STUDIA UNIVERSITATIS ECONOMICS SERIES
"Vasile Goldiş" Western University of Arad
2025 - 35(4)
DOI: 10.2478/sues-2025-0016

INCOME INEQUALITY AND ECONOMIC COMPLEXITY NEXUS: THE MODERATING ROLES OF INSTITUTIONAL QUALITY AND GLOBALIZATION

Kemal Erkişi*
Antalya Bilim University, Department of Economics, Antalya, Türkiye
E-mail: kemal.erkisi@antalya.edu.tr

(Received: September 2024; Accepted: November 2024; Published: October 2025)

Abstract: This paper investigates the link between economic complexity and income inequality by addressing the moderating functions of institutional quality and globalization on economic complexity. The dataset spans the G7 nations throughout the years 1995–2020. Parameter estimations draw on Panel Corrected Standard Errors (PCSE). Two models explore disparity in income distribution. The first model addresses personal income inequality, second labor income share. Economic complexity, institutional quality, globalization, economic growth, and human capital are independent factors in both models. The results show that when moderating effects are not taken into account, economic complexity increases income inequality and decreases labor income share. Conversely, institutional quality reduces personal income inequality and increases labor income share. When we consider the moderating roles of institutional quality and globalization; the higher institutional quality reduces the negative effects of economic complexity on personal income inequality as well as labor income share. This result shows that the moderating effect of institutional quality helps economic complexity to distribute income relatively more fairly. On the other hand, when the moderating effect of globalization is taken into account, it reveals that increasing globalization strengthens the negative effect of economic complexity on labor income share and reduces its effect on personal income inequality. In other words, although globalization provides a more equitable distribution among individuals, it does so at the expense of reducing labor income share.

Keywords: Income inequality; economic complexity; institutional quality; globalization.

JEL Codes: O15, E25, O4, F6, E24.

* Corresponding author: Kemal Erkişi. *E-mail: kemal.erkisi@antalya.edu.tr*

1. Introduction

Academic interest in the relationship between economic complexity and income inequality has been increasing, especially when it comes to the interaction between the factors contributing to economic inequalities. Economic complexity, which captures the knowledge density embedded in a country's productive structure, can be associated with a variety of economic outcomes, including growth, development, and inequality (Hausmann et al., 2014). Notably, the channels through which economic complexity shapes income distribution are complex and involve essential interactions among various factors.

The expanding body of literature indicates that economic complexity has the potential to promote economic development; however, its impact on income inequality can be either ameliorated or exacerbated, contingent upon the strength of institutions and the extent of a country's integration into the global economy (Acemoglu & Robinson, 2012). It is clear that strong institutions are often linked with the effective distribution of income. This is facilitated by good governance, respect for the law, and ensuring that proceeds from economic engagement accrue to the majority (North, 1990). On the other part, globalization, which is very layered and rife with contradictions, does not have a simple consequence; it can either shrink or worsen income inequality. It depends on the interplay between globalization and the domestic economy and its legal systems (Rodrik, 2011).

A variety of economic theories form the foundation of this study's theoretical framework. Economic Complexity Theory states that the variations and sophistication in production capabilities of a country play a large role in its economic development; however, unless there are appropriate institutions and sophisticated policies in place to address these complexities, they may result in income inequality (Hausmann et al., 2014). The Human Capital Theory emphasizes the importance of education and skills in income distribution and states that such education and other human capital could help curb the impact of economic complexity on inequality (Becker, 1964). The Kuznets Curve Hypothesis states that initially with economic development, income inequality will increase but will thereafter fall as development continues (Kuznets, 1955). Besides, as an illustration of the transversal spin of the discipline, the Public Economics Approach brings into focus the influence of government policy through taxation and other redistributive measures on income distribution. Globalization and Trade Theory helps to explain how and under what conditions the internationalization of economic relations and trade can contribute to or combat the problem of disparity within a nation based on its economic and political field. Institutional Economics focuses on every system of governance, law, and property rights, stating that these are very critical in achieving fair economic

Studia Universitatis "Vasile Goldis" Arad. Economics Series Vol 35 Issue 4/2025
ISSN: 1584-2339; (online) ISSN: 2285 – 3065
Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 1-26

results. Furthermore, Development Traps and Core Periphery Models concentrate on why some inequalities remain persistent over long periods, and that is mainly because some countries or regions of the world are more complex than others, with the center benefiting more than the periphery from the economic complexity.

In the literature, it is seen that the factors affecting income distribution are directly examined, but the moderating effect between the variables is neglected. In this sense, there is a notable gap in the studies, which examine how economic complexity interacts with income inequality. This research investigates the effects of economic complexity on income distribution by taking into account the moderating effects of globalization and institutional quality. Furthermore, the study highlights a distinction by examining the distribution of personal income and the labor's portion of income using distinct models, all based on the principles of Economic Complexity Theory, The Human Capital Theory, Globalization Theory, and Institutional Economics The dataset encompasses the G7 countries from 1995 to 2022. We use the Panel Corrected Standard Errors (PCSE) technique, which takes into account cross-sectional dependence and heteroskedasticity to produce reliable results in parameter estimates.

Subsequent to this introduction, Section 2 outlines the theoretical and empirical literature concerning economic complexity, income inequality, institutional quality, and globalization. Section 3 constitutes the central component of the empirical study, detailing the methodological design, variables, graphical analyses of key variables, model specification, estimation strategy, and empirical findings. In conclusion, we present policy recommendations by examining the implications of the findings.

2. Theoretical and empirical literature

The dynamics of factors such as economic complexity, income inequality, institutional quality and globalization constitute a multi-faceted problem in the field of development economics. In this context, it will be important to understand how these components work together so as to be able to develop strategies that aim at equity both within and among countries. This section examines the theoretical framework and the practice that seeks to understand these interactions so as to give a picture of how economic complexity, human capital, institutions, globalization and public policy impact on income distribution. It is along these lines that we hope to give a workable structure in which our empirical analysis will be anchored. Economic Complexity Theory states that the capability of a certain nation to produce complicated goods—those that need a multi facets of ideas—is essential in defining its income distribution structure and development.

The Economic Complexity Index (ECI) created by Ricardo Hausmann and César Hidalgo captures the intricacies of the level of sophistication of the exports of

countries in terms of the knowledge embedded in those products (Hausmann & Hidalgo, 2011), meaning that it is second important after PCI Index. According to Hausmann and Klinger (2007), this theory is based on the premise that economic progress is not achieved through increasing capital or labor only, but it is determined by the knowledge that is productive and dispersed through people and companies. For instance, highly complex economies are more growth-prone, as they have more space for income growth through consumption, better innovation and production diversification, and development of the high value-added activities.

Economic complexity also has a direct relationship to income distribution, especially in income earning levels. Complexity of production oftentimes integrates highly educated personnel skilled in a variety of trades leading to broad-range economic engagement causing primary product dependence which is typically characterized by wealth concentration to decrease. Hence countries with an arguably higher economic complexity usually record a low 'GINI' index even when socio-economic variables like human capital and institutional quality are rendered constant (Hartmann et al., 2015; Hartmann et al., 2017). Such a framework allows us to understand how countries may escape the "middle-income trap", which normally appears after considerable progress has been achieved, by undergoing structural transformations and reform policies to promote more productive capabilities and uplift growth for all social strata narrows as well (Felipe et al., 2012).

