Article

The Fabric of Transition: Unraveling the Weave of Labor Dynamics, Economic Structures, and Innovation on Income Disparities in Central and Eastern Europe Nations

Adriana AnaMaria Davidescu [1,2,*] , Oana-Ramona Lobonţ [3] and Tamara Maria Nae [4,5]

1   Department of Statistics and Econometrics, The Faculty of Economic Cybernetics, Statistics and Informatics, The Bucharest University of Economic Studies, 010552 Bucharest, Romania
2   Department of Education, Training and Labour Market, National Scientific Research Institute for Labour and Social Protection, 010643 Bucharest, Romania
3   Department of Finance, Faculty of Economics and Business Administration, West University of Timisoara, 300223 Timisoara, Romania; oana.lobont@e-uvt.ro
4   Department of Economics and Economic Policies, Faculty of Theoretical and Applied Economics, Bucharest University of Economic Studies, 010552 Bucharest, Romania; tamara.nae@economie.ase.ro
5   Research and Analysis Department, Ministry of Finance, 050706 Bucharest, Romania
*   Correspondence: adriana.alexandru@csie.ase.ro

Abstract: In recent years, the issue of income inequality has ascended to the forefront of national and international agendas, underscored by the urgency to navigate the complexities of market-driven economies without exacerbating social disparities. These challenges are particularly pronounced in the post-communist nations of Central and Eastern Europe, where the transition legacy and the marketization forces present unique dynamics in the evolution of income disparities. This research investigates the intricate mechanisms through which marketization impacts income inequality within the Central and Eastern European countries context, aiming to uncover how economic transformations influenced by global sustainability goals can contribute to narrowing the income gap. By employing panel data estimation techniques and Generalized Method of Moments (GMM) analysis, this study highlights the enduring nature of income disparities and the critical roles played by economic growth, education investment, labor market reforms, globalization, and governance quality in shaping equitable income distributions. Findings reveal that, despite the competitive nature of market economies potentially creating disparities, strategic policy interventions in education, economic policy, and labor market regulations can mitigate the adverse effects of marketization on income inequality. Additionally, this research emphasizes the importance of strong institutional frameworks and the nuanced role of the informal economy in influencing income distribution dynamics.

Keywords: income inequality; determinants; CEE countries; panel data approach; GMM; social progress; convergence

1. Introduction

Inequality has been the subject of a great debate at all times. This phenomenon has gained particular interest among economists since the economic downturns that hit Europe after the most significant wave of accession. Concurrently, there has been a heightened emphasis in research on income distribution, which is currently emerging as a progressively urgent economic and social concern. This is especially notable in emerging European nations, where inequalities surpass the mean observed in the European Union (EU).

In the aftermath of the collapse of communist regimes in Central and Eastern Europe, the interplay between income inequality and marketization has witnessed significant changes. The shift from centrally planned to market-driven economies in the region has presented both opportunities and challenges. While marketization has stimulated economic growth, fostering an overall increase in prosperity and the emergence of a

growing middle class, the swift implementation of market reforms has concurrently given rise to varying levels of income inequality. Certain segments of the population have been more adept at leveraging new economic opportunities, leading to disparities that need careful consideration.

Reducing income inequality in Central and Eastern European countries holds paramount significance for fostering sustainable development, social cohesion and resilience. High levels of income inequality can undermine a region's economic potential by limiting access to education, healthcare, and opportunities for a significant portion of the population. Addressing inequality contributes to political stability and a more inclusive society. Moreover, a more equitable distribution of income can stimulate domestic demand, fostering a robust and resilient economy. As CEE nations continue to navigate the challenges of transition and marketization, prioritizing policies that reduce income disparities becomes crucial for building a prosperous and harmonious future for their citizens.

The genesis of this study is rooted in the persistent challenges pertaining to inequality, notably discernible within the European Union and accentuated within CEE countries. The research is motivated by the identification of a comprehensive set of policy recommendations designed to ameliorate the social landscape in CEE nations, with a strategic aim of mitigating and ultimately eradicating the socio-economic disparities between Eastern Europe and the rest of European Union.

This paper contributes significant added value to the existing literature by offering a nuanced examination of the complex interplay between marketization, income inequality, and institutional quality, with a specific focus on post-communist countries in CEE. The study not only investigates the impact of marketization on income distribution but also integrates the crucial dimension of institutional quality, providing a more comprehensive understanding of the factors influencing inequality dynamics in the CEE region. By identifying key policy recommendations tailored to the unique socio-economic landscape of CEE countries, this paper offers actionable insights for policymakers striving to address and mitigate income disparities.

