivors			-0.081				
			(0.777)				
Unemployment				-2.357***			
				(0.638)			
Single parent*unemployment				-0.492			
				(0.565)			
Family / children					-0.511		
					(1.049)		
Single parent*family/ children					0.063		
					(0.868)		
Housing						-1.994	
						(1.592)	
Single parent*housing						1.121	
						(1.755)	
Social exclusion							-3.075**
							(1.267)
Single parent*social exclusion							0.112
							(1.509)
Constant	42.099***	48.695***	41.489***	40.297***	42.326***	41.872***	42.472***
	(3.279)	(3.323)	(3.376)	(2.686)	(3.494)	(3.193)	(3.111)
Variance in coefficient	8.78	9.24	9.26	9.02	9.23	9.01	9.23
Variance in intercept	10.37	6.40	9.81	7.86	10.45	10.18	9.29
Variance residual	294.25	294.25	294.25	294.25	294.25	294.25	294.25
ICC	0.034	0.021	0.032	0.026	0.034	0.033	0.031
Log likelihood	-607010.57	-607003.87	-607010.14	-607006.77	-607011.04	-607010.52	-607009.36

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

Regarding social protection functions, health care and unemployment benefits show an additional negative impact for this type of household, whereas interactions with old age and survivor benefits do not present a differential effect. Conversely, we do not find any differential effect for Single parent households as opposed to other household types (Table 5.6), which suggests that public policy is performing poorly when protecting this group in terms of economic insecurity.

5.4.3 Robustness tests

To make sure our previous results are not a product of the chosen data sample, we conduct a series of robustness tests. First, we discard individuals below 16 and above 65 years of age and we run our random intercept estimations on a subsample of working age individuals. Our principal conclusions do not change, that is individual characteristics show the expected sign and macroeconomic variables have a significant impact on economic insecurity (see Table A5.1 and A5.2). In general, our main results also hold when analysing economic insecurity in a period with negative economic growth by using the 2013 wave of EU-SILC –income variables are referred to 2012. Nonetheless, it is true that the effect of means-tested benefits on insecurity becomes non-significant (Tables A5.3, A5.4 and A5.5).

Furthermore, we estimate several multilevel logit models with a dependent variable that takes the value one if the individual is considered as multidimensionally insecure when applying an intermediate threshold –at least three out of six dimensions– and zero otherwise (Tables A5.6 and A5.7). The effects of microeconomic determinants on insecurity are quite robust to the response variable chosen. In this case, GDP per capita does not show any relevant impact on the probability of being insecure while country's unemployment rate does increase insecurity. However, we can also confirm our first research hypothesis: a more generous social protection system and larger personal tax revenue contribute to reduce the probability of insecurity in the European context

5.5 Concluding remarks

In this chapter, we have analysed to which extent differences in economic insecurity among European countries are due to individuals' characteristics as well as country-

specific factors. In particular, we checked if welfare systems are providing social insurance to some economic hazards, namely if a more generous tax-benefit system leads to a lower level of insecurity. The percentage of insecurity dimensions is significantly smaller in those countries with lower unemployment rates, higher gross domestic product and more generous tax-benefit systems, especially social protection expenditure targeted to economic risks that are related with insecurity.

Firstly, we replicate the insecurity measure developed in Romaguera-de-la-Cruz (2019) for 29 European countries, following Rohde et al.'s (2015) proposal on dimensions. As we believe insecurity is a complex phenomenon which reveals itself in a variety of indicators, we compute a multidimensional index at the individual level thus analysing the joint distribution of a series of dimensions. Economic insecurity is related with individuals' expectations of their future economic situation and the impossibility to cope with future financial hardship. Consequently, our economic insecurity measure has included both subjective and objective dimensions, combining past experiences with probabilities of future events. For aggregating our insecurity dimensions, we have chosen the use of the counting approach method: we have defined a threshold in each dimension to determine if a person lacks security in a given indicator and counted the dimensions in which the individual is insecure, weighting each one of them by the proportion of the population not affected by the specific phenomenon. This approach enables us to account for national distributions of insecurity dimensions, introducing a relative perspective into the index.

