Drivers of Inequalities in the European Union

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This paper aims to examine the drivers of income inequalities in the European Union. Existing literature suggested a variety of determinants of income inequality. This paper takes into account uncertainty related to the selection of explanatory variables and follows the Bayesian model averaging approach while controlling heterogeneities in panel data by fixed effects specification. Following previous empirical findings and conditions by the availability of reliable data sources, 20 potential drivers of income inequality for 28 EU member countries between 2016 and 2019 were considered in this research. Empirical findings from this research pointed out financialization, human capital index, and adjusted wage share as the most prominent drivers of post-tax income inequality in the short run. Furthermore, the results suggested stabilizing effects of taxation on income inequalities in EU member countries.

Keywords: income inequality, European Union, data-driven model, Bayesian model averaging.

JEL classification: D33, D63, C11.

INTRODUCTION

Income distribution and its disparity is an ever-green topic in economics and social science. Kolluru and Semenenko (2021) based on a report from the World Economic Forum 2021 emphasized income inequality as one of the top global risks in the following years while pointing out substantial heterogeneity of European Union (EU) countries in terms of income inequality. The global financial crisis in 2008 has strengthened polarization in terms of income within the EU (Cutrini, 2019). Cross-national inequalities among inhabitants need to be reduced across the EU member states (Follesda, 2023). Based on data samples from 25 European countries between 2002 and 2014, Winkler (2019) found that income inequality increases political polarization. Škorić et

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al. (2019) pointed out income inequality in the EU as a threatening factor to: the deterioration of education and health quality, rise in crime rate, increase in risk of poverty, suppression of economic growth, and growth of political inequality. Reduction of inequality is among the top targets of the EU. Given the importance of this topic, a growing body of literature has started to emerge suggesting a wide range of potential drivers of income inequality. In the case of a wide range of potential explanatory variables and conventional empirical procedure, many potential empirical problems might arise resulting in biased estimates. The most common is the problem of model overfitting and the problem of omitted variables in empirical specifications. Hence, there is a need to select proper explanatory variables and we are uncertain about which variables should be selected.

This paper aims to take a step ahead and select drivers of inequality in the EU. To deal with the uncertainty this paper follows the Bayesian model averaging and brings determinants of inequality across EU countries.

Besides the introductory part, the remainder of this paper is organized as follows: Section 2 briefly summarizes existing literature related to the topic under consideration. Section 3 presents research methodology, while Section 4 provides empirical results and discussion. The final section provides an overview of the main findings of the research.

OVERVIEW OF RELATED LITERATURE

Rodríguez-Pose and Tselios (2009) examined inequality across 102 EU regions between 1995 and 2000. Empirical findings suggested that inequality in educational attainment was related to income inequality. The findings were robust to a variety of income distribution measures. Furthermore, the findings suggested the negative effects of urbanization, female participation in the labor force, and agriculture to income inequality. Unemployment rates and a strong financial sector were associated with an increase in inequality. Beckfield (2009) considered EU countries and found regional integration related to an increase in inequality within-country and a decrease in inequality between-country. Bouvet (2021) studied the effects of regional integration in Europe and pointed out that deeper economic integration might have worsened gross income inequality. However, a decrease in interest rates enabled countries to counteract income inequality through their social welfare programs. Filauro and Parolin (2019) analyzed and compared findings for 28 European Union member countries and 50 United States countries. The findings pointed out rising inequality in the United States and stagnant inequality in the EU since 2008 while a higher level of heterogeneity was found among EU countries. Sánchez and Pérez-Corral (2018) analyzed a linkage between public social expenditure and income inequality in EU member countries between 2005 and 2014 and found a negative linkage between public social expenditure and income inequality. Akyuz et al. (2022), based on panel data for 15 EU member countries between 1985 and 2017, found no empirical support for a cointegrating relationship between trade income inequality and liberalization. Suárez-Arbesú et al. (2022) considered convergence and inequality among EU countries between 2007 and 2018 and found openness, education, and public intervention as factors related to the reduction of inequality. Atkinson (2013) pointed out a rise in inequality in the European Union not only as a consequence of globalization and technology but also due to policies adopted in the labor and capi-

