Hacienda Pública Española/Review of Public Economics

Manuscript 2269

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

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Abstract: This paper aims to understand if differences in European countries' tax-benefit systems impact on individual levels of economic insecurity beyond their socioeconomic and demographic characteristics, with an additional focus on a key vulnerable group: households with children. We consider 29 European countries and use multilevel modelling techniques to consider the simultaneous role of micro and macro determinants on a multidimensional index of economic insecurity. Our results show that larger welfare systems and generous general social risk policies for unemployment, bad health and social exclusion are correlated with lower economic insecurity levels, also in the case of households with children who may receive other transfers specifically targeted to them.

Keywords: economic insecurity, tax-benefit systems, households with children, multilevel modelling. JEL Codes: D63, I39

1. Introduction

In the last decade, economic insecurity has revealed itself as one of the main threats to individual's well-being (Stiglitz, Sen & Fitoussi, 2009). This phenomenon, understood as the uncertainty about future economic hazards and the impossibility to recover from them (D'Ambrosio & Rohde, 2014; Hacker et al., 2014; Osberg, 1998; Osberg & Sharpe, 2005; Rohde & Tang, 2018), is likely to have increased as a consequence of the Great Recession and the COVID-19 crisis (Clyne and Smith, 2021). The rise in inequality and poverty in several European countries since 2008, and now even more strongly since the COVID-19 pandemic, has worsened individuals' expectations about their financial situation in the near future.

Economic insecurity may have a relevant impact in the short term, promoting a reduction in household consumption and in investment levels, which may lead to negative macroeconomic effects that will deepen recessions (Lepinteur and Yin, 2022). However, economic insecurity will also have a key effect in the medium term, and most strongly if it strikes hard on households with dependent children, affecting adult decisions regarding the labour market, education, or fertility (Smith, Stoddard & Barnes, 2009; Modena et al., 2014). Thus, present economic insecurity might cause a strong 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 or may decide to reduce fertility altogether (Clark and Lepinteur, 2022).

It is well known that one of the key functions of modern welfare states in Europe is that of serving as 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 play a crucial role in shaping the income

distribution of a country and thus its level of inequality, poverty or even intra and intergenerational mobility by smoothing the impact of economic cycles (Gottschalk & Joyce, 1998; Esping-Andersen & Myles, 2011; Van Kerm & 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). However, to the best of our knowledge, there are no recent contributions that undertake a large comparative analysis on the relationship between economic insecurity levels and the tax-benefit system.

The contribution of this paper to the literature is twofold. First, it provides a large and up-to-date comparative analysis of the relationship between developed countries' welfare states and economic insecurity levels in Europe. We explore the effect of countries' social protection system focussing on 2014 and 2018, so that we can also check that country differences are robust to the economic cycle. In general, we would expect that in countries with a larger state intervention, automatic stabilizers related to government expenditures and tax revenues will imply that individual insecurity levels are generally lower than in countries where government expenditures and tax revenues are smaller. To determine the general factors that may promote economic insecurity, we explore the effect of micro and macro variables making use of multilevel modelling techniques. In doing so we use an innovative approach to the measurement of economic insecurity proposed in Romaguera-de-la-Cruz (2020), which follows Rohde et al.'s (2015) proposal on insecurity dimensions. This method considers insecurity as a latent variable referred to future states of the world with an important psychological component. Therefore, it incorporates both subjective and objective indicators in which insecurity reveals itself. Secondly, given that tax-benefit systems treat individuals heterogeneously, by focusing on a key vulnerable group −households with children− we also provide evidence about how the welfare system may

affect well-being in the long-term. The presence of dependent children imposes higher expenditures in basic needs in the household which may exacerbate economic distress. Therefore, current economic insecurity can have a negative impact on children's development if parents expect a future financial hardship and reduce investment in children's needs and education leading to a lower well-being in their adult life.

We find that being young, low educated and unemployed has a positive correlation with economic insecurity, while homeownership and being in a multigenerational household has a negative one. At a macro level, a higher country's social protection expenditure as a percentage of GDP as well as a larger direct tax revenue are negatively related to economic insecurity, meaning that a more generous welfare state helps mitigate uncertainty about future economic losses, also for households with children. For the latter a more generous expenditure on these reduces economic insecurity proportionally more than for the rest. When looking at the impact of social protection functions separately, we find a significant negative relationship between economic insecurity and health expenditure, old age pensions, unemployment benefits and social exclusion benefits.

This paper 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 main conclusions and enunciates some policy recommendations.

2. Background

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 large well-being disparities. 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 an individual long-run redistribution, so that incomes are smoothed over a person's life cycle by paying more taxes in periods of abundance and receiving benefits if an economic shock occurs (Bartels, 2012; Bartels & Neumann, 2018; Björklund & Palme, 2002; Haan et al., 2018).

The literature on optimal taxation has acknowledged this insurance component of progressive taxes and benefits beyond its redistributive effect. Income at a given point in time has a large exogenous random component (Varian, 1980). Individuals will turn to private insurance markets to avoid uncertainty, but these markets may be incomplete 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 the event of an economic downturn. In the case that individuals do not have enough wealth to purchase private coverage or when markets are incomplete, government policies can be a relevant instrument to reduce unpredictable income dispersion providing security against individual risk (Buchanan & Tullock, 1962; Eaton & 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 to unlucky individuals (Floden, 2001; Sinn, 1995). Nevertheless, even if public insurance may be a useful tool by collectivizing risk,

we must not forget the trade-off between distortionary effects via reduced incentives and 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 benefits, especially in the short-term. In addition, there is evidence of an insurance component against divorce risk of some US family policies (Gruber, 2000). Grant et al. (2010) find that a more redistributive tax system diminishes consumption variance providing social insurance to households. When studying the role of public transfers, Floden (2001) shows that a more generous transfer system implies a larger insurance effect in a country with higher risk (US) rather than in a low-exposed one (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 & Neumann, 2018; Björklund & Palme, 2002; Haan et al., 2018). Public insurance is here not understood as a mechanism to reduce income dispersion at a given period, but as an instrument to allow for smoothing

individual resources generated in different periods of time. 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 & 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 the rich to the poor in exchange of income smoothing (Bartels & Neumann, 2018).

