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Measurement of Economic Insecurity in the European Union between 2005 and 2020

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Abstract

Because of the macroeconomic shocks caused by pandemic COVID-19 a lot of people have faced the economic insecurity in the recent years. The measurement and monitoring of economic insecurity is important for the government in order to increase resilience to future shocks. In our research a macro-level approach is applied using macroeconomic data of selected EU countries. We created a structural equation model (SEM) for years 2005-2020 based on the LISREL estimation procedure. The model assumes that the economic insecurity depends on observable economic indicators. In addition, the economic insecurity is also explained by economic, social, demographic and cultural and infrastructural indicators. The variable selection and the classification into causes and consequences was a multistep process, and the factors were classified by analysis of correlations, cross-correlations and Granger-causality. Based on our estimation, the development of economic insecurity can be calculated as a latent variable. Its development gives a good picture about geographical and relative differences of economic insecurity in selected EU member states.

Keyword: Economic insecurity, Structural Equation Model (SEM)

1. Introduction

Economic insecurity is a complex phenomenon because of its multidimensional nature. It is important to distinguish the factors that might contribute to the economic insecurity as causes from the factors that might be observed as consequences. Our concept was to create a model based estimation on regional data that is able to show the change of economic insecurity of countries over time together with the causes and consequences. We wanted to answer the following questions: How can the economic insecurity measured applied a macro-level approach using macroeconomic data? How did the economic insecurity change in European countries between 2005 and 2020? If we rank countries on the basis of economic insecurity, how it developed over time? In order to answer these questions, a structural equation model was constructed. Following Pietrzak's (2017) and Máténé Bella and Ritzlné Kazimir's (2021) concepts, we argue that the economic insecurity is a latent variable. A linear regression cannot be made because the dependent variable is unknown. However, a special factor analytic method can provide a solution to this problem. The unobserved dependent variable is influenced by determinants and in turn has an effect on the indicators. Using the LISREL estimation procedure (structural equation model), it is possible to quantify the economic insecurity level of countries. This method is used often to calculate the hidden economy or relative regional development, but it has been already proved that this is a useful method to quantify other latent variables. We suggest that the complex analyses of causes and consequences leads to a reliable picture of the economic insecurity of European counties between the years 2005 and 2020. Our model is based on official statistical data, but our methodology can be classified as experimental statistics.

2. Literature review

Richiardi and He (2020) gives a good literature review about measuring economic insecurity. They show the different descriptions and the approaches of micro and macro level, as well the potential measures. There are many concepts of what we mean by economic uncertainty. Without wishing to be exhaustive, some are described.

Economic security is defined as the risk imposed by unemployment, financial risk from illness, risk from single parent poverty and risk from poverty in old age by Osberg and Sharpe. (Osberg and Sharpe (2004))

Jacobs (2007, p. 1) suggests that, "Economic insecurity is perhaps best understood as the intersection between 'perceived' and 'actual' downside risk."

The United Nations Department of Economic and Social Affairs (United Nations (2008, p. 6)) writes that, "It is not easy to give a precise meaning to the term economic insecurity. Partly because it often draws on comparisons with past experiences and practices, which have a tendency to be viewed through rose-tinted lenses, and also because security has a large subjective or psychological component linked to feelings of anxiety and safety, which draw heavily on personal circumstances. Still in general terms economic insecurity arises from the exposure of individuals, communities and countries to adverse events, and from their inability to cope with and recover from the costly consequences of those events."

According to Stiglitz et al. (2009, p. 198), "Economic insecurity may be defined as uncertainty about the material conditions that may prevail in the future. This insecurity may generate stress and anxiety in the people concerned, and make it harder for families to invest in education and housing."

Osberg (1998, p. 1) gives the following definition: "[…] 'economic insecurity' which reflects the common usage meaning of the term 'insecure' might be: 'the anxiety produced by the lack of economic safety.'"

Economic insecurity can be defined as „the anxiety produced by the possible exposure to adverse economic events and by the anticipation of the difficulty to recover from them." (Bossert and D'Ambrosio (2013, p. 1018))

Based on these definitions, economic insecurity has two dimensions: (1) the size of the potential loss and (2) the probability of the event occurring. People have to make effort to avoid or prepare for shocks and their consequences. Osberg argue that welfare state programs can provide a satisfactory degree of economic safety. (Osberg (2021, pp. 4-5)

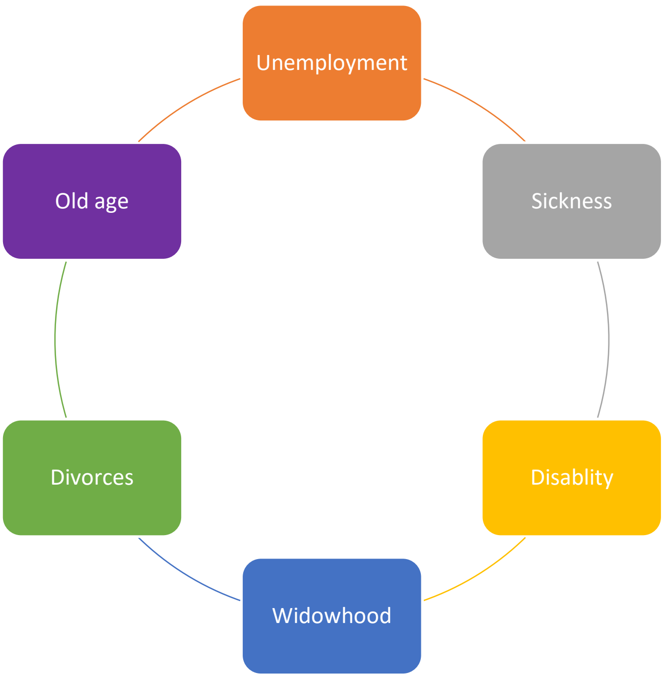
Which life situations can lead to economic insecurity? In order to answer this question, it is worth thinking through the Universal Declaration of Human Rights which was proclaimed by the United Nation General Assembly in 1948. Based on the Article 25, "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other loss of livelihood in circumstances beyond his control." (United Nation (1948))

According to Hacker et al (2014) and Hacker (2018), the economic insecurity is higher among people with lower levels of education and lower incomes as well as among younger adults, ethnic minorities, and heads of single parent households. Hacker and Rehm (2020) argued that about half of significant income losses from year to year are caused by changes in employment status, family structures and health status.

Jiménez (2021) identified the key factors underpinning the economic insecurity which are the following: unemployment and under-employment, sickness and disability, widowhood and union dissolution, life cycle and old age.

Based on the United Nations' Universal Declaration of Human Rights and the above mentioned concepts, we argue that there are several life situations which can lead to economic insecurity. The Figure 1 presents the potential causes. If someone loses their job and becomes permanently unemployment or cannot work due to a long-term illness (sickness, disability), financial difficulties can occur in the household. A single parent household due to divorce or death has more exposure to economic insecurity, especially, if the single parent has to take care of a lot of kids. Older people are also at risk because of the low pensions or/ and widowhood.

Figure 1. Potential causes of economic insecurity at micro-level

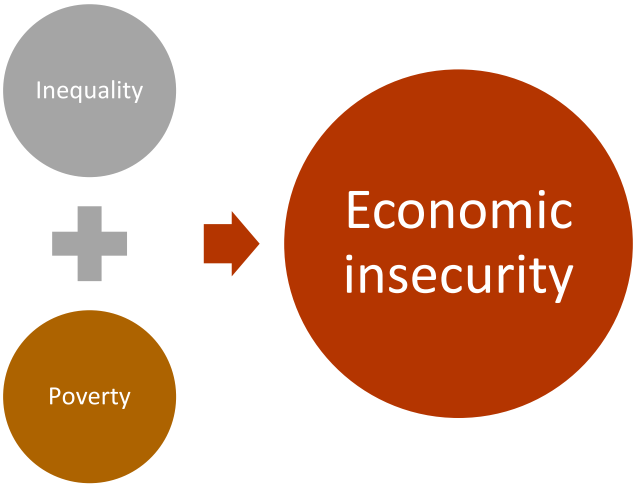


Source: own elaboration based on United Nations (1948) and Osberg and Sharpe (2004)

It is important to emphasize that economic insecurity is a forward-looking concept. In contrast, poverty and inequality are facts of the present. (Osberg (2021, p. 5)) Poverty is the state of having few material possessions or little income. Inequality is the unequal distribution of resources and opportunities among members of a society which is measured by the distribution of income and the distribution of wealth. Known indicators of the inequality are the Gini coefficient and inequality-adjusted human development index (IHDI).