tal markets. Han et al. (2023) used a panel quantile approach to examine inequality in EU-28 countries between 1995 and 2018. The empirical findings suggested market capitalization and trade openness as suitable to reduce poverty at any level of development. Research and development expenditure and foreign direct investments were found suitable only at specific levels of development. Tober (2022) analyzed the effect of trade unions on inequality and pointed out that the effect of reducing inequality from trade unions substantially decreases as a country becomes more integrated into the EU. Soava et al. (2020) illustrated that the effects of gross domestic product on income inequality in the EU were determined by its trend in the most developed EU countries. Furthermore, effects from the risk of poverty threshold and median equivalized net income to income inequality were governed by their trend in new EU countries. Brzezinski (2018) analyzed the effects of the recession that started in 2008 on inequality in Central and Eastern Europe. The findings suggested an increase in income inequality in Slovenia, Hungary, Estonia, and Bulgaria. Furthermore, a decrease in full-time employment was found as a major driver of increases in inequality. Tridico (2018) provided results for OECD countries that suggested an increase in inequality as a consequence of the deepening of flexibility in the labor market, an increase in financialization, weakening of trade unions, and welfare state retrenchment. Asteriou et al. (2014) analyzed a linkage between globalization and income inequality between 1995 and 2009. The empirical findings suggested trade openness as an effect equalizer while stock market capitalization and openness of capital accounts were found as drivers of inequalities in EU27. Negri (2022) employed Data Envelopment Analysis for 27 EU member states in 2020 and found an inefficiency of EU countries in the reduc-

tion of income disparities. High levels of government performance were found in three countries only, namely: Bulgaria, Cyprus, and Luxembourg. Financial policies in these three countries were reflected in the reduction of income inequalities.

MATERIALS AND METHODS

The research sample in this paper consists of panel data with cross-sectional units (countries) and periods and the specification of the panel data model employed in this paper is presented in equation (1).

$$y_{it} = C_j + \alpha_1 d_1 + \cdots + \alpha_{N+T-2} d_{N+T-2} + \\ + X_{j,it-1}\beta_j + \varepsilon_{it} \qquad (1)$$

y_{it} in equation (1) represents a vector of observations for the dependent variable. To take into account country and time heterogeneity fixed effects specification was followed. Fixed effects in periods were captured by $(T-1)$ dummy variables while fixed effects in countries were captured by $(N-1)$ dummy variables. Hence, $d_1, \cdots, d_{N+T-2}$ represent $(N+T-2)$ dummy variables, and coefficients $(\alpha_1, \cdots, \alpha_{N+T-2})$ represent time and country individual effects, respectively. $X_{j,it-1}$ in equation (1) denotes (lagged) regressors or potential drivers of inequalities, β_j represents slope parameters while ε_{it} represents independently and normally distributed residuals. Hence, all potential regressors are lagged to avoid the potential issue of endogeneity. Furthermore, all variables are in their stationary form and therefore short-run effects were observed. Literature dealing with drivers of inequalities pointed out many of its potential determinants and all of the potential determinants can hardly be included in the model specification when the standard frequentist approach is followed. Hence, there is uncertainty related to the selection of regressors. At the same time, it is a

well-known fact that omitted regressor in model specification implies biased model estimates. To deal with the issue of inequality determinants selection this paper follows the Bayesian approach that explicitly considers the uncertainty. The Bayesian model averaging (BMA) followed in this paper exhibited some desirable properties (Berger et al., 2001). In the case of k potential independent variables, following BMA 2^k different models were estimated and weighted averages were constructed over all of them. The model weights arise from the Bayesian theorem as presented in equation (2).

$$p(M_\gamma \mid y,\, X) = \frac{p(y \mid M_\gamma, X) \cdot p(M_\gamma)}{p(y|X) = \sum_{i=1}^{2^k} p(y|M_i, X) \cdot p(M_i)} \quad (2)$$