In this context, Björklund & 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 systems encourage intra-personal redistribution (Bartels & Neumann, 2018).

As far as we know, there is no previous work that empirically evaluates the impact of tax-benefit policies on economic insecurity. In this paper, 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 a progressive taxation and benefit transfers 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.*

2.2 Determinants of individual economic insecurity

2.2.1 Individual sociodemographic characteristics

Comparative analysis of economic insecurity is still scarce and most importantly does not provide us with a list of possible causes of the observed country differences (D'Ambrosio & Rohde, 2014; Nichols & Rehm, 2014; Osberg & Sharpe, 2005, 2014; Cantó et al., 2020). We aim to check if economic insecurity levels can be better explained by differences in individual characteristics or by differences in institutional factors.

Economic insecurity is a phenomenon rather distinct to material deprivation or poverty –while the latter are static and referred to the moment they are experienced, insecurity incorporates dynamics as the anticipation of economic risks (Ranci et al., 2021; Rohde & Tang, 2018; Osberg, 2018). Rohde et al. (2015) have explored some of the micro determinants of economic insecurity in Australia, concluding that the determinants of insecurity are similar to those of other low well-being phenomena: in general, insecurity decreases with age and with higher levels of educational attainment and is lower for the full-time employed, particularly those working in the industrial sector. Married individuals and those with good health conditions also suffer significantly less from insecurity. As could be expected, low household disposable income is associated with high economic insecurity levels.

Using an individual multidimensional mixed approach to the measurement of economic insecurity, Romaguera-de-la-Cruz (2020) investigated the correlation between several sociodemographic characteristics and economic insecurity in three European countries

with different welfare systems: France, Spain and Sweden. She found that economic insecurity decreases as household disposable income grows. 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 is suffered mostly by the poor. 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.

2.2.2 Country-specific characteristics

Regarding macroeconomic determinants, we are not aware of any previous work exploring the correlation between country-specific factors and economic insecurity levels. Nevertheless, it has been shown that for other well-being indicators 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 a decline in disposable income 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 per capita 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 & 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).

Regarding economic insecurity, Rohde et al. (2015) found that in Australia it is correlated with economic growth, as well as with the evolution of the unemployment rate. Before the Great Recession, insecurity there followed a downward trend, increasing very slightly since then. Regarding these results we expect macroeconomic conditions and social protection expenditure to have 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, we will analyse if this negative association depends on the type of social protection function. We are especially interested in exploring the impact of means-tested vs. non-means tested benefits on economic insecurity. Korpi & Palme (1998) note that countries with larger welfare states based on non-means tested benefits help more to mitigate poverty and inequality while other authors have shown that means-tested benefits are more effective in redistributing incomes (Kenworthy, 2011). As Figari et al. (2011) note, even though non-means tested benefits reduce poverty and deprivation relatively more in absolute terms, means-tested benefits are a better option in relative terms because they also reduce low well-being at a lower cost.

Social protection expenditure targeted to children has been proven to effectively reduce child poverty and deprivation (Bárcena-Martín et al., 2017, 2018; Chzhen & Bradshaw, 2012) but we still 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 child, especially through benefits (cash or in-kind) aimed at children.*

3. Methodology

3.1 Economic insecurity measure

Following Romaguera-de-la-Cruz (2020) we consider economic insecurity as a multidimensional phenomenon that can be 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.[1] 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 individual must experience a fall of 25% or more 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 insecurity dimensions, we use a counting approach to construct a composite index of economic insecurity (Alkire & Foster, 2011; Bucks, 2011). As we are

[1] For further information about the definition and computation of subjective and objective insecurity dimensions, see Romaguera-de-la-Cruz (2020).

only interested in individual economic insecurity and its intensity, in this paper 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.

Once dimensional thresholds are applied, we define 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, and D is the total number of dimensions ($D = 6$). This index therefore enables us to consider the intensity of economic insecurity for every individual. 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). Thus, EI_i gives more importance to indicators that measure an aspect of economic insecurity which is less frequent in a reference population and adapts to national distributions of dimensions.[2]

We replicate this methodology for 29 European countries and 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 into a percentage of insecurity dimensions[3] in which the individual lacks security (if $EI_i^N = 0$, a person does not lack

[2] 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 & Shah, 1988).

[3] We normalize our economic insecurity index so that: $EI_i^N = \frac{\sum_{j=1}^{D} w_j X_{ij}}{D} \cdot 100$

security in any of the dimensions considered; conversely, if $EI_i^N = 100$, an individual lacks security in all insecurity indicators). We observe a significant variation in EI_i^N across countries in 2014 and 2018 (Figure 1), with a minimum of 9% of weighted insecurity dimensions in Sweden in 2018 and a maximum of 32% in Croatia in 2014. In general, Eastern and Southern European countries display the largest individual economic insecurity at both moments in time, while the lowest EI_i^N can be found in Nordic countries. On average, the intensity of individual economic insecurity is around 21.5% in 2014 and 17.4% in 2018.

< place Figure 1 around here >

3.2 Data and explanatory variables

We make use of longitudinal data from EU-SILC which is a standardized survey that provides consistent data about income, demographic and socioeconomic information at a household and individual level, thus allowing for sound comparisons in the European context. To deal with attrition bias, the longitudinal EU-SILC database is designed as a four-year rotational panel, with a few exceptions. For the construction of the individual measure of economic insecurity (EI_i^N), we use all waves of EU-SILC containing information from 2008 to 2019 and, subsequently, we use the 2014 and 2018 results to analyse the impact of tax-benefit systems on insecurity.[4] Most institutional and contextual variables are drawn from Eurostat statistics except for direct income tax revenue which is obtained from the European Commission database.

[4] We pool all waves from longitudinal EU-SILC dataset from 2008 to 2019 and discard duplicated observations and individuals over 65 years of age living alone. 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. We analyse those present in 2014 and 2018.