This paper adopts a systematic structure, commencing with an insightful introduction that articulates the research problem's significance and delineates the study's objectives. Subsequently, this literature review meticulously examines existing scholarship, establishing a robust theoretical framework. The Data and Methodology section outlines the research design, data sources, and analytical approach, encompassing the nuanced exploration of random effects, fixed effects, and rigorous endogeneity testing techniques. Moving forward, the Results and Discussion section synthesizes empirical findings, differentiating between random and fixed effects. The conclusion succinctly summarizes key findings, underscores their contributions to the existing body of knowledge, and propounds avenues for future research. Additionally, the paper culminates with judicious policy recommendations, deriving practical implications from the study's insights and offering guidance for decision makers in relevant domains. This cohesive structure ensures a logical progression of ideas, facilitating a comprehensive and impactful presentation of the research.

2. Literature Review

2.1. Marketization and Income Inequality: A Complex Nexus

The relationship between marketization and income inequality is highly contextual, showing variance across different countries and regions. This variance is largely shaped by specific policy measures, institutional frameworks, and socio-economic conditions unique to each context. Scholars have underscored the critical importance of considering the distributive impacts of market-oriented policies, which include changes in access to education, social protection, and employment opportunities. The consensus from these studies suggests an intricate and multifaceted link between income inequality and marketization, highlighting the necessity for a nuanced understanding that accommodates a broad spectrum of contextual factors.

2.2. Labor Market Dynamics and Their Disparate Impacts

The labor market plays a pivotal role in influencing income inequality, with technological advancements and shifts in the demand for skilled labor contributing significantly to wage disparities. Acemoglu and Autor (2011) and Piketty (2014) provide evidence of how economic growth periods and technological shifts exacerbate income inequality. Goldin and Katz (2007) further this discussion by emphasizing the exacerbating role of education and skill differentials within the labor market. The importance of labor market policies, such as minimum wage regulations and social protection measures in shaping income distribution, is highlighted by Atkinson and Morelli (2010), with Chetty et al. (2014) discussing the persistence of inequalities across generations due to labor market opportunities.

Card and Krueger (1994) and Autor et al. (2008) delve into the effects of minimum wage policies and labor market polarization, underscoring the significance of educational composition in the workforce and its impact on income disparities. The distribution of employees across industries, as discussed by Goos and Manning (2007), demonstrates how technological advancements have led to the decline in middle-skilled jobs, further increasing income inequality.

2.3. Economic Performance, Structure, and Income Inequality

The intricate relationship between economic growth and income inequality has captured scholarly attention, with mixed findings regarding its impacts. Barro (2000) and Forbes (2000) explore this relationship, while Berg and Ostry (2011) suggest that extreme income disparities may disrupt economic stability. Persson and Tabellini (1994) underscore the mediating role of institutional quality in this relationship, proposing that well-designed institutions can alleviate the adverse effects of inequality on development.

2.4. Openness of the Economy: A Double-Edged Sword

The interplay between economic openness and income inequality has been extensively studied, with Rodrik (1997) and Milanovic (2005a, 2005b) discussing how trade liberalization and globalization can initially increase income inequality. Bergstrand and Egger (2007), along with Firebaugh and Goesling (2004), emphasize the contingent nature of this relationship on factors like development level and institutional quality.

2.5. Shadow Economy and Income Disparities

The shadow economy's role in influencing income inequality is highlighted by Schneider and Enste (2000) and Torgler and Schneider (2007), noting the informal sector's contribution to wage disparities and the growth of informal employment driven by income inequality. Buehn and Schneider (2012) stress the importance of the institutional context in understanding these dynamics.

2.6. Technological Advancements and High-Tech Exports

The literature on high-tech exports and income inequality presents a nuanced view, with Lin and Li (2011) and Gouvea and Wang (2019) discussing the sector's potential to both exacerbate and mitigate income disparities. The importance of investments in education and technology in narrowing skill differentials is noted by Barro (2000), with Li and Liu (2005) cautioning about the uneven benefits of high-tech exports.

2.7. Governance, Institutional Quality, and Income Distribution

The role of governance and institutional quality in addressing income inequality is emphasized by Acemoglu and Robinson (2012) and Kaufmann et al. (2010), highlighting the importance of strong institutions in promoting equitable resource distribution. Murtin and Wacziarg (2014) provide empirical evidence linking improvements in institutional quality to reductions in income inequality.

Despite extensive research on individual marketization factors and their impact on income inequality, there exists a notable gap in studies that provide a holistic analysis

integrating these elements into a unified framework. The current literature often examines these aspects in isolation, lacking a comprehensive understanding of the synergies and interactions among marketization components and their collective influence on income distribution. There's a critical need for research that bridges these gaps, offering an integrated perspective that encompasses the dynamic interplay among labor market dynamics, economic performance, technological shifts, and institutional frameworks in shaping income inequality outcomes. Addressing this void is imperative for policymakers and scholars seeking a thorough comprehension of marketization's multifaceted impact on income distribution.

The description of the variables that will be used in the empirical analysis can be studied in (Table 1).

Table 1. List of the variables and data source.