Secondly, we have conducted a series of multilevel regressions in order to disentangle the effect of individual variables as well as institutional factors on our individual economic insecurity index. When analysing the effect of individuals' sociodemographic factors on our measure of economic insecurity, we found that young individuals (between 16 and 30 years old), with an educational attainment below secondary education and unemployed are those with the highest percentage of insecurity dimensions. Also, declaring a bad health status increases insecurity due to possible economic losses related with sickness and medical costs associated. Especially relevant is the negative impact of homeownership, which stresses the necessity of wider housing policies that help individuals to mitigate the uncertainty and negative expectations associated with renting. On other hand, lone-parent households as well as those with dependent children show a larger economic insecurity. In addition, those households with all members below 40 are

associated with a higher insecurity, conversely to multigenerational households which benefit from life-time savings of their oldest members. As expected, the percentage of unemployed individuals in the household increases the insecurity index.

Even though individual characteristics account for most of economic insecurity, we find that the impact of country-specific factors is non-negligible, thus confirming our second research hypothesis. Countries with larger unemployment rates and smaller GDP per capita display lower levels of individual economic insecurity. Furthermore, differences in economic insecurity levels across countries can be explained by a more generous welfare system, with a negative impact of social protection expenditure and personal tax revenue on our insecurity measure. This result corroborates our first hypothesis: countries with larger tax-benefit systems are providing social insurance to individuals, meaning that their level of anxiety with respect to future economic distress is lower than that without any kind of social protection. This reduction of insecurity may act through an improvement in people's expectations –having an impact on subjective insecurity dimensions– as well as smoothing the effects of income drops, unemployment risk or future consumption distress. When looking into the impact of specific social protection functions, we found that both means- and non-means tested benefits reduce economic insecurity as well as cash and in-kind benefits. Nonetheless, this effect is mainly due to health expenditure, old-age pensions, unemployment benefits and social exclusion allowances. Housing benefits do not show a significant impact on insecurity, reinforcing the result for homeownership at the individual level. It seems that the most effective policies to reduce insecurity are those targeted at specific economic risks and not at particular subgroups of the population.

Moreover, we have analysed if more generous welfare systems help more households with at least one dependent child in mitigating economic insecurity. We observed that social protection expenditure has an additional negative impact for households with dependent children beyond its overall effect on the country's population, while the welfare system is failing in providing insurance to lone-parent households. Nevertheless, our third research hypothesis is partially confirmed: only some tax-benefit policies mitigate economic insecurity more for those households with children but not those especially targeted to this group as family benefits, which do not provide insurance neither for households with children nor for other population subgroups probably due to its small budget size.

5.6 Appendix

TABLE A5.1. Random intercept multilevel linear model for EI_i. Micro determinants. Working age individuals

	1	2	3	4
Male		-1.154***	-1.154***	-1.154***
		(0.159)	(0.159)	(0.159)
Age group				
16 - 30		3.857***	3.861***	3.860***
		(0.341)	(0.342)	(0.341)
46 - 65		-1.780***	-1.776***	-1.776***
		(0.213)	(0.213)	(0.213)
Level of education				
Secondary		-6.220***	-6.215***	-6.218***
		(0.770)	(0.772)	(0.772)
Tertiary		-14.494***	-14.488***	-14.490***
		(0.929)	(0.930)	(0.930)
Bad health		7.056***	7.058***	7.056***
		(0.449)	(0.449)	(0.449)
Basic activity status				
Employed		-2.092***	-2.089***	-2.088***
		(0.429)	(0.430)	(0.429)
Unemployed		9.340***	9.342***	9.342***
		(0.688)	(0.689)	(0.689)
% unemployed in the household		0.175***	0.174***	0.174***
		(0.009)	(0.009)	(0.009)
Multigenerational household		-6.665***	-6.664***	-6.664***
		(1.746)	(1.746)	(1.746)
Young household		1.120***	1.123***	1.122***
		(0.381)	(0.381)	(0.381)
Homeownership		-11.580***	-11.581***	-11.579***
		(0.648)	(0.648)	(0.647)
Type of household				
One adult without children		-8.206***	-8.209***	-8.212***
		(0.585)	(0.588)	(0.587)
Two adults without children		-12.017***	-12.030***	-12.031***
		(0.489)	(0.492)	(0.492)
Other household without children		-11.585***	-11.605***	-11.604***
		(0.586)	(0.589)	(0.587)
Two adults with children		-8.791***	-8.803***	-8.804***
		(0.539)	(0.541)	(0.540)
Other household with children		-6.317***	-6.336***	-6.334***
		(0.645)	(0.647)	(0.646)
Constant	20.399***	47.500***	57.056***	52.368***
	(0.915)	(1.193)	(2.883)	(2.565)
Macro determinants	No	No	Yes	Yes
Variance in intercept	23.27314	18.95898	6.11	7.72
Total variance	386.5429	290.6734	290.67	290.67
ICC	0.0567892	0.0612306	0.021	0.026
Observations	192851	158725	158725	158725
Country groups	29	29	29	29
Log likelihood	-546795.93	-449235.32	-449219.15	-449222.53

