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Article

Examining the impact of institutional quality on the relationship between economic growth and inequality

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Abstract: Economic growth is one of the most important goals of economic policymaking, but increasing production and national income does not necessarily lead to a fairer distribution of income and a reduction in inequality. The distribution of benefits from economic growth can be affected by the quality of economic and political institutions. Accordingly, the present study aims to investigate the effect of economic growth on income inequality by considering the interactive role of institutional quality in a selection of developed and developing countries. For this purpose, panel data from selected countries in the period under study were used and the research model was estimated using the Feasible Generalized Least Squares (FGLS) method. In the empirical model, in addition to the direct effect of economic growth on income inequality, the interactive effect of economic growth and institutional quality was also examined. The results show that economic growth has a positive and significant effect on income inequality in both groups of developed and developing countries; This means that economic growth alone does not necessarily lead to a fairer distribution of income and, under existing institutional conditions, can be accompanied by increased inequality. Also, the unemployment rate has a positive and significant effect on income inequality, while trade openness has shown a negative and significant effect on inequality. The most important finding of the research is related to the interactive effect of economic growth and institutional quality, which is negative and significant in both groups of countries. This result shows that improving institutional quality can reduce the unequal effect of economic growth and pave the way for a broader distribution of the benefits of economic growth. Accordingly, the research results emphasize the necessity of combining economic growth policies with institutional reforms, strengthening the rule of law, controlling corruption, increasing transparency, improving government effectiveness, and implementing employment-generating and distributional policies.
Keywords: Economic growth, income inequality, institutional quality, developing and developed countries, panel data

1. Introduction

Economic growth is one of the most important goals of economic policymaking and is considered one of the main indicators of the economic performance of countries. Increasing production, income, and economic activities can improve the economic conditions of society by creating job opportunities, increasing household income, and

expanding production capacities. In a favorable economic environment, increasing confidence in the future and the efficiency of economic activities can increase the motivation of individuals and firms to invest, produce, and participate in the economy. However, increasing production and income at the economy-wide level does not necessarily mean an equal distribution of the benefits of growth among different groups in society. In fact, one of the most important questions raised in the development literature is how the benefits of economic growth are distributed among different individuals and groups, and under what conditions can economic growth be associated with a reduction in inequality (Wu et al., 2024). The relationship between economic growth and income inequality is a complex one that depends on the economic, social, and institutional conditions of countries. Economic growth can lead to a reduction in inequality by increasing the demand for labor, creating new job opportunities, and increasing wages, especially for low-income groups. In situations where economic growth provides economic opportunities for a wide segment of society, increased employment and income can help improve income distribution. Van der Slycken and Bleys (2024) also emphasize the importance of economic conditions and labor market mechanisms in transferring the benefits of growth to different groups in society. Therefore, potential economic growth can not only increase the level of income in society, but also affect the distribution of income by expanding economic opportunities.

However, economic growth does not have the same consequences for income distribution in all countries. Economic growth may occur mainly in sectors that use more skilled labor, capital, and technology, and as a result, its benefits accrue more to high-income groups. In contrast, if economic growth is based on the expansion of employment-generating activities and an increase in demand for low-income labor, it can lead to an improvement in the relative situation of low-income groups and a reduction in inequality. Therefore, the effect of economic growth on inequality depends largely on the growth pattern, economic structure, and the distribution of benefits from increased production (Wu et al., 2024). This is one of the fundamental challenges for economic policymakers in developing countries. On the one hand, economic growth is necessary to increase production, income, and economic opportunities; on the other hand, economic growth can be accompanied by increased inequality if its benefits are unevenly distributed. Therefore, the policymaker is faced with the problem of how to create conditions in which the increase in production and income at the macroeconomic level also leads to an improvement in the situation of different groups in society. In fact, the main issue is not simply achieving economic growth, but how the benefits of economic growth are distributed and the factors that can affect this process.

Income inequality is one of the most important dimensions of economic and social development and can have far-reaching consequences for the economic performance and social stability of countries. Severe inequality can limit the access of low-income groups to economic opportunities, education, capital and other resources and, in the long run, lead to the persistence of differences in income and economic opportunities. In addition, high inequality can have consequences such as reduced social cohesion, increased dissatisfaction and weakened public trust. Stiglitz (2009) shows that economic inequality is not simply a problem related to income distribution, but can also affect economic performance and opportunities for individuals. Therefore, examining the factors that can shape the relationship between economic growth and inequality is of particular importance for achieving inclusive development.

Meanwhile, the role of institutions and institutional quality in determining how the benefits of economic growth are distributed has received increasing attention. Institutions are a set of rules, regulations, norms, and formal and informal organizations that determine the framework for economic and social interactions. The quality of these institutions can affect how resources are allocated, individuals' access to economic opportunities, the implementation of laws, the protection of property rights, the control of corruption, and the performance of government. From this perspective, institutions not only affect the level of economic growth, but can also determine how the benefits of economic growth are distributed among different groups in society.

The importance of institutions in the process of economic development has been widely emphasized in the institutional economics literature. Acemoglu et al. (2001) They show that economic and political institutions play an important role in shaping the development path and economic performance of countries. Inclusive and efficient institutions can provide opportunities for economic participation for more groups in society and prevent the concentration of opportunities and resources in the hands of limited groups. In contrast, inefficient or monopolistic

institutions can limit access to economic resources and opportunities and provide the basis for the concentration of income and wealth. Therefore, differences in institutional quality can be one of the factors explaining differences in the distributional effects of economic growth across countries.

One of the most important channels through which institutions influence the relationship between economic growth and inequality is the way in which resources and economic opportunities are allocated. High-quality institutions can provide individuals and firms with broader access to economic opportunities by protecting property rights, effectively enforcing contracts, reducing corruption, and creating a transparent and predictable environment. Such conditions can increase the possibility of different groups in society participating in the production process and benefiting from the benefits of economic growth. In contrast, institutional weakness can limit access to resources, credit, job opportunities, and other economic opportunities to specific groups. In such circumstances, even high economic growth may not lead to a more equitable distribution of income, and the benefits of growth may accrue primarily to the wealthy (Ayana et al., 2024).

The quality of financial institutions is also of particular importance from this perspective. An efficient financial system can provide investment and economic activity to more groups in society by providing broader access to credit and financial resources. In contrast, weak financial institutions and limited access to financial resources for low-income groups can create unequal economic opportunities and cause the benefits of economic growth to accrue primarily to individuals and firms that initially have more financial resources. Therefore, institutional quality can affect the intensity or weakness of the impact of economic growth on income inequality through the way financial and economic resources are allocated.

On the other hand, political and social institutions can also play an important role in how the benefits of economic growth are distributed. Government effectiveness, political stability, control of corruption, and the rule of law can influence the capacity of the government to provide public services, implement distributive policies, and create equal economic opportunities. Also, social institutions that foster trust, cooperation, and social participation can provide more equitable access to economic opportunities for different groups in society. Ayana et al. (2024) They have emphasized the role of social institutions and strengthening social capital in improving economic and social relations. Hence, institutional quality can be considered one of the important factors in explaining the differences in the distributional consequences of economic growth across countries.

This issue is more important in developing countries, as these countries often face problems such as weak rule of law, corruption, political instability, limited access to financial resources, and inequality in economic opportunities. In such circumstances, economic growth may lead to greater concentration of income and wealth rather than distributing its benefits widely throughout society. Rodrik (2007) also emphasizes the importance of appropriate institutions and policies to ensure the inclusiveness of the economic growth process. Therefore, in developing countries, examining the relationship between economic growth and inequality without considering the quality of the institutional environment may provide an incomplete picture of the distributional mechanisms of growth.

The experience of different countries also shows that similar economic growth rates do not necessarily produce the same consequences for income distribution. Some countries have been able to improve the economic situation of low-income groups through economic growth and the expansion of job opportunities, while in some other countries, economic growth has been accompanied by the continuation or even exacerbation of income inequality. This difference can be due to differences in economic structure, distributional policies and especially the quality of economic, political and social institutions. Hence, the fundamental research question is what effect does economic growth have on inequality in selected developing and developed countries and how can institutional quality change the intensity and direction of the effect of economic growth on inequality?

From this perspective, the role of institutions can be considered as a moderating mechanism in the relationship between economic growth and inequality. In countries with higher institutional quality, economic growth may have a more reducing effect on inequality by creating more equal opportunities, expanding employment, improving access to resources, and implementing effective economic and social policies. In contrast, in countries with lower institutional

quality, the benefits of economic growth may be allocated to more limited groups, and as a result, the effect of growth on reducing inequality may be weakened or even lead to an increase in inequality (Rodrik, 2007). Therefore, examining the interactive effect of economic growth and institutional quality can provide a more accurate understanding of the differences between countries in the distributional consequences of economic growth.

Given the importance of this issue, the present study examines the role of institutions and institutional quality in the relationship between economic growth and income inequality in a selection of developed and developing countries. The use of institutional indicators, including the World Bank's Worldwide Governance Indicators, allows the quality of the institutional environment of the countries under study to be assessed and its role in the impact of economic growth on inequality to be examined. The importance of this research stems from the fact that a significant portion of previous studies have examined the direct relationship between economic growth and inequality, while paying attention to how institutional quality can change the relationship between these two variables is of particular importance for understanding the development process. Examining the interactive effects of economic growth and institutional quality can show whether improving institutional quality causes the benefits of economic growth to be distributed more widely across groups in society. Such an approach takes the analysis of the relationship between growth and inequality beyond a purely direct relationship and considers the role of the institutional environment in shaping the distributional consequences of economic growth. Accordingly, the main objective of this study is to examine the effect of economic growth on income inequality and to determine the role of institutional quality in moderating this relationship in selected developing and developed countries. Specifically, the present study attempts to determine whether higher institutional quality can cause economic growth to lead to a greater reduction in income inequality and whether institutional weakness can prevent the benefits of economic growth from being transferred to low-income groups.

2. Theoretical foundations

2.1. Economic growth and income inequality

Income inequality, as a key phenomenon in development economics and social economics, has profound effects on the economic well-being of individuals and societies. This concept, which refers to the unequal distribution of income among individuals, households, or social groups, not only affects access to material resources but also affects the quality of life and well-being through multiple channels, such as health, education, and social cohesion. While economic growth is often seen as a means of improving well-being, income inequality can limit these benefits and even lead to a decrease in well-being. This section provides a theoretical review of the relationship between income inequality and economic well-being, and analyzes the mechanisms by which inequality affects well-being, drawing on the perspectives of different economic schools.

Income inequality is usually measured using measures such as the Gini coefficient, Palma ratio, or the Thiel index, which indicate the distribution of income in a society. Economic well-being, as a measure of quality of life, includes access to goods and services, health, education, and social security, and is often measured by indicators such as the Human Development Index (HDI). The relationship between income inequality and economic well-being is complex, as inequality can affect well-being through both direct (such as reduced access to resources) and indirect (such as psychological and social effects) channels. According to Stiglitz (2012), high inequality can undermine well-being by reducing social cohesion and limiting economic opportunities for low-income groups.

Classical economists, such as Adam Smith and David Ricardo, emphasized the role of income distribution among the factors of production (labor, capital, and land). Smith believed that income inequality could lead to the concentration of wealth in the hands of certain groups, which ultimately limited economic opportunities for others. Ricardo also argued that unequal income distribution, especially in favor of capitalists, could enhance economic growth, but its effects on welfare depended on how these resources were used (Sadeghi et al., 2013). In the neoclassical view, economic welfare depends on maximizing individual utility, and income inequality is problematic only if it leads to a decrease in the utility of society as a whole. However, these views paid less attention to the social and psychological effects of inequality.