Variable	Source	Sign
Endogenous		
Gini Coefficient (pp)	Eurostat data base	−
Exogenous variable		
Economic Performance and Labor market		
Minimum monthly wage (%)	Eurostat data base	−
Strictness of employment protection index, individual and collective dismissals (%)	Employment Protection Database, OECD	−
Gross domestic product per capita (euro/cap.)	Eurostat data base	(+/−)
Economic growth/cap. (%)	Eurostat data base	(+/−)
Employed population with tertiary education (%)	Eurostat data base	−/+
Employees in the industry (%)	Eurostat data base	−
Education expenditure (% GDP)	Eurostat data base	(−)
Informal economy (% GDP)	Global Economy	(−/+)
Globalization		
Share of high-tech exports (%) of Total Exports	Eurostat data base	+/−
Innovation index (%)	Global Economy	(+/−)
Openness of the economy (% GDP)	Eurostat data base	(+/−)
Quality of institutions		
Regulatory quality (pp)	World Bank	(−)
Rule of law (pp)	World Bank	(−)
Control of Corruption (pp)	World Bank	(−/+)

3. Data and Methodology

Addressing social issues and enhancing fair income distribution necessitates a deep dive into the factors influencing income disparity. This exploration is crucial for fostering broader socio-economic inclusion, elevating the general quality of life, and ensuring economic and social stability, which in turn, strengthens socio-economic cohesion and resilience against future crises.

The empirical component of this study zeroes in on the determinants of income inequality within ten CEE countries, excluding Croatia due to data limitations. Utilizing panel data regression analysis, the research covers annual data from 2008 to 2019, dissecting the influence of identified determinants across four main categories: labor market institutions, economic development, globalization, and governance. The model employed is given by:

$$\text{Gini}_{it} = \beta 0 + \beta 1 * \text{Labour Market Institutions}_{it} + \beta 2 * \text{Economic Development}_{it} + \beta 3 * \text{Globalisation}_{it} + \beta 4 * \\ \text{Governance}_{it} + \beta 5 * \text{Control Variables}_{it} + \varepsilon t \tag{1}$$

where i represents the cross sections, t the period, and β the coefficients of influencing factors on income distribution. Based on the literature and empirical evidence, the analysis includes additional control variables to account for factors such as sectoral employment distribution, urbanization effects, and inflation impacts on income inequality.

Table 1 comprehensively explains the variables, their definitions, and the data sources utilized. These sources encompass the Eurostat database. Meanwhile, Table 2 furnishes descriptive details about the main leading indicators.

Table 2. Empirical results of income inequality determinants with random effects models.

Variables	M1	M2	M3	M4	M5	M6
Economic Performance and Labor market						
MMWBI	−0.014 (0.0016) (0.00)	−0.01 (0.001) (0.00)	−0.01 (0.002) (0.00)	0.0005 (0.002) (0.79)	−0.001 (0.00) (0.30)	
MMWBI × URBANISATION	0.0001 (3.86) (0.00)		0.0001 (3.76) (0.01)			
ECG/cap.	−0.30 (0.15) (0.07)	−0.53 (0.20) (0.02)				0.04 (0.03) (0.28)
SHADOW_EC	−0.002 (0.08) (0.97)	0.18 (0.05) (0.00)			0.05 (0.08) (0.54)	
SHADOW_EC × ECG/cap.	0.02 (0.00) (0.02)	0.02 (0.008) (0.01)	0.003 (0.002) (0.10)			
TERED	0.44 (0.03) (0.00)	0.34 (0.02) (0.00)	0.30 (0.02) (0.00)	0.03 (0.06) (0.61)	0.09 (0.06) (0.10)	0.01 (0.04) (0.80)
EMP_IND			−0.53 (0.08) (0.00)	−0.79 (0.12) (0.00)	−0.82 (0.11) (0.00)	−0.85 (0.10) (0.00)
ED_SPEND			−1.15 (0.34) (0.00)	−0.66 (0.35) (0.06)	−0.93 (0.50) (0.09)	−0.75 (0.32) (0.02)
Globalization						
INNOV		−0.16 (0.06) (0.03)		−0.17 (0.07) (0.02)	−0.15 (0.08) 0.09)	−0.14 (0.08) (0.09)
HIGHTECHXP			0.003 (0.04) (0.93)			−12 (0.07) (0.10)
OPENESS	−0.07 (0.00) (0.00)	−0.06 (0.003) (0.00)	−0.05 (0.004) (0.00)			