Where $p(M_\gamma|y,\, X)$ denotes posterior model probability $p(y \mid M_\gamma, X)$ denotes the marginal likelihood of the model or probability of the data given the model M_γ and $p(M_\gamma)$ denotes prior model probability or how probable researcher thinks model M_γ before looking at the data. Integrated likelihood that is constant over all models is denoted by $p(y|X)$. The marginal likelihood was obtained as presented in equation (3).

$$p(y \mid M_\gamma, X) = \int p(y|\alpha_\gamma, \beta_\gamma, \sigma, M_\gamma) p(\alpha_\gamma, \sigma)$$
$$p(\beta_\gamma|\alpha_\gamma, \sigma, M_\gamma) d\alpha_\gamma d\beta_\gamma d\sigma \quad (3)$$

Where $p(y|\alpha_\gamma, \beta_\gamma, \sigma, M_\gamma)$ denotes the conditional probability of the data while $p(\alpha_\gamma, \sigma)$ and $p(\beta_\gamma|\alpha_\gamma, \sigma, M_\gamma)$ denote priors of the parameters for model M_γ. In this

research, we implemented uniform priors often referred to as agnostic priors. Eventually, the importance of each potential regressor to explain the dependent variable was evaluated following posterior inclusion probability obtained as illustrated in equation (4).

$$p(x_r|y) = \sum_{x_r \in M_\gamma} p(M_\gamma|y), \ r = 1, \cdots, k. \quad (4)$$

Following Raftery (1995) posterior inclusion probabilities from 0.50 up to 0.75 were called weak. Posterior inclusion probabilities from 0.75 up to 0.95 were called positive. Posterior inclusion probabilities from 0.95 up to 0.99 were called strong while posterior inclusion probabilities above 0.99 were called very strong.

RESULTS

The research sample in this paper was conditioned by the availability of reliable data sources. The research sample and corresponding data sources are provided in Table A1 in the appendix. The robustness of results was considered by inspection of estimates based on some subsamples. Similarly, to Benkovskis et al. (2020) the posterior mean and posterior standard deviation were estimated and reported enabling identification of coverage interval based on Gaussian posterior parameter distribution. To establish a potential link towards frequentist statistics along posterior inclusion probabilities (PIP) posterior means and corresponding standard deviations were reported as well. Firstly, the post-tax GINI index was considered as a measure of income inequality for the data sample of EU 28: The obtained estimates are summarized in Table 1.

Table 1

Drivers of post-tax GINI index in EU28

Variable	PIP	Post Mean	Post SD	Post Mean / Post SD
Domestic credit to private sector (% of GDP)	0.998	0.001	0.000	3.509
Human Capital Index	0.971	-0.999	0.285	-3.506
Adjusted wage share (% of GDP)	0.944	0.004	0.001	2.589
General government expenditure on education (% of GDP)	0.383	-0.004	0.006	-0.672
Employment in FIRE (% of total)	0.232	-0.002	0.005	-0.455
Master's degree graduates	0.173	0.001	0.003	0.334
Government expenditure on social protection (% of GDP)	0.163	0.001	0.004	0.372
Financial development index	0.147	-0.010	0.029	-0.352
GDP growth	0.146	0.000	0.001	-0.277
Current account balance	0.113	0.000	0.000	-0.158
Merchandise trade (% of GDP)	0.089	0.000	0.000	0.144
Total labor productivity growth	0.082	0.000	0.000	0.062
Gross value added in Government (% of Total)	0.082	0.000	0.001	-0.197
Unemployment (% of total population)	0.081	0.000	0.001	0.067
Remittance inflows to GDP (%)	0.080	-0.001	0.003	-0.213
Total factor productivity growth	0.078	0.000	0.001	-0.130
FDI inflows (% of GDP)	0.077	0.000	0.000	-0.204
Gross value added in FIRE (% of total)	0.056	0.000	0.001	0.060
Capital-labor intensity	0.045	-0.003	0.025	-0.112
ICT goods imports (% of total)	0.040	0.000	0.000	0.092

Source: Authors.