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

TABLE A5.2. Random intercept multilevel linear model for EI_i. Macro determinants. Working age individuals.

	3	4	5	6
Unemployment rate	0.279***	0.206**	0.560***	0.494***
	(0.096)	(0.096)	(0.095)	(0.090)
GDP	-0.041***	-0.038***	-0.033**	-0.027
	(0.011)	(0.014)	(0.015)	(0.017)
Social protection expenditure	-0.361***		-0.297***	
	(0.070)		(0.079)	
Personal tax revenue		-0.258**		-0.273**
		(0.110)		(0.112)
Constant	57.056***	52.368***	24.808***	21.325***
	(2.883)	(2.565)	(2.442)	(2.177)
Micro determinants	Yes	Yes	No	No
Variance in intercept	6.11	7.72	5.45	5.83
Variance residual	290.67	290.67	386.54	386.54
ICC	0.021	0.026	0.014	0.015
Observations	158725	158725	192851	192851
Country groups	29	29	29	29
Log likelihood	-449219.15	-449222.53	-546775.13	-546776.14

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

TABLE A5.3. Random intercept multilevel linear model for EI_i. Micro determinants. 2013

	1	2	3	4
Male		-1.031***	-1.030***	-1.030***
		(0.129)	(0.129)	(0.129)
Age group				
< 16		-0.421	-0.416	-0.416
		(0.534)	(0.535)	(0.534)
16 - 30		3.606***	3.607***	3.607***
		(0.379)	(0.379)	(0.379)
46 - 65		-1.840***	-1.838***	-1.839***
		(0.312)	(0.312)	(0.312)
> 65		-7.844***	-7.845***	-7.844***
		(0.676)	(0.676)	(0.676)
Level of education				
Secondary		-4.757***	-4.756***	-4.757***
		(0.427)	(0.428)	(0.428)
Tertiary		-13.893***	-13.889***	-13.890***
		(0.603)	(0.603)	(0.604)
Bad health		6.193***	6.195***	6.194***
		(0.529)	(0.530)	(0.530)
Basic activity status				
Employed		-2.169***	-2.168***	-2.168***
		(0.551)	(0.551)	(0.551)
Unemployed		8.815***	8.816***	8.816***
		(0.765)	(0.766)	(0.765)
% unemployed in the household		0.172***	0.172***	0.172***
		(0.009)	(0.009)	(0.009)
Multigenerational household		-3.751***	-3.759***	-3.756***
		(0.905)	(0.904)	(0.904)
Young household		2.783***	2.783***	2.783***
		(0.284)	(0.284)	(0.284)
Homeownership		-11.980***	-11.981***	-11.978***
		(0.807)	(0.807)	(0.807)
Type of household				
One adult without children		-7.082***	-7.081***	-7.084***
		(0.638)	(0.638)	(0.639)
Two adults without children		-10.687***	-10.699***	-10.698***
		(0.694)	(0.695)	(0.695)
Other household without children		-10.010***	-10.027***	-10.024***
		(0.799)	(0.800)	(0.799)
Two adults with children		-7.754***	-7.762***	-7.763***
		(0.727)	(0.728)	(0.728)
Other household with children		-4.470***	-4.485***	-4.482***
		(0.841)	(0.842)	(0.841)
Constant	21.803***	46.341***	58.395***	52.133***
	(0.962)	(1.015)	(2.548)	(2.105)
Macro determinants	No	No	Yes	Yes
Variance in intercept	25.77	21.17	4.30	6.93
Total variance	401.25	308.35	308.35	308.35
ICC	0.060	0.064	0.014	0.022
Observations	261753	209494	209494	209494
Country groups	29	29	29	29
Log likelihood	-750892.88	-598293.68	-598271.42	-598278.03