Table 2. *Cont.*

Variables	M1	M2	M3	M4	M5	M6
	Quality of Institutions					
REG_QUAL						
RULE_OF_LAW	−3.43 (0.50) (0.00)	−0.23 (0.70) (0.75)	−1.49 (0.50) (0.01)		−1.09 (0.08) (0.30)	
CONT_CORR				−1.16 (1.16) (0.18)		
Constant	34.15 (1.55) (0.00)	42.64 (3.25) (0.00)	50.43 (2.65) (0.00)	57.16 (5.02) (0.00)	56.52 (2.71) (0.00)	58.64 (4.13) (0.00)
Obs.no.	120	120	120	120	120	120
F-test	211.63 (0.00)	39.53 (0.00)	90.94 (0.00)	11.39 (0.00)	20.39 (0.00)	14.12 (0.00)
S.E. of Reg.	1.177	1.89	1.81	1.48	1.64	1.51
Adj. R^2	0.945	0.86	0.87	0.34	0.53	0.39
	Lagrange Multiplier Tests for Random Effects Null hypotheses: No effects					
Breusch–Pagan Multiplier LM test	21.06 (0.00)	19.05 (0.00)	10.93 (0.00)	138.92 (0.00)	68.93 (0.00)	117.12 (0.00)
	Testing the normality					
Jarque–Bera	5.09 (0.07)	7.72 (0.02)	3.08 (0.21)	2.74 (0.25)	2.01 (0.36)	2.57 (0.27)
	Testing for cross-sectional dependence/contemporaneous correlation: using Breusch–Pagan LM test of independence					
Breusch–Pagan LM	111.54	109.25	95.59 (0.00)	77.72 (0.00)	95.96	76.57
	(0.00)	(0.00)			(0.00)	(0.00)
Pesaran Scaled LM	7.01	6.77	5.33	3.44	5.37	3.32
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pesaran CD	1.10	0.93	0.92	3.42	3.46	2.97
	(0.27)	0.35	0.35	(0.00)	(0.00)	(0.00)
	Testing for heteroskedasticity					
Panel Cross Section Heteroskedasticity L.R. test	57.59 (0.00)	54.24 (0.00)	48.34 (0.00)	81.70 (0.00)	67.26 (0.00)	45.54 (0.00)

Note: Within the table, the coefficients are displayed together with standard errors and the probabilities within (). Standard errors are typically displayed in parentheses right below the coefficients to indicate they are related but distinct values.

The primary constraints of the empirical analysis arise from the lack of data availability for post-communist nations. The most recent estimate by Medina and Schneider (2018) pertains to the year 2015. Consequently, for the period spanning from 2015 to 2019, we relied on this latest estimate. Regarding the innovation index, due to data unavailability for the years 2008 to 2011, we utilized the 2011 value as a substitute for this timeframe. Additionally, data regarding the share of high-tech exports was only accessible up to 2018; consequently, we maintained the same metrics for the year 2019 due to the unavailability of updated information.

To rigorously examine the impact of various factors on income inequality within the context of CEE countries, our empirical analysis employs a multi-faceted econometric

approach that integrates fixed effects (FE), random effects (RE), and Difference Generalized Method of Moments (Dif-GMM) models. This combination allows for a comprehensive understanding of the dynamics at play, offering distinct advantages in addressing specific data and econometric challenges.

The general model for analyzing income inequality, represented by the Gini coefficient (Gini it), across CEE countries over time is specified as:

$$\text{Gini}_{it} = \beta0 + \beta1 X_{1it} + \beta2 X_{2it} + \ldots + \beta k X_{k\,it} + u_i + v_t + \varepsilon_{it} \tag{2}$$

where:

i = index countries
t = index time (years)
$X_{1it} \ldots X_{k\,it}$ are the explanatory variables that include labor market institutions, economic development, globalization, governance, and other control variables.
$\beta0$ is the intercept
$\beta1 \ldots \beta k$ are the coefficients of the explanatory variables
u_i is the unobserved country specific effect
v_t is the unobserved time specific effect
ε_{it} is the idiosyncratic error term

In our estimation process, we initially utilized cross-section and period fixed effects models in combination with the ordinary least squares (OLS) technique. These models were progressively fine-tuned to capture income disparity effectively across all CEE nations. To determine the most suitable model, we conducted Redundant Fixed Effects and Hausman tests, evaluating the choice between fixed effects models (FEM) or random effects models (REM). Moreover, we employed the Breusch–Pagan Lagrange (LM) multiplier to evaluate the random effects' consistency and select between a random effects regression and a conventional OLS regression.

Key tests—Redundant Fixed Effects, Hausman, and Breusch–Pagan LM—inform the selection between fixed effects and random effects models, ensuring the model's fit and reliability.

Challenges such as heteroskedasticity and autocorrelation are addressed through specific statistical tests and corrections, including Breusch–Pagan for heteroskedasticity, upholding the integrity of regression outcomes. Cross-sectional dependency is scrutinized via Pesaran's test among others, with heteroskedasticity and normality of residuals assessed to ensure robust statistical inferences.