But, the economic insecurity is correlated with low income. The greater the inequality is, the grater the economic insecurity is. High-income people can reduce the probability and the cost of possible future adverse events by having less risky jobs, purchasing insurance or pension plans. Low-income people cannot afford these options and so they are more exposed to risks of adverse events. (Osberg (2021, p. 5)) Cantó and Ruiz (2014) argue that the prevalence of income losses might be a proxy for economic insecurity in a country. The relationship between economic insecurity, inequality and poverty is illustrated in the Figure 2.

Figure 2. The relationship between inequality, poverty and economic insecurity



Source: own elaboration

Osberg (2021, p. 9) emphasizes the role of the government in reducing poverty and inequality. Social benefits and social insurance programs like unemployment insurance, sick pay and old age pensions can be good social protection tools. The economic insecurity has naturally various consequences which are discussed in the literature also.

Stiglitz et al (2009) argue that failings in the socioeconomic system lead to more economic insecurity regarding crimes and failures in education.

Linz and Semykina (2010) point out that the economic insecurity has direct consequences not only for the well-being, but also on consumption and saving behaviour of households. They analysed the transition period of Russia using Russian Longitudinal Monitoring Survey data. They found that workers with less education, woman are more vulnerable.

Ciganda (2015) found in analyse of French data that employment instability has a strong and persistent negative effect on the final number of children for both men and woman, and contributes to fertility postponement in the case of men.

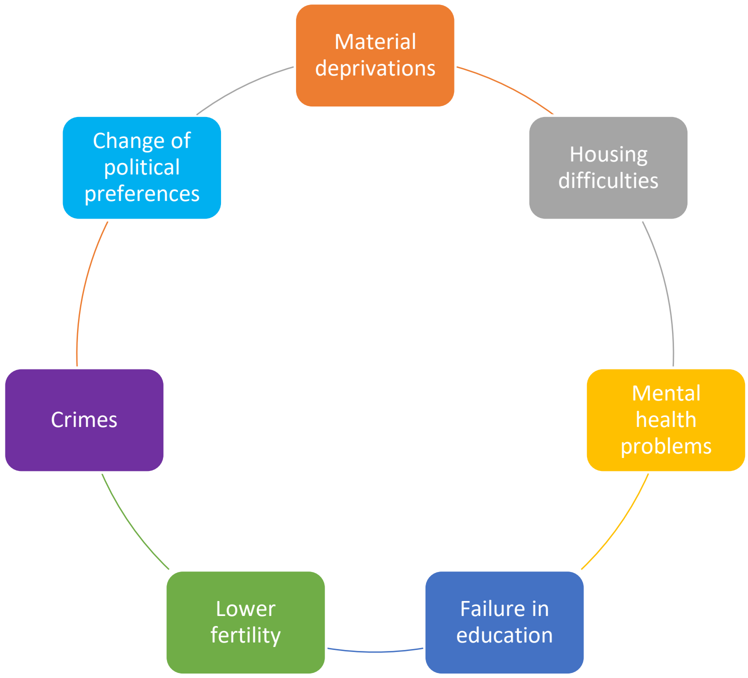
Busetta et al. (2019) found a relationship between the persistent joblessness and fertility intentions of woman. Their findings showed that the higher the level of persistent joblessness, the lower a woman's fertility intentions.

Kopasker et al. (2018) used UK survey data to identify the causal effect of various aspects of economic insecurity on mental health within the working-age population, where economic insecurity is measured by the Economic Security Index (ESI proposed by Hacker et al. (2014).

Bossert et al. (2019) find that the economic insecurity predicts political participation and political preferences towards the right. Margalit (2019) argues populism might be driven by four economic changes (increased import competition, technological change, financial crisis, and immigration) which feed into individual insecurity.

Based on the above mentioned concepts, the Figure 3 presents the potential consequences of the economic insecurity at micro-level. Economic insecurity lead to material deprivations, housing difficulties, mental health problems and failure in education of children. Due to economic insecurity, fewer children may be born in the long run which reduces the fertility. As a result of the permanent economic insecurity, crime increases and populism may be strengthened.

Figure 3. Potential consequences of economic insecurity at micro-level



Source: own elaboration bases on Ciganda (2015), Busetta et al. (2019), Kopasker et al. (2018), Bossert et al. (2019)

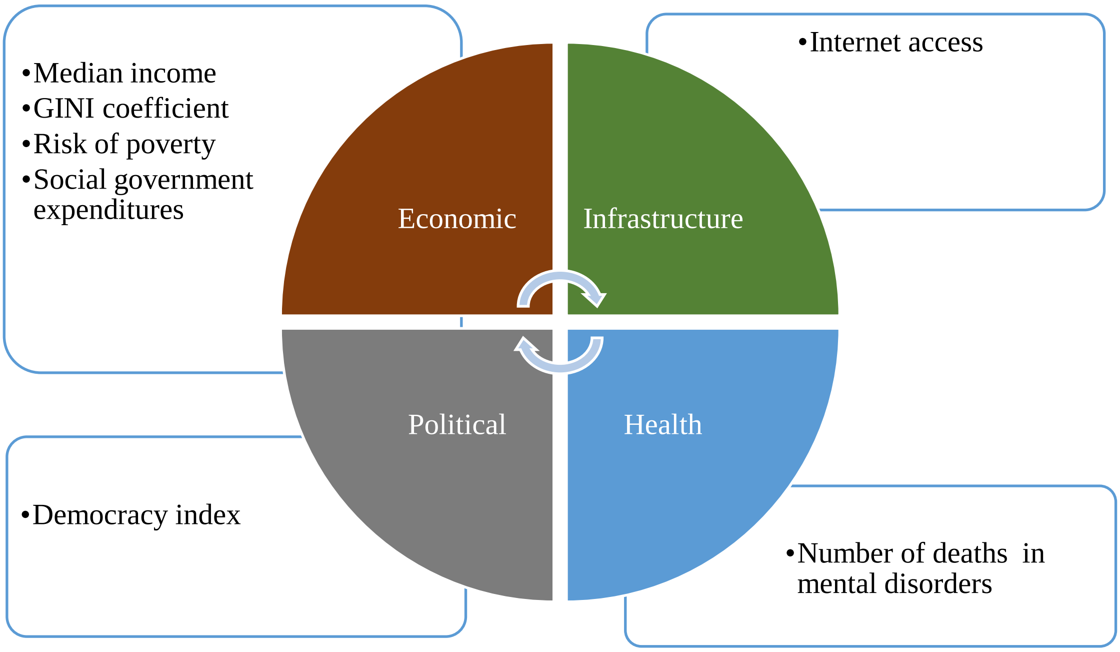
After the definitions of economic insecurity and the exploration of factors on causes and consequences side, we want to highlight Osberg and Sharpe's idea of measurement. They created an index of economic security using macro-level approach which is one of the four components (consumption flows, stocks of wealth, equality and security) of the Index of Economic Well-Being (IEWB). Osberg and Sharpe (2009) referred to it as The IEWB Index of Economic Insecurity. In the IEWB, specific risks (unemployment, illness, single parent and old age) are identified. These components are all measured at national level, weighted by the relative population size and then aggregated to an overall index of economic security. (Osberg (2015, p. 14)) They applied this IEWB to analyse the economic insecurity in selected OECD countries. (Osberg and Sharpe (2014))

We followed Osberg and Sharpe's concept, but we didn't use the 'index method'. We argue that economic insecurity is a latent variable, so it is worth applying Structural Equation Model. In order to construct our model, the potential data sources were explored first.

3. Data

Based on literature review, we concluded that the economic insecurity is connected to several dimensions, namely economic, demographic, health and political factors, see Figure 4. Therefore, we collected several potential indicators for our macro-level analysis from Eurostat's database[1] and ordered them to a panel dataset.