One of the most important theories on the relationship between inequality and welfare is the Kuznets hypothesis (1955). Kuznets proposed that in the early stages of economic development, income inequality increases because the benefits of economic growth accrue to a limited group (such as the owners of capital and the modern sectors of the economy). As development progresses, education expands, and job opportunities increase, inequality decreases and welfare improves. This relationship is depicted as an inverted U-shaped curve. However, subsequent studies, such as Piketty (2014), have shown that this hypothesis is not confirmed in many countries, especially in developing countries with weak institutions. High inequality can persist rather than decrease, neutralizing the positive effects of economic growth on welfare.

In the modern literature, economists such as Atkinson and Bourguignon (2015) argue that income inequality reduces human development and well-being by limiting access to education, health, and physical capital for low-income groups. This view is consistent with theories of institutional economics, such as North's (1990) theory, which define institutions as the “rules of the game” that shape the distribution of resources and opportunities. Inclusive institutions, which provide economic opportunities for all, can reduce inequality and increase well-being, while extractive institutions, which concentrate resources in the hands of a few groups, exacerbate inequality and poverty (Acemoglu et al., 2001).

Income inequality affects economic well-being through several mechanisms:

Access to resources and opportunities: High inequality limits access to education, health care, and employment opportunities for low-income groups. According to Aghion et al. (1999), these limitations reduce human capital development and thus undermine well-being. For example, in countries such as South Africa, high inequality has hindered the poor’s access to public services and has lowered the Human Development Index.

Health and nutrition: Income inequality affects well-being through its effects on physical and mental health. The absolute income hypothesis (Preston, 1975) states that higher income provides access to better nutrition and medical care, but this relationship is concave, meaning that an additional unit of income has a greater impact on health for the poor than for the rich. Therefore, reducing inequality by transferring income from the rich to the poor can improve the health of the entire society and, consequently, well-being (Deaton, 2003).

Relative Income Hypothesis and Psychological Effects: Wilkinson (1997) argues in the relative income hypothesis that income inequality reduces psychological health and social cohesion by creating feelings of insecurity, stress, and social comparison. These psychological effects can lead to reduced well-being, especially in societies with high class disparities, such as Brazil and South Africa.

Social and political instability: High inequality can lead to political and social instability, which is an obstacle to sustainable economic growth and improved well-being. Todaro (2020) argues that excessive inequality can reduce well-being by creating social tensions and reducing trust in institutions.

Human development and investment: Income inequality reduces labor productivity by limiting investment in education and health. Galor and Moav (2004) show that high inequality undermines long-term economic growth and well-being by reducing investment in human capital.

Income inequality negatively affects economic well-being through multiple mechanisms, including limited access to resources, reduced physical and mental health, social instability, and reduced investment in human capital. Theoretical perspectives, from classical to modern, reflect the complexity of this relationship. The Kuznets hypothesis emphasizes the possibility of reducing inequality in later stages of development, but modern evidence suggests that without strong institutions, inequality can persist and undermine well-being. The age-based social welfare function provides a quantitative framework for analyzing this relationship. In this study, examining the impact of income inequality on well-being with an emphasis on the mediating role of institutions provides a basis for further empirical analyses.

2.2. The role of institutions and institutional quality in moderating the relationship between income inequality and economic well-being

Income inequality is a key challenge in development economics that affects economic well-being through multiple channels, such as limited access to resources, declining health, and weakening social cohesion. However, institutions and institutional quality play an important role as a moderating factor in this relationship. High-quality institutions, by creating frameworks for the equitable distribution of resources, reducing corruption, and strengthening social cohesion, can reduce the negative effects of income inequality on well-being or even turn it into an opportunity to improve well-being. In contrast, weak institutions can amplify these negative effects by exacerbating inequality and concentrating resources. This section theoretically examines the moderating role of institutions and institutional quality in the relationship between income inequality and economic well-being, and analyzes the mechanisms of influence and the importance of this role, drawing on the perspectives of economic schools and institutional theories. This analysis provides a theoretical framework for examining this relationship in selected countries (Brazil, India, Indonesia, South Africa, and Turkey).

Institutions, as defined by North (1990), are a set of formal (such as laws, regulations, and contracts) and informal (such as norms, values, and culture) rules that guide economic and social behavior. Institutional quality refers to the ability of institutions to create a transparent, equitable, and efficient environment for economic and social activities. The World Bank's Global Governance Indicators (WGI), which include accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption, are key tools for measuring institutional quality. These indicators indicate the capacity of institutions to support the equitable distribution of resources and enhance well-being. Institutions act as mediators that moderate the relationship between income inequality and well-being. According to Acemoglu et al. (2001), Inclusive Institutions reduce the negative effects of inequality by providing equal opportunities and fair distribution of resources, while Extractive Institutions exacerbate inequality and reduce welfare by concentrating resources in the hands of limited groups.

Institutions affect the relationship between income inequality and economic well-being through the following mechanisms:

- **Redistributive policies and reducing inequality**

High-quality institutions reduce income inequality by designing and implementing redistributive policies, such as progressive taxation, targeted subsidies, and social protection programs, and thereby moderate their negative effects on well-being. According to Piketty (2014), effective tax systems can improve access to public services such as education and health by shifting resources from high-income groups to low-income groups, which in turn increases well-being. For example, in Brazil, the Bolsa Família program, with strong institutional support, has reduced income inequality and improved the Human Development Index (HDI). In contrast, in South Africa, weak implementation of redistributive policies due to corruption and institutional inefficiency has perpetuated high inequality (Gini coefficient around 0.6) and exacerbated its negative effects on well-being.

- **Strengthening access to human capital**

Income inequality weakens human capital by limiting access to education and health for low-income groups, thereby reducing well-being. Strong institutions moderate this negative effect by creating equitable education and health infrastructure. According to Rodrik (2007), institutions that ensure equal access to education and health care increase labor productivity and reduce inequality. For example, in Turkey, institutional reforms in the education sector in the 2000s improved access to primary education, which helped reduce inequality and raise the HDI. In contrast, in India, institutional weakness in rural areas has meant that inequality in access to education continues to be an obstacle to improving well-being.

- **Reducing corruption and improving resource allocation**

Institutional corruption is a major factor in the aggravation of income inequality, as it diverts resources towards unproductive activities and deprives low-income groups of access to public services. By enhancing transparency and controlling corruption, high-quality institutions ensure the efficient allocation of resources and reduce the negative effects of inequality on welfare. Kaufmann et al. (2010) show that controlling corruption enhances welfare by increasing public trust and improving access to services. For example, in Indonesia, institutional reforms following the 1998 financial crisis helped reduce corruption, which in turn improved access to public services for low-income groups and increased welfare.

- **Strengthening social cohesion and reducing the psychological effects of inequality**

Income inequality reduces psychological health and social cohesion by creating feelings of insecurity and social comparison (Wilkinson, 1997). Strong institutions moderate these negative effects by creating social policies that foster cohesion and trust. For example, social protection programs and anti-discrimination laws can strengthen a sense of justice in society and reduce the psychological effects of inequality. In Brazil, institutional policies to support marginalized groups have helped reduce social tensions, while in South Africa, institutional weakness has perpetuated social gaps and reduced well-being.

- **Creating political and social stability**

High income inequality can lead to political and social instability, which in turn hinders welfare gains. Strong institutions moderate the negative effects of inequality by providing political stability and reducing social tensions. According to Acemoglu et al. (2005), political stability helps to improve welfare by reducing economic risks and encouraging investment. For example, in Turkey, relative political stability in the 2000s, which was the result of institutional reforms, helped to reduce inequality and improve welfare, while political instability in South Africa has hindered this process.

3. Empirical evidence

Economic growth and welfare are two fundamental concepts in economics that are interconnected and have important reciprocal effects on each other. Economic growth refers to the increase in the production of goods and services in an economy, while welfare refers to the improvement in the quality of life and standard of living of individuals and includes factors such as health, education, housing, income and social opportunities. Various economic theories show that economic growth can lead to improved welfare. Increased production and income lead to increased access to goods and services and can improve people's living conditions. In other words, economic growth can provide more resources for investment in the health, education and infrastructure sectors, all of which help to increase the level of welfare. The theoretical relationship between economic growth and welfare can be divided into several parts. In the absolute income hypothesis, the increase in incomes resulting from economic growth leads to improved welfare. Whatever Higher GDP means higher incomes for individuals, which in turn improves their living conditions. In human development theory, economic growth must be accompanied by improvements in human development indicators to translate into meaningful social well-being. Without human development, economic growth may only lead to increased inequalities and social problems. Endogenous growth models also point to the relationship between investment in research and development, education, and innovation and economic growth. Sustainable and long-term economic growth requires improvements in various economic and social sectors that lead to improved well-being (Wu et al., 2024).

The quality of institutions also plays a decisive role in improving the relationship between economic growth and welfare. Efficient and quality institutions can help promote economic growth through effective policies and better resource management. The rule of law, political stability, quality of regulation, and the fight against corruption are among the factors through which quality institutions can help improve this relationship. Strong institutions can increase public trust and investment and improve economic growth and welfare by enforcing laws and regulations, creating a stable and predictable environment for businesses, providing political stability and reducing risks, and increasing transparency (Ayana et al., 2024). As a result, economic growth and welfare are directly and indirectly

dependent on each other, and the role of institutions in strengthening this relationship is very important. Strong and efficient institutions can create an enabling environment, manage resources in the best way, and bring about sustainable economic growth and social welfare.

The following are some related studies conducted in this field:

In a study by Wu et al. (2024) The study examines the relationship between economic growth and improved well-being in Africa. Using data collected from 1981 to 2021, the study shows that economic growth (measured by growth in per capita GDP) has had a smaller impact on poverty reduction in sub-Saharan Africa. compared to other regions of the world. The results of this study specifically indicate that the income of poor households in Sub-Saharan Africa does not change significantly with economic growth, while in other regions economic growth has been able to produce significant improvements in the well-being of low-income households. For example, limiting factors such as the lack of basic education and infrastructure, dependence on natural resources, and the occurrence of violent conflict in Sub-Saharan Africa has led to a weaker link between economic growth and household well-being. The study also notes that extensive agriculture and slow economic structural change are among the factors that have limited economic growth in affecting household well-being in this region. As a result, economic growth in countries with low incomes has been slower than in other parts of the world. Sub-Saharan Africa has seen a smaller improvement in household well-being, which has led to poverty reduction in the region being relatively slower than economic growth.

In another study by Van der Slycken and Bleys (2024), examines the relationship between economic growth and social well-being in European Union member states. This research uses the Sustainable Economic Well-being Index for 15 European Union member states. (EU-15) Between 1995 and 2018, it shows that although the GDP per capita of these countries increased by 32.4% during this period, the social welfare index grew at a lower rate, increasing only between 10.5% and 13.4%. This research emphasizes that after the financial crisis of 2008 and 2009, social welfare in countries EU-15 Relative to GDP has stagnated to a greater extent and by 2018, although from a Their GDP has improved, but social well-being has not returned to pre-crisis levels. In addition, some countries, such as Austria, Finland, Greece, and Ireland, have experienced a decline of more than 5% from their previous highs.