Recognizing the dynamic nature of inequality and potential endogeneity issues, this study employs advanced econometric techniques. The integration of Dif-GMM with FE and RE models in the analysis of income inequality within CEE countries offers a robust methodological framework that mitigates specific econometric issues inherent in panel data analysis. This approach enhances the reliability of the empirical findings by effectively controlling for unobserved heterogeneity, addressing endogeneity, and ensuring the consistency and efficiency of the estimated coefficients.

The Dif-GMM approach transforms the original model by differencing:

$$\Delta\text{Gini}_{it} = \Delta\beta1 X_{1it} + \Delta\beta2\,X_{2it} + \ldots + \Delta\beta k X_{k\,it} + \Delta\varepsilon_{it} \tag{3}$$

where Δ denotes the first difference operator. The Dif-GMM then uses lagged levels of the variables as instruments for the differenced equations, effectively addressing endogeneity.

The FE model controls for unobserved heterogeneity when this heterogeneity is constant over time but varies between entities. It effectively captures the impact of variables that change over time within entities, removing the effect of time-invariant characteristics. The RE model is useful when the unobserved heterogeneity is assumed to be uncorrelated with the explanatory variables. It allows for generalization beyond the sampled entities and is more efficient than the FE model if the unobserved effects are indeed random. The

Dif-GMM estimator, developed by Arellano and Bond, is particularly advantageous in addressing the endogeneity problem that often plagues panel data analyses.

Therefore, this methodology section outlines a comprehensive approach to analyzing income inequality in CEE countries, leveraging panel data regression, addressing methodological challenges, and employing advanced econometric techniques to uncover the multifaceted determinants of income disparity. By meticulously handling data constraints, methodological issues, and endogeneity concerns, this study aims to contribute valuable insights into policy formulation to reduce income inequality and foster socio-economic inclusion.

4. Results and Discussion

4.1. Investigating the Impact of Marketization Factors on Income Distribution in CEE Countries

This section aims to analyze and understand how various marketization processes influence the distribution of income within the economies of Central and Eastern Europe. Integrating insights from the literature review into the empirical findings of the study on the impact of marketization factors on income distribution in CEE countries allows for a nuanced understanding of how these dynamics play out in specific regional contexts. The literature underscores the complexity of the relationship between marketization and income inequality, emphasizing the critical role of policy measures, institutional frameworks, and socio-economic conditions.

This study finds that higher minimum wages are generally associated with reduced income inequality in CEE countries, aligning with Acemoglu and Autor's (2011) and Card and Krueger's (1994) discussions on wage disparities and the redistributive effects of minimum wage policies. The impact of labor market dynamics, as detailed by Goldin and Katz (2007), further supports the empirical evidence, suggesting that policies aimed at reducing skill differentials and protecting low-wage workers are vital for mitigating income inequality. The mixed impact of economic growth on income inequality reflects the literature's varied perspectives, with initial growth potentially reducing inequality, as supported by Barro (2000) and Forbes (2000), before the benefits become unevenly distributed. Berg and Ostry's (2011) suggestion that extreme disparities might hinder economic stability complements the empirical evidence, indicating the importance of balanced growth and inclusive policies.

The negative coefficients for economic openness in reducing income inequality are consistent with the discussions by Rodrik (1997) and Milanovic (2005a) and Milanovic (2005b), highlighting globalization's complex role in shaping income distribution. The findings resonate with Bergstrand and Egger's (2007) emphasis on the contingent nature of globalization's impacts, suggesting that openness can benefit income distribution when coupled with strong institutional frameworks and development strategies.

The study's indication that high-tech exports contribute to reducing income inequality aligns with Lin and Li's (2011) observations on the sector's dual potential to affect income disparities. This underscores the importance of investments in education and technology, as noted by Barro (2000), in leveraging high-tech industries for equitable growth. Also, the significant negative impact of improved governance and anti-corruption measures on income inequality echoes the literature's consensus on the importance of strong institutions, as discussed by Acemoglu and Robinson (2012) and Kaufmann et al. (2010). These findings highlight the critical role of institutional quality in ensuring equitable resource distribution and mitigating the adverse effects of marketization on income inequality.

This integrated analysis contributes to filling the gap in the literature by offering a holistic perspective that combines labor market dynamics, economic performance, globalization effects, and institutional quality into a unified framework for understanding income inequality. It underscores the need for comprehensive policy approaches that consider the interplay among these factors to effectively tackle income disparities in the CEE region and beyond. The main empirical findings of the random effects models are outlined in Table 2.

4.2. Endogeneity Testing of the Core Factors Influencing Income Distribution Dynamics in Emerging Countries

Reinterpreting the empirical findings from the GMM estimation through the lens of the integrated literature insights and empirical data, we derive a nuanced understanding of income distribution dynamics in CEE countries. This section revisits the core determinants of income inequality, emphasizing the role of dynamic panel data estimation in mitigating endogeneity and revealing the temporal influences on income disparities.