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

TABLE A5.4. Random intercept multilevel linear model for EI_i. Macro determinants. 2013

	3	4	5	6
Unemployment rate	0.248***	0.197**	0.510***	0.460***
	(0.085)	(0.093)	(0.088)	(0.090)
GDP	-0.048***	-0.045***	-0.039***	-0.031*
	(0.006)	(0.012)	(0.012)	(0.016)
Social protection expenditure	-0.430***		-0.376***	
	(0.068)		(0.087)	
Personal tax revenue		-0.286***		-0.322***
		(0.093)		(0.114)
Constant	58.395***	52.133***	28.915***	23.785***
	(2.548)	(2.105)	(2.313)	(2.011)
Micro determinants	Yes	Yes	No	No
Variance in intercept	4.30	6.93	5.13	6.34
Variance residual	308.35	308.35	401.25	401.25
ICC	0.014	0.022	0.013	0.016
Observations	209494	209494	261753	261753
Country groups	29	29	29	29
Log likelihood	-598271.42	-598278.03	-750869.73	-750872.77

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

TABLE A5.5. Random intercept multilevel linear model for EI_i. Social protection functions. Year 2013

	7	8	9	10	11	12	13	14	15	16	17	18
Unemployment rate	0.232**	0.235**	0.314***	0.169*	0.201**	0.211**	0.251**	0.303***	0.386***	0.165	0.210**	0.181
	(0.102)	(0.100)	(0.098)	(0.088)	(0.089)	(0.102)	(0.115)	(0.093)	(0.112)	(0.115)	(0.101)	(0.114)
GDP	-0.061***	-0.054***	-0.052***	-0.052***	-0.056***	-0.062***	-0.067***	-0.062***	-0.047***	-0.055***	-0.063***	-0.062***
	(0.015)	(0.010)	(0.010)	(0.007)	(0.010)	(0.017)	(0.011)	(0.018)	(0.012)	(0.017)	(0.017)	(0.015)
Social protection functions												
Means tested	-0.314											
	(0.214)											
Non-means tested		-0.434***										
		(0.100)										
Cash benefits			-0.643***									
			(0.145)									
In-kind benefits				-0.641***								
				(0.160)								
Health care					-0.818***							
					(0.269)							
Disability						-0.428						
						(0.650)						
Old age							-0.799***					
							(0.211)					
Survivors								-1.266*				
								(0.733)				
Unemployment									-1.829***			
									(0.488)			
Family / children										-1.340*		
										(0.770)		
Housing											-1.200	
											(1.823)	
Social exclusion												-2.078
												(1.525)
Constant	50.864***	58.254***	58.128***	54.756***	55.094***	51.319***	58.018***	51.032***	49.309***	52.878***	50.928***	51.827***
	(2.385)	(3.015)	(2.800)	(2.363)	(2.544)	(2.629)	(3.060)	(2.693)	(2.309)	(3.020)	(2.529)	(2.722)
Micro determinants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Variance in intercept	7.94	5.06	4.73	6.04	6.74	8.33	4.83	7.70	6.65	7.83	8.31	8.02
Variance residual	308.35	308.35	308.35	308.35	308.35	308.35	308.35	308.35	308.35	308.35	308.35	308.35
ICC	0.025	0.016	0.015	0.019	0.021	0.026	0.015	0.024	0.021	0.025	0.026	0.025
Observations	209494	209494	209494	209494	209494	209494	209494	209494	209494	209494	209494	209494
Country groups	29	29	29	29	29	29	29	29	29	29	29	29
Log likelihood	-598279.9	-598273.5	-598272.4	-598276.2	-598277.7	-598280.5	-598272.6	-598279.4	-598277.4	-598279.6	-598280.5	-598279.9

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

TABLE A5.6. Random intercept multilevel logit model. Micro determinants.