In a study by Ayana et al. (2024), The effect of government revenue and institutional quality interaction on economic growth in 43 sub-Saharan countries. Africa It is investigated using panel data over the period 2012-2022. This study uses the generalized system moments method, which effectively treats the problems of first and second order serial correlation. The panel data are from the World Development Index and the Index of Economic Freedom. Heritage Economic Have been reviewed. The results of this study showed that before the interaction of government revenue with institutional quality, government revenue has a negative and significant effect on the economic growth of countries. Sub-Saharan Africa Africa has. However, when government revenue interacts with institutional quality, real growth GDP of countries Sub-Saharan Africa Africa is positively affected. The results show that institutional quality is the link between government revenue and economic growth in developing countries. Sub-Saharan Africa Africa matters. The study also presents findings on foreign direct investment and trade openness as key sources of economic growth. The results suggest that population growth has a negative impact on real growth. GDP of countries Sub-Saharan Africa Africa has it.

In an article by Rauber and Ritschel (2024) The effect of competition between banks on economic growth and welfare is examined in an overlapping generations model with rational expectations. The results show that monopoly banking can outperform competitive banking in terms of growth and welfare if the production sector is capital-intensive. The research shows that bank competition is beneficial if production is user-intensive. The capital dependence of the production sector plays a decisive role in the relative importance of factors' saving incentives and bank intermediation margins for capital accumulation. This theory explains why monopoly can have positive effects on welfare, since capital accumulation is generally inefficient. The study also examines how competition between banks can increase productive investment and lead to higher long-run economic growth. In economies that are facing a shortage of capital, bank financial intermediation can play a key role in promoting economic growth.

A study by Kammas et al. (2023) examined the role of institutions in the relationship between inequality and public education. The results of this study show that the impact of income inequality on the quality of public education depends on the quality of institutions. In societies with weak institutions, increasing inequality can lead to a decrease in the quality of public education, especially through a decrease in the resources allocated to this area and a decrease in the number of people participating in the public education system. However, as the quality of institutions improves, this negative effect of inequality on public education decreases. The findings of this study indicate that countries with weak institutions and inefficient tax systems face greater challenges in improving the quality of the public education system.

In another study by He et al. (2023), The impact of capitalist sentiment on monetary policy, growth, and welfare is examined in a Schumpeterian growth model. The study shows that money cannot be inert in the long run and can affect economic growth when capitalist sentiment is strong. The study shows that the optimal nominal interest rate decreases with the strength of capitalist sentiment, which may support negative interest rates. The model shows that the interaction between the nominal interest rate and capitalist sentiment, which affects the real interest rate and long-term research and development, creates a new channel for the impact of monetary policy. These findings help economic policymakers to better understand the real effects of monetary policy and to act more optimally in economic decisions. The study suggests that by increasing capitalist sentiment, monetary policy can play an important role in promoting long-term economic growth.

A study by Kouadio and Gakpa (2022) examined the role of economic growth and institutional quality in reducing poverty and inequality in West African countries. Using data from the World Development Indicators (WDI), the International Country Risk Guide (ICRG), and the Standardized World Income Inequality Database (SWIID), the study shows that economic growth is a necessary condition for poverty reduction and that overall improvements in the quality of institutions, particularly through the enhancement of democratic institutions, the reduction of bureaucratic barriers, the improvement of the judicial and control system, and the quality of government stability, significantly contribute to the reduction of poverty and income inequality in the long run. The results of this study also indicate that improving the judicial system, reducing corruption, and improving bureaucratic quality are key prerequisites for the impact of economic growth on reducing income inequality. These findings are of particular importance for policymakers in West African countries to improve the living conditions of citizens by improving their institutional frameworks.

Another study by Szczepaniak et al. (2022) examined the relationship between institutional factors and income inequality in Indonesia during the reform era, known as the Reformasi Era. The study, which used Engel and Granger covariance methods and the ARDL model to assess short-run and long-run relationships and causality between variables, showed that improvements in institutional factors, including economic freedom, corruption control, government efficiency, regulatory quality, and public voice and accountability, significantly reduced income inequality. These results are of particular importance for Indonesia, which has been able to reduce income inequality during its institutional reform process.

In another study, Tamai (2022), examines government policies in the provision of public goods and their effects on economic growth and welfare under conditions of intergenerational altruism. Using an endogenous growth model with overlapping and altruistic generations, this study shows that democratically elected governments are affected by a forward-looking bias that is inherited from current individuals. The results show that the forward-looking bias makes young people have more dynamic incentives to invest, and the intergenerational redistribution effects of public goods stimulate these incentives under certain conditions. Thus, government size affects economic growth through intertemporal changes in resource allocation. Also, the growth effect of government size provides significant results for welfare analysis. This study shows that democratic governments, due to their tendency to be forward-looking, strategically invest more to compensate for the lack of resource allocation. For this reason, a welfare system with high benefits does not necessarily hinder economic growth. These findings demonstrate, through numerical analyses, that democratic governments have a growth and welfare advantage compared to unbiased social planners.

A study by Long and Ji (2019) assessed the quality of economic growth, environmental sustainability, and social well-being in Chinese provinces. The study used the Real Progress Index (GPI) For 31 provinces in China between 1997 and 2016, it shows that in some provinces, the index Real progress It has recently been reduced, which is considered a threat to social welfare and sustainability. The findings of this study show that resource consumption and environmental pollution, especially water pollution and carbon emissions, have had major negative impacts on social welfare in China. In addition, income inequality and climate change have been key factors that have caused social welfare to decline in some provinces. The study also examines the impact of structural changes on resource use and economic productivity, emphasizing that sustainable environmental policies are essential for improving social welfare.

4. Presenting the research model and examining the variables

Considering the main objective of the research, which is to analyze the role of institutions in the impact of economic growth on inequality, and based on existing theoretical foundations and previous empirical studies, two econometric models have been developed for two groups of developed and developing countries. The overall structure of the models is based on panel data, and in order to examine the direct effect of economic growth and the moderating effect of institutional quality, an interactive variable between economic growth and institutional quality has been included in the model. Also, in order to examine the structural difference between developed and developing countries, a dummy variable has also been included in the models. According to the theoretical foundations and previous studies, such as Kouadio & Gakpa, 2022 and Wu et al., 2024 use the following model to examine the effect of economic growth on inequality and analyze the interactive effect of institutional quality:

$$Giniindex2_{it} = \alpha i + \beta_1 Inflation_{it} + \beta_2 Open_{it} + \beta_3 Unemployment_{it} + \beta_4 GGDP_{it} + \beta_5 IQGPCGDP2_{it} + \beta_6 Inst\_Quality_{it} + \beta_7 PCGNI_{it} + \beta_8 D_i + \varepsilon_{it}$$

where represents the country and represents the year. The variable represents the dummy variable of the model and represents developing and developed countries. In these models, the Gini index is used as the main measure of income inequality. The model variables are examined below (Wu et al., 2024).

- **Legatum Welfare Index (Welfare)**

The dependent variable in the welfare models is the Legatum Welfare Index, which is extracted from the Legatum Welfare Index database of the Legatum Institute. This index is considered one of the most comprehensive welfare indices internationally and does not limit welfare to economic income, but also includes multiple dimensions such as the quality of governance, education, health, personal freedom, security, environment, and social capital. Higher values of this index indicate a higher level of welfare and quality of life in countries (Wu et al., 2024).

- **Income Inequality Index (Giniindex2)**

In inequality models, the Gini coefficient is used as the main measure of income inequality. It measures the degree of income concentration in a society, with higher values indicating greater inequality in income distribution.

- **Inflation rate**

The inflation rate is defined based on the Consumer Price Index and is extracted from World Bank data. This variable represents the percentage change in the annual general price level and is considered a key indicator of macroeconomic stability. High inflation is usually associated with a decrease in household purchasing power and a decline in economic well-being. (Kouadio & Gakpa, 2022)

- **Degree of trade openness (Open)**

This variable shows the ratio of total exports and imports to GDP and indicates the degree of integration of the country's economy into world trade. Increasing the degree of economic openness can affect economic welfare through increased competition, technology transfer, and productivity growth.

- **Unemployment rate**

The unemployment rate is the ratio of the unemployed population to the total labor force and is based on modeled estimates by the International Labor Organization. This indicator indicates the state of the labor market and the capacity to absorb human resources in the economy. Increasing unemployment usually leads to a decrease in social welfare and an increase in income inequality.

- **Economic growth (GGDP)**

Economic growth in this study is measured by the growth rate of real GDP per capita (at constant 2015 prices and in US dollars). This indicator reflects the annual changes in the level of real output and the improvement in economic productivity. From a theoretical perspective, economic growth can improve welfare through increased income and economic opportunities; however, the magnitude of this effect depends on the quality of institutions.

- **Institutional Quality Index (Inst_Quality)**

To measure institutional quality, a composite index based on principal component analysis (PCA) is constructed. The primary data for this index are extracted from the World Bank's Global Governance Indicators, which include the following six sub-indices:

1. Government Effectiveness
2. Political Stability and Absence of Violence
3. Regulatory Quality
4. Rule of Law
5. Voice and Accountability
6. Control of Corruption

In the first step, all six variables are standardized to eliminate the difference in measurement scale. Then, using the principal component analysis method, the first component (PCA) was extracted, which explains the largest share of the common variance among the sub-indices. This component is considered as the final indicator of institutional quality. Higher values of this index indicate better institutional quality, stronger governance and more efficient governance structures (Kammas et al., 2023).

- **Interactive variable of economic growth and institutional quality (IQGPCGDP2)**

This variable is created by multiplying economic growth by the institutional quality index and measures the moderating role of institutions in the relationship between economic growth and welfare or inequality. The purpose of this variable is to examine whether the effect of economic growth on the dependent variables differs at different levels of institutional quality.

- **Per capita gross national income (PCGNI)**

Real gross national income per capita is entered into the model as a control variable. This variable indicates the overall level of economic development of the country and is expected to have a positive relationship with well-being and a negative relationship with inequality.

To account for structural differences between countries, a dummy variable D is used, whose value is zero for developed countries and 1 for developing countries. The classification of countries is based on the UNCTAD, 2025 classification (UNCTAD, 2025). The developing countries examined in this study are:

Developing countries surveyed include Algeria, Angola, Argentina, Armenia, Azerbaijan, Bhutan, Bangladesh, Barbados, Belarus, Belize, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burundi, Cape Verde, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Comoros, Costa Rica, Ivory Coast, Democratic Republic of the Congo, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eswatini, Gabon, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Iraq, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Lebanon, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar., Namibia, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Rwanda, South Sudan, Senegal, Serbia, Sierra Leone, South Africa, Sri Lanka, Sudan, Suriname, Syria, Tajikistan, Tanzania, Thailand, East Timor, Togo, Tunisia, Turkey, Uganda, Uzbekistan, Vietnam, Yemen, Zambia and Zimbabwe.

The developed countries studied include Albania, Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, South Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Panama, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States and Uruguay.

The econometric models of this study are designed to examine, in addition to the direct effect of economic growth, the role of institutional quality and its interaction with economic growth in determining inequality. The use of a composite institutional index, an interactive variable, and a dummy variable of development allows for a more precise analysis of structural differences between countries.

4.1. Descriptive statistics of research data

Before estimating the research model, some descriptive statistics of the model variables in the developing and developed countries considered in this study are examined.