The significant impact of lagged income inequality variables across all models not only evidences the enduring nature of income disparities but also suggests a compounding effect over time. This temporal persistence underscores the inherent challenges in effecting swift changes in income distribution patterns.

The variable impact of minimum wage adjustments on income inequality reflects its dual nature within different economic contexts, underscoring the complexity of wage policy outcomes. These findings illuminate the conditionality of minimum wage effectiveness on urban economic structures and labor market dynamics, challenging the traditional view of minimum wage as a straightforward tool for reducing income disparities.

The inverse relationship between economic growth and income inequality underscores the potential of inclusive growth strategies to enhance social welfare. This suggests that economic expansion, when aligned with equitable social policies, can significantly mitigate income disparities by broadening access to economic benefits.

Increased allocations for education emerge as a potent mechanism for reducing income inequality, emphasizing the transformative power of education in leveling socioeconomic disparities. This pivotal finding aligns with the consensus on education as a foundational pillar for equitable development and opportunity access.

The reduction in income inequality associated with economic openness and high-technology exports underscores the potential of globalization to foster a more equitable income distribution. This suggests that strategic integration into the global economy, through high-value sectors, can catalyze inclusive economic growth.

The substantial negative impact of governance improvements and anti-corruption measures on income inequality highlights the indispensable role of robust institutional frameworks in promoting fair economic distribution. This aligns with the principle that effective governance and transparent institutions are fundamental to equitable development.

The nuanced role of the shadow economy, with its potential to both alleviate and exacerbate income disparities, underscores the complex interplay between formal and informal economic sectors. This finding suggests that the informal economy can serve as both a cushion and a challenge in the quest for equitable income distribution, emphasizing the need for policies that recognize and address its multifaceted impacts.

Integrating GMM estimation results with comprehensive literature insights offers a rich understanding of the multifaceted drivers of income inequality in CEE countries. It highlights the importance of a holistic policy approach that encompasses economic growth, labor market reforms, educational investment, global integration, and institutional strengthening. Furthermore, it underscores the need to consider the informal economy's intricate role in shaping income distribution dynamics. This integrated perspective is crucial for formulating policies that not only target economic indicators but also address the underlying structural and institutional determinants of income inequality, paving the way for more inclusive and resilient economic systems. The empirical findings from the GMM estimation, which investigates the primary drivers of income inequality in CEE countries, are outlined in Table 3.

Table 3. Endogeneity testing of the main determinants of income inequality in CEE countries using dynamic panel data estimation.

	M1	M2	M3	M4	M5	M6
Lagged dep.variable (Gini t − 1)	0.622 (0.103) (0.00)	0.60 (0.10) (0.00)	0.55 (0.11) (0.00)	0.57 (0.08) (0.00)	0.57 (0.09) (0.00)	−0.40 (0.79) (0.61)
Economic Performance and Labor market						
MMWBI	0.0044 (0.004) (0.29)	0.001 (0.001) (0.41)	0.001 (0.001) (0.40)	0.001 (0.001) (0.19)	0.001 (0.001) (0.27)	
MMBI × RBAN			−1.99 (2.63) (0.94)			
ECG/cap.	−1.16 (0.544) (0.03)	−0.20 (0.12) (0.12)				−0.01 (0.09) (0.87)
TERED	−0.14 (0.14) (0.34)	−0.10 (0.09) (0.26)	−0.02 (0.07) (0.78)	−0.01 (0.04) (0.08	−0.09 (0.05) (0.08)	0.44 (0.18) (0.02)
EMP_IND			−0.70 (0.22) (0.01)	−0.63 (0.24) (0.03)	−0.63 (0.20) (0.01)	0.21 (0.77) (0.77)
ED_SPEND			−0.39 (0.17) (0.04)	−0.46 (0.28) (0.10)	−0.21 (0.21) (0.33)	0.74 (1.74) (0.67)
SHADOW_EC	−0.45 (0.212) (0.03)	−0.21 (0.08) (0.03)			−0.16 (0.13) (0.27)	
SHADOW_EC × ECG/cap.	0.055 (0.02) (0.04)	0.007 (0.005) (0.21)				
Globalization						
INNOV		0.06 (0.03) (0.10)		0.05 (0.07) (0.53)	0.02 (0.06) (0.66)	−0.20 (0.23) (0.38)
HIGHTECHXP			0.04 (0.11) (0.68)			−0.76 (0.52) (0.10)
OPENESS	−0.02 (0.03) (0.33)	−0.004 (0.02) (0.86)	−0.003 (0.02) (0.88)			
Quality of institutions						
RULE_OF_LAW	−1.11 (3.33) (0.73)	0.61 (2.50) (0.81)	1.12 (2.09) (0.60)		0.89 (2.22) (0.69)	
CONT_CORR				−1.97 (1.19) (0.10)		
Sargan J-stat	41.44 (0.06)	66.91 (0.10)	65.26 (0.10)	61.11 (0.10)	61.80 (0.10)	0.56 (0.10)

Table 3. *Cont.*

	M1	M2	M3	M4	M5	M6
	Quality of institutions					
No. of instruments (groups)	10	10	10	10	10	10
Obs.no.	120	120	120	120	120	120

Note: Within the table, the coefficients are displayed together with standard errors and the probabilities within (). Standard errors are typically displayed in parentheses right below the coefficients to indicate they are related but distinct values.