Figure 4. Dimensions of economic insecurity at macro-level



Source: own elaboration

The dataset contained the seven variables in Figure 4 for the period 2005-2020 for 27 European countries, namely the EU 27 countries without Croatia and plus Norway. If there were some missing values, we imputed them generally with the average of two neighbouring years. If data for several consecutive years were missing, we imputed the missing data using the dynamics of a highly correlated country data.

Our collected data are related to macro-level analyse. But, we argue that there is a potential link between microeconomic aspects and macroeconomic aspects, namely social protection

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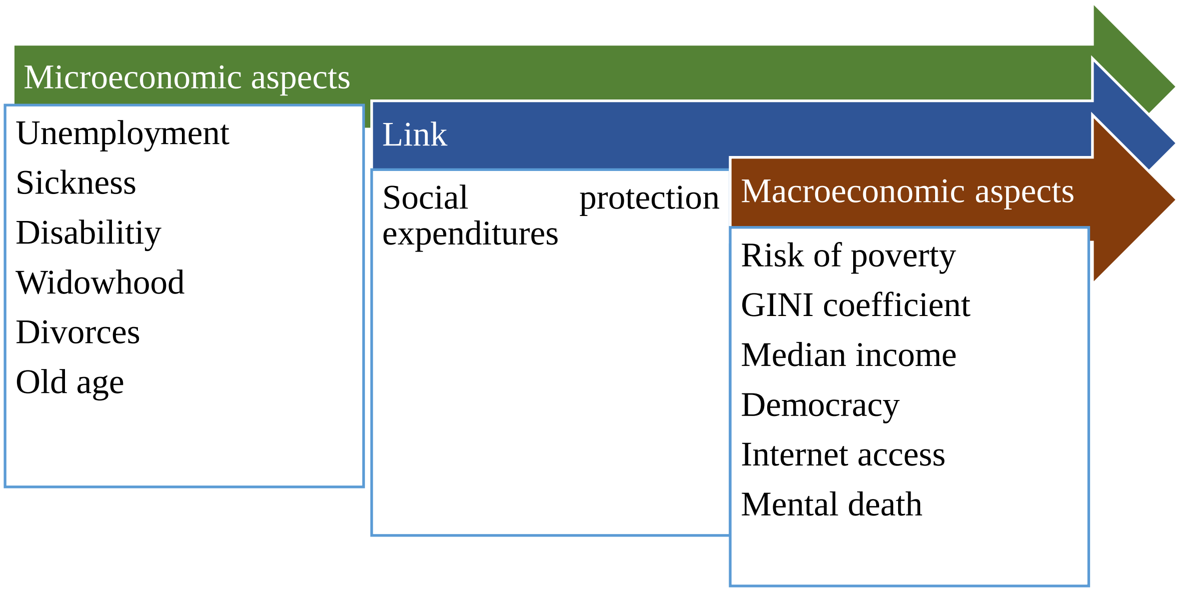
[1] The Democracy Index was downloaded from the homepage of Gapminder (http://gapm.io/ddemocrix_eiu). The Democracy Index captures the quality of democracy in just one number. It's calculated by the Economist Intelligence Unit (EIU) on a yearly basis, as a scale from 0 to 10. This data has converted to a scale from 0 to 100, to make it easier to communicate as a percentage.

expenditure in the European countries. This is supported by Osberg's concept about role of government. (Osberg (2021, p. 9) This relationship is presented in the Figure 5.

Figure 5. Link between microeconomic and macroeconomic aspects of economic insecurity



Source: own elaboration

We argue that social protection expenditures include in one macroeconomic variable which represents some life situations that increase economic insecurity at individual level. This variable can be seen as a link variable between micro and macroeconomic level. Based on the literature review, we had a preliminary idea about the relationship between selected variables and economic insecurity which can be seen in Table 1.

Table 1. Variables related to the economic insecurity at macro-level and their relationship with economic insecurity

Macroeconomic level: causes or consequences	**Economic insecurity**
Higher risk of poverty	positive correlation
Higher GINI coefficient	positive correlation
More social protection expenditures	negative correlation
Higher median income	negative correlation
Greater number of internet access	negative correlation
Democracy	positive/negative correlation
Higher number of deaths in mental disorders	positive correlation

Source: own elaboration

We calculated the cross-correlation among these variables. The average cross-correlation was 0.6045 in absolute terms in the panel dataset.

Table 2. Cross-correlations between selected macroeconomic variables in the whole panel dataset (values without rounding)

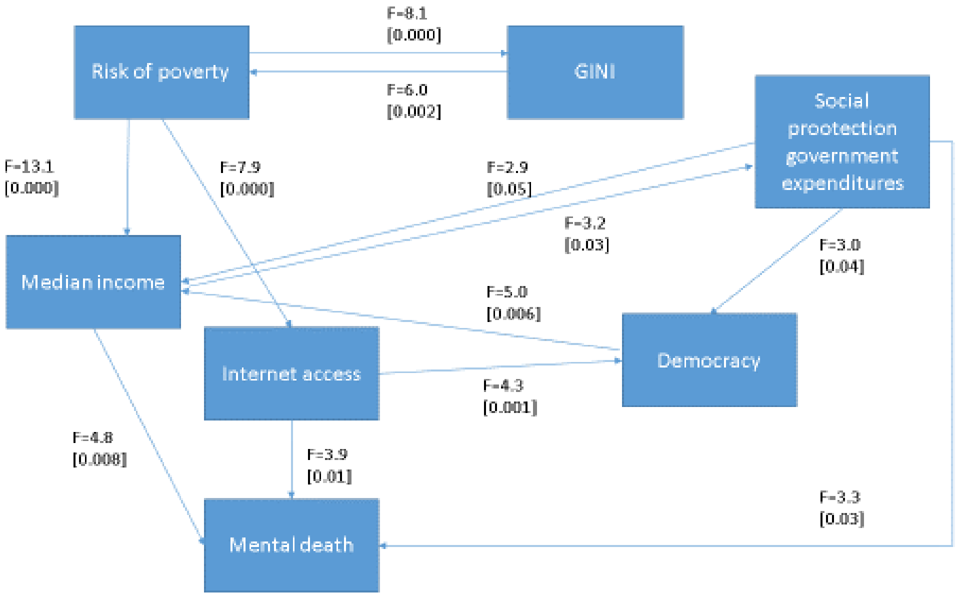
	Risk of poverty	GINI coeffi-cient	Median income	Social protection expen-ditures	Internet access	Mental death	Democracy
Risk of poverty	1						
GINI coefficient	0.73	1					
Median income	-0.68	-0.49	1				
Social protection expenditures	-0.55	-0.42	0.89	1			
Internet access	-0.59	-0.37	0.65	0.58	1		
Mental death	-0.53	-0.43	0.68	0.65	0.65	1	
Democracy	-0.61	-0.48	0.75	0.76	0.41	0.68	1

Source: own calculation

We can see that the average cross-correlation is medium between the variables in sample of all countries which can be suitable for compiling a SEM.

In order to understand better the relationship between variables, we made Granger-causality tests among variables in pairs with software EViews. The results are presented in Figure 5. We illustrated only the relationships where the p-values relating to F-tests were lower than 0.05. From which the arrow starts that variable explains the other variable.

Figure 5. Result of Granger-causality tests between variables



Source: own calculation

After the Granger-test analyse, we standardized the data in order the fitting a Structural Equation Model (SEM).