	1	2	3	4
Male		-0.062***	-0.070***	-0.070***
		(0.020)	(0.021)	(0.021)
Age group				
< 16		-0.007	0.001	0.001
		(0.045)	(0.049)	(0.049)
16 - 30		0.291***	0.304***	0.304***
		(0.049)	(0.053)	(0.053)
46 - 65		-0.179***	-0.178***	-0.178***
		(0.044)	(0.049)	(0.049)
> 65		-1.032***	-1.039***	-1.039***
		(0.116)	(0.133)	(0.133)
Level of education				
Secondary		-0.468***	-0.472***	-0.472***
		(0.082)	(0.086)	(0.086)
Tertiary		-1.405***	-1.427***	-1.427***
		(0.109)	(0.112)	(0.112)
Bad health		0.472***	0.482***	0.482***
		(0.048)	(0.054)	(0.054)
Basic activity status				
Employed		-0.245***	-0.231***	-0.231***
		(0.058)	(0.063)	(0.063)
Unemployed		0.924***	0.939***	0.939***
		(0.091)	(0.105)	(0.105)
% unemployed in the household		0.015***	0.015***	0.015***
		(0.001)	(0.001)	(0.001)
Multigenerational household		-0.496***	-0.460***	-0.460***
		(0.088)	(0.100)	(0.100)
Young household		0.278***	0.282***	0.282***
		(0.067)	(0.071)	(0.071)
Homeownership		-0.903***	-0.947***	-0.947***
		(0.074)	(0.064)	(0.064)
Type of household				
One adult without children		-0.332**	-0.324**	-0.324**
		(0.132)	(0.135)	(0.135)
Two adults without children		-0.933***	-0.929***	-0.930***
		(0.104)	(0.108)	(0.108)
Other household without children		-0.887***	-0.878***	-0.878***
		(0.130)	(0.137)	(0.137)
Two adults with children		-0.579***	-0.549***	-0.549***
		(0.104)	(0.103)	(0.103)
Other household with children		-0.220*	-0.194*	-0.193*
		(0.116)	(0.117)	(0.117)
Constant	-2.517***	-0.777***	0.170	0.217
	(0.124)	(0.194)	(0.437)	(0.435)
Macro determinants	No	No	Yes	Yes
Observations	263976	219562	208977	208977
Country groups	29	29	29	29
Log likelihood	-83363.831	-64564.154	-59560.74	-59561.40

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

TABLE A5.7. Random intercept multilevel logit model. Macro determinants

	3	4	5	6
Unemployment rate	0.054***	0.043***	0.075***	0.066***
	(0.014)	(0.013)	(0.013)	(0.011)
GDP	-0.005	-0.004	-0.003	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Social protection expenditure	-0.048***		-0.036**	
	(0.018)		(0.017)	
Personal tax revenue		-0.046***		-0.040**
		(0.016)		(0.016)
Constant	0.217	-0.341	-2.179***	-2.561***
	(0.435)	(0.393)	(0.382)	(0.328)
Micro determinants	Yes	Yes	No	No
Observations	208977	208977	252700	252700
Country groups	29	29	29	29
Log likelihood	-59560.74	-59561.40	-77471.34	-77470.76

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

Chapter 6

Conclusions

In this dissertation, we have discussed the pros and cons of various ways to measure economic insecurity at the individual level and proposed the use of a sound multidimensional methodology that has many advantages for a comprehensive assessment of the phenomenon. We have also conducted a broad empirical study of economic insecurity in the European context using currently available and largely comparable living conditions survey data for all countries which has allowed us to analyse its level, trend and distribution as well as identifying the most insecure subpopulations in different social contexts. The present investigation aims to be a starting point in the study of economic insecurity in Europe, where previous comparative work was still very scarce. The purpose of this last section is essentially to gather the main general conclusions of our analysis while discussing possible future lines of research in this field as well as some public policy recommendations.