5. Conclusions

The investigation into the effects of marketization on income inequality across CEE offers critical insights, synthesizing empirical evidence with dynamic panel data and GMM analysis. This refined understanding leads to several key conclusions:

The pronounced persistence of income inequality, as highlighted by the lagged income inequality variable's significance, underscores the chronic nature of disparities within CEE nations. This revelation underscores the imperative for enduring, strategic policy interventions designed to combat income inequality effectively.

Confirming the pivotal roles of economic growth and increased allocations for education, this study advocates for policies that bolster economic development while significantly investing in education. Such initiatives promise to foster equitable income distributions, enhance job quality, and broaden educational opportunities.

The nuanced impacts of minimum wage adjustments and the unequivocally positive influence of employment protection and active labor market initiatives illustrate the essential nature of thoughtful labor market policies. These findings advocate for measures that uplift low-income workers and promote inclusivity within the labor market.

The association between reduced income inequality with high technology exports and economic openness speaks to globalization's multifaceted role in fostering equitable income distribution. This highlights the opportunities globalization presents for inclusive growth, emphasizing strategic global integration.

This study illuminates the indispensable role of governance, with strong institutions marked by rule of law and anti-corruption efforts emerging as crucial for mitigating income disparities. Strengthening governance and institutional integrity is framed as a cornerstone strategy in addressing income inequality.

The shadow economy's complex influence on income inequality highlights the intricate balance needed in integrating the informal sector with the formal economy. Crafting strategies that harness the informal sector's potential while curbing its adverse effects is pivotal for equitable growth.

In sum, this study not only enriches the academic dialogue on income inequality within the context of CEE countries but also provides actionable insights for policymakers. By delineating the mechanisms through which marketization factors influence income distribution, it underscores the critical need for targeted, integrated policy interventions that span economic, educational, labor, and governance domains to cultivate a more inclusive, equitable economic landscape.

While this study contributes valuable insights into income inequality within CEE countries, certain limitations must be acknowledged. The exclusion of countries like Croatia due to insufficient data highlights the broader issue of data limitations in post-communist nations, emphasizing the challenges associated with comprehensive regional analyses. Additionally, despite the study's extensive coverage, it may not capture all relevant marketization factors and their nuanced interactions. Factors such as technological innovation, demographic shifts, and international trade dynamics warrant further exploration for a comprehensive understanding. Furthermore, the focus on CEE countries, while providing essential regional context, raises concerns about the generalizability of the findings to other global contexts. The unique historical, economic, and social trajectories of CEE nations underscore the need for caution when applying these results beyond the studied region.

Future research endeavors in the realm of income inequality within CEE countries could prioritize enhanced data collection efforts, particularly in nations currently facing data limitations. Additionally, future research could delve into evaluating the effectiveness of specific policy interventions within the CEE context, contributing to a more targeted and evidence-based approach to reducing income inequality in the region.

Social implications: The findings highlight the importance of inclusive growth that benefits a broader segment of the population. By addressing income inequality, countries can improve social cohesion, reduce poverty rates, and enhance the overall quality of life for their citizens. This approach aligns with the pursuit of the Sustainable Development Goals, particularly Goal 10, which focuses on reducing inequalities.

Economic implications: Addressing income inequality is not just a matter of social justice but also economic efficiency. High levels of inequality can hinder economic growth, create economic instability, and waste human capital. Policies that foster a more equitable income distribution can lead to a more sustainable and robust economic system.

Author Contributions: Conceptualization, A.A.D. and O.-R.L. and A.A.D.; methodology, A.A.D. software, A.A.D., T.M.N.; validation, A.A.D., O.-R.L. and T.M.N.; formal analysis, O.-R.L.; investigation, A.A.D.; resources, A.A.D.; data curation, T.M.N.; writing—original draft preparation, A.A.D., T.M.N.; writing—review and editing, A.A.D., T.M.N.; visualization, O.-R.L.; supervision, A.A.D.; project administration, A.A.D.; funding acquisition, A.A.D. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data can be available upon request.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

Acronyms for the variable.