Following estimates in Table 1, domestic credit to the private sector and human capital index appeared with strong posterior inclusion probabilities. Positive inclusion probability was found for adjusted wage share. Hence, an increase in financialization represented by domestic credit to the private sector was related to an increase in inequality for EU 28 while an increase in human capital index was relat-ed to a decrease in income inequality for EU 28. Furthermore, an increase in adjusted wage share corresponded to an increase in income inequality for EU 28. Other considered variables were not detected as determinants of income inequality for EU 28. Afterwards, the pre-tax GINI index was considered for a sample of EU 28 and estimates were provided in Table 2.

Table 2

Drivers of pre-tax GINI index in EU 28

Variable	PIP	Post Mean	Post SD	Post Mean / Post SD
Unemployment (% of total population)	1.000	0.021	0.002	9.872
Adjusted wage share (% of GDP)	1.000	0.010	0.001	9.459
Human capital index	0.997	-0.822	0.207	-3.965
Financial development index	0.952	0.066	0.024	2.691
Total factor productivity growth	0.949	0.006	0.002	2.685
Total labor productivity growth	0.946	-0.004	0.001	-2.748
General government expenditure on education (% of GDP)	0.888	0.007	0.004	1.879
Remittance inflows to GDP (%)	0.828	-0.011	0.007	-1.668
ICT goods imports (% of total)	0.552	-0.001	0.001	-0.897
GDP growth	0.320	0.000	0.001	-0.097
Gross value added in FIRE (% of total)	0.318	-0.001	0.002	-0.428
Current account balance	0.233	0.000	0.000	-0.141
Gross value added in Government (% of Total)	0.214	0.000	0.001	-0.301
Government expenditure on social protection (% of GDP)	0.202	0.001	0.002	0.290
Domestic credit to private sector (% of GDP)	0.200	0.000	0.000	0.242
Master's degree graduates	0.191	0.000	0.001	0.253
Capital-labor intensity	0.187	-0.014	0.038	-0.353
FDI inflows (% of GDP)	0.181	0.000	0.000	-0.231
Merchandise trade (% of GDP)	0.168	0.000	0.000	0.185
Employment in FIRE (% of total)	0.147	0.000	0.002	0.158

Source: Authors.

Following estimates in Table 2, very strong posterior inclusion probabilities were found for unemployment rates, adjusted wage share and human capital index while a strong posterior inclusion probability was found for the financial development index. Positive posterior inclusion probabilities were found for total factor productivity growth, total labor productivity growth, general government expenditure on education and remittance inflows. Weak posterior inclusion probability was found for imports of ICT goods. Effects from unemployment, adjusted wage share, financial development index, total factor productivity growth and general government expenditure on education to income inequality were positive. Effects from the human capital index, total labor productivity growth, remittance inflows and imports of ICT goods to income inequality were negative. There considered variables were not identified as determinants of income inequality in EU28. Afterwards, the estimates were obtained for EU15 often called older EU member states. As a dependent variable representing income inequality post-tax GINI index was considered. The estimates are provided in Table 3.

Table 3
Drivers of post-tax GINI index in E15

Variable	PIP	Post Mean	Post SD	Post Mean / Post SD
Master's degree graduates	0.806	0.208	0.154	1.353
Current account balance	0.744	0.003	0.004	0.663
ICT goods imports (% of total)	0.669	-0.010	0.011	-0.925
Gross value added in FIRE (% of total)	0.667	-0.009	0.008	-1.138
Unemployment (% of total population)	0.640	0.008	0.009	0.957
Domestic credit to private sector (% of GDP)	0.597	0.002	0.002	0.886
Total factor productivity growth	0.580	-0.004	0.006	-0.659
Financial development index	0.547	-0.044	0.051	-0.858
Human capital index	0.535	-0.970	1.370	-0.709
GDP growth	0.528	-0.002	0.003	-0.788
Capita-labor intensity	0.510	0.094	0.139	0.677
Total labor productivity growth	0.484	0.001	0.004	0.313
Gross value added in Government (% of Total)	0.457	-0.003	0.006	-0.600
Merchandise trade (% of GDP)	0.420	0.001	0.002	0.372
FDI inflows (% of GDP)	0.349	0.000	0.000	0.162
Remittance inflows to GDP (%)	0.344	0.013	0.111	0.120
Adjusted wage share (% of GDP)	0.295	-0.001	0.003	-0.181
Employment in FIRE (% of total)	0.226	-0.001	0.011	-0.066
General government expenditure on education (% of GDP)	0.213	0.001	0.012	0.107
Government expenditure on social protection (% of GDP)	0.187	-0.001	0.005	-0.133

Source: Authors.