We trim the data eliminating the 1% tails of this income distribution (Cowell & 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 from 29 countries includes 257,191 individual observations in 2014 and 256,386 individual observations in 2018. We use the individual as the unit of analysis and all our results are estimated using sample weights.

In line with the literature, we have chosen different demographic and socioeconomic characteristics to assess the correlation of individual variables (level 1) with 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 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.

To assess the impact of the tax-benefit system, we include diverse measures as *social protection* expenditure and *direct 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 & 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 in 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. We distinguish between *means* vs. *non-means tested* benefits, *cash* vs. *in-kind* protection expenditure and several social protection functions.

< place Table 1 around here >

We also include the *unemployment rate* to control for the business-cycle and *GDP per capita* as a percentage of EU-27 average to account for average country per capita production.[5]

3.3 Econometric model

In this paper we want to check 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 in general and for households with children. 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 estimation method is multilevel analysis (Goldstein, 2003; Rabe-Hesketh & Skrondal, 2012; Snijders & Bosker, 1999) because, given the 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. Separate country regressions do not allow for the consideration of country-level explanatory variables. Furthermore, the inclusion of country fixed effects does not allow to estimate the impact of second-level variables since these

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

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 & Jenkins, 2016).[6]

We first adopt a random intercept model in which the intercept can 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}^N 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:

$$EI_{ic}^N = \beta_0 + u_{0c} + e_{0ic} \quad (1)$$

where u_{0c} is the random intercept that gathers the difference between the average insecurity in country c and the overall mean, while e_{0ic} are the individual-level residuals which are assumed to be independent.[7] Total variance is divided into two components: the variance of economic insecurity between countries (σ_{u0}^2) and that between individuals within countries (σ_e^2). Thus, the correlation of errors between two individuals or *intraclass correlation coefficient* (ICC) is defined as followed:

$$ICC = \frac{\sigma_{u0}^2}{\sigma_{u0}^2 + \sigma_{e0}^2} \quad (2)$$

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

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 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:

$$EI_{ic}^{N} = \beta_0 + \beta_1 X_{ic} + u_{0c} + e_{0ic} \quad (3)$$

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:

$$EI_{ic}^{N} = \beta_0 + \beta_2 Z_c + u_{0c} + e_{0ic} \quad (4)$$

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

$$EI_{ic}^{N} = \beta_0 + \beta_1 X_{ic} + \beta_2 Z_c + u_{0c} + e_{0ic} \quad (5)$$

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 & 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.[8] Thus, we now relax the assumption that the slope is the same for all countries and include heteroskedasticity in the error term (Snijders & Bosker, 1999):

$$EI_{ic}^{N} = \beta_0 + \beta_1 X_{ic} + \beta_2 Z_c + u_{0c} + u_{1c} x_{ic} + e_{0ic} \quad (6)$$

4. Results

4.1 Social protection and economic insecurity in the EU

Results of multilevel estimations with random intercept are displayed in Tables 2a (2014) and 2b (2018). According to the ICC of the null model (Model 1), 6.2% and 4.8% of the variation in economic insecurity in 2014 and 2018, respectively, is due to disparities between countries while most differences come from the individual level. However, when adding first-level variables, there is little or no reduction in this percentage, suggesting that there exists some compositional effect and that individual characteristics are not homogeneously distributed across countries.

Subsequently, we first estimate the impact of individual sociodemographic characteristics on EI_{ic}^{N} without contextual factors and then add institutional variables that control for countries' economic cycle (unemployment rate) and relative GDP per capita as a percentage of EU-27 as well as two proxies for the welfare state: social protection expenditure and direct tax revenue.

Our results are in line with previous evidence and very similar whatever the specification considered. Young individuals (those between 16 and 30) experience a higher economic insecurity than those at later stages in life. Being an individual above 65 is associated with a lower percentage of insecurity dimensions by more than 7.1 percentage points (p.p.) in 2014 and 5.4 p.p. in 2018, probably due to a lower need of income as well

[8] Estimates for micro determinants of 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 & Schaeffer, 2019).

as access to life-time savings and public or private pensions. Educational attainment shows a negative and significant correlation with insecurity, meaning that individuals with a level of education above primary school have a lower economic insecurity and particularly those who reached tertiary education (around 14 p.p. in 2014 and 12 p.p. in 2018). On the other hand, bad self-assessed health has a positive and significant association with 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 is clearly positive correlated with economic insecurity as opposed to being employed, as labour income is the major source of income in the European context. Also, homeownership displays a large negative association with economic insecurity (around 12 p.p. in both periods of analysis) as individuals avoid the uncertainty that fluctuating rental expenses may produce.

< place Table 2a and 2b around here >

Regarding households' characteristics, the 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 levels are lower, whereas being present in a young household (all members below 40) has a positive correlation with the phenomenon. All types of households show a negative and significant association with insecurity with respect to single-adult households with one dependent child. Nevertheless, this correlation is larger for households where no child 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.

< place Table 3a and 3b around here >

When adding country-specific variables (Tables 3a and 3b), the percentage of insecurity variation due to cross-country differences shows a reduction above 75% (the ICC falls to 2% to 1.1% depending on the specification), showing the relevance of institutional factors in explaining economic insecurity. The unemployment rate, a proxy of the business cycle, has a positive and significant correlation with economic insecurity (Models 5 and 6), although this correlation is smaller 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 a lower percentage of insecurity dimensions, capturing both the role of living standards and institutional factors on economic insecurity.

Regarding the welfare state, we conclude that countries with more generous social protection systems and larger direct tax revenue have lower economic insecurity levels. Our estimates are rather large: a 10 percent increase in social protection expenditure (in % of GDP) is associated with lower levels of economic insecurity in EU by 4.6 p.p. in 2014 and 2.6 p.p. in 2018 (including microeconomic determinants), while a similar increase in direct tax revenue shows a negative coefficient of 3.6 p.p. in 2014 and 2.4 p.p. in 2018 approximately. 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. Furthermore, as expected given tax-benefit system automatic stabilizers role, the inverse relationship between the welfare state and economic insecurity levels is stronger in periods of economic recession such as 2014, even if the association is also significant, but smaller, for a recovery period such as 2018. Thus, results suggest that social protection expenditure influences more economic insecurity in times of hardship than in periods of growth.