4. Method

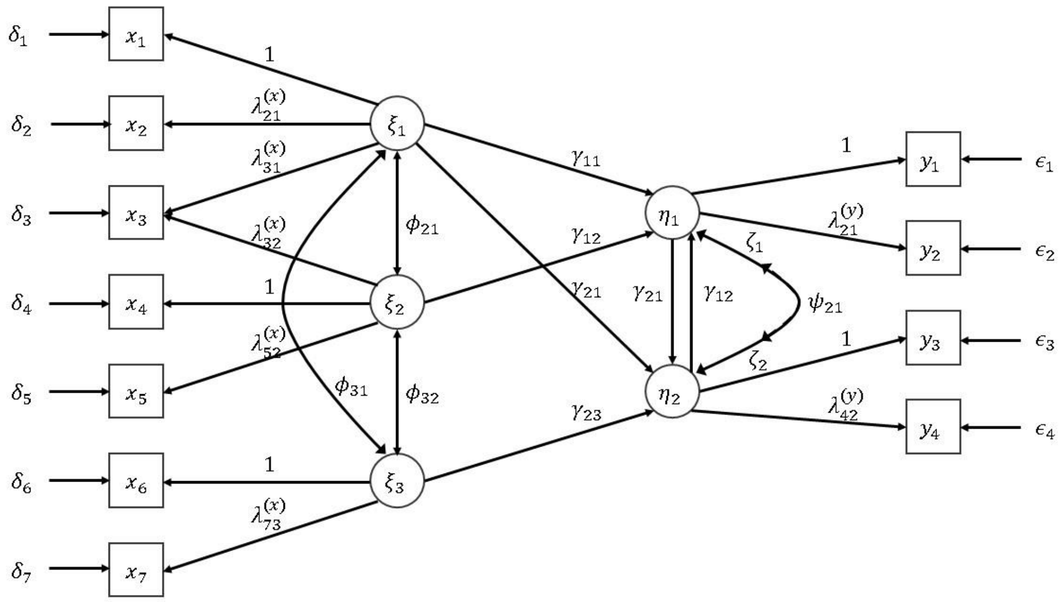
We constructed a Structural Equation Model to quantify the economic insecurity as a latent variable. We used Jöreskog's concept. (Jöreskog (1969), Jöreskog et al.(2016, pp. 344–345)). For this model, IBM AMOS (Analysis of Moment Structure) software was applied. With this software a model can be quickly specified, viewed and modified graphically using simple drawing tools. After computations, the program displays the results by the path graph.

4.1. The General Structural Equation Model (SEM)

The SEM includes two components: the structural model presents the causal dependencies between the latent variables, and the measurement model specifies how the observed variables depend on the unobserved, latent variables. The theoretical description of the SEM model follows the concept of Jöreskog et al. (2016, pp. 344–345).

The next figure shows an example of a general SEM model (see Figure 6).

Figure 6. Path diagram of a general LISREL model (Jöreskog et al. 2016, p. 344).



Source: *Jöreskog et al. 2016*

In Figure 6, there are five non-observed variables, $\boldsymbol{\xi} = (\xi_1, \xi_2, \xi_3)$ and $\boldsymbol{\eta} = (\eta_1, \eta_2)$. There are seven observed explanatory variables ($\boldsymbol{x} = (x_1, x_2, x_3, x_4, x_5, x_6, x_7)$) for the $\boldsymbol{\xi}$, and four explanatory variables ($\boldsymbol{y} = (y_1, y_2, y_3, y_4)$) for the $\boldsymbol{\eta}$. The relationship between the above variables is drawn up with the arrows, and the parameters are on the arrows as well. Some of the parameters are fixed by unit value. For the observed variables the model assigns also error terms $\boldsymbol{\delta} = (\delta_1, \delta_2, \delta_3, \delta_4, \delta_5, \delta_6, \delta_7)$ and $\boldsymbol{\epsilon} = (\epsilon_1, \epsilon_2, \epsilon_3, \epsilon_4)$. The $\phi_{21}, \phi_{31}, \phi_{32}$ are the element of covariance matrix between the elements of $\boldsymbol{\xi}$. The $\psi_{21}$is the covariance between η_1 and η_2.

The general framework of SEM is described by the following formal model:

$$\boldsymbol{\eta} = \boldsymbol{\alpha} + \boldsymbol{B}\boldsymbol{\eta} + \boldsymbol{\Gamma}\boldsymbol{\xi} + \boldsymbol{\zeta} \qquad (1)$$

Equation (1) includes the linear structural relationship between the vectors of the latent dependent ($\boldsymbol{\eta} = (\eta_1, \eta_2, \dots, \eta_m)'$) and the latent independent ($\boldsymbol{\xi} = (\xi_1, \xi_2, \dots, \xi_n)'$) variables. The vector $\boldsymbol{\alpha}$ is the intercept, the matrices $\boldsymbol{B}$ and $\boldsymbol{\Gamma}$ includes the coefficients and $\boldsymbol{\zeta} = (\zeta_1, \zeta_2, \dots, \zeta_m)'$ is the vector of residuals. It is assumed that the $\boldsymbol{\zeta}$ is uncorrelated with $\boldsymbol{\xi}$, and that the matrix $(\boldsymbol{I} - \boldsymbol{B})$ is non-singular.

The latent variables ($\boldsymbol{\eta}$ and $\boldsymbol{\xi}$) are non-observed, but the variables $\boldsymbol{x} = (x_1, x_2, \dots, x_p)'$ and $\boldsymbol{y} = (y_1, y_2, \dots, y_q)'$ are observed, that such

$$\boldsymbol{y} = \boldsymbol{\tau}_y + \boldsymbol{\Lambda}_y \boldsymbol{\eta} + \boldsymbol{\epsilon} \tag{2}$$

$$\boldsymbol{x} = \boldsymbol{\tau}_x + \boldsymbol{\Lambda}_x \boldsymbol{\xi} + \boldsymbol{\delta} \tag{3}$$

Where $\boldsymbol{\epsilon}$ and $\boldsymbol{\delta}$ are the error term vectors, assumed to be uncorrelated with $\boldsymbol{\eta}$ and $\boldsymbol{\xi}$ respectively**.** The vectors $\boldsymbol{\tau}_y$ and $\boldsymbol{\tau}_x$ are the intercepts in these multivariate regressions, the $\boldsymbol{\Lambda}_y$and $\boldsymbol{\Lambda}_x$ show the coefficient matrices.

The mean vector $\boldsymbol{\mu}$ and the covariance matrix $\boldsymbol{\Sigma}$ of $\boldsymbol{z} = (\boldsymbol{x}', \boldsymbol{y}')'$ can be expressed by the next formulas:

$$\boldsymbol{\mu} = \begin{pmatrix} \boldsymbol{\tau}_y + \boldsymbol{\Lambda}_y (\boldsymbol{I} - \boldsymbol{B})^1 (\boldsymbol{\alpha} + \boldsymbol{\Gamma}\boldsymbol{\kappa}) \\ \boldsymbol{\tau}_x + \boldsymbol{\Lambda}_x \boldsymbol{\kappa} \end{pmatrix} \tag{4}$$

$$\boldsymbol{\Sigma} = \begin{pmatrix} \boldsymbol{\Lambda}_y (\boldsymbol{I} - \boldsymbol{B})^1 (\boldsymbol{\Gamma}\boldsymbol{\Phi}\boldsymbol{\Gamma}' + \boldsymbol{\Psi})(\boldsymbol{I} - \boldsymbol{B})^{1'} \boldsymbol{\Lambda}_y' + \boldsymbol{\Theta}_\epsilon & \boldsymbol{\Lambda}_y (\boldsymbol{I} - \boldsymbol{B})^1 \boldsymbol{\Gamma}\boldsymbol{\Phi}\boldsymbol{\Lambda}_x' + \boldsymbol{\Theta}'_{\delta\epsilon} \\ \boldsymbol{\Lambda}_x \boldsymbol{\Phi}\boldsymbol{\Gamma}' (\boldsymbol{I} - \boldsymbol{B})^{1'} \boldsymbol{\Lambda}_y' + \boldsymbol{\Theta}_{\delta\epsilon} & \boldsymbol{\Lambda}_x \boldsymbol{\Phi} \boldsymbol{\Lambda}_x' + \boldsymbol{\Theta}_\delta \end{pmatrix} \tag{5}$$

Where the vector $\boldsymbol{\kappa}$ is the mean vector of $\boldsymbol{\xi}$, $\boldsymbol{\Phi}$ and $\boldsymbol{\Psi}$ **are** the covariance matrices of $\boldsymbol{\xi}$ and $\boldsymbol{\zeta}$. The matrices $\boldsymbol{\Theta}_\epsilon$, $\boldsymbol{\Theta}_\delta$ are the covariance matrices of error terms $\boldsymbol{\epsilon}$, $\boldsymbol{\delta}$. The $\boldsymbol{\Theta}_{\delta\epsilon}$ mean is the covariance matrix between $\boldsymbol{\epsilon}$, and $\boldsymbol{\delta}$. The vector $\boldsymbol{\mu}$ and matrix $\boldsymbol{\Sigma}$ are the functions of elements: $\boldsymbol{\kappa}$, $\boldsymbol{\alpha}$, $\boldsymbol{\tau}_y$, $\boldsymbol{\tau}_x$, $\boldsymbol{\Lambda}_y$, $\boldsymbol{\Lambda}_x$, $\boldsymbol{B}$, $\boldsymbol{\Gamma}$, $\boldsymbol{\Phi}$, $\boldsymbol{\Psi}$, $\boldsymbol{\Theta}_\epsilon$, $\boldsymbol{\Theta}_\delta$, $\boldsymbol{\Theta}_{\delta\epsilon}$.These elements can be classified in three categories:

1. Fixed parameters that have specific values,
2. Constrained parameters that are linear or non-linear functions of one or more other variables,
3. Free parameters.