This point of view is compounded by Human Capital Theory's stress on how education, skills and health enhance economic development as well as impact the distribution of income. Human capital enhancement and more particularly education, Schultz (1961) observes, is important for providing people with relevant knowledge and experience to be employed, hence narrowing the income gaps. However, in most cases, economically disadvantaged people are sometimes unable to access certain levels of education as compared to those affluent ones. This inequality in accessing resources causes a division of human capital among groups. Furthermore, technological progress has created the necessity for a more educated workforce that has resulted in such changes as skill-biased technological changes, leading to an increasingly wider income gap between skilled and unskilled workers. The health and educational system's response to this problem should include addressing education and health inequality, which is imperative for economic growth and poverty reduction strategies.

With regard to economic complexity and inequality, Institutional Economics adds another crucial perspective to the discussion of institutional context by focusing on various institutions including laws, rules, regulations, property and social norms. The formation of strong and inclusive institutions enables individuals to participate in the economy, secure their property and have access to equal opportunities which in

return enhance growth and reduce inequality (North, 1990). On the contrary, because of the extractive institutions, power and wealth are consolidated in the hands of the few while economic progress stops and inequality remains (Acemoglu & Robinson, 2012). Therefore, improving the institutional quality, for instance by implementing governance reform, fighting corruption, or supporting the rule of law, is essential for achieving sustainable growth and fairness of income distribution (Rodrik, Subramanian, & Trebbi, 2004).

In the area of Globalization and Trade Theory, one of the areas investigated is how interrelations created by trade, investment, and technology impact the economy and the distribution of income within the economy. One of the impacts of globalization is the ability to reach larger markets, which gives the opportunity to specialize in the industries with comparative advantages as well as to increase the transfer of technologies and lead to a rise in the economic complexity of any given country (Krugman, 1979). However, the effect of globalization on income dispersion remains quite complicated. As globalization can increase the wages of individuals in the export-oriented sectors, such growth can also reinforce wage inequality by outsourcing employees in the less competitive sectors of the economy and raising the demand for skilled labor, thereby increasing the gulf between the skilled and unskilled labor (Autor, Dorn, & Hanson, 2013). The case of globalization is the other side of this argument, especially for developing countries, the outcome may be different it can also stimulate growth by participating in the Global Value Chains but it can also encourage low value-added production, which in turn, has severe income distributions if not controlled properly (Gereffi & Fernandez-Stark, 2011).

Public Economics is particularly suited to address some of the issues brought about by the complexity of the economy and the uneven distribution of income. More specifically, there are government policies that aim at addressing market imperfections, income redistribution, or provision of public goods which can form the basis of attaining inclusive growth. Inherent within these characteristics is the need for public outlay in education, healthcare, and infrastructure essential for the accumulation of social capital and undertakings of complicated constructive industries that require human capital primarily (Barro, 1990). Besides, progressive taxation and welfare programs are effective means of income redistribution, leveling inequalities, and optimizing economic complexity's benefits across society (Musgrave & Musgrave, 1989).

Development Traps and Core-Periphery Models further understand the economic forces that hinder countries or regions from escaping economic complexity and inclusive growth. A country or region systemically catches low-income equilibrium due to poor health, education and institutions and no market diversification and structural change takes place (Azariadis & Drazen, 1990). Core-periphery models

explain the geographical realities where wealth and economic activities are concentrated in core regions while peripheral regions are economies of dependence and marginalization in most time engage in low complexity low value-added production systems (Wallerstein, 1974). Such traps can be avoided by putting minimum investments in education, infrastructure, technology and development policy which does not promote dependency on core areas but rather equal growth out across the peripherals.

It has been stated that more advanced economies, in the form of economic complexity, are associated with lower levels of income inequality, given that such complexity advocates for more diversified production along with a bigger need for skilled labor which decreases wage differentials (Hartmann et al, 2015). Further, studies have also claimed that the quality of institutions may moderate the relationship between economic complexity and income inequality. For instance, Chen et al (2018) have found that higher economic complexity combined with institutional strength reduces income inequality by facilitating a more balanced pattern of economic growth and income distribution. Stakeholders could claim that, however, the opposite might be true in that the economic complexity factors do have a negative effect on the income distribution since the institutional settings are weak (Nadeem et al, 2021).

Though globalization may be regarded as a major contributor to economic prosperity, its influence on income distribution remains contentious. There are situations where globalization actually increases income inequality, particularly amongst lower-income nations by creating a high demand for skilled human capital, thus forcing less competitive industries to let go of some employees (Roy-Mukherjee & Udeogu, 2020). Where inequality and measures of globalization exist, it lies in how institutions are organized within a given nation. Thus better institutional quality may help minimize the adverse effects of globalization on disparities in income by increasing the degree to which people are included in the economy and the ways the fruits of globalization are more equally distributed (Ali & Ahmad, 2021). The impact of globalization and it's, or their issues, can either widen or narrow income inequality depending on the institutional framework prevailing in any nation. For instance, in nations with less functional institutions, globalization is associated with widening wealth disparity in advanced economies as people may not be able to access many benefits aimed at all people from global business without or little redistribution (Omosuyi, 2023). On the other hand, in nations with well-functioning institutions, globalization has been argued to reduce the income gap by enhancing the concentration of the economy where growth is focused on all people, and poverty eradication programs are implemented (Buhari et al., 2020).

Studia Universitatis "Vasile Goldis" Arad. Economics Series Vol 35 Issue 4/2025
ISSN: 1584-2339; (online) ISSN: 2285 – 3065
Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 1-26

Besides that, institutional quality forms the relationship between economic complexity and globalization with income distribution. There is a need for a political and legal framework within which income distribution can be managed, and economic complexity can produce positive equity effects (Josifidis et al., 2017). For instance, it has been discovered that institutional quality moderates the nexus between financial development and environmental sustainability, where better institutions are said to promote the benefits of growth without the ills of income inequality (Hunjra et al., 2020). Other investigations have also looked at the relationship between institutional quality, economic complexity and environmental sustainability and its effect on income inequality. In particular, the phenomenon is observed in emerging market economies in which rising economic complexity also leads to more environmental pollution with deteriorating further income distribution. However, strong institutions can improve and support environmental sustainability and in turn lower the level of inequity within the society (Ahmad et al., 2021).

The empirical evidence shows that economic complexity and globalization are important sources of economic growth in the modern ideal structure of the economy. However, their effect on income inequality varies with the quality of institutions. To address income inequality, strong institutions not only maximize the benefits of economic complexity and globalization but also contain their possibly adverse effects on income inequality. Hence, institutional quality improvement policies are necessary in order for the society to enjoy the advantages that come with economic complexity and globalization in a more equitable way.

3. Empirical analysis

3.1. Methodology design

In designing the methodology for this study, we aimed to accurately capture the relationships between income inequality, economic complexity, and other macroeconomic variables across a panel of countries over time. The analysis is structured to address the unique characteristics of panel data, which combines both cross-sectional and time-series dimensions, making it essential to account for potential interdependencies and variations across countries and years.

The first step involved specifying the variables of interest, which include income inequality, economic complexity, institutional quality, globalization, economic growth, and human capital. Each variable was selected based on its theoretical relevance and empirical significance in the existing literature. Given that our data spans seven countries over the period from 1995 to 2022, the panel structure is well-suited to exploring long-term relationships among these variables.