To achieve a deeper understanding of the relationship between tax-benefit systems and economic insecurity, 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 (Tables 4a and 4b). We find that countries with a higher percentage of means-tested benefits with respect to GDP have lower individual economic insecurity (around -0.43 p.p. in 2014 and -0.27 p.p. in 2018: Model 7). The coefficient of non-means tested benefits generosity is also negative and significant (Model 8). Moreover, both cash and in-kind benefits show a significant and large coefficient (Models 9 and 10). These results highlight the fact that cross-country differences in social protection expenditure are significantly associated with economic insecurity levels regardless of the policy we analyse. In fact, those European countries with a higher degree of individual economic insecurity tend to spend less on both means- and non-means tested benefits as a percentage of GDP, as well as cash and in-kind policies. Regarding social protection functions, we find that health care, old age benefits, unemployment benefits and those aimed to mitigate social exclusion are associated with lower insecurity levels, whereas differences between countries in disability or survivors' benefits, housing policies and family/children benefits cannot be linked with this phenomenon.

In this sense, social protection functions which are targeted to certain risks where economic insecurity may reveal itself seem to be more effective in decreasing the negative effects of this phenomenon, rather than providing benefits for certain vulnerable groups. Thus, public expenditure in health reduces the uncertainty that sickness may bring to individuals, so that the more effective the public health care system is, the lower income drops will be. The negative correlation between insecurity and 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, the potential income losses and the

economic distresses these events may cause are smoothed by the knowledge that the welfare system will make financial strain more tolerable. Moreover, 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 (Romaguera-de-la-Cruz, 2020; Cantó et al., 2020, 2021). Thus, the generosity of social exclusion benefits seems to increase security for those situated in the lower part of the income distribution, who suffer from several negative well-being phenomena at the same time.

In contrast, policies specifically targeted to vulnerable groups of the population rather than to economic hazards do not display a significant correlation with insecurity levels: 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 to provide a good welfare system is extending universal social insurance policies which allow people to obtain security against risks, rather than only aiming to redistribute incomes from richer to poorer individuals (Kenworthy, 2011).

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 than the rest. Previous evidence has confirmed that suffering from financial difficulties during childhood can affect the development of children, who might have lower well-being in the future (Morrissey and Kinderman, 2020). 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.

Tables 5a and 5b display the impact of cross-level interactions between welfare variables and living in a household where dependent children are present. Countries with bigger social protection generosity or larger direct tax revenue protect more households with children than the rest, so the correlation of policies on these households' insecurity levels seems to go beyond the global one estimated for the tax-benefit system on all the population.

Nevertheless, the overall coefficient of means-tested benefits becomes non-significant while the cross-level interaction with households with children shows a negative and significant correlation with insecurity levels. Thus, it seems that the mitigating effect of this kind of expenditure on insecurity performs mainly through households with children. In fact, country differences in insecurity can also be explained by non-means tested generosity, which decreases insecurity even more for our group of interest in 2014, as well as cash and in-kind benefits. For 2018, we only find a differential and larger correlation with insecurity levels of households with children in the case of in-kind benefits, while the overall association between a higher expenditure in non-means tested and cash benefits is maintained.

< place Table 4a and 4b and 5a and 5b around here >

5. Concluding remarks

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

specific factors. We have 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.

Using an insecurity measure that includes both subjective and objective dimensions, combining past experiences with probabilities of future events, we have conducted a series of multilevel regressions to disentangle the association of individual variables as well as institutional factors with our individual economic insecurity index. When analysing the effect of individuals' sociodemographic factors on our measure of economic insecurity, we find 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 is associated with higher insecurity due to possible economic losses related with sickness and medical costs associated. Especially relevant is the negative correlation of homeownership, which stresses the necessity of wider housing policies that help individuals mitigating the uncertainty and negative expectations associated with renting. Households with dependent children and those with all members below 40 years of age suffer from higher levels of economic insecurity in all countries, differently from multigenerational households that benefit from life-time savings of their oldest members. As expected, the percentage of unemployed individuals in the household is positively correlated with the insecurity index.

Even though individual characteristics account for most of economic insecurity, we find that the inclusion of country-specific factors also contributes to explain the phenomenon, thus confirming our second research hypothesis. Countries with larger unemployment rates

and smaller GDP per capita display higher levels of individual economic insecurity. Furthermore, differences in economic insecurity levels across countries can be explained by a more generous welfare system, as we find a negative and significant correlation of social protection expenditure and direct tax revenues with insecurity levels. 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 find that larger expenditure on both means and non-means tested benefits (cash and in-kind) are associated with lower economic insecurity levels. 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 correlation with 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 subgroups of the population.

Moreover, we have analysed if more generous welfare systems help households with at least one dependent child more in mitigating economic insecurity. We see that countries with higher social protection spending and higher direct tax revenues have lower levels of insecurity for households with dependent children than for the rest of the country's population. Nevertheless, our third research hypothesis is only partially confirmed: only some tax-benefit policies mitigate economic insecurity significantly more for households with children. These are not those especially targeted to this group such as family cash

benefits, probably because of their relatively small budget size compared to larger programs.

To the best of our knowledge, this is the first paper to investigate the relationship between tax and benefit systems and economic insecurity levels in a wide number of European countries. However, our study has several limitations which we hope to improve in future research. To begin with, the present analysis only uses a single economic insecurity measure as dependent variable. It is important to remember that there is still no agreed definition of this phenomenon and that there are several proposals for its measurement in the literature. Testing the robustness of our results to diverse economic insecurity measures will be key to finally conclude that more generous welfare systems help to mitigate individuals' anxiety about future economic hardship by providing insurance against risks. Moreover, we must underline the problems associated with the hierarchical structure of the data and be aware that multilevel estimations are computationally demanding. Future research in this area should better identify the drivers of economic insecurity and the transmission channels between tax and benefit policies and this phenomenon. Furthermore, while exploring the cross-country variation, our estimates focus on the European Union as a whole and do not allow for an in-deep understanding of the causes and consequences of economic insecurity in each region. Further analysis is required to disentangle the differences between high and low insecurity countries searching for the channels through which the tax-benefit system impacts on insecurity.