Following estimates in Table 3, the number of master's degree graduates appeared with positive posterior inclusion probability of being income inequality determinant. An increase in the number of master's degree graduates increases inequality in EU15. The weak posterior inclusion probabilities were found for current account balance, imports of ICT goods, gross value added in FIRE, unemployment, domestic credit to the private sector, total factor productivity growth, financial development index, human capital index, GDP growth and capital-labor intensity. Effects from current account balance, unemployment, domestic credit to the private sector and capital labor intensity to income inequality were positive. The effects from imports of ICT goods, gross value added in FIRE, total factor productivity growth, financial development index, human capital index and GDP growth to income inequality were negative. The estimates for pre-tax as a dependent variable are summarized in Table 4.

Table 4
Drivers of post-tax GINI index in E15

Variable	PIP	Post Mean	Post SD	Post Mean / Post SD
Adjusted wage share (% of GDP)	1.000	0.017	0.004	3.981
Human capital index	0.849	0.226	1.292	0.176
Total factor productivity growth	0.760	0.006	0.007	0.830
General government expenditure on education (% of GDP)	0.716	-0.021	0.021	-0.988
Unemployment (% of total population)	0.698	0.013	0.010	1.253
Capital-labor intensity	0.683	-0.217	0.183	-1.185
ICT goods imports (% of total)	0.659	0.007	0.007	0.969
Gross value added in Government (% of Total)	0.630	0.006	0.006	0.958
Domestic credit to private sector (% of GDP)	0.629	0.000	0.002	-0.220
GDP growth	0.593	-0.002	0.005	-0.341
Remittance inflows to GDP (%)	0.578	0.204	0.264	0.773
Gross value added in FIRE (% of total)	0.554	-0.004	0.005	-0.917
Merchandise trade (% of GDP)	0.346	0.000	0.001	0.309
FDI inflows (% of GDP)	0.318	0.000	0.000	-0.433
Total labor productivity growth	0.308	0.001	0.002	0.257
Current account balance	0.301	0.000	0.001	0.378
Government expenditure on social protection (% of GDP)	0.277	0.002	0.004	0.369
Master's degree graduates	0.273	-0.002	0.025	-0.081
Employment in FIRE (% of total)	0.227	0.003	0.008	0.362
Financial development index	0.164	-0.002	0.011	-0.200

Source: Authors.

Following estimates in Table 4, a very strong posterior inclusion probability was found for adjusted wage share. Positive inclusion probabilities were found for the human capital index and total factor productivity growth. Weak inclusion probabilities were found for general government expenditure on education, unemployment rates, capital-labor intensity, imports of ICT goods, gross value added in government, domestic credit to the private sector, GDP growth, Remittance inflows to GDP and gross value added in FIRE. The negative effects on inequality were found in general government expenditure on education, capital-labor intensity, GDP growth as well as from Gross value added in FIRE. The effects from adjusted wage share, human capital index, total factor productivity growth, unemployment rates, imports of ICT goods, gross value added in government, domestic credit to the private sector and Remittance inflows to inequalities were positive. The estimates for the rest of the EU member countries EU13 and post-tax GINI index as a dependent variable were obtained and presented in Table 5.