Table 1. Summary of descriptive statistics of model variables

Developed countries								
Variable	**Average**	**Middle**	**At least**	**Maximum**	**Standard deviation**	**Skewness**	**Elongation**	**Number of observations**
Legatum Welfare Index (Welfare)	**73.19**	**73.58**	**52.30**	**91.52**	**7.67**	**-0.61**	**2.67**	**693**
Inflation rate	**3.31**	**2.35**	**-4.45**	**48.70**	**4.13**	**4.16**	**33.58**	**1050**
Degree of trade openness (Open)	**101.63**	**85.88**	**19.56**	**412.18**	**56.41**	**1.87**	**8.46**	**1050**
Unemployment rate	**7.55**	**6.57**	**1.81**	**27.69**	**4.05**	**1.57**	**6.03**	**1047**
Economic growth (GGDP)	**2.54**	**2.61**	**-28.76**	**24.62**	**3.87**	**-0.92**	**10.97**	**1050**
Interactive variable of growth and institutional	**1.78**	**1.86**	**-17.53**	**39.04**	**4.30**	**0.45**	**11.45**	**966**

Developed countries								
Variable	**Average**	**Middle**	**At least**	**Maximum**	**Standard deviation**	**Skewness**	**Elongation**	**Number of observations**
quality (IQGPCGDP2)								
Institutional Quality Index (Inst_Quality)	**2.45**	**2.55**	**-2.57**	**4.86**	**1.58**	**-0.79**	**3.22**	**966**
Per Capita National Income (PCGNI)	**30720.72**	**26920.55**	**815.29**	**104870.70**	**20364.61**	**0.73**	**2.94**	**1002**
	Developing countries							
Variable	**Average**	**Middle**	**At least**	**Maximum**	**Standard deviation**	**Skewness**	**Elongation**	**Number of observations**
Legatum Welfare Index (Welfare)	**50.13**	**50.78**	**28.46**	**70.18**	**8.27**	**-0.13**	**2.47**	**1614**
Inflation rate	**8.68**	**4.79**	**-16.86**	**557.20**	**24.21**	**13.42**	**235.65**	**2816**
Degree of trade openness (Open)	**76.42**	**69.79**	**1.99**	**347.72**	**37.19**	**1.53**	**7.95**	**2597**
Unemployment rate	**8.39**	**6.03**	**0.25**	**37.32**	**6.69**	**1.38**	**4.73**	**2844**
Economic growth (GGDP)	**3.78**	**4.11**	**-46.08**	**63.38**	**5.45**	**-0.03**	**23.35**	**2997**
Interactive variable of growth and institutional quality (IQGPCGDP2)	**-0.74**	**-0.61**	**-97.47**	**70.47**	**5.56**	**0.84**	**75.41**	**2723**
Institutional Quality Index (Inst_Quality)	**-1.04**	**-1.04**	**-5.06**	**3.34**	**1.46**	**0.12**	**2.98**	**2751**
Per capita gross national income (PCGNI)	**3613.25**	**2974.55**	**254.43**	**19660.95**	**3075.20**	**1.44**	**5.23**	**2150**

The descriptive statistics presented in Table (1) provide an initial and yet very important picture of the characteristics of the data used in the model for developing and developed countries. It should be noted that the Legatum Welfare Index data are available for the period 2007 to 2023, while other economic and institutional variables cover a longer period from 2000 to 2023; therefore, the difference in the number of observations for some variables is natural and arises from the data limitations of the Legatum Welfare Index.

The results show that the average Legatum welfare index in developed countries is about 73 units, which indicates a high level of social, economic, and institutional welfare in these countries. The relatively low standard deviation of this index indicates that welfare fluctuations among these countries are limited and most countries are concentrated around a high level of welfare. The negative skewness of the welfare index also confirms that the data distribution is mostly in the high value region and a small number of observations have a lower level of welfare. This feature is also expected from a theoretical perspective, because developed economies usually have institutional stability, strong social infrastructure, and established policy structures. An examination of the inflation rate shows that the average inflation in developed countries is about 3 percent, which is consistent with the nature of economies with monetary stability. However, the presence of very high skewness and significant elongation indicates the occurrence of severe inflation shocks in some periods. This could reflect global economic crises, energy shocks, or periods of monetary policy volatility. Indeed, although the overall level of inflation is low, the data show that these economies have also faced temporary instability at some point in time.

In the case of trade openness, an average above 100% indicates the deep integration of developed countries into the global economy. The wide range of variations in this variable indicates significant differences in the economic structure of countries; some countries have very open economies dependent on foreign trade, while others rely more on the domestic market. The positive skewness and high elasticity also indicate the existence of countries with very high levels of trade openness that play the role of international trade hubs. The unemployment rate in these countries is on average about 7.5%, but its relatively large range of variations indicates that the labor market has faced significant pressures even in developed economies during periods. The positive skewness of this variable indicates that most observations are at lower levels of unemployment, but a limited number of countries or periods of time have experienced high unemployment rates, which may have been due to economic recessions or structural labor market reforms.

Economic growth is estimated to average around 2.5 percent, which is a normal and expected value for mature and developed economies. The presence of very negative minimum values and relatively high maximum values indicates the sensitivity of these countries to global economic cycles. The high elasticity of this variable also indicates the occurrence of severe growth shocks in some years, which can be attributed to financial crises or global recessions. This reinforces the importance of using robust methods in estimation. The interactive variable of economic growth and institutional quality has significant dispersion, which indicates that the intensity of the joint effect of growth and institutional quality is not the same in different countries. This statistical heterogeneity indicates that in some countries economic growth has occurred in a stronger institutional context, while in others this synergy has been observed less. This feature provides a suitable theoretical basis for testing the institutional moderation hypothesis in empirical models.

The institutional quality index with a relatively high mean and negative skewness indicates that most developed countries have high levels of institutional quality and its range of variation is relatively limited. This is very important from the perspective of econometric analysis, because the limited dispersion of institutional quality can be one of the reasons for the weakening of the interaction effect in the empirical estimates, since the institutional difference between these countries is smaller than that of developing countries. Finally, the gross national income per capita with a high mean and significant standard deviation indicates the existence of differences in the level of economic development even among developed countries. The positive relationship of this variable with welfare is theoretically expected, because higher income levels are usually associated with better access to public services, education, health, and welfare infrastructure. In general, the results of descriptive statistics show that although developed countries have a high level of welfare and institutional quality, there are still significant differences in macroeconomic variables, trade structure, and income level. Also, the existence of high skewness and elongation in some variables indicates the occurrence of economic shocks and non-normal distributions, which highlights the importance of using appropriate econometric methods to control heterogeneity and cross-sectional dependence.

The descriptive statistics presented in Table (1) provide a clear picture of the economic, institutional, and welfare structure of developing countries and, compared to developed countries, show fundamental differences in the distribution pattern of variables.

The average welfare index in developing countries is about 50 points, which is a significant gap from developed countries and indicates a welfare gap between the two groups of countries. In addition, the relatively higher standard deviation of the welfare index compared to developed countries indicates greater heterogeneity in the level of welfare among these countries. This feature indicates that some countries have managed to approach relatively high levels of welfare, while others are still at lower levels. A skewness close to zero indicates a relatively symmetrical distribution of this index, indicating that welfare is not concentrated in a particular part of the distribution.

The inflation rate is one of the most prominent structural features in developing countries. The average inflation rate is about 8.7 percent, more than twice that of developed countries. But more important than the average value is the very high stretch and skewness of this variable, which reflects the existence of periods of high inflation or even hyperinflation in some countries. The very wide range of data shows that monetary instability and price shocks are a structural feature of these economies, and this can have profound effects on social welfare and income distribution.

The degree of trade openness in developing countries is on average lower than in developed countries, but there is still considerable dispersion. This reflects the differences in countries' development strategies; some are heavily dependent on international trade, while others have relatively closed economies. Positive skewness and high elasticity also indicate the presence of countries with very high levels of foreign trade relative to the size of their economies. Unemployment rates in these countries are on average slightly higher than in developed countries, and their higher standard deviation reflects structural fluctuations in the labor market. Positive skewness indicates that a limited number of countries are experiencing very high unemployment, which could be due to structural labor market problems, private sector weakness, or repeated economic shocks.

Economic growth in developing countries is on average higher than in developed countries, which is consistent with the theory of economic convergence, as developing economies usually have greater growth capacity. However, the very wide range of growth variations and high elasticity indicate severe fluctuations in business cycles and greater vulnerability of these countries to domestic and external shocks.

The interaction variable of economic growth and institutional quality has a negative mean, reflecting the lower level of institutional quality in these countries. The high dispersion and significant skewness of this variable indicate that the joint effect of growth and institutions is very different across countries; in other words, in some countries economic growth occurred in a weak institutional context and failed to improve welfare, while in others the existence of better institutions has been able to strengthen the growth effect.

The institutional quality index has a negative average value, indicating a major structural difference compared to developed countries. This indicates the relative weakness of governance institutions, the rule of law, and the quality of policymaking in a significant part of developing countries. However, the relatively wide range of this index indicates that some countries have succeeded in improving institutional quality, which provides a suitable basis for analyzing the moderating role of institutions in the econometric model. Finally, gross national income per capita reveals the huge difference between the levels of economic development. The average per capita income in developing countries is approximately one-tenth that of developed countries, and its high positive skewness indicates a high concentration of countries at low income levels and the existence of a limited number of countries with relatively high incomes.

In general, the results of descriptive statistics show that developing countries face very high structural heterogeneity, greater economic volatility, and lower institutional quality. These features, on the one hand, highlight the importance of examining the role of institutions in transforming economic growth into welfare, and on the other hand, justify the use of econometric methods that are robust to heterogeneity and cross-sectional dependence. Also, the wide dispersion of variables indicates that the effect of economic growth on welfare is likely to be different at

different levels of institutional quality, and the analysis of interaction effects in this group of countries is of particular importance.

Table 2. Average value of research variables in developing and developed countries

Developing countries								
Country name	**Country**	**Legatum Well-being Index**	**Inflation rate**	**Degree of trade openness**	**Unemployment rate**	**Economic growth rate**	**Institutional quality**	**National income per capita**
Algeria	**Algeria**	**50.487**	**4.438**	**56.211**	**14.362**	**3.052**	**-1.951**	**4573.680**
Angola	**Angola**	**38.899**	**43.004**	**74.390**	**16.233**	**4.825**	**-2.495**	**3725.974**
Argentina	**Argentina**	**57.456**	**86.293**	**32.365**	**9.916**	**1.721**	**-0.474**	**11831.419**
Armenia	**Armenia**	**58.080**	**3.564**	**79.382**	**15.059**	**6.276**	**-0.568**	**3439.858**
Republic of Azerbaijan	**Azerbaijan**	**53.407**	**6.363**	**86.839**	**6.514**	**7.420**	**-1.868**	**5324.625**
Bhutan	**BTN**	**48.501**	**5.294**	**87.246**	**3.102**	**5.778**	**0.819**	**2261.761**
Bangladesh	**Bangladesh**	**45.501**	**6.646**	**35.090**	**4.293**	**5.963**	**-2.093**	**1303.870**
Barbados	**Barbados**	**46.511**	**3.757**	**35.090**	**9.481**	**0.615**	**2.652**	**19660.947**
Belarus	**Belarus**	**57.564**	**24.474**	**129.446**	**6.633**	**3.845**	**-1.998**	**5067.696**
Belize	**Belize**	**54.948**	**1.733**	**99.230**	**8.851**	**3.279**	**-0.101**	**5569.489**
Benin	**Benin**	**46.096**	**2.198**	**49.619**	**1.386**	**4.857**	**-0.660**	**988.450**
Bolivia	**Bolivia**	**51.898**	**4.190**	**61.229**	**3.115**	**3.348**	**-1.382**	**2665.144**
Bosnia and Herzegovina	**Bosnia and Herzegovina**	**56.821**	**2.333**	**88.239**	**23.390**	**3.049**	**-0.858**	**4407.118**
Botswana	**Botswana**	**56.310**	**6.577**	**92.710**	**19.636**	**3.185**	**1.687**	**5390.102**
Brazil	**Brazil**	**59.987**	**6.276**	**27.868**	**9.862**	**2.381**	**-0.124**	**8192.445**
Burkina Faso	**Burkina Faso**	**44.522**	**2.501**	**49.797**	**4.067**	**5.261**	**-0.991**	**565.191**
Burundi	**Burundi**	**36.845**	**10.499**	**nan**	**1.873**	**3.203**	**-3.007**	**254.435**