To ensure the robustness of our model, we conducted a series of pre-estimation tests. These tests included checks for cross-sectional dependence, slope homogeneity, unit

root properties, and potential issues such as multicollinearity, heteroskedasticity, autocorrelation, endogeneity, and panel cointegration tests. The results of these tests guided the selection of the most appropriate estimation method, ensuring that our model could accurately reflect the underlying data structure and relationships.

Recognizing the complexities inherent in panel data, including mixed integration orders, the presence of cross-sectional dependencies and heteroskedasticity, our methodological approach is tailored to handle these challenges effectively. By integrating these considerations into the design of our methodology, we have laid a solid foundation for conducting reliable analysis, which is critical for deriving meaningful insights from the data.

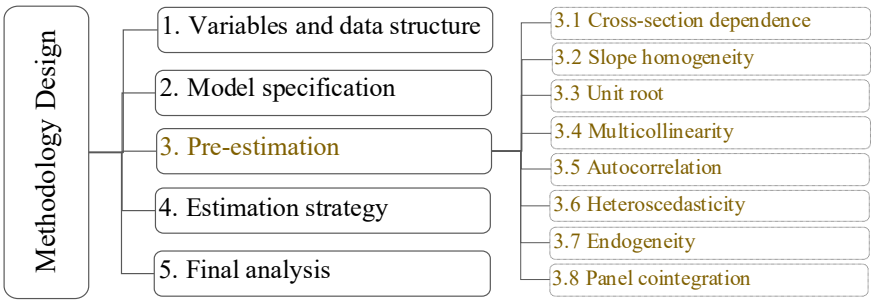


Figure 1. Methodology design
Source: Author's view

3.2. Dataset and variables

Table 1 presents the key variables used in the study, including their abbreviations, proxies, and data sources. The variables encompass various aspects of economic and social dimensions relevant to the analysis of income inequality and labor income share within G7 countries. Income distribution is measured by the Gini index (IE), sourced from the Standardized World Income Inequality Database (SWID), while labor income share (LS) as a percentage of GDP is obtained from the Penn World Table (PWT). Economic complexity (EC), an index reflecting the diversity and sophistication of a country's exports, is derived from the Harvard Atlas of Economic Complexity. Institutional quality (IQ) is captured through a composite index from the Worldwide Governance Indicators (WGI), which includes metrics such as voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption.

Table 1. Variables

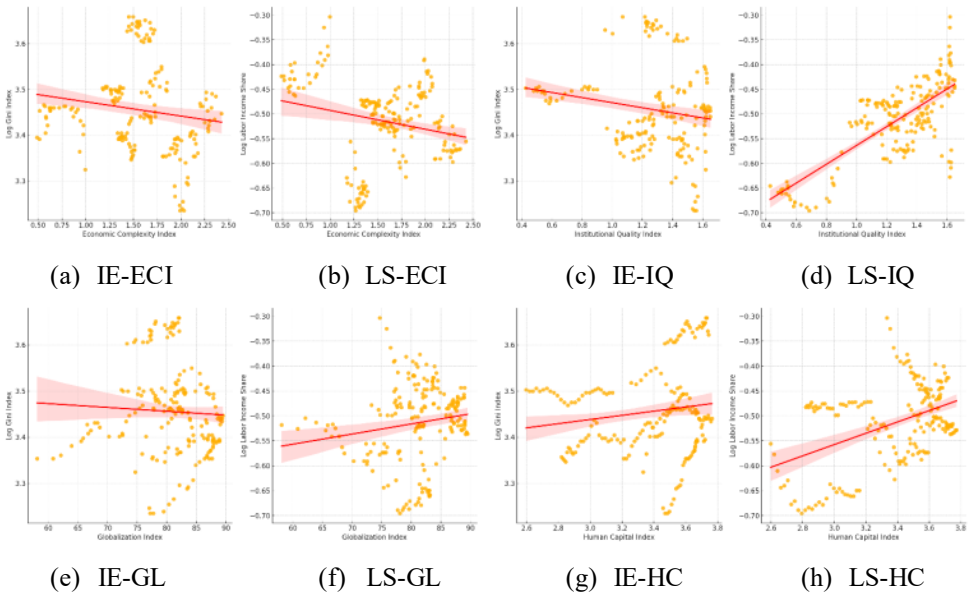
Variable	Abbr.	Proxy	Database
Income distribution	IE	Gini index	SWID
Labor income share	LS	Labor income share as a percent of GDP (%)	PWT
Economic complexity	EC	Economic complexity index	HL
Institutional quality	IQ	Institutional quality composite index	WGI
Globalization	GL	Globalization composite index	KOF
Economic growth	EG	GDP (constant 2015 US$)	WB
Human capital	HC	Index of human capital per person, based on years of schooling and returns to education	PWT

Source: "SWID [The Standardized World Income Inequality Database (Solt, F., 2019)], PWT (Penn World Table 10.01), WGI (Daniel Kaufmann and Aart Kraay (2023) Worldwide Governance Indicators, 2023 Update (www.govindicators.org), HL (Harvard Atlas of Economic Complexity Dataverse), KOF (KOF Swiss Economic Institute)"

Globalization (GL), a composite index from the KOF Swiss Economic Institute, measures the economic, political, and social dimensions of globalization. Economic growth is represented by GDP per capita in constant 2015 US dollars (EG), sourced from the World Bank (WB), and human capital (HC) is quantified by an index based on years of schooling and returns to education from the Penn World Table. This detailed compilation of variables sets the foundation for the subsequent model specifications, where the relationships between economic complexity, income inequality, and labor income share are examined with the moderating effects of institutional quality and globalization, aligning closely with the study's objectives.

3.3. Interrelations among key variables

In Figure 2 (a), as economic complexity increases, there appears to be a trend where income inequality, as measured by the Gini Index, tends to decrease, indicating an improvement in personal income distribution. This suggests that more complex economies may promote a fairer distribution of income among individuals. However, in Figure 2 (b) the same increase in economic complexity is also associated with a decline in the share of labor income within the total income. This implies that as economies become more complex, while the overall income distribution might improve, the portion of income that accrues to labor diminishes. This finding highlights a potential trade-off in complex economies where gains in equality might come at the cost of a reduced share of income going to labor.



(a) IE-ECI (b) LS-ECI (c) IE-IQ (d) LS-IQ

(e) IE-GL (f) LS-GL (g) IE-HC (h) LS-HC

Figure 2. Connections between key variables
Source: Author's plot

Figure 2 (c) shows that when the institutional quality index grows, the Gini index tends to drop. That is, stronger institutional quality correlates with reduced personal income inequality. This indicates that nations with stronger institutions, as evidenced by improved governance, rule of law, and political stability, have a more equitable distribution of personal income. On the other hand, Figure 2 (d) illustrates that a rise in institutional quality is associated with a rise in labor income share. This suggests that as institutional quality improves, both personal income distribution becomes more equitable, and the labor share of income increases.

Figure 2 (e) shows that as the globalization index increases, there is a slight decrease in the Gini index. This implies that a modest reduction in income inequality may be associated with higher levels of globalization. That is, nations with greater global integration may see a fairer distribution of income among their citizens. Figure 2 (f) reveals a clear trend: labor income shares increase with rising globalization. We may argue that globalization has a positive impact on both personal income and labor income.