Table 5
Drivers of post-tax GINI index in E13

Variable	PIP	Post Mean	Post SD	Post Mean / Post SD
Gross value added in Government (% of Total)	0.914	-0.004	0.002	-2.079
Adjusted wage share (% of GDP)	0.888	0.003	0.002	1.769
Current account balance	0.755	-0.002	0.001	-1.355
Total factor productivity growth	0.410	-0.001	0.001	-0.563
Unemployment (% of total population)	0.325	0.002	0.005	0.413
Government expenditure on social protection (% of GDP)	0.284	0.002	0.005	0.498
Domestic credit to private sector (% of GDP)	0.283	0.000	0.000	0.233
Capital-labor intensity	0.270	0.050	0.136	0.372
Employment in FIRE (% of total)	0.246	0.002	0.005	0.380
Total labor productivity growth	0.214	0.000	0.001	-0.282
ICT goods imports (% of total)	0.185	0.000	0.001	-0.096
Human capital index	0.177	-1.724	29.116	-0.059
FDI inflows (% of GDP)	0.152	0.000	0.000	-0.152
Gross value added in FIRE (% of total)	0.145	0.000	0.002	0.122
Financial development index	0.145	0.000	0.033	0.011
Merchandise trade (% of GDP)	0.140	0.000	0.000	-0.196
Remittance inflows to GDP (%)	0.132	0.001	0.004	0.214
Master's degree graduates	0.114	0.000	0.001	0.155
GDP growth	0.112	0.000	0.000	-0.065
General government expenditure on education (% of GDP)	0.106	0.000	0.002	-0.114

Source: Authors.

The estimates in Table 5 suggested gross value added in government, adjusted wage share and current account balance as drivers of income inequalities in EU13. All of the drivers appeared with positive inclusion probabilities. Effects from gross value added in government and current account balance were negative while the effects from adjusted wage share were positive. The estimates for the rest of the EU member countries EU13 and pre-tax GINI index as a dependent variable were obtained and presented in Table 6.

Table 6
Drivers of post-tax GINI index in E13

Variable	PIP	Post Mean	Post SD	Post Mean / Post SD
Current account balance	0.779	-0.003	0.002	-1.450
Capital-labor intensity	0.768	0.504	0.338	1.491
Adjusted wage share (% of GDP)	0.564	0.002	0.003	0.872
Gross value added in Government (% of Total)	0.531	-0.001	0.004	-0.352
Total labor productivity growth	0.529	-0.001	0.002	-0.553
Merchandise trade (% of GDP)	0.514	0.000	0.001	-0.505
Employment in FIRE (% of total)	0.496	0.008	0.010	0.744
Human capital index	0.455	-0.426	0.799	-0.533
Unemployment (% of total population)	0.399	0.003	0.010	0.295
Domestic credit to private sector (% of GDP)	0.370	0.000	0.001	-0.148
GDP growth	0.367	0.000	0.002	0.170
Government expenditure on social protection (% of GDP)	0.316	0.002	0.008	0.248
ICT goods imports (% of total)	0.297	0.000	0.002	-0.165
FDI inflows (% of GDP)	0.274	0.000	0.000	-0.145
Financial development index	0.269	-0.029	0.083	-0.351
Total factor productivity growth	0.269	0.000	0.003	-0.033
General government expenditure on education (% of GDP)	0.206	-0.001	0.005	-0.273
Master's degree graduates	0.182	0.001	0.004	0.345
Remittance inflows to GDP (%)	0.169	0.000	0.008	0.055
Gross value added in FIRE (% of total)	0.159	0.001	0.003	0.150

Source: Authors.

The estimates from Table 6 pointed out current account balance, capital-labor intensity, adjusted wage share, gross value added in government, total labor productivity growth and merchandise trade as the drivers of income inequalities in EU13. Current account balance and capital-labor intensity appeared with positive inclusion probabilities while adjusted wage share, gross value added in government, total labor productivity growth and merchandise trade appeared with weak posterior inclusion probabilities. Negative effects on income inequalities were found from current account balance, gross value added in government and total labor productivity growth while the effects from capital labor intensity, adjusted wage share and merchandise trade were positive. Financialization represented by domestic credit to the private sector appeared as a determinant of income inequality in EU28 and EU15 such that an increase in domestic credit to the private sector increases income inequality. However, in the rest of the EU member countries (EU13) domestic credit to the private sector was not a determinant of income inequality. The effects of financialization are in line with Alexiou et al. (2022) who found that financialization has increased income inequality in OECD countries. Human capital index was found as a determinant of income inequality in