Cape Verde	Cape Verde	56.002	1.897	94.257	12.598	4.578	1.226	3521.497
Cameroon	Cameroon	42.220	2.689	44.687	4.266	3.917	-2.321	1303.677
Central African Republic	Central African Republic	32.118	3.826	41.951	5.495	1.189	-3.424	483,880
Chad	Chad	32.936	3.419	60.624	0.970	5.733	-3.202	917,064
Chile	Chile	68.859	3.774	65.610	8.597	3.447	2.612	11510.451
China	China	59.424	2.018	44.753	4.488	8.192	-1.063	8137.081
Colombia	Colombia	56.959	5.382	37.288	11.559	3.578	-0.752	5391.062
Comoros	Comoros	45.949	3.415	38.921	4.232	2.722	-2.254	1277.277
Costa Rica	Costa Rica	67.644	6.056	73.926	8.250	3.931	1.524	10255.000
Ivory Coast	Ivory Coast	44.448	2.570	55.443	4.479	3.839	-2.104	1635.232
Democratic Republic of the Congo	Democratic Republic of the Congo	42.813	60.675	64.082	4.058	4.953	-3.867	446,703
Djibouti	Djibouti	46.803	2.796	281.139	26.397	5.633	-1.831	2671.656
Dominican Republic	Dominican Republic	43.804	7.777	59.198	6.269	4.706	-0.595	5917.127
Ecuador	Ecuador	54.786	8.434	57.697	4.120	3.265	-1.413	5180.685
Egypt	Egypt	47.432	11.477	45.071	9.966	4.297	-1.525	3154.237
El Salvador	El Salvador	54.902	2.508	74.953	5.090	2.113	-0.549	3506.908
Equatorial Guinea	Equatorial Guinea	45.856	4.081	103.633	8.077	6.955	-2.901	7390.970
Eswatini	Eswatini	44.323	6.823	90.598	27.590	2.963	-1.282	3232.691
Gabon	Gabon	47.815	2.139	83.969	19.329	2.189	-1.342	6925.114
Georgia	Georgia	59.682	5.054	90.738	14.550	5.822	0.136	4397.264
Ghana	Ghana	53.145	17.773	78.497	5.061	5.580	0.065	1697.149

Guatemala	Guatemala	52.972	5.362	57.144	2.749	3.491	-1.496	3650.524
Guinea	Guinea	41.072	13.971	75.282	5.005	4.599	-2.625	797,762
Guinea-Bissau	Guinea-Bissau	40.161	2.788	46.285	3.068	3.766	-2.585	608.621
Haiti	Haiti	39.170	13.953	36.687	13.977	0.874	-2.984	1366.761
Honduras	Honduras	51.299	6.288	113.496	5.462	3.955	-1.500	2062.765
Iraq	IRQ	42.921	9.031	83.527	10.803	4.192	-3.646	5786.975
India	India	50.871	6.091	43.046	7.163	6.257	-0.421	1404.556
Indonesia	Indonesia	58.055	5.821	49.535	5.278	4.890	-0.905	3401.677
Iran	Iran	47.568	21.925	46.700	11.220	3.251	-2.449	5451.937
Jamaica	Jamaica	58.935	8.248	nan	6.814	1.060	0.262	5182.307
Jordan	Jordan	56.661	2.987	109.661	15.087	3.975	-0.018	3997.375
Kazakhstan	Kazakhstan	57.568	8.779	75.414	6.484	5.824	-1.238	8155.699
Kenya	Kenya	49.198	8.449	46.942	3.526	4.348	-1.506	1352.073
Kyrgyzstan	Kyrgyzstan	52.411	7.645	112.330	3.076	4.584	-1.912	1203.281
Lebanon	Lebanon	53.515	44.356	79.987	9.206	1.392	-1.658	6821.007
Lesotho	Lesotho	44.209	5.129	144.492	16.379	2.087	-0.537	1171.190
Liberia	Liberia	43.593	11.176	nan	2.637	3.594	-2.240	632,497
Madagascar	Madagascar	43.626	8.619	57.423	3.125	2.850	-1.352	430,518
Malawi	Malawi	45.954	16.267	43.537	5.040	3.879	-0.939	526,742
Malaysia	Malaysia	65.431	2.091	160,786	3.485	4.676	0.946	10364.066
Financial	Mali	42.948	2.202	50.260	1.849	4.261	-1.501	789,734
Mauritania	Mauritania	39.657	4.895	84.468	10.138	3.753	-1.632	1655.387
Mauritius	Mauritius	65.249	4.689	124,576	7.576	3.580	1.908	8481.020

Mexico	**Mexico**	**58.793**	**4.759**	**64.159**	**3.851**	**1.687**	**-0.508**	**9765.132**
Moldova	**Moldova**	**55.843**	**9.442**	**107.916**	**3.102**	**3.678**	**-0.861**	**2689.989**
Mongolia	**Mongolia**	**54.650**	**8.736**	**117.864**	**6.144**	**6.127**	**-0.137**	**3932.350**
Montenegro	**Montenegro**	**62.011**	**3.315**	**105.829**	**20.795**	**3.080**	**0.247**	**6925.919**
Morocco	**Morocco**	**53.740**	**1.855**	**70.944**	**10.032**	**3.747**	**-0.697**	**2770.608**
Mozambique	**Mozambique**	**42.783**	**7.682**	**89.449**	**3.310**	**5.806**	**-1.285**	**486,774**
Myanmar	**Myanmar**	**42.357**	**13.665**	**87.449**	**1.200**	**7.117**	**-3.411**	**1125.477**
Namibia	**Namibia**	**55.360**	**5.340**	**95.612**	**20.761**	**3.373**	**0.855**	**3868.029**
Nepal	**Nepal**	**47.599**	**6.290**	**45.155**	**10.788**	**4.180**	**-1.739**	**831.209**
Nicaragua	**Nicaragua**	**51.443**	**6.866**	**91.112**	**5.777**	**3.350**	**-1.559**	**1724.871**
Niger	**Niger**	**41.487**	**2.465**	**40.982**	**1.221**	**5.206**	**-1.555**	**495.103**
Nigeria	**Nigeria**	**42.299**	**13.932**	**nan**	**4.054**	**4.788**	**-2.624**	**2519.086**
North Macedonia	**North Macedonia**	**59.857**	**2.955**	**110.003**	**27.293**	**2.633**	**-0.321**	**4658.150**
Pakistan	**Pakistan**	**41.466**	**9.506**	**28.451**	**2.495**	**3.973**	**-2.357**	**1359.943**
Papua New Guinea	**Papua New Guinea**	**47.088**	**5.815**	**121.291**	**2.560**	**3.636**	**-1.446**	**2322.311**
Paraguay	**Paraguay**	**55.925**	**5.969**	**75.352**	**5.849**	**3.181**	**-1.414**	**5095.839**
Peru	**Peru**	**59.606**	**3.098**	**47.863**	**4.214**	**4.142**	**-0.590**	**5021.322**
Philippines	**Philippines**	**55.609**	**3.923**	**70.041**	**3.224**	**4.978**	**-0.819**	**2943.027**
Rwanda	**Rwanda**	**50.912**	**7.016**	**43.865**	**12.003**	**7.507**	**-0.802**	**629,454**
South Sudan	**SSD**	**31.103**	**63.679**	**78.611**	**12.660**	**-4.925**	**-4.529**	**1082.785**
Senegal	**Senegal**	**50.308**	**2.105**	**59.000**	**3.407**	**4.192**	**-0.326**	**1165.018**
Serbia	**Serbia**	**59.275**	**13.592**	**84.061**	**15.298**	**3.343**	**-0.508**	**5565.531**

Sierra Leone	Sierra Leone	42.109	14.083	40.001	3.913	5.037	-1.819	927,884
South Africa	South Africa	56.778	5.245	54.673	25.815	2.222	0.541	5543.184
Sri Lanka	Sri Lanka	58.778	9.519	58.869	5.640	3.939	-0.579	4109.124
Sudan	Sudan	37.475	47.216	22.349	14.332	-0.364	-3.692	1263.322
Suriname	Suriname	56.614	22.704	97.519	8.644	2.034	-0.207	8790.574
Syria	Syrian Arab Republic	39.885	13.225	59.628	11.789	-0.635	-3.406	815,806
Tajikistan	Tajikistan	49.277	11.187	93.068	8.861	7.693	-2.765	868.235
Tanzania	Tanzania	47.521	6.331	38.546	2.792	5.926	-1.069	839,627
Thailand	Thailand	59.903	1.961	125.618	1.090	3.286	-0.399	5395.387
East Timor	Timor-Leste	nan	4.746	107.806	3.255	5.589	-1.432	2298.237
Togo	Togo	41.359	2.679	62.107	2.945	3.803	-1.991	707.050
Tunisia	Tunisia	55.468	4.598	96.327	14.994	2.518	-0.331	3559.943
Türkiye	Turkey	57.005	21.705	54.025	10.539	5.103	-0.474	10940.855
Uganda	Uganda	45.268	5.957	39.229	3.064	5.890	-1.477	754.006
Uzbekistan	Uzbekistan	51.454	11.834	56.935	6.202	6.371	-2.803	2849.586
Vietnam	Vietnam	55.710	5.698	143.649	1.781	6.333	-1.066	2228.876
Yemen	Yemen	34.713	11.114	63.402	14.637	0.083	-3.493	1596.825
Zambia	Zambia	48.245	13.399	69.556	9.180	5.397	-0.905	1270.754
Zimbabwe	Zimbabwe	41.908	79.611	64.579	6.130	0.968	-3.265	1225.309
Developed countries								
Country name	Country	Legatum Well-being Index	Inflation rate	Degree of trade openness	Unemployment rate	Economic growth rate	Institutional quality	National income per capita
Albania	Albania	57.810	2.622	73.210	14.463	4.115	-0.450	3969.212