Figure 2 (g) shows a slight increase in the Gini index as the Human Capital Index rises. In other words, higher levels of human capital are linked to greater income inequality. This suggests that while education and skills development boost human capital, they may not immediately result in a more equitable income distribution. In contrast, Figure 2 (h) illustrates that an increase in the Human Capital Index is also associated with a clear increase in the labor income share. This indicates that improvements in human capital contribute to a rising share of income allocated to labor. We may argue that enhancements in human capital can drive inequality while also increasing labor's share of income. This may result from shifts in economic structures or the growing importance of skilled labor in capital-intensive industries.

3.4. Model specification

We commence our empirical analysis by specifying two primary models to examine the relationship between economic complexity and income inequality (Model 1), and between economic complexity and labor income share (Model 2), within the context of G7 countries over the period 1995 to 2022. In Model 1, the dependent variable is income inequality (IE), while in Model 2, the dependent variable is labor income share (LS). The independent variables include economic complexity (EC), institutional quality (IQ), globalization (GL), economic growth (EG), and human capital (HC). To explore the moderating effects, interaction terms are included between economic complexity and both institutional quality ($EC_{it} * IQ_{it}$) and globalization ($EC_{it} * GL_{it}$). Because the impact of economic complexity on income inequality varies depending on the levels of institutional quality and globalization, the model incorporates the moderating effects of institutional quality and globalization to explore how these factors influence the primary relationships.
We can express the functional form of Model 1

$$IE = f(EC, \quad IQ, \quad GL, \quad EG, \quad HC) \qquad (1)$$

This functional form indicates that income inequality (measured by the Gini index, IE) is hypothesized to be influenced by economic complexity (EC), institutional quality (IQ), globalization (GL), economic growth (EG), and human capital (HC). Equation 2 specifies the econometric form of the model:

$$lnIE_{it} = \beta_0 + \beta_1 lnEC_{it} + \beta_2 lnIQ_{it} + \beta_3 lnGL_{it} + \beta_4 lnEG_{it} + \beta_5 lnHC_{it} + \varepsilon_{it} \qquad (2)$$

t (year): 1995…2022; i (country): 1…7

This equation estimates the log-transformed relationship between income inequality and the independent variables, accounting for country-specific effects (i) and time-specific effects (t).

Equation 3 introduces interaction terms to capture the moderating effects

$$lnIE_{it} = \beta_0 + \beta_1 lnEC_{it} + \beta_2 lnIQ_{it} + \beta_3 lnGL_{it} + \beta_4 lnEG_{it} + \beta_5 lnHC_{it} + \beta_6(EC_{it} * IQ_{it}) + \beta_7(EC_{it} * GL_{it}) + \varepsilon_{it} \quad (3)$$

This specification brings together interaction terms between economic complexity and both institutional quality and globalization. These terms $(EC_{it} * IQ_{it})$ and $(EC_{it} * GL_{it})$ capture the moderating effects of institutional quality and globalization on the relationship between economic complexity and income inequality.

We can express the functional form of Model 2 as in Equation 4:

$$LS = f(EC, \quad IQ, \quad GL, \quad EG, \quad HC) \quad (4)$$

This model posits that labor income share (LS) is influenced by the same set of variables as in Model 1: economic complexity, institutional quality, globalization, economic growth, and human capital.

Equation 5 provides the econometric specification of Model 2:

$$lnLS_{it} = \beta_0 + \beta_1 lnEC_{it} + \beta_2 lnIQ_{it} + \beta_3 LnGL_{it} + \beta_4 LnEG_{it} + \beta_5 LnHC_{it} + \varepsilon_{it} \quad (5)$$

t (year): 1995…2022; i (country): 1…7

This model estimates the log-transformed relationship between labor income share and the independent variables as in Model 1.

Equation 6 expands the model by adding interaction terms similar to Model 1

$$lnLS_{it} = \beta_0 + \beta_1 lnEC_{it} + \beta_2 lnIQ_{it} + \beta_3 lnGL_{it} + \beta_4 lnEG_{it} + \beta_5 lnHC_{it} + \beta_6(EC_{it} * IQ_{it}) + \beta_7(ECI2_{it} * GL_{it}) + \varepsilon_{it} \quad (6)$$

This equation includes interaction terms to evaluate how institutional quality and globalization moderate the effect of economic complexity on labor income share.

In order to measure the net impact of the interaction terms on the dependent variables, partial derivatives are calculated. For Model 1, the moderating impact of

Studia Universitatis "Vasile Goldis" Arad. Economics Series Vol 35 Issue 4/2025
ISSN: 1584-2339; (online) ISSN: 2285 – 3065
Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 1-26

institutional quality is given by Eq.7, and the moderating impact of globalization is given by Eq.8. Similarly, for Model 2, the moderating impacts on labor income share are captured by Eq.9 and Eq.10.

Table 2. Moderating impact of institutional quality and globalization

	Moderating the impact of IQ	Moderating the impact of GL
Model 1	$\frac{\partial lnIE}{\partial lnEC} = \beta_1 + \beta_6 IQ$ (7)	$\frac{\partial lnIE}{\partial lnEC} = \beta_1 + \beta_7 GL$ (8)
Model 2	$\frac{\partial lnLS}{\partial lnECI} = \beta_1 + \beta_6 IQ$ (9)	$\frac{\partial lnLS}{\partial lnEC} = \beta_1 + \beta_7 GL$ (10)

Source: author's view

In the specified models, the interaction terms $(EC_{it} * IQ_{it})$ and $(EC_{it} * GL_{it})$ are crucial for assessing how institutional quality and globalization, respectively, moderate the effect of economic complexity on income inequality (Model 1) and labor income share (Model 2).

The interaction term $(EC_{it} * IQ_{it})$ captures how the impact of economic complexity (EC) on the dependent variables changes as institutional quality (IQ) varies. A significant and positive coefficient for this interaction term (β_6) would indicate that higher institutional quality amplifies the effect of economic complexity on the dependent variable. Conversely, a significant and negative coefficient suggests that higher institutional quality dampens this effect. For instance, if $\beta_6 > 0$, the relationship between economic complexity and income inequality strengthens (becomes more positive or less negative) as institutional quality improves, indicating that robust institutions enhance the influence of economic complexity on income distribution. On the other hand, if $\beta_6 < 0$, higher institutional quality mitigates the effect of economic complexity, potentially leading to more equitable income distribution or a reduced impact on labor income share.

Similarly, the interaction term $(EC_{it} * GL_{it})$ captures the moderating role of globalization on economic complexity. In this regard, a positive coefficient for this interaction term (β_7) means that globalization intensifies the effects of economic complexity on dependent variables. Conversely, a negative coefficient means that globalization reduces the impact of economic complexity. Specifically, when the value of β_7 is greater than zero, the correlation between economic complexity and income inequality or labor income share becomes more pronounced with the growth of globalization. The implication is that increased integration into the global

economy amplifies the influence of economic complexity. When the value of β_7 is less than 0, globalization diminishes the impact of economic complexity. That is, it has the potential to decrease income disparity or promote stability in the labor income contribution.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
IE	203	31.83	3.02	25.40	38.80
LS	203	0.60	0.05	0.50	0.74
EC	203	1.55	0.46	0.46	2.43
IQ	203	1.26	0.31	0.43	1.65
GL	203	81.08	6.06	58.08	89.59
EG	203	39282	7698	29265	65020
HC	203	3.39	0.31	2.60	3.78