Our investigation is based on the conception of economic insecurity as the anxiety that people experience when anticipating forthcoming economic losses and the impossibility to avoid them. We strongly believe that insecurity is a multidimensional notion which cannot be fully captured through the analysis one single dimension separately. We have therefore adapted the insecurity indicators proposed from Rohde et al. (2015) to the European context and we have explored diverse weighting and aggregation methods in order to produce a composite indicator of economic insecurity for European countries. Drawing on our proposed index, we have studied insecurity from a wide comparative perspective discovering that the phenomenon seems correlated with the socioeconomic background of countries as well as the business cycle trend. In general, in all countries the most insecure subgroups of the population are the young, the less educated, the unemployed, those individuals with low-quality jobs and households with at least one dependent child. Even though poor individuals are also economically insecure –thus accumulating negative well-being dimensions–, we have found a significant proportion of insecure individuals in middle-income positions in some countries but not in others, revealing that economic insecurity cannot be fully identified with the lack of income in one period. In addition, we have demonstrated that tax and benefit policies can smooth the insecurity felt by the individuals by acting as a public safety net.

Focussing on Chapters 2 and 3, we have conducted a systematic review of current existing measures of economic insecurity and we have explored diverse methods to compute it. Despite the fact that academics still do not agree in a single definition of this

phenomenon, it seems clear that economic insecurity only involves downside economic hazards, which implies that we should ignore possible future financial gains unlike when aiming to measure volatility. Furthermore, these potential economic losses cause a deterioration in people's expectations which in turn generate current anxiety or stress lowering present individual well-being. That is, economic insecurity refers to the exposure to several financial hazards and its psychological translation into subjective expectations. These two key elements make the measurement of economic insecurity a complex challenge.

There are several proposals in the literature on how to best measure economic insecurity so far. Surveys on subjective expectations of individuals seem to be the best tool to compute insecurity. However, the production of these surveys is not widespread, and the existing ones have a limited scope that does not allow researchers to calculate the dimension of the phenomenon in a regular basis nor in a broad range of countries. Aggregate indicators such as Osberg and Sharpe's index on economic security (2005, 2014) or the prevalence of large income losses from Hacker et al. (2008) stand out for their simplicity and are easy to implement, but do not allow for the analysis of subgroups or covariates as they are computed using aggregated data. Moreover, these measures are based on retrospective information, assuming that past exposure to objective risk is, on average, a good approximation to future economic hazards and subjective expectations, which may be an overly restrictive premise. In turn, existing individual indices enable researchers to study the level of vulnerability of different subgroups to economic insecurity and its main determinants, but most of them build on a single variable. In that case, the selection of different variables can drive results to be largely inconsistent in time. We believe that a reasonable alternative is to use multidimensional measures of economic insecurity.

As we have already mentioned, we stand for the multidimensional nature of economic insecurity. Therefore, our preferred option has been to calculate economic insecurity by using a composite indicator including subjective expectations on future financial distress and objective exposure to certain economic dangers making use of widespread living conditions surveys. Two main questions arise: how to weigh and aggregate dimensions and which are the most appropriate indicators to proxy economic insecurity. The second chapter has addressed the first question and has explored diverse procedures to calculate a synthetic index of insecurity based on the dimensions' proposal by Rohde et al. (2015).

Specifically, we have compared the use of a simple mean of dimensions as an example of a normative method, a standard PCA and a corrected polyserial PCA as an aggregation procedure with statistical weights and a counting approach based on the Alkire and Foster (2011) method that involves data-driven weights and normative thresholds.