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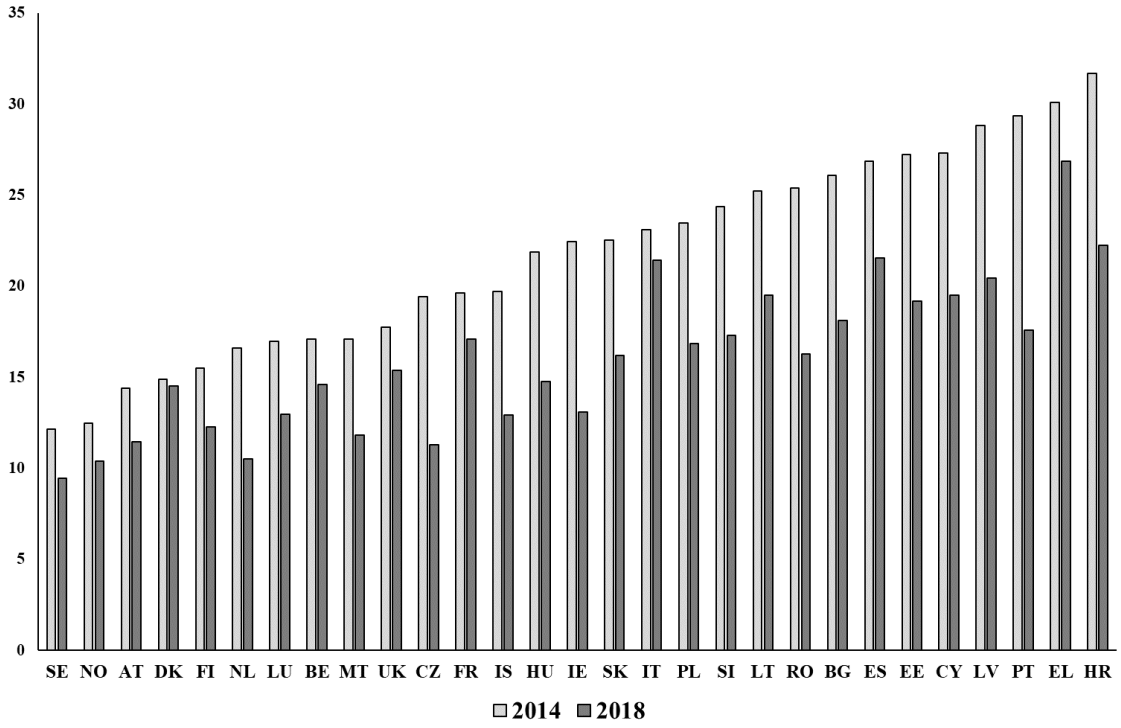
Tables and Figures

FIGURE 1. Individual economic insecurity (EI_i) by country. 2014 and 2018



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

TABLE 1. Average values of economic insecurity determinants. 2014 - 2018

	2014	2015	2016	2017	2018
Micro-determinants					
Male	0.497	0.496	0.495	0.495	0.498
Age groups					
< 16	0.191	0.190	0.192	0.196	0.197
16 - 30	0.187	0.186	0.183	0.180	0.173
31 - 45	0.247	0.243	0.238	0.237	0.242
46 - 65	0.322	0.326	0.329	0.331	0.335
> 65	0.053	0.056	0.058	0.056	0.053
Level of education					
Primary or less	0.079	0.079	0.076	0.071	0.065
Secondary	0.609	0.602	0.604	0.593	0.576
Tertiary	0.313	0.319	0.320	0.337	0.359
Bad health	0.066	0.067	0.065	0.060	0.056
Basic activity status					
Employed	0.470	0.472	0.473	0.485	0.504
Unemployed	0.040	0.039	0.037	0.031	0.027
Inactive	0.490	0.489	0.491	0.484	0.469
% unemployed in household	6.293	5.963	5.741	4.699	4.066
Multigenerational household	0.010	0.011	0.012	0.012	0.011
Young household	0.198	0.196	0.189	0.188	0.188
Homeowner	0.742	0.741	0.743	0.735	0.725
Type of household					
One adult without children	0.070	0.072	0.073	0.075	0.077
Two adults without children	0.182	0.182	0.179	0.179	0.178
Other household without children	0.228	0.229	0.229	0.221	0.214
One adult with children	0.032	0.031	0.031	0.033	0.035
Two adults with children	0.332	0.329	0.328	0.332	0.344
Other household with children	0.157	0.157	0.161	0.159	0.152
Macro-determinants					
Unemployment rate	10.255	9.459	8.507	7.448	6.455
GDP	102.476	103.541	102.703	103.135	103.662
Social protection expenditure	22.948	22.607	22.479	22.097	21.921
Direct tax revenue	11.775	11.597	12.179	11.792	11.820
Social protection functions					
Means-tested	2.269	2.179	2.141	2.093	2.045
Non-means tested	20.679	20.421	20.328	20.000	19.879
Cash benefits	15.303	15.017	14.835	14.562	14.376
In-kind benefits	7.631	7.586	7.638	7.531	7.541
Health care	6.238	6.186	6.214	6.148	6.176
Disability	2.028	1.976	1.935	1.886	1.852
Old age	9.559	9.483	9.403	9.293	9.245
Survivors	1.197	1.159	1.124	1.090	1.069
Unemployment	1.148	1.055	1.000	0.897	0.848
Family / children	1.983	1.962	1.979	1.962	1.976
Housing	0.266	0.255	0.269	0.252	0.252
Social exclusion	0.517	0.521	0.569	0.535	0.507

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

TABLE 2a. Random intercept multilevel linear model for EI_i. Micro determinants. 2014