Source: author's computation

The income distribution, represented by the Gini index, shows a mean value of 31.83 with moderate variability, indicating differences in income inequality across the sample. Germany, with the lowest Gini index of 25.40, suggests a more equal income distribution, while the United States, with the highest value of 38.80, points to significant income inequality. Labor income share as a percentage of GDP averages at 60%, with relatively low variability across countries. The data reveals that labor's contribution to GDP is fairly consistent, although Canada, with a 74% share, and Italy, with only 50%, represent the upper and lower bounds, respectively, highlighting notable differences in the economic structures of these countries. The mean value of the economic complexity is 1.55, with significant variance ranging from 0.46 in Canada to 2.43 in Japan. The vast range seen in this context is indicative of the difference in economic structures across nations. Japan's high economic complexity signifies a sophisticated and varied economy, whilst Canada's modest score implies a less complex economic framework. Institutional quality, with a mean of 1.26 and a standard deviation of 0.31, is a significant factor that includes aspects such as representation and responsibility, political stability, government efficiency, regulatory excellence, adherence to legal principles, and prevention of corruption. Canada, with the highest score of 1.65, demonstrates robust institutional quality, while Italy's score of 0.43 suggests notable difficulties in these domains. On average, the Globalization Index, which quantifies the level of economic, political, and social integration into the global economy, is at 81.08. The index varies from 58.08 in Japan to 89.59 in Germany. The present index indicates that while the majority of nations exhibit a significant degree of globalization, notable disparities persist, notably in

Japan, which has the least degree of globalization among the countries included in the sample. The mean value of economic growth, as assessed by GDP per capita, is $39,282. The United States has the highest increase at $65,020, while Italy has the lowest at $29,265. Ultimately, the Human Capital Index, which considers both the duration of schooling and the benefits derived from education, has an average of 3.39. The United Kingdom has the greatest score of 3.78, while Italy has the lowest. This observation implies that there is a significant variation in educational achievement and the resulting economic advantages, which in turn affects the capacity of each nation to achieve sustainable economic growth and development.

3.5. Pre-estimations

Examining both the presence of cross-sectional dependence and the homogeneity of slopes across units helps us to obtain a complete picture of interactions in panel data. These elements are critical in choosing the appropriate technique and ensuring the validity of the findings. Table 4 summarizes the results testing for the presence of cross-sectional dependence and the results of the slope homogeneity test.

Table 4. Panel-specific test results

Cross-sectional dependence tests				
Variables	CD	CDw	CDw+	CD*
LnIE	1.150	-2.360**	50.320***	0.130
LnEC	8.410***	0.790	61.060***	-1.550
LnIQ	6.650***	-0.020	73.350***	4.930***
LnGL	23.790***	10.120***	119.130***	-6.900***
LnEG	21.770	9.020***	108.800***	-1.530
LnHC	24.260***	10.440***	121.610***	-3.390***

Slope homogeneity tests		
Tests	Stat.	p-value
Swamy S test	4084.68*	0.000
Delta adj test	0.569	0.569

Note: *** p<.01, ** p<.05, * p<.10. Source: author's computation.

The Pesaran (2015, 2021) CD test, along with Juodis and Reese's (2021) CDw test, Fan et al. (2015) CDw+ test, and the Pesaran and Xie (2022) CD* test are used to examine cross-sectional dependence across the variables. For LnIE and LnEC, results are mixed, with some tests indicating weak dependence while others suggest strong dependence. LnIQ, LnGL, LnEG, and LnHC show consistent evidence of strong cross-sectional dependence, as most tests reject the null hypothesis of weak dependence. These findings suggest significant interconnections among the cross-sectional units in the data, particularly for LnIQ, LnGL, LnEG, and LnHC. These

results revealed significant cross-sectional dependence across most of the variables in our panel. This indicates that the economic shocks affecting one country may have spillover effects on others that lead to correlated errors across the panel units.

In addition to the CD test in Table 4, the slope homogeneities are tested with the help of Swamy's S Test (Swamy, 1970) and Pesaran and Yamagata (2008) Delta test. Swamy's S test yielded a Chi2 value of 4084.68 with a p-value of 0.000, strongly rejecting the null hypothesis of slope homogeneity. This indicates significant evidence of slope heterogeneity across the cross-sectional units in the panel data. In contrast, the Adjusted Delta test produced p-values of 0.569, which are not statistically significant. These results suggest that the slopes may be homogeneous across the cross-sections. The contradictory outcomes from these tests could stem from differences in their power, assumptions, or the specific characteristics of the data. However, given the strong rejection by Swamy's S test, slope heterogeneity seems more likely that the cross-sectional units exhibit different behaviors. This suggests that the relationship between the independent variables and the dependent variable differs significantly across countries.

Table 5 presents the results of the Pesaran CIPS (2007) and Pesaran CADF (2003) panel unit root tests. The Pesaran CIPS test results show that IQ (2.384), GL (-2.447), and HC (-2.467) show significant test statistics at the 5% level. These outcomes indicate that these variables are stationary at the level. In contrast, IE (-1.794), LS (-2.272), EC (-1.794), and EG (-0.789) are non-stationary at the level because of that their test statistics do not reach the critical thresholds. After differencing, the non-stationary variables become stationary, with highly significant test statistics, e.g., IE (-4.561), EC (-4.561), and EG (-4.168). That is, they are integrated into order I(1).

The Pesaran CADF test provides similar results but with some differences. At the level, IQ (-2.367), and HC (-2.426) show significant test statistics at the 5% level. However, other variables, including IE (-2.078), LS (-2.272), EC (-2.015), GL (-1.929), and EG (-1.050), are non-stationary at the level because of that their test statistics do not surpass the critical values. Like in the CIPS test, these non-stationary variables become stationary after taking the first difference, as indicated by the significant test statistics e.g., IE (-2.785), LS (-3.653), EC (-3.848), and EG (-3.172). That is they are I(1).

In the CIPS and CADF tests, the dataset exhibits mixed integration orders, with some variables being stationary at the level (I(0)) and others requiring differencing to become stationary (I(1)). IQ and HC are stationary at the level across both tests. That is, they are I(0). In contrast, IE, LS, EC, and EG are non-stationary at the level but become stationary after differencing. In other words, they are I(1). GL shows mixed results, being stationary in the CIPS test at the level but not in the CADF test. This suggests that the integration order of variables is either I(0) or I(1).

Studia Universitatis "Vasile Goldis" Arad. Economics Series Vol 35 Issue 4/2025
ISSN: 1584-2339; (online) ISSN: 2285 – 3065
Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 1-26

Table 5. CIPS – CADF unit root tests

	Pesaran CIPS Test 2007		Pesaran CADF Test 2003	
	Level	1st difference	Level	1st difference
IE	-1.794	-4.561***	-2.078	-2.785***
LS	-2.272	-4.680***	-2.272	-3.653***
EC	-1.794	-4.561***	-2.015	-3.848***
IQ	2.384**	-	-2.367**	-
GL	-2.447**	-	-1.929	-3.043***
EG	-0.789	-4.168**	-1.050	-3.172***
HC	-2.467**	-	-2.426**	-

Note: %5 and %1 critical values are -2.33 and -2.57 respectively.
Source: author's computation.