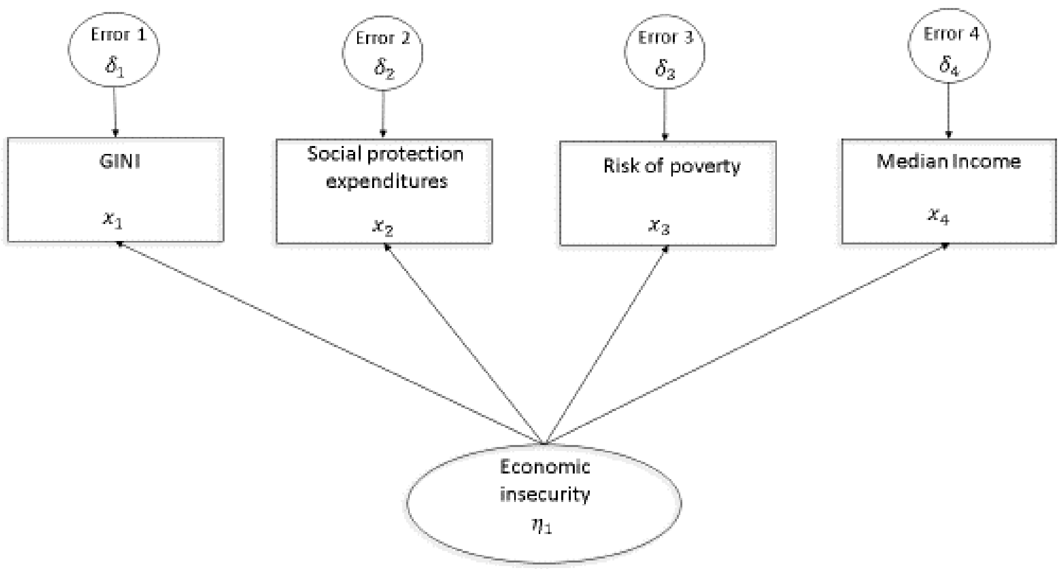
The latent variables do not have definite scale, because they are unobservable. The LISREL method has two ways to scale them:

1. If it is a fixed non-zero coefficient between the latent variable and a reference variable, then this reference variable defines the scale for that latent variable.
2. If there is no reference variable for the latent variable with a fixed non-zero coefficient, then the LISREL method standardises the latent variable.

4.2. Specification of the Model

The current model for the period 2005-2020 has two distinct measurement sub-models which is connected by the latent variable. The latent variable is the economic insecurity which cannot be measured directly. Based on Granger-causality analysis, we hypothesized that the absolute level and the distribution of income in society affect the economic insecurity. The social protection expenditures also influences the economic insecurity. The selected indicators are presented in Figure 7.

Figure 7. Model on the cause side of development

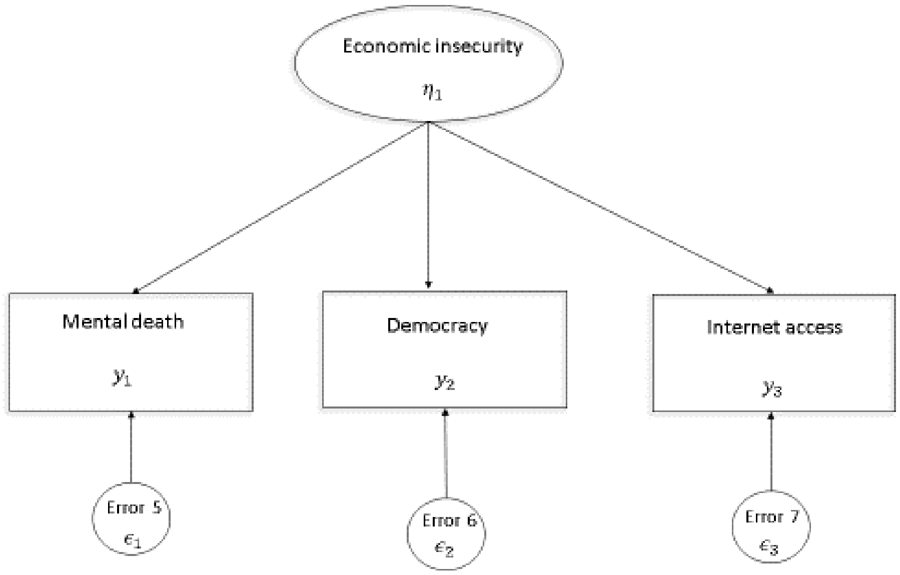


Source: own elaboration

As the second part of the model, we wrote a sub-model with three variables in which the variables evolve as a consequence of economic insecurity. The second sub-model is shown in Figure 8.

Among the variables available, the number of deaths due to mental illness was included in the model because the number of mental illnesses may increase due to economic uncertainty. Internet access is an indicator of economic development. Finally, democracy is included in the model because, according to the literature, economic uncertainty increases the risk of an undemocratic state system.

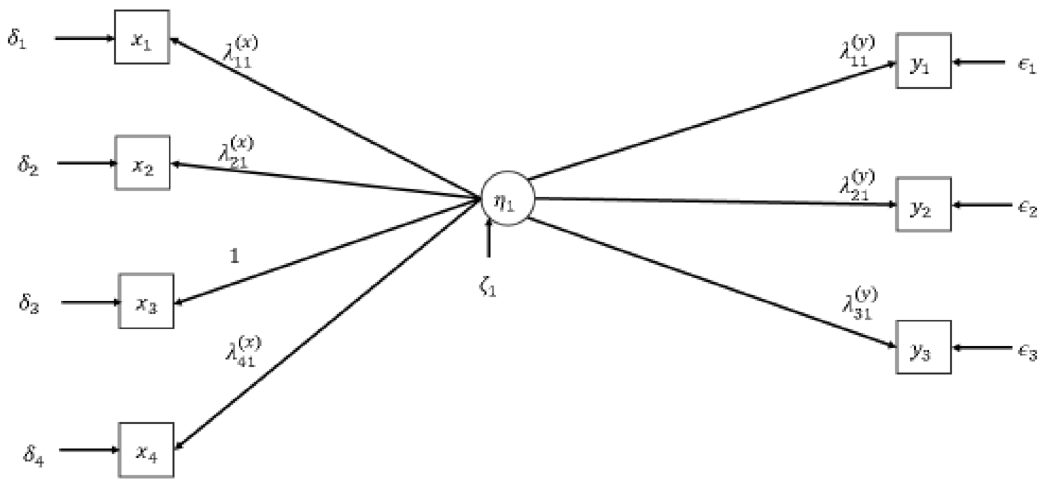
Figure 8. Model on the consequence side of economic insecurity



Source: own elaboration

Based on the two model parts presented earlier, the complete model is shown in Figure 9 below.

Figure 9. Model of the economic insecurity



Source: own elaboration

Our model is much simpler than the model shown in Figure 6, since it contains only one latent variable η_1 with the connecting error variable ζ_1. Between the variable y and η_1, seven measurement equations can be written where $\lambda_{i1}^{(y)}$ and ϵ_i are the coefficients and error of the equation i. The equations written for the variables x are the followings:

$$x_1 = \lambda_{11}^{(x)}\eta_1 + \delta_1 \tag{6}$$

$$x_2 = \lambda_{21}^{(x)}\ \eta_1 + \delta_2 \tag{7}$$

$$x_3 = \ \eta_3 + \delta_3 \tag{8}$$

$$x_4 = \lambda_{41}^{(x)}\ \eta_1 + \delta_4 \tag{9}$$

The covariance matrices of the vectors $\boldsymbol{\epsilon}$ and $\boldsymbol{\delta}$ are the following diagonal matrices:

$$\Theta_\epsilon = diag(\theta_{11}^{(\epsilon)}, \theta_{22}^{(\epsilon)}, \theta_{33}^{(\epsilon)})$$

$$\Theta_\delta = diag(\theta_{11}^{(\delta)}, \theta_{22}^{(\delta)}, \theta_{33}^{(\delta)}, \theta_{44}^{(\delta)})$$

Since there are 9 unobserved variables in the model (one latent variable and eight error terms), the parameter of an unobserved variable in the measurement equation needs to be fixed with an appropriate value to reduce the number of parameters to be estimated. Therefore, the coefficient of the variable x_3 was taken as 1.