	1	2	3	4
Male		-0.955***	-0.954***	-0.954***
		(0.131)	(0.131)	(0.131)
Age group				
< 16		0.010	0.016	0.016
		(0.507)	(0.507)	(0.507)
16 - 30		3.917***	3.919***	3.919***
		(0.373)	(0.373)	(0.373)
46 - 65		-1.838***	-1.835***	-1.836***
		(0.214)	(0.214)	(0.214)
> 65		-7.180***	-7.181***	-7.179***
		(0.685)	(0.684)	(0.685)
Level of education				
Secondary		-4.752***	-4.751***	-4.754***
		(0.612)	(0.614)	(0.613)
Tertiary		-14.041***	-14.037***	-14.039***
		(0.812)	(0.813)	(0.813)
Bad health		6.259***	6.261***	6.260***
		(0.377)	(0.377)	(0.377)
Basic activity status				
Employed		-1.881***	-1.879***	-1.879***
		(0.515)	(0.516)	(0.516)
Unemployed		9.102***	9.104***	9.103***
		(0.699)	(0.700)	(0.700)
% unemployed in the household		0.180***	0.180***	0.180***
		(0.009)	(0.009)	(0.009)
Multigenerational household		-3.643***	-3.648***	-3.647***
		(0.881)	(0.880)	(0.881)
Young household		2.546***	2.546***	2.547***
		(0.337)	(0.337)	(0.337)
Homeownership		-12.261***	-12.264***	-12.259***
		(0.710)	(0.710)	(0.710)
Type of household				
One adult without children		-7.673***	-7.673***	-7.675***
		(0.658)	(0.659)	(0.659)
Two adults without children		-11.734***	-11.745***	-11.743***
		(0.558)	(0.560)	(0.560)
Other household without children		-11.134***	-11.151***	-11.146***
		(0.661)	(0.663)	(0.662)
Two adults with children		-8.785***	-8.793***	-8.792***
		(0.506)	(0.508)	(0.508)
Other household with children		-5.505***	-5.521***	-5.516***
		(0.652)	(0.655)	(0.654)
Constant	21.709***	47.086***	57.689***	52.836***
	(1.028)	(1.057)	(2.260)	(2.100)
Macro determinants	No	No	Yes	Yes
Variance in intercept	29.47	21.34	3.44	6.00
Total variance	397.29	298.14	298.14	298.14
ICC	0.069	0.067	0.011	0.020
Observations	257191	208061	208061	208061
Country groups	29	29	29	29
Log likelihood	-741772.3	-592840.6	-592814.4	-592822.4

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) References of categorical variables are the following: between 31 and 45 years (age), primary (education), inactive (basic labour status), and one adult with children (type of household).

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

TABLE 3b. Random intercept multilevel linear model for EI_i. Micro determinants. 2018

	1	2	3	4
Male		-0.929***	-0.929***	-0.929***
		(0.128)	(0.128)	(0.128)
Age group				
< 16		-0.457	-0.455	-0.456
		(0.359)	(0.359)	(0.359)
16 - 30		2.859***	2.861***	2.861***
		(0.337)	(0.337)	(0.337)
46 - 65		-0.961***	-0.958***	-0.958***
		(0.228)	(0.228)	(0.228)
> 65		-5.435***	-5.435***	-5.434***
		(0.487)	(0.486)	(0.486)
Level of education				
Secondary		-4.588***	-4.582***	-4.583***
		(0.747)	(0.747)	(0.748)
Tertiary		-12.162***	-12.152***	-12.152***
		(0.795)	(0.795)	(0.795)
Bad health		5.802***	5.806***	5.805***
		(0.438)	(0.440)	(0.439)
Basic activity status				
Employed		-1.870***	-1.871***	-1.871***
		(0.360)	(0.361)	(0.360)
Unemployed		10.441***	10.441***	10.440***
		(1.280)	(1.280)	(1.280)
% unemployed in the household		0.157***	0.157***	0.157***
		(0.013)	(0.013)	(0.013)
Multigenerational household		-2.907***	-2.908***	-2.908***
		(0.628)	(0.628)	(0.628)
Young household		1.950***	1.954***	1.954***
		(0.358)	(0.358)	(0.357)
Homeownership		-12.060***	-12.060***	-12.059***
		(0.889)	(0.890)	(0.890)
Type of household				
One adult without children		-7.907***	-7.908***	-7.910***
		(0.724)	(0.724)	(0.724)
Two adults without children		-10.842***	-10.850***	-10.850***
		(0.555)	(0.555)	(0.555)
Other household without children		-10.489***	-10.500***	-10.500***
		(0.678)	(0.678)	(0.677)
Two adults with children		-8.915***	-8.922***	-8.923***
		(0.570)	(0.570)	(0.570)
Other household with children		-5.967***	-5.978***	-5.976***
		(0.633)	(0.632)	(0.633)
Constant	16.070***	41.534***	45.882***	43.208***
	(0.780)	(1.232)	(2.297)	(2.060)
Macro determinants	No	No	Yes	Yes
Variance in intercept	16.93	13.18	3.25	3.90
Total variance	336.12	261.94	261.94	261.94
ICC	0.048	0.048	0.012	0.015
Observations	256386	210843	210843	210843
Country groups	29	29	29	29
Log likelihood	-704960.1	-578051.9	-578031.9	-578034.5

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) References of categorical variables are the following: between 31 and 45 years (age), primary (education), inactive (basic labour status), and one adult with children (type of household).

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

TABLE 4a. Random intercept multilevel linear model for EI_i. Macro determinants. 2014

	3	4	5	6
Unemployment rate	0.327***	0.217***	0.599***	0.498***
	(0.069)	(0.079)	(0.093)	(0.093)
GDP per capita (% EU-27)	-0.035***	-0.038***	-0.028**	-0.027*
	(0.005)	(0.012)	(0.012)	(0.016)
Social protection expenditure	-0.459***		-0.408***	
	(0.059)		(0.082)	
Direct tax revenue		-0.362***		-0.376***
		(0.096)		(0.114)
Constant	57.689***	52.836***	27.423***	23.443***
	(2.260)	(2.100)	(2.185)	(2.032)
Micro determinants	Yes	Yes	No	No
Variance in intercept	3.44	6.00	5.42	6.75
Variance residual	298.14	298.14	397.29	397.29
ICC	0.011	0.020	0.013	0.017
Observations	208061	208061	257191	257191
Country groups	29	29	29	29
Log likelihood	-592814.4	-592822.4	-741748.1	-741751.2

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) Unemployment rate is measured as a percentage of active population. (4) GDP per capita is measured as a percentage of EU-27 and expressed in Purchasing Power Parity (PPP). (5) Social protection expenditure and direct tax revenue is measured as a percentage of GDP.