Table 6. Karavias and Tzavalis structural brake panel unit root test

	Level			1st difference		
	Z_{min}-stat.	crtical V.	p-value	Z_{min}-stat.	Critical V.	p-value
IE	0.1507	-0.5968	1.0000	-4.1047	-2.9136	0.0000
LS	-0.0004	-0.0010	0.3400	-0.0074	-0.0076	0.0500
EC	-0.0296	-0.0577	0.1800	-0.4644	-0.2415	0.0000
IQ	-0.0028	-0.0151	0.7000	-0.3263	-0.2630	0.0100
GL	-0.2802	-0.6811	0.4900	-18.2503	-3.0478	0.0000
EG	0.1780	-2.0810	0.8200	-23.3569	-1.3521	0.0000
HC	0.0002	-0.0001	1.0000	-0.0004	-0.0003	0.0200

Note: Heteroskedasticity and CD are considered to identify an unknown break; Zmin-statistic calculated with 5% bootstrap critical value. Source: author's computation.

Table 6 presents the results of a structural break panel unit root test by employing the Karavias and Tzavalis (2014) method, which considers cross-section dependence and heteroskedasticity. All variables in the dataset are non-stationary at the level, as indicated by high Z_{min}-statistics and p-values. However, after taking the first difference, all variables become stationary, with Z_{min}-statistics significantly lower than the critical values and p-values dropping to near zero. This indicates that the variables are integrated in the same order, specifically I(1), as they achieve stationarity only after differencing.

Table 7. Multicollinearity, heteroscedasticity, autocorrelation, and endogeneity

	White	Wooldridge	VIF	Durbin (χ2)	Wu-Hausman (F)
Model I	157.48***	173.833***	1.69	1.604 (p=0.21)	1.55 (p=0.21)
Mode II	122.72***	27.829**	1.83	0.155 (p=0.70)	0.149 (p=0.69)

Note: *** p<.01, ** p<.05, * p<.10. Source: author's computation.

Table 7 summarizes the results of tests for multicollinearity, heteroscedasticity, and autocorrelation across two models. The table shows that both models exhibit significant heteroscedasticity and autocorrelation, as indicated by the White and Wooldridge test results. These issues, if unaddressed, could lead to biased standard errors and unreliable statistical inference in parameter estimations. The mean VIF values, 1.69 for Model I and 1.83 for Model II, suggest that multicollinearity is not a significant issue in either model. These findings suggest that while the models may suffer from heteroscedasticity and autocorrelation, multicollinearity does not pose a significant issue. The endogeneity tests, indicated by the Durbin (score) and Wu-Hausman tests, both show p-values above conventional significance levels (0.21 and 0.70, respectively). Since these values do not reject the null hypothesis of exogeneity, we can conclude that the variables in question are likely exogenous and not subject to endogeneity concerns. These results, along with those presented in Table 3, will be considered in determining the most suitable panel data estimation method to generate unbiased results.

Table 8. Panel Cointegration test

	Model-1			Model-2		
Statistic	Value	Z-value	p-value	Value	Z-value	P-value
Gt	-2.726	1.921	0.027	-2.161	1.967	0.025
Ga	-10.355	0.177	0.430	-6.265	0.214	0.416
Pt	-7.444	2.499	0.006	-5.873	2.554	0.005
Pa	-9.973	1.396	0.081	-6.196	1.996	0.023

Source: author's computation.

Table 8 presents the results of the Westerlund ECM panel cointegration tests for two models. The tests assess whether a long-term equilibrium relationship exists between the variables in the panel data. In both models, the Gt and Pt statistics are significant, indicating evidence of cointegration, meaning a stable long-term relationship is present. However, the Ga statistic does not show significance in either model, suggesting that the evidence for cointegration is not consistent across all test statistics. These results imply that while the models exhibit some mixed evidence, there is generally strong support for the presence of a long-term equilibrium relationship among the variables in both models.

3.6. Estimation strategy and estimations

Given the characteristics of our panel data, the Panel Corrected Standard Errors (PCSE) method was selected to address several critical issues identified during pre-estimation testing. Significant cross-sectional dependence among the variables

indicated that shocks in one country could influence others. The presence of slope heterogeneity, as revealed by Swamy's S test, further supported the use of PCSE. Because PCSE does not assume homogeneity across units and can accommodate differing relationships between variables across countries. Additionally, the detection of heteroskedasticity and autocorrelation reinforced the choice of PCSE, which provides robust standard errors in the presence of these issues. The data's mixed integration orders, with some variables being stationary at the level and others requiring differencing. These outcomes also favored PCSE, which handles such complexities without imposing strict stationarity assumptions. Finally, the absence of significant multicollinearity and endogeneity was confirmed through VIF and endogeneity tests. These outcomes allow us to focus on correcting for heteroskedasticity and cross-sectional dependence without requiring more complex adjustments. Considering these factors, PCSE is determined to be the most appropriate method for generating reliable unbiased estimates.

Table 9. Estimations

	Model 1		Model 2	
Variables	(1) LnIEE	(2)LnIEE	(3)LnLS	(4)LnLS
LnEC	0.0323***	0.118**	- 0.334***	-0.186*
	(2.679)	(2.240)	(.0989)	(-1.699)
LnIQ	- 0.0413**	- 0.135***	0.259***	0.237***
	(-2.419)	(-3.392)	(.0486)	(.0481)
LnGL	0.00724	0.065	- 0.168	- 0.256**
	(0.100)	(0.662)	(.1198)	(.1043)
LnEG	0.272***	0.329***	- 0.131***	- 0.121***
	(7.177)	(8.597)	(.0406)	(.0372)
LnHC	- 0.204***	- 0.128*	0.271**	0.377***
	(-2.842)	(-1.740)	(2.536)	(.0926)
$(EC * IQ)$	.	- 0.0413**	.	0.084***
	.	(.0170)	.	(.0216)
$(EC * GL)$	.	- 0.0735***	.	- 0.128***
	.	(.0200)	.	(.0251)
Constant	0.814**	0.811***	0.689	1.201**
	(2.194)	(.3708)	(.458)	(.557)

Note: z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
Source: author's computation.

Table 9, Model 1 and Model 2 show how economic complexity, institutional quality, globalization, economic growth and human resources affect income inequality

(LnIE) and labor income share (LnLS). While Model 1 (1) and Model 2 (1) are the basic models of our research, Model 1 (2) and Model 2 (4) include interaction terms capturing the moderating effects of institutional quality and globalization are the models that fully meet the subject of our research. Model 1 (1) and Model 2 (1) were created to see the situation where there are no moderator effects.

In Model 1 (1), the results show that economic complexity (LnEC) has a positive and statistically significant effect on income inequality. In this case, as economic complexity increases, personal income equity deteriorates. In contrast, institutional quality (LnIQ) has a negative and significant effect on personal income inequality. This result shows that better institutional quality is associated with lower inequality. Globalization (LnGL) does not show a significant direct effect on income inequality in this specification. Economic growth (LnEG) positively affects income inequality, while human capital (LnHC) has a negative effect, indicating that higher levels of human capital are associated with reduced inequality.

Model 1 (2), which includes the interaction terms, shows that the positive effect of economic complexity on income inequality (LnEC) is amplified with a higher coefficient of 0.118, and remains significant. The negative impact of institutional quality (LnIQ) on income inequality is stronger in this specification, with a coefficient of -0.135, suggesting that institutional quality plays a crucial role in mitigating income inequality. The interaction term between economic complexity and institutional quality ($EC * IQ$) shows a coefficient of (-0.0413), which is statistically significant. This negative coefficient indicates that the impact of economic complexity on de income inequality diminishes as institutional quality improves. Essentially, higher institutional quality weakens the positive relationship between economic complexity and income inequality, suggesting that in countries with stronger institutional frameworks, an increase in economic complexity is associated with a smaller rise in income inequality. This could be attributed to more effective governance and equitable distribution mechanisms. Additionally, the interaction between economic complexity and globalization ($EC * GL$) has a coefficient of (-0.0735), which is also significant and negative. This suggests that as globalization increases, the relationship between economic complexity and income inequality weakens. In more globalized countries, the rise in economic complexity contributes less to income inequality, potentially due to the inclusive effects of globalization, such as increased market access, technology transfer, and better integration into the global economy, which can help distribute economic gains more evenly.