4.3. Estimation of the Model

Parameter estimation is done by comparing the actual covariance matrices representing the relationships between variables and the estimated covariance matrices of the best fitting model.

Table 3. The free parameters of the model

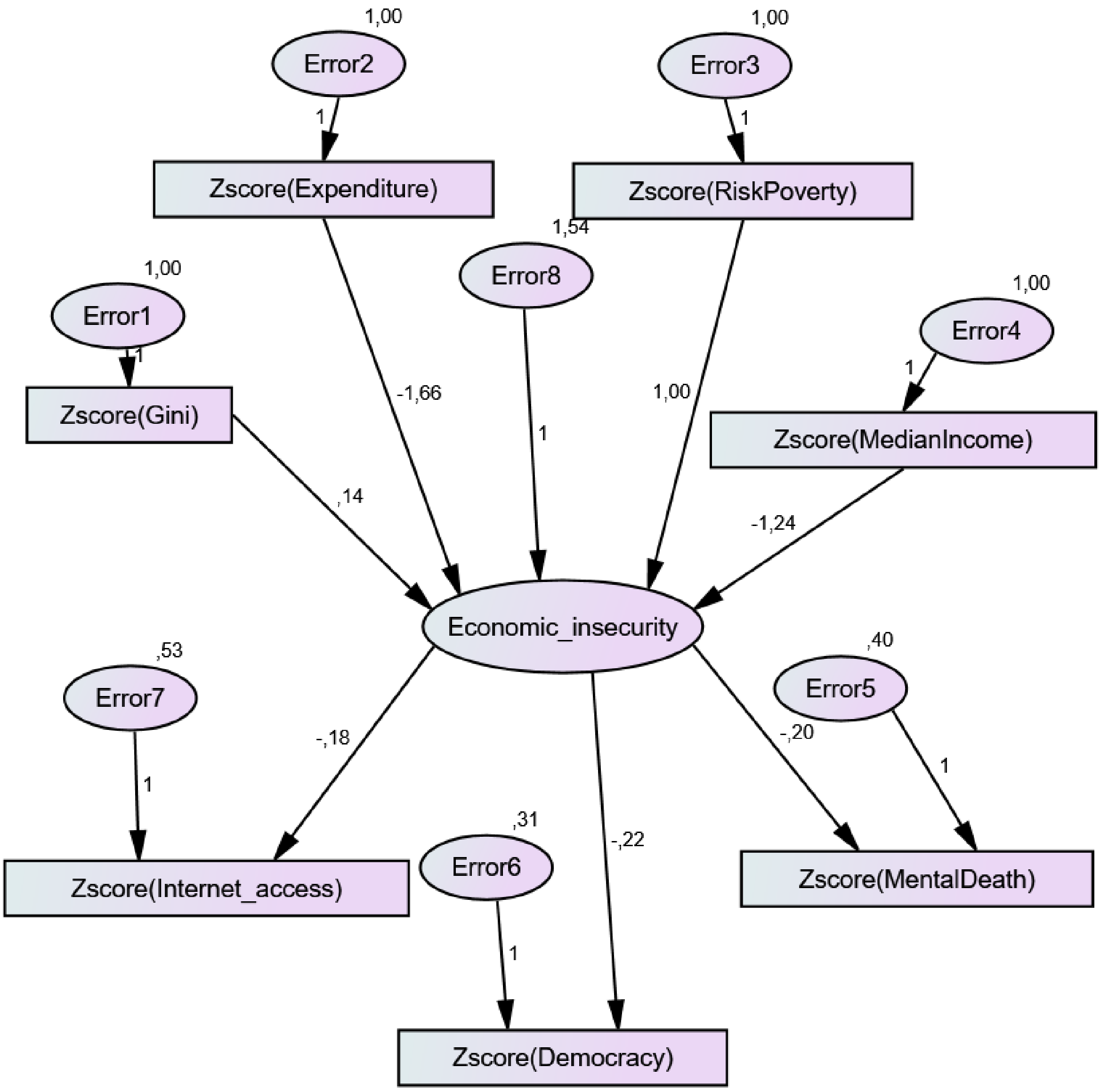
Computation of degrees of freedom (Default model)	
Number of distinct sample moments	28
Number of distinct parameters to be estimated	18
Degrees of freedom (105-28)	14
Result (Default model)	
Minimum was achieved	
Chi-square	1543.8
Degrees of freedom (105-28)	14
p-value	0.000

Source: own calculation

The results are presented in Table 3. The calculation of degrees of freedom is necessary for identifying the model, and for computing Chi-square.

The estimated model for the period 2005-2020 is presented graphically as a path model in Figure 10. The latent variables are illustrated in the ellipse and the circle, while the observed variables are shown in the rectangle. On the causes side, the latent variable (economic insecurity) has a strong relationship between the observed variables such as GINI coefficient, social protection expenditures, risk of poverty and median income. The consequences side presents the relationship between the latent variable and its indicators such as internet access, democracy and mental death.

Figure 10. Path diagram of the model



Source: own elaboration

4.4. Testing the Model

Testing the model is one of the most discussed issues in structural equation models. Three situations can be distinguished according to Jöreskog et al. (2016, pp. 495–502):

- **Strictly confirmatory (SC) situation**: The researcher has specified one single model and has obtained empirical data to test it. The model should be accepted or rejected.

- **Alternative models or competing models (AM) situation**: The researcher has formulated several alternative models, and based on the data, one of the models should be accepted.

- **Model generating (MG) situation**: The researcher has specified an initiative model. If this model does not fit the given data, the model should be modified and tested. The re-specification of each model may be theory-driven and/or data-driven. The goal may be to find a model which not only fits the data well from a statistical point of view, but also has the property that every parameter of the model can be given a meaningful interpretation (Jöreskog et al 2016).

Our research relates to the Model-Generating situation, because we have formulated and tested some models in order to find a model that fits the data well and has a meaningful economic interpretation. The output from the structural equation program provides information for model evaluation and assessment of fit. This information can be classified into three groups:

1. Examination of the solution

2. Measures of overall fit

3. Detailed assessment of fit.

4.4.1. Examination of the Parameters to Explore Unreasonable Values

The unstandardized regression weights (parameters λ) are significant in all three equations according to the p-value except for variable GINI coefficient (see Table 4.)

Table 4. Estimated parameters and p-values relating to equations

Variable		Estimated parameter λ	Standard error SE	Critical ratio for regression weight CR= λ/SE	p-value
x1	GINI coefficient (Gini)	0.143	0.106	1.352	0.176
x2	Social protection expenditures (Expenditure)	-1.664	0.203	-8.190	0.000
x3	Risk of poverty (RiskPoverty)	1	-	-	-
x4	Median income (MedianIncome)	-1.237	0.167	-7.431	0.000
y1	Mental death (MetalDeath)	-0.202	0.024	-8.532	0.000
y2	Democracy	-0.217	0.024	-8.975	0.000
y3	Internet access (Internet_access)	-0.179	0.023	-7.809	0.000

Source: own calculation

4.4.2. Examination of the Measures to Demonstrate Overall Fit of the Model

Several measures are available to test whether the constructed model represents a good fit. These measures can be classified in the following two groups:

1. Chi-square, relative chi-square
2. Fit indices

    - Incremental or relative fit index
    - Absolute fit index
    - Comparative fit index

Chi-square is considered a fundamental measure of overall fit of the model to the data. It is a function of the sample size and the difference between the observed covariance matrix and the model covariance matrix. Chi-square is a badness-of-fit measure in the sense that a small chi-square corresponds to a good fit and a large chi-square corresponds to a bad fit. Zero chi-square corresponds to a perfect fit. It is a reasonable measure when the sample size is between 75 and 200, but in more than 400 cases the chi-square is always quite statistically significant.