Acronym	The Name of the Variable
GINI COEF	Gini Coefficient
MMWBI	Minimum monthly salary, annual average
GDP/cap.	Gross domestic product per capita
ECG/cap.	Economic growth/cap
TERED	Employed population with tertiary education
EMP_IND	Employees in the industry
ED_SPEND	Education expenditure
INNOV	Innovation index
HIGHTECHXP	Share of high-tech exports
OPENESS	Openness of the economy
REG_QUAL	Regulatory quality
RULE_OF_LAW	Rule of law
CONT_CORR	Control of Corruption
SHADOW_EC	Informal economy
URB	Urbanization degree
EMP_SEV	Employees in the services sector

References

Acemoglu, Daron, and David Autor. 2011. Skills, tasks, and technologies: Implications for employment and earnings. *Handbook of Labor Economics* 4B: 1043–171.

Acemoglu, Daron, and James A. Robinson. 2012. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. New York: Crown Business.

Atkinson, Anthony Barnes, and Salvatore Morelli. 2010. Inequality and labor market institutions. *Handbook of Income Distribution* 2: 1059–143.

Autor, David H., Lawrence F. Katz, and Melissa S. Kearney. 2008. Trends in U.S. Wage Inequality: Revising the Revisionists. *The Review of Economics and Statistics* 90: 300–23. [CrossRef]

Barro, Robert J. 2000. Inequality and Growth in a Panel of Countries. *Journal of Economic Growth* 5: 5–32. [CrossRef]

Berg, Andrew, and Jonathan D. Ostry. 2011. *Inequality and Unsustainable Growth: Two Sides of the Same Coin?* International Monetary Fund Staff Discussion Note No. 11/08. Washington, DC: International Monetary Fund.

Bergstrand, Jeffrey H., and Peter Egger. 2007. A Knowledge-and-Physical-Capital Model of International Trade Flows, Foreign Direct Investment, and Multinational Enterprises. *Journal of International Economics* 73: 278–308. [CrossRef]

Buehn, Andreas, and Friedrich Schneider. 2012. Shadow economies around the world: Novel insights, accepted knowledge, and new estimates. *International Tax and Public Finance* 19: 139–71. [CrossRef]

Card, David, and Alan B. Krueger. 1994. Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *The American Economic Review* 84: 772–93.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, Emmanuel Saez, and Nicholas Turner. 2014. Is the United States still a land of opportunity? Recent trends in intergenerational mobility. *American Economic Review* 104: 141–47. [CrossRef]

Firebaugh, Glenn, and Brian Goesling. 2004. Accounting for the Recent Decline in Global Income Inequality. *American Journal of Sociology* 110: 283–312. [CrossRef]

Forbes, Kristin J. 2000. A Reassessment of the Relationship between Inequality and Growth. *American Economic Review* 90: 869–87. [CrossRef]

Goldin, Claudia, and Lawrence F. Katz. 2007. *The Race between Education and Technology*. Cambridge: Harvard University Press.

Goos, Maarten, and Alan Manning. 2007. Lousy and Lovely Jobs: The Rising Polarization of Work in Britain. *The Review of Economics and Statistics* 89: 118–33. [CrossRef]

Gouvea, Raphael, and Wei Wang. 2019. Innovation and income inequality: Evidence from China's high-tech industry. *Structural Change and Economic Dynamics* 51: 133–44.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2010. The worldwide governance indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law* 2: 220–46. [CrossRef]

Li, Xiaoyig, and Xiaming Liu. 2005. Foreign direct investment and economic growth: An increasingly endogenous relationship. *World Development* 33: 393–407. [CrossRef]

Lin, Frank, and John Li. 2011. Exports and income inequality: Further evidence from China. *China Economic Review* 22: 80–91.

Medina, Leandro, and Friedrich Schneider. 2018. *Shadow Economies around the World: What Did We Learn over the Last 20 Years?* Washington, DC: International Monetary Fund.

Milanovic, Branko. 2005a. Can we discern the effect of globalisation on income distribution? Evidence from household surveys. *The World Bank Economic Review* 19: 21–44. [CrossRef]

Milanovic, Branko. 2005b. *Worlds Apart: Measuring International and Global Inequality*. Princeton: Princeton University Press.

Murtin, Fabrice, and Romain Wacziarg. 2014. The democratic transition. *The Quarterly Journal of Economics* 129: 267–340.

Persson, Tabellini, and Guido E. Tabellini. 1994. Is Inequality Harmful for Growth? *American Economic Review* 84: 600–21.

Piketty, Thomas. 2014. *Capital in the Twenty-First Century*. Cambridge: Cambridge Belknap Press.

Rodrik, Dani. 1997. *Has Globalization Gone Too Far?* Washington, DC: Institute for International Economics.

Schneider, Friedrich, and Dominik H. Enste. 2000. Shadow Economies: Size, Causes, and Consequences. *Journal of Economic Literature* 38: 77–114. [CrossRef]

Torgler, Benno, and Friedrich Schneider. 2007. Shadow economy, voice and accountability, and corruption. In *Growth, Inequality, and Poverty: Prospects for Pro-Poor Economic Development*. Edited by Anthony F. Shorrocks and Rolph Van Der Hoeven. Oxford: Oxford University Press, pp. 153–71.