Australia	**Australia**	**79.097**	**2.874**	**42.534**	**5.315**	**2.787**	**3.933**	**53448.055**
Austria	**Austria**	**79.479**	**2.476**	**101.243**	**5.181**	**1.409**	**3.781**	**43262.062**
Belgium	**Belgium**	**76.687**	**2.373**	**155.314**	**7.070**	**1.673**	**3.228**	**41049.332**
Bulgaria	**Bulgaria**	**62.994**	**4.645**	**111.791**	**9.277**	**3.331**	**0.468**	**6681.250**
Canada	**Canada**	**79.256**	**2.229**	**66.810**	**6.970**	**2.065**	**3.982**	**42082.977**
Croatia	**Croatia**	**65.965**	**2.667**	**88.156**	**11.624**	**2.445**	**0.995**	**12448.910**
Cyprus	**Cyprus**	**69.819**	**1.927**	**136.003**	**7.675**	**3.215**	**2.353**	**24875.959**
Czech Republic	**Czech Republic**	**73.689**	**3.198**	**129.115**	**5.381**	**2.426**	**2.287**	**16196.613**
Denmark	**Denmark**	**83.242**	**1.918**	**101.768**	**5.512**	**1.469**	**4.445**	**54008.664**
Estonia	**Estonia**	**75.595**	**4.110**	**143,800**	**8.503**	**3.300**	**2.797**	**15640.907**
Finland	**Finland**	**82.548**	**1.896**	**77.278**	**8.472**	**1.312**	**4.558**	**43905.566**
France	**France**	**76.355**	**1.707**	**61.002**	**8.827**	**1.380**	**2.947**	**36800.059**
Germany	**Germany**	**80.384**	**1.900**	**73.358**	**6.202**	**1.114**	**3.678**	**40809.160**
Greece	**Greece**	**66.461**	**2.166**	**65.221**	**15.104**	**0.844**	**1.199**	**19526.375**
Hungary	**Hungary**	**66.412**	**5.199**	**152.383**	**6.566**	**2.425**	**1.714**	**11982.734**
Iceland	**Iceland**	**80.125**	**4.954**	**83.339**	**4.053**	**2.828**	**3.963**	**52857.621**
Ireland	**Ireland**	**79.610**	**2.214**	**198.389**	**7.436**	**5.237**	**3.672**	**46280.668**
Italy	**Italy**	**71.492**	**2.039**	**54.665**	**9.205**	**0.568**	**1.514**	**32342.123**
Japan	**Japan**	**76.989**	**0.414**	**31.686**	**3.837**	**0.709**	**3.154**	**35262.730**
South Korea	**Korea, Rep.**	**72.541**	**2.496**	**76.995**	**3.309**	**3.767**	**2.016**	**27364.605**
Latvia	**Latvia**	**69.644**	**4.171**	**115.729**	**10.601**	**3.301**	**1.808**	**12320.584**

Lithuania	**Lithuania**	**68.908**	**3.363**	**131.156**	**9.948**	**3.935**	**2.057**	**12492.430**
Luxembourg	**Luxembourg**	**80.704**	**2.214**	**322,495**	**4.959**	**2.564**	**4.238**	**73265.766**
Malta	**Malta**	**nan**	**2.170**	**195.117**	**5.491**	**5.282**	**2.684**	**21668.314**
Netherlands	**Netherlands**	**81.686**	**2.343**	**141.912**	**4.510**	**1.612**	**4.149**	**45119.598**
Norway	**Norway**	**82.854**	**2.445**	**71.209**	**3.701**	**1.659**	**4.294**	**76277.195**
Panama	**Panama**	**63.463**	**2.133**	**116.986**	**6.157**	**5.792**	**0.296**	**10897.267**
Poland	**Poland**	**69.104**	**3.574**	**87.259**	**9.477**	**3.641**	**1.702**	**11431.248**
Portugal	**Portugal**	**73.024**	**2.137**	**75.766**	**8.478**	**1.096**	**2.612**	**19277.646**
Romania	**Romania**	**63.462**	**9.168**	**72.612**	**6.304**	**3.587**	**0.407**	**8339.146**
Russia	**Russia**	**56.702**	**9.856**	**50.896**	**6.158**	**3.415**	**-1.759**	**9277.457**
Slovakia	**Slovak Republic**	**69.375**	**4.054**	**163.341**	**11.782**	**3.312**	**1.724**	**14677.210**
Slovenia	**Slovenia**	**73.525**	**3.258**	**138.512**	**6.254**	**2.417**	**2.350**	**20736.502**
Spain	**Spain**	**74.139**	**2.377**	**60.862**	**15.370**	**1.800**	**2.316**	**26166.236**
Sweden	**Sweden**	**83.021**	**1.936**	**87.412**	**7.132**	**1.989**	**4.275**	**50011.230**
Switzerland	**Switzerland**	**82.606**	**0.627**	**116.743**	**4.202**	**1.891**	**4.334**	**81678.438**
Ukraine	**Ukraine**	**54.706**	**12.359**	**95.488**	**8.650**	**1.123**	**-1.456**	**2073.985**
United Kingdom	**United Kingdom**	**79.568**	**2.462**	**58.373**	**5.429**	**1.687**	**3.560**	**43386.781**
United States of America	**United States**	**77.361**	**2.576**	**26.610**	**5.698**	**2.209**	**3.101**	**55881.895**
Uruguay	**Uruguay**	**67.782**	**8.139**	**51.757**	**9.586**	**2.317**	**2.122**	**14336.192**

Source: Research calculations

An examination of the average of the research variables at the country level shows that there is a noticeable difference between developed and developing countries. In general, developed countries have higher average welfare and institutional quality, more stable unemployment and inflation rates, and much higher per capita national income. In contrast, developing countries face greater dispersion in macroeconomic indicators, higher fluctuations in inflation

and growth, and lower levels of institutional quality and per capita income. Also, in some developing countries, such as South Sudan, Zimbabwe, Argentina, and Angola, the average inflation is very high, while countries such as Switzerland, Japan, France, and Finland enjoy greater price stability. In terms of welfare, the highest values also belong mainly to Northern and Western European countries, while the lowest values are observed in low-income and fragile African countries. These differences indicate that the level of economic development and the quality of institutions play an important role in shaping the welfare and economic conditions of countries.

4.2. Estimation of the research model

Research findings in research include a set of results and statistical data that are collected, analyzed, and interpreted through various methods. Research tests are performed before estimating the research model to ensure the accuracy and validity of the results. The main objectives of these tests include examining the reliability of the data, testing for cointegration to determine the clustering of variables, detecting autocorrelation and variance heterogeneity in the model, and testing for the normality of the residuals to ensure the normal distribution of the residuals. These tests help in selecting the appropriate model and obtaining valid and reliable results.

4-2-1. Pesaran Cross Section Dependency Test

In panel data econometrics, one of the classical assumptions is that cross-sectional units are independent of each other and that shocks or disturbances to one cross-section do not affect other cross-sections. However, in international studies and macroeconomic data, the assumption of cross-sectional independence is often violated due to the existence of common global shocks, market integration, financial and trade linkages between countries, and economic policy transmission. Therefore, it is essential to examine the presence or absence of cross-sectional dependence before performing any unit root test, cointegration, and panel model estimation. In panel data econometrics, it is generally assumed that the data used are cross-sectionally independent. This assumption, like other assumptions, may not be true; therefore, the first step in panel data econometrics is to identify cross-sectional dependence or independence before performing any test. Several tests have been proposed in the literature for this purpose. In this study, Pesaran's cross-sectional dependence test (Pesaran, 2004) was used to measure cross-sectional dependence. This test can be used for both balanced and unbalanced panels and is designed based on the average pairwise correlation coefficients between the disturbance terms of different sections. The test hypotheses are defined as follows:

Ho: $Pij = Pji = cor(uit, uji)$ for $i = j$

H1: $Pij = Pji \neq 0$ for some $i \neq j$

where Pij is the product moment correlation coefficient of the disturbances. Thus, by rejecting the null hypothesis, cross-sectional dependence in the panel data is confirmed. The results of this test for all variables used in the model in the developing and developed countries selected in this study are shown in Table (3).

Table 3. Dependence test

Variable (symbol)	The value of the Pesaran test statistic	Probability level	Test result
	Developing countries		
Legatum Welfare Index (Welfare)	98.76	0.000	The existence of dependencies between sections
Gini inequality index (Giniindex)	49.90	0.000	The existence of dependencies between sections

Income inequality index (Inequalityindex)	**46.81**	**0.000**	**The existence of dependencies between sections**
Inflation rate	**77.56**	**0.000**	**The existence of dependencies between sections**
Degree of trade openness (Open)	**3.29**	**0.001**	**The existence of dependencies between sections**
Unemployment rate	**33.70**	**0.000**	**The existence of dependencies between sections**
Economic growth (GPCGDP)	**96.41**	**0.000**	**The existence of dependencies between sections**
Interactive variable of growth and institutional quality (IQGPCGDP)	**68.45**	**0.000**	**The existence of dependencies between sections**
Per capita gross national income (PCGNI)	**74.75**	**0.000**	**The existence of dependencies between sections**
	Developed countries		
Variable (symbol)	**The value of the Pesaran test statistic**	**Probability level**	**Test result**
Legatum Welfare Index (Welfare)	**201.58**	**0.000**	**The existence of dependencies between sections**
Gini inequality index (Giniindex)	**34.17**	**0.000**	**The existence of dependencies between sections**
Income inequality index (Inequalityindex)	**30.97**	**0.000**	**The existence of dependencies between sections**
Inflation rate	**83.57**	**0.000**	**The existence of dependencies between sections**
Degree of trade openness (Open)	**46.45**	**0.000**	**The existence of dependencies between sections**
Unemployment rate	**35.81**	**0.000**	**The existence of dependencies between sections**
Economic growth (GPCGDP)	**110.30**	**0.000**	**The existence of dependencies between sections**

Interactive variable of growth and institutional quality (IQGPCGDP)	**18.49**	**0.000**	**The existence of dependencies between sections**
Per capita gross national income (PCGNI)	**128.66**	**0.000**	**The existence of dependencies between sections**

Source: Research findings

Table (3), shows that the test probability value for all variables under study is less than the 5% significance level; therefore, the null hypothesis of no cross-sectional dependence is rejected. This finding indicates that economic shocks and changes in one country can also affect other countries and that the research variables have cross-sectional dependence. The existence of cross-sectional dependence has an important consequence for the choice of econometric methods; because in such circumstances, the use of first-generation unit root tests and traditional estimation methods can lead to inconsistent results. Accordingly, in the subsequent stages of the analysis, econometric tests and methods compatible with cross-sectional dependence (second-generation tests) will be used so that the estimation results are more accurate and reliable.

4-2-2. Unit root test for Pesaran with regard to cross-sectional dependence (CIPS)

In the previous section, in order to examine the existence or absence of cross-sectional dependence between cross-sectional units, the Pesaran cross-sectional dependence test was used. The results of that test showed that the assumption of cross-sectional independence is rejected; therefore, in the following analyses, it is necessary to use methods that consider cross-sectional dependence in the structure of panel data. One of the essential steps before estimating panel models is to examine the stationarity of variables; because the use of dummy variables can lead to spurious regression and misleading results. In situations where cross-sectional dependence exists between countries, the use of first-generation unit root tests such as Levin-Lin-Chu (LLC) or Im-Pesaran-Shin (IPS) can lead to inconsistent and biased results; because these tests are based on the assumption of cross-sectional independence. For this reason, in this study, the second-generation unit root test, namely the CIPS test proposed by M. Hashem Pesaran (2007), has been used. This test is a generalized IPS test and is obtained by adding the cross-sectional mean of the dependent variable and its difference in the equation. ADF (also known as CADF) controls for the effect of cross-sectional dependence. The CIPS statistic is the average of the t-statistics from the regressions CADF It is defined for each sectional unit. In this test:

- Null hypothesis (H_0): Existence of a unit root (variable invariance)
- Opposite hypothesis (H_1): Variable stability

If the value of the test statistic is greater than the critical value provided by the Pesaran (in absolute terms smaller than the negative critical value), the null hypothesis is rejected and the variable is considered stationary. In this study, after confirming cross-sectional dependence using the Pesaran (2004) test, the Pesaran CIPS (2007) test was run to examine the degree of stationarity of the variables in the two groups of developed and developing countries. The test results are presented in Table (4).