An old measure of fit is the relative chi-square, namely the chi-square to degree of freedom ratio or $\chi 2$/df proposed by Wheaton et al. (1977). A problem with this fit index is that there is no universally agreed upon standard as to what is a good and a bad fitting model.

From the fit indices we have chosen the Root Mean Square Error of Approximation (RMSEA) as an absolute fit index and the Comparative Fit Index (CFI) as a relative fit index. Root Mean Square Error of Approximation is an absolute measure of fit based on the non-centrality parameter. Its computational formula is (Schwarz (1978); Raftery (1993)):

$$RMSEA = \sqrt{\frac{\chi 2 - \mathrm{df}}{df(N-1)}} \qquad (10)$$

where N is the sample size and df is the degrees of freedom of the model. If $\chi 2$ is less than df, then the RMSEA is set to zero. Like the TLI, its penalty for complexity is the chi-square to df ratio. The measure is positively biased (i.e., it tends to be too large) and the amount of the bias depends on the smallness of the sample size and df.

The CFI value heavily depends on the average size of the correlations in the data. If the average correlation among variables is not high, then the CFI will not be very high. A CFI value of 0.95 or higher is desirable (Hu and Bentler (1999)). CFI is about 0.4 in our model. These values indicate a “medium strong model”. It is easy to see that if the fit is medium then the error is not low. The value of zero of Root Mean Square Error of Approximation (RMSEA) indicates the best fit. In our model, this value is 0.5. Hu and Bentler (1999) suggested that 0.08 or a smaller value is a sign of a very good fit.

Why do the fit measures suggest a moderate fit? According to Table 2, the average correlation among variables is 0.60, thus using these variables it is impossible to construct a model with better CFI value. We tried to include additional variables in the model, but they had lower cross-correlations, so while the RMSEA improved, the CFI and TLI tended to decline slightly. We came to the conclusion that we have found the model that is statistically significant and has an acceptable fitting on empirical data.

Table 5. Indicators of model fit

Type of indicators of model fit	Name of indicator	Vale	Optimal value
Absolute fit index	Chi-square (CMIN)	1543.8 (p-value:0.000)	-
Absolute fit index	Chi-square/Degree of freedom (CMIN/DF)	110.27	-
Absolute fit index	RMSEA (Root Mean Square Error of Approximation)	0.504≈0.5	0
Relative fit index	CFI (Comparative Fit Index)	0.395≈0.4	1

Source: own calculation

5. Results

The run of the constructed SEM resulted in the factor score weights listed in Table 6.

Table 6. Factor weights of accepted SEM

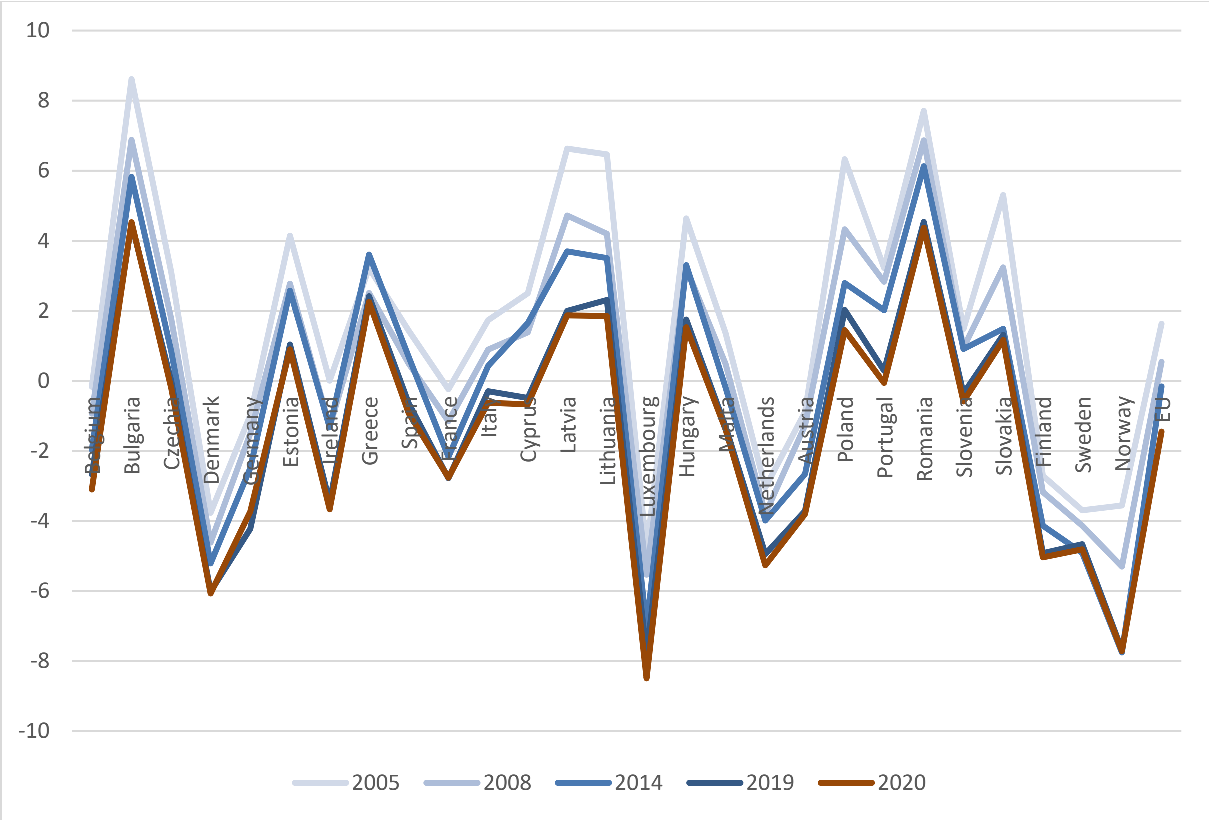
Variables	Economic insecurity
Risk of poverty	0.674
GINI coefficient	0.096
Median income	-0.834
Social protection expenditures	-1.121
Internet access	-0.353
Democracy	-0.724
Mental death	-0.524

Source: own calculation

Using these factor score weights, the standardised value of economic insecurity was calculated for each country and for all years. The smaller and more negative the calculated value is, the lower the economic uncertainty is.

The Figure 11 shows the development of economic insecurity in European countries in selected years such as 2005, 2008, 2014, 2019 and 2020.

Figure 11. Development of economic insecurity in European countries



Source: own elaboration

Based on the results, the economic insecurity declined between 2005 and 2020 in all countries. But, there was sub-periods, when the economic insecurity increased in several countries. In Table 7, the development of economic insecurity is presented compared to the previous year. The years in which economic insecurity has increased are marked in grey. For example, the economic insecurity increased in Ireland, Greece, Spain, Italy, Hungary between 2009 (2010) and 2012 (2013). In 2009 and 2011, the economic insecurity increased in 8 countries, and in 2010, the economic insecurity increased in 14 countries from the selected 27 countries compared to the previous year. This result is clearly in line with the financial crises and its effects.