EU28 and EU15 such that an increase in human capital index decreases inequality. A linkage between human capital and income inequality can be found in (Kuštepeli, 2006) and references herein. Adjusted wage share is detected as a determinant of income inequality in EU28 and EU13 but not in EU15. An increase in adjusted wage share in EU28 or EU18 was related to an increase in income inequality. Erauskin (2020) based on data samples from 62 countries found that a lower labor share was linked to a higher income inequality. The current account balance was found as non-relevant at the level of EU28. At the level of EU15 and EU13 current account balance appeared as relevant but its effects were different. An increase in the current account balance in EU15 was related to an increase in income inequality while an increase in the current account balance in EU13 was related to a decrease in income inequality. Nolan et al. (2019) illustrated various relationships between globalization and income inequalities. Furthermore, estimates for the pre-tax GINI index were provided as well. There are more relevant drivers of income inequality when the pre-tax GINI index was considered. Hence, there was a stabilizing effect of taxation on income inequalities. Fuller et al. (2020) discussed a linkage between taxation and income inequality.

CONCLUDING REMARKS

Several conclusions can be derived from the research presented in this paper. Firstly, existing literature pointed out the complexity of the topic and the variety of determinants of income inequality. This paper takes into account uncertainty related to the selection of explanatory variables and follows the Bayesian model averaging approach while controlling heterogeneity among countries and periods. Following previous empirical findings and conditions by the availability of reliable data sources, 20 potential drivers of income inequality were considered as short-run drivers of inequality. Empirical findings from this paper as well as previous research findings suggested heterogeneity of the European Union in terms of income inequality. Empirical findings suggested financialization, human capital index and adjusted wage share as the most prominent drivers of post-tax income inequality in the short run. Hence, the detrimental effects of financialization on income inequalities need to be controlled and human capital development needs to be supported. There were more drivers related to pre-tax income inequalities compared to post-tax income inequality. Therefore, the effects of taxation on income inequalities were stabilizing in the European Union.

Acknowledgments

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APPENDIX

Table A1
Variables and data sources

Variable	Definition	Source
Post-tax GINI	The Gini coefficient is a measure of the inequality of the income distribution in a population. Higher values indicate a higher level of inequality. Income here is measured after the payment and receipt of taxes and cash benefits, but does not include in-kind benefits	Source: SWIID
Pre-tax GINI	The Gini coefficient is a measure of the inequality of the income distribution in a population. Higher values indicate a higher level of inequality. Income here is measured before the payment and receipt of taxes and cash benefits, but does not include in-kind benefits	Source: SWIID
Top 1% income share	This is the income of the richest 1% as a share of total income. Income here is measured before the payment and receipt of taxes and benefits.	Source: SWIID
Gross value added in FIRE	Gross Value Added (GVA) (ESA 2010, 9.31) is defined as output value at basic prices less intermediate consumption valued at purchasers' prices. GVA is calculated before consumption of fixed capital. GVA is available in a breakdown by 10 main economic activities according to NACE Rev. 2. FIRE is abbreviation for - Financial and Insurance activities, Real Estate activities.	% of total (all NACE activities). Source: Eurostat
Employment in FIRE	Employment covers all persons engaged in some productive activity (within the production boundary of the national accounts). National accounts indicator: Total employment domestic concept. FIRE is abbreviation for - Financial and Insurance activities, Real Estate activities	% of total (based on persons) Source: Eurostat
Remittance inflows	Workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by non-resident workers. Data are the sum of three items defined in the fifth edition of the IMF's Balance of Payments Manual: workers' remittances, compensation of employees, and migrants' transfers.	% of GDP (Gross Domestic Product) Source: World Bank - World Development Indicators
Domestic credit to private sector	Domestic credit to private sector refers to financial resources provided to the private sector.	% of GDP (Gross Domestic Product) Source: World Bank - World Development Indicators
Financial development index	Index measures and analyses the factors enabling the development of financial systems among different economies. It provides a comprehensive means for economies to benchmark various aspects of their financial systems. The index is constructed using a standard three-step approach found in the literature on reducing multidimensional data into one summary index: (i) normalization of variables; (ii) aggregation of normalized variables into the sub-indices representing a particular functional dimension; and (iii) aggregation of the sub-indices into the final index. This procedure follows the OECD Handbook on Constructing Composite which is a good reference for methodological suggestions.	Source: IMF