In Model 2 (3), which examines labor income share, economic complexity (LnEC) negatively impacts labor income share with a coefficient of -0.334, indicating that higher economic complexity is associated with a lower share of income going to

Studia Universitatis "Vasile Goldis" Arad. Economics Series Vol 35 Issue 4/2025
ISSN: 1584-2339; (online) ISSN: 2285 – 3065
Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 1-26

labor. Institutional quality (LnIQ) positively affects labor income share, while globalization (LnGL) does not show a significant direct effect. Economic growth (LnEG) negatively affects labor income share, and human capital (LnHC) has a positive and significant effect.

Model 2 (4), which incorporates interaction terms, shows a weaker negative effect of economic complexity on labor income share (coefficient of -0.186), though it remains significant. The positive effect of institutional quality (LnIQ) on labor income share is maintained with a coefficient of 0.237. The interaction term between economic complexity and institutional quality ($EC * IQ$) has a positive coefficient of (0.084), indicating that higher institutional quality amplifies the relationship between economic complexity and labor income share. This suggests that in countries with stronger institutions, the effect of economic complexity on increasing labor's share of income is enhanced, as good governance and institutional effectiveness help channel the benefits of economic complexity toward labor. On the other hand, the interaction between economic complexity and globalization ($EC * GL$) shows a coefficient of (-0.128), which is significant and negative. This finding suggests that as globalization increases, the positive effect of economic complexity on labor income share decreases. In highly globalized countries, the benefits of increased economic complexity may not fully translate to labor, potentially due to factors like global competition, offshoring, or other dynamics that reduce the labor share in complex economic activities.

4. Conclusions

This study examines the connections between income inequality and economic complexity in G7 countries from 1995 to 2022, with a focus on the moderating effects of institutional quality and globalization. We have established two distinct models for the dependent variable of income inequality, which takes into account the distribution of personal income and labor income share. The independent variables affecting income inequality are economic complexity, institutional quality, globalization, economic growth, and human capital.

In the empirical analysis, two models are used to separately examine the cases where institutional quality and globalization have and do not have a moderating effect on economic complexity. As shown in Model 1(1), the results of the analysis without considering the moderating effects of institutional quality and globalization reveal a positive relationship between economic complexity and personal income inequality. This suggests that economic complexity generally has a negative impact on personal income inequality. In Model 2(1), without considering moderating effects, there is an observed inverse relationship between economic complexity and labor income share. Simply put, when economic complexity increases, the portion of income that

labor receives from the national income decreases. Without taking into account moderating effects, it is clear that economic complexity has a tendency to exacerbate personal income inequality and reduce labor's share of national income, thus having a negative impact on overall income distribution equity.

In Model 1(2) and Model 2(2), we examined how economic complexity impacts personal income distribution and labor's share of income. To account for the moderating roles of institutional quality and globalization, we included interaction terms in the model. In this particular context, it has been observed that taking into account the moderating effects of both variables, the presence of higher institutional quality can mitigate the adverse effects of economic complexity on income distribution. Put simply, activities like good governance, effective rule of law, and enhanced regulatory quality practices help ensure a fairer distribution of the benefits of complex economic activities among the population. Model 2(2) also arrived at a similar conclusion, with a specific focus on labor's share of income. More specifically, the moderating effect of institutional quality mitigates the negative impact of economic complexity on labor income share. Considering these two situations, it can be said that an increase in institutional quality not only reduces the negative impact of economic complexity on income inequality but also enhances its positive effect on labor income share.

Conversely, when considering the moderating effects, the estimation results indicate that globalization reduces the positive impact of economic complexity on both income inequality and labor income share. Given the nature of the Economic Complexity Index, which accounts for the diversity and sophistication of export baskets, these findings may seem contradictory. More precisely, industrialized nations with high degrees of economic complexity usually fit quite well into the global market. This viewpoint might imply that globalization should have a favorable moderating influence on economic complexity. Nevertheless, the study findings imply that because of rising global competitiveness and declining labor's share of income, globalization might put downward pressure on wages even in more advanced nations. These demands from worldwide competitiveness might result from cost-cutting strategies such as outsourcing, automation, or a move toward capital-intensive manufacturing. Therefore, this may cause a of lowering the percentage of income earned by workers. These results are supposed to adversely affect the equality of income distribution.

Moreover, the observed relationships might represent measurement subtleties or particular scopes for the research. Different aspects of economic integration and sophistication could be captured by the indices for economic complexity and globalization, possibly resulting in unintended dynamics like the change from manufacturing to service sectors in highly globalized environments, usually with

lower labor income shares. Furthermore, structural changes within complicated economies generated by globalization might lower the labor share even further because of the growing predominance of capital-intensive sectors.

These inferences lead to questioning the accepted understanding of how economic complexity, institutional quality, and globalization affect income inequality. Particularly in a global environment, this research emphasizes that the advantages of economic complexity do not always result in positive outcomes for labor income share or personal income equality. These extractions add important perspectives to the literature, highlighting the various effects of globalization and complexity in developed countries.

Emphasizing the effects of moderating factors on income distribution and framing them as new contributions to the understanding of how complexity and globalization interact in developed countries can help effectively communicate these results. That is, the factors - such as structural changes, global competitiveness, and distributional dynamics - help place the data within a broader economic context. On the other hand, when the results are evaluated from a policy perspective, we may suggest that in globally interconnected complex economies, traditional understandings of complexity and inequality may not hold, and customized strategies may be needed. Supporting labor and strengthening institutional structures can contribute to mitigating the negative effects of globalization and complexity on income distribution.

It is important to note possible limits in the data and model definitions, despite the fact that the research findings that take into account the impacts of moderators provide significant understanding. This is necessary to ensure scientific accuracy and clarity. Further research may potentially provide theoretical visions that account for the moderating impacts of institutional quality and globalization on economic complexity and therefore income inequality. Additional empirical research may be performed to explore similar dynamics across a broader variety of nations or over a longer period of time by considering other influencing factors in order to determine how generalizable the results are. This approach would not only improve our knowledge of the distributional impacts of economic complexity, but it might also result in more effective policy responses in developed and globalized economies.

Acknowledgments

The author thanks the anonymous reviewers and editors for their valuable contributions.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contributions

Kemal Erkişi was solely responsible for conceiving the study, designing the research, and developing the data analysis. He also carried out the data collection, performed the analysis and interpretation, and authored the literature review.

Disclosure Statement

The author declares no competing financial, professional, or personal interests.