Table 4. Pesaran Unit Root Test (CIPS)

Variable	Test statistic	Probability level	Test result
	Developed countries		
Welfare	**84.8881**	**0.0064**	**I(1)**
Gini index	**111.7064**	**0.0163**	**I(0)**
Inequality index	**124.4906**	**0.0017**	**I(0)**

Inflation	**340.7294**	**0.0000**	**I(0)**
Unemployment	**98.6187**	**0.0027**	**I(1)**
GPCGDP	**41.5368**	**0.0000**	**I(0)**
IQGPCGDP	**781.9893**	**0.0000**	**I(0)**
PCGNI	**63.0822**	**0.0006**	**I(1)**
Open	**50.0822**	**0.0096**	**I(0)**
	Developing countries		
Welfare	**945881**	**0.0004**	**I(1)**
Gini index	**110.7864**	**0.003**	**I(0)**
Inequality index	**114.5906**	**0.0007**	**I(0)**
Inflation	**310.8794**	**0.0000**	**I(0)**
Unemployment	**99.712**	**0.0000**	**I(1)**
GPCGDP	**41.5368**	**0.0000**	**I(0)**
IQGPCGDP	**751.4493**	**0.0001**	**I(0)**
PCGNI	**67.0122**	**0.0003**	**I(1)**
Open	**52.0112**	**0.0096**	**I(0)**

Source: Research findings

According to the results of the CIPS test, in both developed and developing countries, some variables are at a stationary level. (I(0)) and some others are stationary after one differentiation (I(1)). In developed countries, the variables Gini coefficient, inequality index, inflation rate, output per capita, adjusted output index and degree of trade openness are stationary, while the variables welfare, unemployment rate and gross national income per capita have a stationary degree of I(1). A similar pattern is observed in developing countries; in such a way that the variables inequality, inflation, output per capita, adjusted output index and degree of trade openness are stationary and the variables welfare, unemployment and gross national income per capita are of type I(1). The presence of a combination of variables I(0) and I(1) in the model indicates that in the later stages of estimation, the use of methods that allow working with different degrees of stationary (Similar to panel cointegration approaches) It can be appropriate. Also, the similarity of the stationary structure of the variables in the two groups of countries indicates that developmental differences are reflected more in the coefficients and intensity of the structural relationships of the variables than in the dynamic nature of their time series.

4-2-3. Kao cointegration test

After examining the stationarity of the model variables and determining that some variables are not stationary at the level and become stationary after a difference, the next step is to examine the existence of a long-run relationship between the model variables. In panel data, when variables have different degrees of stationarity (I(0) and I(1)), examining cointegration is essential to avoid spurious estimates. In this study, the Kao panel cointegration test was used to test the existence of a long-run equilibrium relationship between the variables. The Kao test is one of the common panel cointegration tests based on the Dickey-Fuller test. Development Finding Design Done and Assumption Does Vector Cointegration In Between Sections Various Same is. Hypotheses This Test To Face Below Definition They become:

- Null hypothesis (H0): There is no cointegration between the variables in the model.
- Opposite hypothesis (H1): There is a cointegration relationship between the variables in the model.

In this test, various statistics are reported based on the model residuals, the most important of which is the Augmented Dickey–Fuller t statistic. If the probability level of this statistic is less than the 5 percent error level, the null hypothesis is rejected and the existence of a long-run relationship between the variables is confirmed.

Table 5. Cointegration Test of Research Models

Equation (model variables)	Kao test statistic (ADF t)	Probability level	Test result
Inequality model – Countries Developed **(giniindex2, inflation, open, unemployment, gpcgdp , iqgpcgdp , pcgni)**	**-2.7238**	**0.0032**	**The existence of cointegration**
Inequality model – Countries Under development **(giniindex2, inflation, open, unemployment, gpcgdp , iqgpcgdp , pcgni)**	**2.7435**	**0.0030**	**The existence of cointegration**

Source: Research findings

The results of the Kao test for the two equations examined in the two groups of developed and developing countries show that in all equations, the probability value of the test statistic is less than 0.05. Therefore, the null hypothesis of no cointegration is rejected. Accordingly, it can be concluded that there is a long-run equilibrium relationship between economic growth, the interactive variable of economic growth and institutional quality, and other control variables with the welfare index and the inequality index. The existence of this long-run relationship indicates that the model variables move towards a common equilibrium path in the long run and that short-term deviations from this equilibrium are adjusted over time. Consequently, confirmation of panel cointegration allows the estimation and interpretation of the long-run coefficients of the model and justifies the continuation of the analyses using long-run economic estimation methods.

4-2-4. F-test Limer and Hausman

F-limer test show that in all models the null hypothesis of equal width at the origins is rejected and therefore the use of panel data is more appropriate than the pooled model. The results of the Hausman test also show that in both models the probability value is less than 5 percent; therefore the null hypothesis of the Hausman test is rejected and the fixed effects model is selected as the basic estimation method.

Table 6. Test results F Leamer and Hausman

Model	Group of countries	Limer's F-test	Probability level	Result	χ^2 test	Probability level	Selected model
Inequality	**Developed**	**179.88**	**0.0000**	**Rejecting the integrated model**	**20.42**	**0.0023**	**Fixed effects**
Inequality	**Under development**	**102.41**	**0.0000**	**Rejecting the integrated model**	**48.43**	**0.0000**	**Fixed effects**

Source: Research calculations

4-2-5. Autocorrelation test Wooldridge

the Wooldridge test show that in both models under study, the null hypothesis of no autocorrelation is rejected. Therefore, autocorrelation There is a series in both inequality models.

Table 7. Results of the autocorrelation test Wooldridge

Model	Group of countries	F autocorrelation test	Probability level	Result
Inequality	**Developed**	**67.507**	**0.0000**	**The existence of self-correlation**
Inequality	**Under development**	**57.262**	**0.0000**	**The existence of self-correlation**

4-2-6. Results of the heterogeneity test Adjusted Wald Variance

After selecting the fixed effects model, the classical assumptions of the model were examined. Results of the heteroscedasticity test the adjusted Wald variance in Table (8) shows that in both models the probability value is less than 0.05; hence the null hypothesis of homogeneity of variance is rejected and the existence of heterogeneity is rejected. Variance is confirmed in all models.

Table 8. Results of the heterogeneity test Variance

Model	Group of countries	Modified Wald statistic	Probability level	Result
Inequality	**Developed**	**3233.98**	**0.0000**	**Existence of variance heterogeneity**
Inequality	**Under development**	**785306.54**	**0.0000**	**Existence of variance heterogeneity**

According to the results of the F-limer and Hausman tests, the fixed effects model was selected for all models. Also, the results of the diagnostic tests showed the existence of autocorrelation and variance heterogeneity in a significant part of the models. On the other hand, the Pesaran cross-sectional dependence test also confirmed the existence of dependence between sections. Therefore, in order to achieve efficient estimates and valid standard errors, the models were estimated using the Panel Feasible Generalized Least Squares (FGLS) method.

4-2-7. Choosing the model estimation method

As mentioned, in the present study, before estimating the econometric models, a set of diagnostic tests was conducted to examine the statistical properties of the panel data in order to select an estimation method appropriate to the data structure. First, the existence of dependence between sections in the data was examined using the Cross-sectional Dependence test. The test results showed that the null hypothesis of the independence of sections is rejected; therefore, economic shocks and changes in different countries are not independent of each other and the data have cross-sectional dependence. In such circumstances, the use of first-generation methods and tests can lead to biased results. Next, considering the existence of cross-sectional dependence, the Second-generation Unit Root Test (CIPS) was used to examine the stationarity of the variables. The results showed that some of the variables are stationary at the stationary level and some are stationary at the first-order difference; in other words, there is a combination of variables I(0) and I(1) in the model. Accordingly, to examine the existence of a long-run equilibrium relationship between the variables, the Kao Cointegration Test was conducted. The results of this test indicated the rejection of the null hypothesis of no cointegration and the confirmation of the existence of a long-run relationship between the variables in the model. According to the results of the above tests, the selection of the estimation method should be such that it can simultaneously consider heterogeneity between countries, cross-sectional dependence, serial autocorrelation, and variance heterogeneity. Therefore, the model was estimated using the Panel-Feasible Generalized

Least Squares (FGLS) method.. In the method FGLS The focus is on using an estimation method that is robust against violations of classical panel data assumptions (especially variance heteroscedasticity) and directly model the variance-covariance structure. Errors particle for direct object Correction Also, since the estimator FGLS With generalized least squares as the most feasible method, these problems are implicitly controlled for in the estimation process. As a result, the use of the method results in more statistically valid estimated coefficients and standard errors, and more reliable econometric inferences are provided.

4-2-8. Results of the research model estimation

In this part of the research, empirical results from estimating research models for developing and developed countries are presented.

Table 9. Results of estimating the inequality model in developed countries using the method FGLS

Explanatory variable	Estimated coefficient	Standard error	Z statistic	Probability level
Inflation rate	**-0.0197**	**0.0292**	**-0.68**	**0.499**
Trade openness	**-0.0181**	**0.0022**	**-8.38**	**0.000 *****
Unemployment rate	**0.1268**	**0.0195**	**6.51**	**0.000 *****
Economic growth	**0.0589**	**0.0222**	**2.65**	**0.008 *****
The interactive effect of economic growth and institutional quality	**-0.000018**	**0.000003**	**-5.81**	**0.000 *****
National income per capita	**-0.053174**	**0.020779**	**-2.56**	**0.010 ****
The square of national income per capita	**0.0015455**	**0.0001674**	**9.23**	**0.000 *****
Fixed value	**34.7709**	**0.5541**	**62.76**	**0.000 *****
Total number of observations	**858**			
Number of countries	**42**			
Wald statistic (Wald χ^2)	**318.31**			
Wald test probability level	**0.0000**			

Source: Research calculations. *** Significant at the 1 percent level, ** Significant at the 5 percent level, * Significant at the 10 percent level.

The results of the income inequality model estimation for developed countries show that the inequality pattern in these countries is influenced by a set of macroeconomic factors and the role of institutional quality is clearly visible through its interactive effect with economic growth. The significance of the Wald statistic at the one percent level (Prob < 0.01) indicates that the variables entered jointly have the ability to explain changes in income inequality and the model has appropriate statistical validity.

Regarding the inflation rate, the estimated coefficient is negative but statistically insignificant. This result shows that in developed countries, changes in the inflation rate do not have an independent effect on income inequality. This finding is consistent with the characteristics of developed economies, because the existence of independent central banks, macroeconomic stability, efficient tax systems, and support mechanisms make inflation shocks less likely to lead to changes in income distribution.

Trade openness has a negative and highly significant coefficient. This result indicates that the expansion of international trade in developed countries has led to a reduction in income inequality. From an economic perspective, this finding indicates that developed economies, due to their advanced technology, quality human capital, competitive markets, and efficient institutions, are able to distribute the benefits of foreign trade relatively widely among different groups in society, thereby reducing income gaps.

The unemployment rate has a positive and highly significant coefficient, which indicates that increasing unemployment leads to an increase in income inequality. This result is fully consistent with the theoretical foundations of labor economics, because unemployment reduces the income of low-income groups, increases dependence on social protection, and increases the concentration of income among employed people and capital owners. Therefore, maintaining full employment and reducing the unemployment rate is considered one of the most important tools for reducing inequality in developed economies.