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

TABLE 5b. Random intercept multilevel linear model for EI_i. Macro determinants. 2018

	3	4	5	6
Unemployment rate	0.566***	0.477***	0.761***	0.696***
	(0.076)	(0.072)	(0.078)	(0.070)
GDP per capita (% EU-27)	-0.028***	-0.024**	-0.027**	-0.024*
	(0.009)	(0.010)	(0.011)	(0.013)
Social protection expenditure	-0.257***		-0.190**	
	(0.068)		(0.077)	
Direct tax revenue		-0.235**		-0.169
		(0.095)		(0.119)
Constant	45.882***	43.208***	17.343***	15.333***
	(2.297)	(2.060)	(1.623)	(1.333)
Micro determinants	Yes	Yes	No	No
Variance in intercept	3.25	3.90	3.75	4.14
Variance residual	261.94	261.94	336.12	336.12
ICC	0.012	0.015	0.011	0.012
Observations	210843	210843	256386	256386
Country groups	29	29	29	29
Log likelihood	-578031.9	-578034.5	-704938.5	-704939.9

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) Unemployment rate is measured as a percentage of active population. (4) GDP per capita is measured as a percentage of EU-27 and expressed in Purchasing Power Parity (PPP). (5) Social protection expenditure and direct tax revenue is measured as a percentage of GDP.

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

TABLE 6a. Random intercept multilevel linear model for EI_i. Social protection functions. 2014

	7	8	9	10	11	12	13	14	15	16	17	18
Unemployment rate	0.260***	0.319***	0.414***	0.186**	0.232***	0.236**	0.330***	0.360***	0.412***	0.191*	0.213**	0.211**
	(0.089)	(0.082)	(0.089)	(0.077)	(0.079)	(0.094)	(0.095)	(0.100)	(0.111)	(0.104)	(0.096)	(0.101)
GDP per capita (% EU-27)	-0.055***	-0.040***	-0.039***	-0.041***	-0.044***	-0.053***	-0.057***	-0.055***	-0.041***	-0.044**	-0.057***	-0.054***
	(0.017)	(0.011)	(0.011)	(0.006)	(0.010)	(0.020)	(0.011)	(0.021)	(0.016)	(0.021)	(0.017)	(0.018)
Social protection functions												
Means-tested	-0.427**											
	(0.175)											
Non-means tested		-0.471***										
		(0.089)										
Cash benefits			-0.660***									
			(0.130)									
In-kind benefits				-0.800***								
				(0.119)								
Health care					-1.095***							
					(0.261)							
Disability						-0.763						
						(0.557)						
Old age							-0.839***					
							(0.165)					
Survivors								-1.267				
								(0.839)				
Unemployment									-1.906***			
									(0.543)			
Family / children										-1.728*		
										(0.896)		
Housing											-3.188**	
											(1.375)	
Social exclusion												-2.542*
												(1.381)
Constant	50.876***	57.498***	56.819***	55.371***	55.991***	51.478***	57.281***	50.366***	49.254***	52.939***	51.408***	51.615***
	(2.430)	(2.538)	(2.409)	(2.233)	(2.369)	(2.650)	(2.467)	(2.774)	(2.423)	(3.084)	(2.537)	(2.691)
Micro determinants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Variance in intercept	7.57	4.43	4.27	4.80	5.69	8.14	4.30	7.92	6.53	7.56	7.57	7.81
Variance residual	298.14	298.14	298.14	298.14	298.14	298.14	298.14	298.14	298.14	298.14	298.14	298.14
ICC	0.025	0.015	0.014	0.016	0.019	0.027	0.014	0.026	0.021	0.025	0.025	0.026
Observations	208061	208061	208061	208061	208061	208061	208061	208061	208061	208061	208061	208061
Country groups	29	29	29	29	29	29	29	29	29	29	29	29
Log likelihood	-592825.68	-592817.96	-592817.45	-592819.19	-592821.64	-592826.69	-592817.47	-592826.33	-592823.53	-592825.64	-592825.67	-592826.09

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) Unemployment rate is measured as a percentage of active population. (4) GDP per capita is measured as a percentage of EU-27 and expressed in Purchasing Power Parity (PPP). (5) All social protection functions are measured as a percentage of GDP.

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

TABLE 7b. Random intercept multilevel linear model for EI_i. Social protection functions. 2018