We have found that results for insecurity trends in Spain are consistent despite the aggregation and weighting procedure used, even if insecurity levels differ substantially depending on the method chosen. In general, young individuals without tertiary education, unemployed or working in low-level occupations, single parents and tenants are the most insecure. Nonetheless, we have discovered some differences between methods when analysing the relative importance of sociodemographic characteristics by computing the ratio of economic insecurity in a subgroup and in the total population. The counting approach method seems to capture more insecurity in the middle class compared to other weighting and aggregation strategies which mainly stress the existence of insecurity in extreme situations. Even though all the analysed methods present advantages and drawbacks, we have concluded that the counting approach is the most adequate method to measure economic insecurity, mainly due to its clear and direct economic interpretation: the percentage of insecurity dimensions in which the individual does not have security. Also, this procedure enables us to incorporate the social context and modulate the insecurity concept between an absolute and relative perspective (frequency vs. inverse frequency weights, respectively). In addition, this method allows for the calculation of aggregate indicators in a second stage, combining the incidence and intensity of economic insecurity in a single indicator which can also be decomposed by dimensions or subpopulations.

In the third chapter of this thesis, we have further investigated how to select relevant dimensions that capture diverse aspects of economic insecurity. We have adapted the proposal on dimensions by Rohde et al. (2015) for the Australian case to the information available in EU-SILC, incorporating new dimensions as well as a household perspective with the individual as the unit of analysis. In order to capture the translation of forthcoming economic losses to idiosyncratic expectations, we have considered three subjective indicators: the household's incapacity to face unexpected expenses without asking for financial help, become indebted or worsening potential debts; financial dissatisfaction, approximated as the difference between needed annual income to make ends meet and current disposable income –which captures the lack of ability in affording

basic expenses–; and changes in the ability to spend a week away from home which reflects a perception of future financial stress –households will save the holiday expense to cope with this negative expectation. On other hand, we have also tried to approximate the objective exposure to economic hazards by large income losses; unemployment risk –as the probability of losing the job or remain unemployed– imputing the mean probability of the household to inactive members; and a probability of extreme expenditure distress reflecting diverse overdue payments. Economic insecurity therefore is considered as a latent variable: while the previous dimensions reveal diverse facets of insecurity, none of them fully captures this notion separately. We hope that the joint distribution of the aforementioned variables reflects the vast majority of the phenomenon.

Thus, taking advantage of the benefits of the counting approach method, we have calculated a composite index of economic insecurity by establishing diverse thresholds for each dimension as well as a multidimensional threshold following and intermediate approach and with inverse frequency weights. We have also conducted an empirical illustration in three European countries: France, Spain and Sweden. In line with the literature, we have found that Spain is the most insecure country with a clear correlation of economic insecurity with the economic cycle, while Sweden has the highest level of security with a steady pattern in time. Although economic insecurity is related to the socioeconomic status of the country it can only be considered as a low-income phenomenon in Sweden, while Spain and to a lesser extent France have a significant proportion of middle-class individuals suffering from insecurity. We have also encountered that each dimension contributes differently to economic insecurity in each income decile: the incapacity to face unexpected expenses and unemployment risk show a similar contribution across the income distribution while financial dissatisfaction and the probability of extreme expenditure distress mainly drive insecurity in the lowest deciles. As expected, changes in the ability to go on a holiday contribute more for insecurity of middle-income individuals. Furthermore, probit estimations confirm the covariates of economic insecurity discovered in the second chapter, however the correlations are significantly larger for those positioned below the fourth income decile.

The fourth chapter has aimed to contribute to the empirical analysis of economic insecurity by computing the proposed index for 27 European countries, benefiting from the wide harmonised scope of the EU-SILC database. We have clustered these countries into five welfare state regimes: corporatist, liberal, Mediterranean, social-democratic and

Eastern European which try to represent diverse institutional settings. Therefore, we have contributed to the comparative assessment of economic insecurity in Europe, where this kind of analysis was still very narrow. In line with Osberg and Sharpe (2005), we have found that Mediterranean and Eastern European regions show the largest levels of insecurity and we find that it is negatively correlated with the economic growth, while social-democratic regimes are the most secure and show a stable pattern in time. Thus, these results suggest that economic insecurity is somewhat related to the socioeconomic status of the regions, being a structural problem and less subject to changes in economic activity in social-democratic countries. When analysing the distribution of insecurity by income decile, we find a significant share of insecure individuals in middle-class positions confirming that economic insecurity is different from poverty. Nonetheless, these insecure middle-income individuals are only significantly relevant in Mediterranean and Eastern European countries. Moreover, in all regions the same subpopulations contribute more to overall insecurity: young individuals, those without primary education, the unemployed and households with dependent children.