Economic growth also has a positive and significant coefficient. This finding suggests that economic growth alone does not necessarily lead to a more equitable distribution of income and can even increase inequality. From a theoretical perspective, this result is consistent with recent studies on technology-driven growth, knowledge-based economies, and higher returns to human capital, because in many developed countries, the benefits of economic growth in the early stages accrue more to groups with skills, capital, and technology, resulting in a widening income gap.

One of the most important findings of the research is related to the interactive variable of economic growth and institutional quality. The coefficient of this variable is negative and significant at the one percent level, which indicates that institutional quality significantly reduces the unequal effect of economic growth. In other words, as the quality of governance, rule of law, transparency, and efficiency of public institutions improve, the benefits of economic growth are distributed more equitably among different segments of society, and the incremental effect of economic growth on income inequality is weakened. This finding confirms the main hypothesis of the research and is one of the most important empirical evidences in support of the institutional economics perspective, which emphasizes the role of efficient institutions in transforming economic growth into inclusive growth.

Regarding national income per capita, the coefficient of this variable is negative and significant, while the coefficient of the square root of national income per capita is estimated to be positive and significant. The simultaneous significance of these two variables indicates the existence of a nonlinear relationship between per capita income and income inequality. The negative sign of the per capita income variable indicates that at lower income levels, an increase in per capita income is associated with a decrease in inequality; but the positive coefficient of the square root of per capita income indicates that after passing a certain level of economic development, a further increase in per capita income can again be associated with an increase in inequality. This result indicates the existence of a U-shaped relationship between per capita income and income inequality in developed countries and shows that even in advanced economies, greater concentration of income at very high income levels can cause inequality to increase again.

Overall, the results of this model show that income inequality in developed countries is mainly influenced by the state of the labor market, the degree of trade openness, the level of per capita income, and the way economic growth interacts with institutional quality. The most important finding of the research is that although economic growth alone can increase income inequality, the existence of efficient and high-quality institutions can significantly moderate this effect and pave the way for a more equitable distribution of the benefits of economic growth.

Table 10. Results of estimating the inequality model in developing countries using the method FGLS

Explanatory variable	Estimated coefficient	Standard error	Z statistic	Probability level
Inflation rate	**0.0032**	**0.0110**	**0.29**	**0.774**
Trade openness	**-0.0503**	**0.0032**	**-15.87**	**0.000 *****
Unemployment rate	**0.0483**	**0.0252**	**1.91**	**0.056 ***
Economic growth	**0.0656**	**0.0361**	**1.82**	**0.069 ***
The interactive effect of economic growth and institutional quality	**-0.1095**	**0.0407**	**-2.69**	**0.007 *****
National income per capita	**-0.051**	**0.143**	**-0.35**	**0.724**
The square of national income per capita	**0.03748**	**0.01198**	**3.13**	**0.002 *****
Fixed value	**43.1693**	**0.3464**	**124.61**	**0.000 *****
Total number of observations	**1418**			
Number of countries	**98**			
Wald statistic (Wald χ^2)	**472.65**			
Wald test probability level	**0.0000**			

Source: Research calculations. *** Significant at the 1 percent level, ** Significant at the 5 percent level, * Significant at the 10 percent level.

The results of the income inequality model estimation for developing countries show that the Wald statistic is significant at the one percent level (Prob<0.01); therefore, the variables entered jointly have the ability to explain changes in income inequality and the model has appropriate statistical validity.

Regarding the inflation rate, the coefficient of this variable is positive but statistically insignificant; therefore, it cannot be concluded that changes in the inflation rate in developing countries directly cause changes in income inequality. This result could be due to the differences in economic structures, the diversity of monetary and fiscal policies, as well as the strong heterogeneity of the countries under study, which caused the average effect of inflation on inequality to not appear significant at the panel level.

Trade openness has a negative and highly significant coefficient and is considered one of the strongest results of the model. This finding indicates that increasing the integration of developing countries into world trade can lead to a reduction in income inequality. From an economic perspective, expanding foreign trade through increasing job opportunities, technology transfer, export development, increased competitiveness, and improved productivity can create more income opportunities for different segments of society and reduce the income gap. The magnitude of the coefficient of this variable also indicates that foreign trade is one of the most important tools for reducing inequality in developing countries.

The unemployment rate has a positive coefficient and is significant at the 10 percent level. This result indicates that increasing unemployment exacerbates income inequality, because the reduction in job opportunities affects low-income groups the most and increases the income gap between different segments of society. Although the significance of this variable is less than that of some other variables, the sign of the coefficient is fully consistent with the theoretical foundations of labor economics.

Economic growth has a positive coefficient and is significant at the 10% level. This result indicates that economic growth alone can be associated with increasing income inequality. From a theoretical perspective, this finding confirms that in many developing countries, the benefits of economic growth are not distributed evenly among

all segments of society and a major part of the benefits of growth accrue to groups with more capital, skills, and access to economic resources. Therefore, economic growth without appropriate distribution mechanisms will not necessarily lead to inclusive growth.

One of the most important findings of the research is related to the interactive variable of economic growth and institutional quality. The coefficient of this variable is negative and significant at the one percent level, which indicates that institutional quality significantly reduces the unequal effect of economic growth. In other words, as the quality of governance, rule of law, government effectiveness, transparency, and accountability of public institutions improve, the benefits of economic growth are distributed more equitably among different segments of society and the incremental effect of economic growth on income inequality decreases. This result is one of the most important findings of the research and well confirms the main hypothesis of the research about the moderating role of institutional quality.

Regarding per capita national income, the coefficient of this variable is negative but statistically insignificant; therefore, the direct effect of per capita income on inequality cannot be confirmed. However, the square of per capita national income has a positive and highly significant coefficient, indicating that the relationship between per capita income and income inequality is nonlinear in nature. This result indicates that although an increase in per capita income in the early stages of development does not necessarily have a significant effect on inequality, at higher income levels, changes in per capita income can be associated with a re-increase in inequality. This finding indicates that the relationship between economic development and income distribution in developing countries is complex and that increasing income levels alone cannot guarantee an improvement in distributive justice.

Overall, the results of this model show that income inequality in developing countries is most affected by the degree of trade openness, the state of the labor market, and the way economic growth interacts with institutional quality. The key finding of the research is that although economic growth alone can increase income inequality, improving institutional quality can significantly moderate this effect and pave the way for a more equitable distribution of the benefits of economic growth. This result highlights the importance of institutional reforms, improving the quality of governance, and improving the efficiency of public institutions alongside economic growth policies, and shows that achieving inclusive growth in developing countries requires that economic policies be implemented simultaneously with strengthening governance institutions so that the benefits of economic growth are distributed equitably among different groups in society.

5. Conclusions and suggestions

Economic growth is one of the most important goals of economic policymaking in different countries, but increasing production and national income does not necessarily mean a more equitable distribution of income and reducing inequality. How the benefits of economic growth are distributed among different groups of society depends on several factors, including economic structure, labor market conditions, distributional policies, and the quality of economic and political institutions. Accordingly, the present study aimed to investigate the effect of economic growth on income inequality and analyze the interactive role of institutional quality in this regard, in two groups of developed and developing countries. To examine this relationship, panel data from the countries studied were used and econometric models were developed using the FGLS was estimated. In this framework, in addition to the direct effect of economic growth on income inequality, the interactive effect of economic growth and institutional quality was also examined. The separation of the studied countries into two groups, developed and developing, also made it possible to consider the structural and institutional differences between these two groups in the way economic growth affects income distribution.

The results of the inequality model estimation in developed countries showed that economic growth has a positive and significant effect on income inequality. In other words, under the existing institutional conditions, increased economic growth alone has not been able to lead to a more equitable distribution of income and has even been accompanied by an increase in inequality. Along with economic growth, the unemployment rate has also had a positive and significant effect on inequality, while trade openness has shown a negative and significant effect on

income inequality. Also, the results have confirmed the existence of a nonlinear relationship between national income per capita and inequality; in such a way that per capita income has a negative effect and the square of per capita income has a positive and significant effect on inequality, which indicates the existence of a U-shaped relationship between per capita income and inequality in developed countries. The results for developing countries also showed a similar pattern. In these countries, economic growth had a positive and significant effect on income inequality; meaning that increased economic growth, under existing institutional conditions, did not necessarily distribute its benefits equally among different groups in society. Also, the unemployment rate increased inequality, while trade openness had a decreasing effect on inequality. In this group of countries, the nonlinear relationship between per capita income and inequality was also confirmed.

The most important finding of the study is related to the interaction effect of economic growth and institutional quality. The results showed that the interaction coefficient of economic growth and institutional quality is negative and significant in both developed and developing countries. This result indicates that institutional quality can reduce the unequalizing effect of economic growth. In other words, although economic growth alone has tended to increase income inequality in the countries studied, improving institutional quality reduces the intensity of this effect and makes a larger part of the benefits of economic growth available to different groups in society.

From this perspective, institutional quality cannot be considered simply as an independent variable affecting inequality; rather, research findings show that institutional quality changes the way economic growth affects income distribution. In an appropriate institutional environment, mechanisms such as the rule of law, corruption control, government accountability, transparency, and protection of economic rights can provide the basis for broader access to economic opportunities for different groups in society. In contrast, institutional weakness can cause the benefits of economic growth to be more available to the advantaged groups, and as a result, the inequitable effects of growth can be exacerbated.

Therefore, the main finding of the research can be summarized in the proposition that economic growth in itself does not guarantee a reduction in inequality; rather, the quality of the institutional environment determines how the benefits of economic growth are distributed among different groups in society. This result is observed in both developed and developing countries and indicates that institutional reforms should be considered as a complement to economic growth policies.

On the other hand, the results related to the unemployment rate show that the labor market is one of the important channels for the formation of inequality. The positive effect of unemployment on inequality indicates that increasing unemployment can affect the income and economic opportunities of different groups asymmetrically and increase the income gap. Therefore, policies to reduce inequality cannot focus solely on income redistribution policies and must also include the creation of productive and sustainable employment. Also, the negative effect of trade openness on inequality in the research results shows that economic and trade integration can help improve income distribution under appropriate conditions. Of course, enjoying the benefits of foreign trade depends on the productive capacity, labor market structure, and the quality of countries' economic policies and institutions. Therefore, trade policy should be designed alongside policies to enhance the competitiveness of domestic production and increase the employability of the workforce.

Overall, the results of this study show that achieving economic growth without regard to institutional quality may be associated with increasing income inequality. In contrast, improving institutional quality can, as a moderating mechanism, reduce the inequitable effects of economic growth and pave the way for a shift from mere growth to inclusive and equitable growth. Therefore, development policies should simultaneously pursue two goals: first, creating the necessary conditions for sustainable economic growth and second, creating institutions that enable a broader distribution of the benefits of this growth.

In summary, based on the research findings, the proposed policy framework can be based on three main axes:

Sustainable and job-generating economic growth to increase economic opportunities;

Improving institutional quality by strengthening the rule of law, corruption control, transparency, and accountability;

Targeted distributional and social policies to ensure a broader distribution of the benefits of economic growth.

Therefore, the main policy message of the research is that economic growth without institutional reforms can be accompanied by increasing inequality, while improving institutional quality can reduce this unequalizing effect and pave the way for more inclusive economic growth. This result suggests that institutional reforms should not be considered as a side policy alongside economic growth programs, but should be considered as one of the main pillars of the development strategy and inequality reduction.

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