Table 7. The development of economic insecurity compared to the previous year*

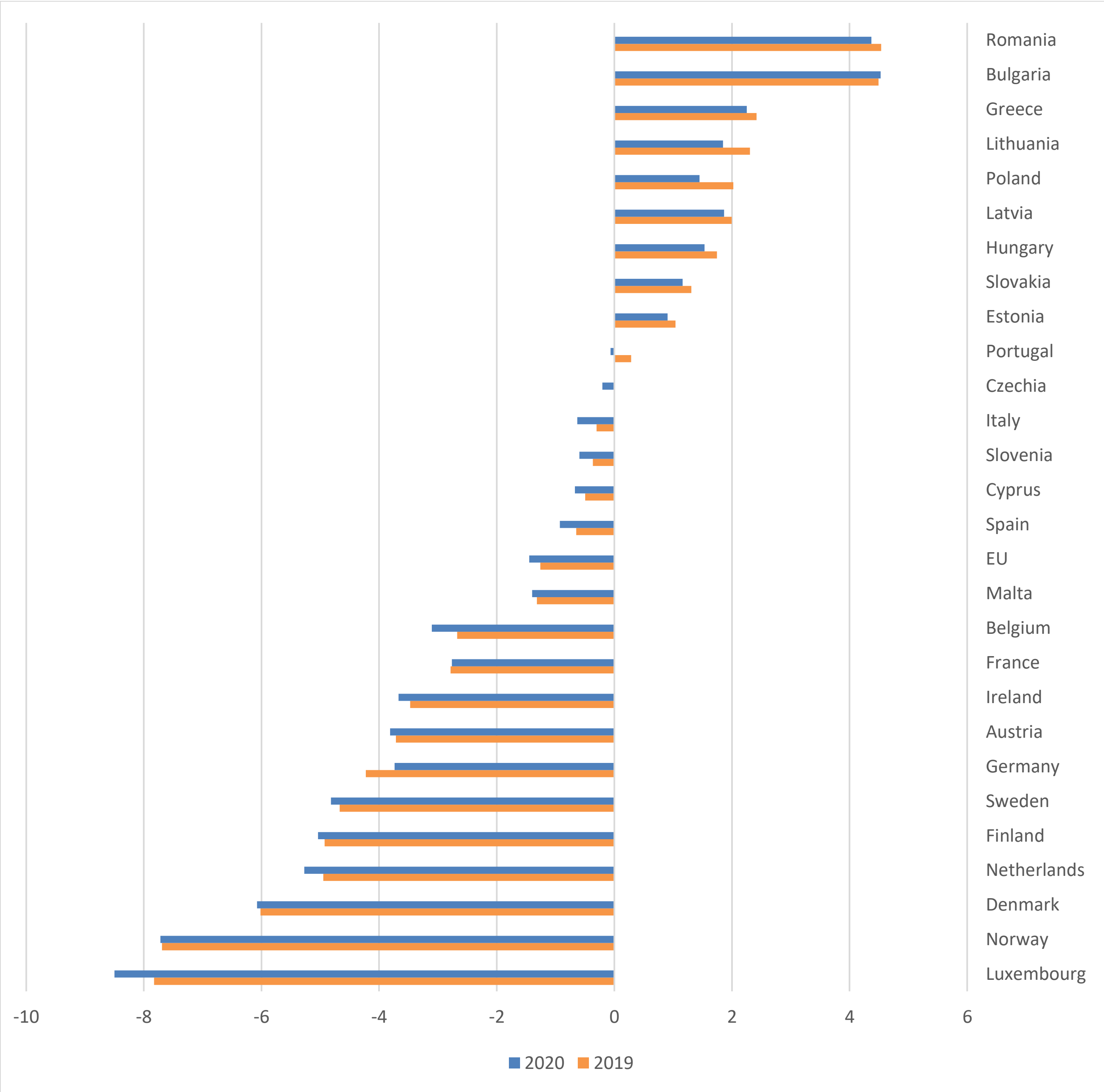
Country	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Belgium	*IMPR*	*IMPR*	*IMPR*	*IMPR*	*INC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Bulgaria	*DEC*	*INC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*
Czechia	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Denmark	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Germany	*INC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*
Estonia	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Ireland	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Greece	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*INC*	*INC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*
Spain	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*INC*	*DEC*	*DEC*		*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*
France	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*INC*
Italy	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*		*DEC*	*DEC*
Cyprus	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Latvia	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Lithuania	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Luxembourg	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*INC*	*DEC*	*DEC*
Hungary	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Malta	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*
Netherlands	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Austria	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Poland	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Portugal	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Romania	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Slovenia	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Slovakia	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*INC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*
Finland	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*INC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*
Sweden	*DEC*	*DEC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*DEC*	*INC*	*INC*	*INC*	*DEC*

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Norway	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*INC*	*DEC*	*DEC*	*DEC*
EU	*DEC*	*DEC*	*DEC*	*DEC*	*INC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*	*DEC*

*DEC=decreased, INC=increased

After 2014, in most countries the economic insecurity has decreased, except for Sweden in years 2015 and between 2017 and 2019. Based on Table 7 and Figure 12, it can be stated that the economic insecurity did not increase in most countries as a result of COVID19 from 2019 to 2020. The exceptions are Bulgaria, Germany and France. We think this can be explained by the fact that the emphasis variable in our model is the social protection expenditures which greatly contributed to compensating for COVID effects.

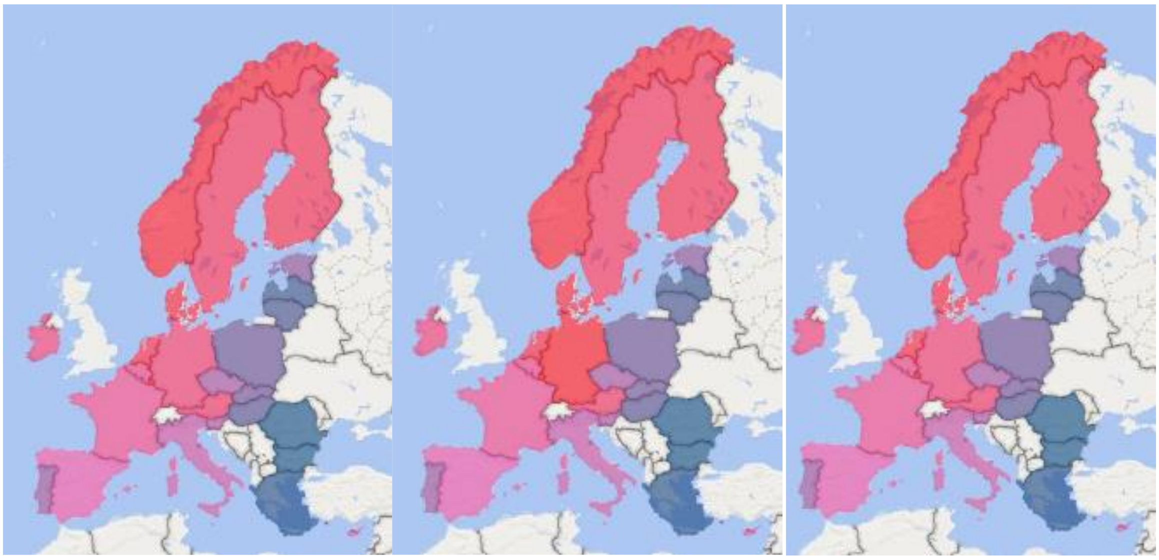
Figure 12. Level of economic insecurity before and during COVID19-period



Source: own elaboration

Based on the results of the model, we ranked the countries in every year. It can be stated that the relative rank among countries has not changed significantly over the years. Compared to the 2005 ranking, a significant number of countries maintained their position or changed their position by 1-3 places in 2020. The only exception is Greece, which deteriorated by 6 places in 2020: while it was 20th in 2005 and 26th in 2020.

*Figure 13. Ranking the countries according to economy insecurity in 2005, 2010 and 2020**



* Countries with low levels of economic insecurity are marked in red and countries with high levels of economic insecurity are marked in blue.

Source: own elaboration

6. Conclusions

We argue that SEM is appropriate for estimating economic insecurity as a latent variable in European countries during the examined period of 2005-2020. We defined the causes and the consequences of economic insecurity using macro-level approach. On the causes side, we identified the following observed variables: social protection expenditures, risk of poverty and median income. The GINI coefficient variable did not prove to be significant despite our expectations. Regarding the consequences side, three indicators such as internet access, democracy and mental death were used. The measurement and the structural models were specified by IBM AMOS software.

We conclude that the economic insecurity increased in the most European countries around 2010 because of financial crises, but no significant change could be detected between 2019 and 2020. We assume that since government social expenditures play a large role in the model, this may explain why economic insecurity has not increased according to our model in European countries.

According to our expectations, it would be worthwhile to run the model again when the annual data are available for 2021-2022, and then the period hit by COVID19 could be better analysed in future.

Based on our result, it was surprising that the relative rank of countries has not changed significantly over the examined years. Compared to the 2005 ranking, a significant number of countries maintained their position or changed their position by 1-3 places in 2020. The only exception is Greece, which deteriorated by 6 places in 2020: while it was 20th in 2005 and 26th in 2020.

Theoretically, other new data source can improve our model, but we think that this first version is a good approach to measuring economic insecurity.

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