Variable	Definition	Source
Unemployment	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	% of total labor force - modeled ILO estimate Source: World Bank - World Development Indicators
Total labor productivity growth	Labor productivity is an important economic indicator that is closely linked to economic growth, competitiveness, and living standards within an economy. Labor productivity represents the total volume of output (measured in terms of Gross Domestic Product, GDP) produced per unit of labor (measured in terms of the number of employed persons or hours worked) during a given time reference period.	Annual percentage change Source: AMECO database
General government expenditure on education	Total general government expenditure on education	% of Gross Domestic Product Source: Eurostat
ICT goods imports	Information and communication technology goods imports include computers and peripheral equipment, communication equipment, consumer electronic equipment, electronic components, and other information and technology goods (miscellaneous).	% of total goods imports Source: World Bank - World Development Indicators
Master's degree graduates	Total number of master's graduates (or equivalent level)	Source: Eurostat
Government expenditure on social protection	Total general government expenditure on social protection	% of GDP Source: Eurostat
Current account balance	Current account balance is the sum of net exports of goods and services, net primary income, and net secondary income.	% of GDP Source: World Bank - World Development Indicators
Total factor productivity growth	European Economy definition: the future evolution of technical progress. Summarizes both the degree of utilization of factor inputs as well as their technological level. Factor inputs are measured in physical units. An ideal physical measure for labor is hours worked which we use as our labor input. For capital we use a comprehensive measure which includes spending on structures and equipment by both the private and government sectors	Annual percentage change Source: AMECO database
Merchandise trade	Merchandise trade as a share of GDP is the sum of merchandise exports and imports divided by the value of GDP, all in current U.S. dollars.	% of GDP Source: World Bank - World Development Indicators

Variable	Definition	Source
FDI inflows	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.	% of GDP Source: World Bank - World Development Indicators
Adjusted wage share	It is defined as the average compensation of employees' times total employment (including self-employment) divided by GDP at factor costs, i.e. after indirect taxes. Thereby, the wage share is being adjusted for the compensation of self-employed workers whose income is imputed based on the average wage of employees	% of GDP at current factor cost Source: AMECO database
Gross value added in Government	Gross Value Added (GVA) (ESA 2010, 9.31) is defined as output value at basic prices less intermediate consumption valued at purchasers' prices. GVA is calculated before consumption of fixed capital. GVA is available in a breakdown by 10 main economic activities according to NACE Rev. 2. Includes public administration, defense, education, human health and social work activities	% of total - all NACE activities Source: Eurostat
GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	Annual percentage change Source: World Bank - World Development Indicators

Sažetak

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Rad nastoji ispitati pokretače nejednakosti u dohotku u Europskoj uniji. Postojeća literatura sugerira brojne odrednice nejednakosti u dohotku. Ovaj rad uzima u obzir neizvjesnost povezanu s odabirom objašnjavajućih varijabli i slijedi Bayesov model uprosječivanja, kontrolirajući heterogenosti u panel podacima specifikacijom fiksnih učinaka. Slijedeći prethodne empirijske nalaze i uvjete dostupnosti pouzdanih izvora podataka, u ovom istraživanju razmotreno je 20 potencijalnih pokretača nejednakosti u dohotku za 28 zemalja članica EU između 2016. i 2019. Empirijski rezultati ovog istraživanja pokazuju da su financijalizacija, indeks ljudskog kapitala i prilagođeni udio plaća najistaknutiji pokretači nejednakosti u dohotku nakon oporezivanja u kratkoročnom razdoblju. Nadalje, rezultati sugeriraju stabilizirajuće učinke oporezivanja na nejednakosti u dohotku u zemljama članicama EU.

Ključne riječi: nejednakosti u dohotku, Europska unija, model temeljen na podacima, Bayesov model uprosječivanja.