We have also found that the contribution of each dimension to regional insecurity is different by welfare state regime. Objective dimensions are more relevant in Eastern European countries, whereas in the rest of the regions the relevance of subjective indicators is remarkably similar to the objective ones. Large short-term income falls are more relevant to liberal regimes in contrast to the probability of unemployment. That is, it seems that active employment policies in this region contribute to mitigate economic insecurity, whereas means-tested benefits are not successful in covering transitory income losses. Additionally, we have discovered that the contribution of dimensions also differs by income group: the inability to face unexpected expenses has a more structural nature while financial dissatisfaction seems a more transitory distress affecting significantly more individuals living in low-income households. Large income drops contribute more to insecurity of low-income people, although differences between low and middle classes are smaller in Eastern European and Mediterranean countries, probably due to the role of non-means tested benefits and contributory pensions.

In the fifth chapter we have furtherly investigated the impact of welfare systems on economic insecurity. Using multilevel regressions, we have tested if tax and benefit policies are acting as a sort of public insurance against economic distress and help to reduce economic insecurity. Furthermore, we have analysed if macroeconomic variables

are correlated with insecurity levels of the countries after we consider individual's sociodemographic characteristics. Results regarding microeconomic covariates are consistent with those obtained in previous chapters: youth, low-educated individuals and those currently unemployed display the highest levels of insecurity. We have found that people with bad self-assessed health and those who are not homeowners are also related with larger economic insecurity, probably due to negative expectations linked to an increase in medical or housing expenditures. Moreover, the household structure has revealed as a major determinant of insecurity: those households with at least one dependent child and those with all members are below 40 suffer more from insecurity, whereas multigenerational households alleviate this phenomenon. Although individual characteristics explain most of economic insecurity variance, the effect of country-specific factors is non-negligible: countries with higher GDP per capita and lower unemployment rates have less insecurity, which is consistent with our previous result that this phenomenon is related with the socioeconomic status of the countries.

Focussing more specifically on the insurance role of tax-benefit systems, we have discovered that a more generous social protection expenditure as well as a larger personal revenue tax are related to less economic insecurity. When analysing diverse social protection policies, we have found that both means- and non-means tested benefits help mitigating this phenomenon. Furthermore, there is a significant negative impact of those policies targeted to specific economic hazards –health expenditure, old-age pensions, unemployment benefits and social exclusion–, while other benefits like housing or family policies do not reduce insecurity due to its limited scope. Finally, we have found that social protection expenditure has an additional negative impact for households with dependent children beyond its effect on the general population.

As outlined above, the main purpose of this doctoral dissertation is to stimulate further research of economic insecurity in the European context, both from a methodological perspective as well as an empirical approach. Even though we have considered the counting approach method as the best aggregation strategy, it also has some disadvantages –ignores inequality and assumes that dimensions are perfect substitutes for insecure people– that could be improved. Researchers should also work on enhancing the measurement of expectations and idiosyncratic risk. Furthermore, widespread surveys on subjective expectations and longer panel data series should be developed in order to obtain better measures of economic insecurity which do not rely on retrospective data,

and some questions about expectations could be introduced in living conditions surveys to improve subjective indicators and separate voluntary decreases in income or wealth from unintentional losses. Also, we need to deepen in the analysis of the consequences of economic insecurity, from both the individual level from a macroeconomic perspective. On other hand, policy makers should become aware of economic insecurity and the threat it poses to quality of life and economic development. Therefore, they should include specific monitoring and evaluation of this phenomenon as well as quantify the effect that public policies could have on individual insecurity.

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