	7	8	9	10	11	12	13	14	15	16	17	18
Unemployment rate	0.483***	0.566***	0.628***	0.442***	0.457***	0.464***	0.628***	0.567***	0.671***	0.455***	0.452***	0.495***
	(0.066)	(0.080)	(0.090)	(0.069)	(0.067)	(0.073)	(0.097)	(0.107)	(0.083)	(0.083)	(0.069)	(0.076)
GDP per capita (% EU-27)	-0.035***	-0.031***	-0.031***	-0.028***	-0.032***	-0.035***	-0.037***	-0.038***	-0.021**	-0.035**	-0.036***	-0.031***
	(0.012)	(0.012)	(0.012)	(0.007)	(0.009)	(0.013)	(0.009)	(0.015)	(0.009)	(0.014)	(0.012)	(0.010)
Social protection functions												
Means-tested	-0.267*											
	(0.162)											
Non-means tested		-0.272***										
		(0.082)										
Cash benefits			-0.362***									
			(0.122)									
In-kind benefits				-0.493***								
				(0.116)								
Health care					-0.654***							
					(0.234)							
Disability						-0.500						
						(0.325)						
Old age							-0.591***					
							(0.153)					
Survivors								-0.745				
								(0.828)				
Unemployment									-2.833***			
									(0.601)			
Family / children										-0.562		
										(0.714)		
Housing											-2.079	
											(1.535)	
Social exclusion												-2.373***
												(0.810)
Constant	42.127***	45.956***	45.362***	44.854***	45.448***	42.577***	46.129***	42.012***	41.278***	42.854***	42.377***	42.346***
	(2.093)	(2.423)	(2.427)	(2.105)	(2.339)	(2.218)	(2.370)	(2.310)	(1.671)	(2.753)	(2.127)	(2.063)
Micro determinants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Variance in intercept	4.69	3.47	3.73	3.38	4.04	4.78	3.04	4.82	3.31	4.90	4.65	4.11
Variance residual	261.94	261.94	261.94	261.94	261.94	261.94	261.94	261.94	261.94	261.94	261.94	261.94
ICC	0.018	0.013	0.014	0.013	0.015	0.018	0.011	0.018	0.012	0.018	0.017	0.015
Observations	210843	210843	210843	210843	210843	210843	210843	210843	210843	210843	210843	210843
Country groups	29	29	29	29	29	29	29	29	29	29	29	29
Log likelihood	-578037.18	-578032.83	-578033.89	-578032.49	-578035.02	-578037.42	-578030.92	-578037.57	-578032.27	-578037.76	-578037.03	-578035.25

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) Unemployment rate is measured as a percentage of active population. (4) GDP per capita is measured as a percentage of EU-27 and expressed in Purchasing Power Parity (PPP). (5) All social protection functions are measured as a percentage of GDP.

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

TABLE 8a. Random coefficient multilevel linear model for EI_i. Interactions with household with children. 2014

	1	2	3	4	5	6
Household with children	8.826*** (1.616)	5.940*** (0.918)	4.063*** (0.563)	8.206*** (1.861)	7.321*** (1.829)	7.267*** (1.039)
Social protection expenditure	-0.353*** (0.072)					
HH with children*social protection	-0.240*** (0.073)					
Direct tax revenue		-0.248*** (0.091)				
HH with children*direct tax revenue		-0.230*** (0.072)				
Social protection functions						
Means-tested			-0.239 (0.163)			
HH with children*means-tested			-0.351*** (0.109)			
Non-means tested				-0.383*** (0.090)		
HH with children*non-means tested				-0.237*** (0.091)		
Cash benefits					-0.558*** (0.136)	
HH with children*cash benefits					-0.261** (0.115)	
In-kind benefits						-0.525*** (0.132)
HH with children*in-kind benefits						-0.525*** (0.137)
Constant	44.996*** (2.801)	41.113*** (2.242)	39.748*** (2.257)	45.172*** (2.960)	44.811*** (2.791)	42.746*** (2.638)
Micro determinants	Yes	Yes	Yes	Yes	Yes	Yes
Macro determinants	Yes	Yes	Yes	Yes	Yes	Yes
Variance in coefficient	3.33	3.67	4.48	3.88	4.26	3.05
Variance in intercept	5.08	7.07	8.05	5.44	5.15	6.58
Variance residual	300.69	300.69	300.69	300.69	300.69	300.69
ICC	0.017	0.023	0.026	0.018	0.017	0.021
Observations	208061	208061	208061	208061	208061	208061
Country groups	29	29	29	29	29	29
Log likelihood	-593447.2	-593452.5	-593456.9	-593449.9	-593450.4	-593449.2

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) Unemployment rate is measured as a percentage of active population. (4) GDP per capita is measured as a percentage of EU-27 and expressed in Purchasing Power Parity (PPP). (5) Social protection expenditure and direct tax revenue is measured as a percentage of GDP. (6) All social protection functions are measured as a percentage of GDP.

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

TABLE 9b. Random coefficient multilevel linear model for EI_i. Interactions with household with children. 2018

	1	2	3	4	5	6
Household with children	4.852***	4.040***	2.935***	4.327***	3.522***	4.756***
	(1.298)	(0.712)	(0.406)	(1.443)	(1.281)	(0.847)
Social protection expenditure	-0.193***					
	(0.072)					
HH with children*social protection	-0.111*					
	(0.060)					
Direct tax revenue		-0.154*				
		(0.092)				
HH with children*direct tax		-0.142**				
		(0.058)				
Social protection functions						
Means-tested			-0.125			
			(0.148)			
HH with children*means-tested			-0.269**			
			(0.132)			
Non-means tested				-0.216**		
				(0.086)		
HH with children*non-means tested				-0.097		
				(0.072)		
Cash benefits					-0.313**	
					(0.131)	
HH with children*cash benefits					-0.078	
					(0.084)	
In-kind benefits						-0.306**
						(0.124)
HH with children*in-kind benefits						-0.317***
						(0.121)
Constant	35.085***	32.951***	32.256***	35.331***	35.095***	33.963***
	(2.497)	(2.080)	(2.012)	(2.570)	(2.515)	(2.294)
Micro determinants	Yes	Yes	Yes	Yes	Yes	Yes
Macro determinants	Yes	Yes	Yes	Yes	Yes	Yes
Variance in coefficient	2.35	2.24	2.47	2.52	2.67	2.02
Variance in intercept	4.07	4.61	5.10	4.12	4.19	4.40
Variance residual	264.32	264.32	264.32	264.32	264.32	264.32
ICC	0.015	0.017	0.019	0.015	0.016	0.016
Observations	210843	210843	210843	210843	210843	210843
Country groups	29	29	29	29	29	29
Log likelihood	-578689.4	-578690.2	-578692.8	-578690.4	-578691.2	-578688.3

Notes: (1) We present coefficients for linear multilevel estimations in which the dependent variable is our normalised economic insecurity index (E_{ic}^{N}), which ranges from 0 to 100. (2) Robust standard errors are presented in brackets. (3) Unemployment rate is measured as a percentage of active population. (4) GDP per capita is measured as a percentage of EU-27 and expressed in Purchasing Power Parity (PPP). (5) Social protection expenditure and direct tax revenue is measured as a percentage of GDP. (6) All social protection functions are measured as a percentage of GDP.

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