References

1. Acemoglu, D., Robinson, J. A., (2012), Why nations fail: The origins of power, prosperity, and poverty. New York, NY: Crown Business.
2. Ahmad, M., Ahmed, Z., Majeed, A., Huang, B., (2021), An environmental impact assessment of economic complexity and energy consumption: Does institutional quality make a difference?, Environmental Impact Assessment Review, 89, 1-9. https://doi.org/10.1016/j.eiar.2021.106603.
3. Ali, S., Ahmad, N., (2021), Does institutional quality strengthen the globalization-growth nexus? A cross-country analysis, Preprint, Research Square. https://doi.org/10.21203/rs.3.rs-178902/v1.
4. Autor, D. H., Dorn, D., Hanson, G. H., (2013), The China syndrome: Local labor market effects of import competition in the United States, American Economic Review, 103(6), 2121-2168. https://doi.org/10.1257/aer.103.6.2121.
5. Autor, D. H., Katz, L. F., Krueger, A. B., (1998), Computing inequality: Have computers changed the labor market?, The Quarterly Journal of Economics, 113(4), 1169-1213. https://doi.org/10.1162/003355398555874.
6. Azariadis, C., Drazen, A., (1990), Threshold externalities in economic development, The Quarterly Journal of Economics, 105(2), 501-526.
7. Barro, R. J., (1990), Government spending in a simple model of endogenous growth, Journal of Political Economy, 98(5, Part 2), S103-S125. https://doi.org/10.1086/261726.
8. Buhari, D., Lorente, D. B., Nasir, M. A., (2020), European commitment to COP21 and the role of energy consumption, FDI, trade, and economic complexity in sustaining economic growth, Journal of Environmental Management, 273, 111146. https://doi.org/10.1016/j.jenvman.2020.111146.
9. Checchi, D., (2006), The economics of education: Human capital, family background, and inequality, Cambridge, England: Cambridge University Press.
10. Kaufmann D., Kraay, A., (2023), Worldwide Governance Indicators, 2023 update. https://govindicators.org. Accessed on 10/19/2023.
11. Fan, J., Liao, Y., Yao, J., (2015), Power enhancement in high-dimensional cross-sectional tests, Econometrica, 83(4), 1497–1541. https://doi.org/10.3982/ECTA12749.
12. Felipe, J., Kumar, U., Usui, N., Abdon, A., (2012), Why has China succeeded? And why it will continue to do so, Cambridge Journal of Economics, 37(4), 791-818. https://doi.org/10.1093/cje/bes058.

13. Gereffi, G., Fernandez-Stark, K., (2011), Global value chain analysis: A primer. Durham, NC: Center on Globalization, Governance & Competitiveness, Duke University.
14. Hartmann, D., Guevara, M. R., Jara-Figueroa, C., Aristarán, M., Hidalgo, C. A., (2017), Linking economic complexity, institutions, and income inequality, World Development, 93, 75-93. https://doi.org/10.1016/j.worlddev.2016.12.020.
15. Hausmann, R., Hidalgo, C. A., (2011), The network structure of economic output, Journal of Economic Growth, 16(4), 309-342. https://doi.org/10.1007/s10887-011-9071-4.
16. Hausmann, R., Klinger, B., (2007), The structure of the product space and the evolution of comparative advantage, CID Working Paper Series No. 146, Center for International Development, Harvard University.
17. Hunjra, A. I., Tayachi, T., Chani, M. I., Verhoeven, P., Mehmood, A., (2020), The moderating effect of institutional quality on the financial development and environmental quality nexus, Sustainability. https://doi.org/10.3390/su12093805.
18. Josifidis, K., Supic, N., Pucar, E. B., (2017), Institutional quality and income inequality in the advanced countries, Panoeconomicus, 64(2), 169-188. https://doi.org/10.2298/PAN1702169J.
19. Juodis, A., Reese, S., (2021), The incidental parameters problem in testing for remaining cross-section correlation, Journal of Business & Economic Statistics, 40(3), 1191–1203. https://doi.org/10.1080/07350015.2021.1906687.
20. Karavias, Y., Tzavalis, E., (2014), Testing for unit roots in short panels allowing for a structural break, Computational Statistics & Data Analysis, 76, 391-407. https://doi.org/10.1016/j.csda.2012.10.014.
21. Krugman, P. R., (1979), Increasing returns, monopolistic competition, and international trade, Journal of International Economics, 9(4), 469-479. https://doi.org/10.1016/0022-1996(79)90017-5.
22. Musgrave, R. A., Musgrave, P. B., (1989), Public finance in theory and practice. New York, NY: McGraw-Hill.
23. Nadeem, M., Anwar, M., Pervaiz, Z., (2021), Moderation effects of institutional quality, diversity, income inequality, and globalization on social cohesion: An empirical evidence, Journal of Parallel and Distributed Computing, 4(3), 207-231. https://doi.org/10.36968/JPDC-V04-I03-12.
24. North, D. C., (1990), Institutions, institutional change and economic performance. Cambridge, England: Cambridge University Press. https://doi.org/10.1017/CBO9780511808678.
25. Omosuyi, O., (2023), Globalization-health outcomes nexus and institutional intermediation in Nigeria, Journal of Economic and Administrative Sciences. https://doi.org/10.1108/jeas-05-2023-0115.
26. Pesaran, M. H., Xie, Y., (2022), A bias-corrected CD test for error cross-sectional dependence in panel data models with latent factors. Cambridge Working Papers in Economics, 2158. https://doi.org/10.48550/arXiv.2109.0040
27. Pesaran, M. H., (2015), Testing weak cross-sectional dependence in large panels, Econometric Reviews, 34(6–10), 1089–1117. https://doi.org/10.1080/07474938.2014.956623.

28. Pesaran, M. H., Yamagata, T., (2008), Testing slope homogeneity in large panels, Journal of Econometrics, 142(1), 50–93. https://doi.org/10.1016/j.jeconom.2007.05.010.
29. Pesaran, M.H., (2006), Estimation and inference in large heterogeneous panels with a multifactor error structure, Econometrica, 74, 967-1012. https://doi.org/10.1111/j.1468-0262.2006.00692.x.
30. Pesaran, M.H., (2007), A simple panel unit root test in the presence of cross-section dependence, Journal of Applied Econometrics, 22, 265-312. https://doi.org/10.1002/jae.951.
31. Pesaran, M.H., (2021), General diagnostic tests for cross-sectional dependence in panels. Empirical Economics, 60, 13–50 (2021). https://doi.org/10.1007/s00181-020-01875-7.
32. Rodríguez-Pose, A., Crescenzi, R., (2008), Research and development, spillovers, innovation systems, and the genesis of regional growth in Europe, Regional Studies, 42(1), 51-67. https://doi.org/10.1080/00343400701654186.
33. Rodrik, D., Subramanian, A., Trebbi, F., (2004), Institutions rule The primacy of institutions over geography and integration in economic development, Journal of Economic Growth, 9(2), 131-165. https://doi.org/10.1023/B:JOEG.0000031425.72248.85.
34. Roy-Mukherjee, S., Udeogu, E., (2020), Neo-liberal globalization and income inequality: Panel data evidence from OECD and Western Balkan countries, Journal of Balkan and Near Eastern Studies, 23(1), 15-39. https://doi.org/10.1080/19448953.2020.1852004.
35. Schultz, T. W., (1961), Investment in human capital, The American Economic Review, 51(1), 1-17.
36. Solt, F., (2019), The Standardized World Income Inequality Database, Versions 8-9. Harvard Dataverse, V11. https://doi.org/10.7910/DVN/LM4OWF.
37. Swamy, P. A. V. B., (1970), Efficient Inference in a Random Coefficient Regression Model, Econometrica, 38(2), 311–323. https://doi.org/10.2307/1913012.
38. Wallerstein, I., (1974), The modern world system I: Capitalist agriculture and the origins of the European world economy in the sixteenth century. New York, NY: Academic Press.