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DETERMINANTS OF ECONOMIC GROWTH: PANEL DATA ANALYSIS

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Abstract

The main objective of this paper is to examine the determinants of economic growth in 78 countries in the period 2012-2022. Although the literature review clearly identifies individual determinants of growth, this paper differentiates in terms of studying individual effects in countries at different stages of development. The analysis was conducted using four different methods (pooled OLS, fixed effects panel, random effects panel, and generalized method of moments), with a special emphasis on dynamic panel analysis, which uses the most complex estimation. Following the identified literature gap regarding the study of the impact of formal institutions in countries with different levels of development, the study identifies investments, employment rate and the institutional framework as the main determinants of growth. The impact of the institutional framework was found to be the strongest, but it largely depends on the level of development of individual countries. In addition, the analysis of long-term estimates further confirms the results obtained. Finally, economic policymakers should make additional efforts to simplify the existing institutional framework and adapt it to the challenges of the global macro environment.

Keywords: economic growth, panel analysis, institutional framework

1. INTRODUCTION

Investigating the determinants of economic growth is one of the most common challenges for economists in empirical research. Using various approximations such as GNI *per capita* (Efendic, Pugh & Adnett, 2011; Efendic & Pugh, 2015; Fabro & Aixalá, 2012; Khan, 2022), the GDP growth rate (Banna, Alam, Chen, & Alam, 2023; Batrancea, Rathnaswamy & Batrancea 2022; Falcetti, Lysenko & Sanfey, 2006; Sachs, 1996), or the GDP level (Assane & Grammy, 2003; Chousa, Khan, Melikyan & Tamazian, 2005; Hammad, Outhman, Hamad, Faisal, Abdullah, & Ulkareem 2024; Hobbs, Paparas, AboElsoud, 2021; Selowsky & Martin, 1997) – the authors attempt to investigate which determinants have the

greatest influence on gross domestic product in countries around the world. So, the question arises as to why economic growth is still an unavoidable topic in academic and other social circles today. The answer lies in the fact that various social actors are aware that economic growth is not just a numbers game, but has a significant impact on their real lives. In their election programs, policymakers base most of their policies precisely on achieving positive economic growth rates. Without growth, fulfilling the program becomes much more difficult, as it can very quickly set off both a positive and a negative spiral of economic activity. Growth leads to an increase in wages, profits, investments, employment and general living standards, while a decline can have the same effects but in a completely different direction. Ultimately, economic development cannot be achieved without significant growth rates, which underlines its importance in the global economy.

A review of the literature revealed that different authors have used different methods to identify the key determinants of economic growth. Using panel analysis methods (Alesina, Ardagna, Nicoletti & Schiantarelli, 2005; Al-Fayoumi, 2016; Bartlett, Čučković, Jurlin, Nojković, & Popovski, 2013; Efendic & Pugh, 2015; Eicher & Schreiber, 2010; Fabro & Aixalá, 2012) and the two-stage least square/three-stage least square methods (Ahlerup Olsson, & Yanagizawa,, 2009; Beck & Laeven, 2006; Fabro & Aixalá, 2012; Falcetti et al., 2006; Murtaza & Faridi, 2016), the group of authors puts formal institutions in the foreground. However, the literature review identified a literature gap in terms of studying formal institutions in countries that are on different income levels. To eliminate the aforementioned gap, this paper uses a panel data analysis (pooled OLS, fixed effects panel, random effects panel and difference generalized method of moments) to examine how the institutional framework affects economic growth in 78 countries at different levels of development in the period from 2012 to 2022. From a methodological point of view, it is necessary to point out two limitations resulting from panel data analysis. The use of static panels (pooled OLS, fixed and random effects) is suitable for longer periods. On the other hand, the use of dynamic panels (difference generalized method of moments), which use a more complex methodology and allow control of the endogeneity problem, is limited to a shorter period of data. In his paper, Roodman (2009) points out that dynamic panels are suitable for large N (number of countries) and small T (time period), which clearly calls for caution when interpreting the results and drawing economic conclusions. Nevertheless, due to all the above and the possibility of calculating long-run estimates, this paper pays special attention to the results of the analysis of the generalized method of moments.

The paper is divided into five sections. Section 2 provides a literature review. Section 3 explains the data and section 4 methodology used in the paper. The results of the analysis are presented in Section 5, while Section 6 contains the conclusions of the paper.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The literature review identified several authors who emphasize formal institutions as important determinants of economic growth (Al-Fayoumi, 2016; Amaxhekaj, Qehaja & Gara, 2024; Assane & Grammy, 2003; Beck & Laeven, 2006; Cooray & Nam, 2025; Deseau, Levai & Schmiegelow, 2025; Duodu, Kwarteng & Ogajah Tawiah, 2025; Efendic & Pugh, 2015; Eicher & Schreiber, 2010; Fabris, Azevedo & Reis, 2025; Fabro & Aixalá, 2012; Falcetti, Raiser & Sanfey, 2002; Falcetti et al., 2006; Havrylyshyn & van Rooden, 2003; Knack & Keefer, 1995; Mauro, 1995; Moers, L., 1999; Paakkonen, 2009; Redek & Sušjan, 2005; Röthel & Leschke, 2024; Sachs, 1996; Scully, 1988; Selowsky & Martin, 1997). Using the system generalized method of moments, Efendic & Pugh (2015) highlight institutions as the most important determinants of economic growth in their work. The improvement of institutions by 1% in a five-year period leads to an increase in GNI per capita by 0.4% (Efendic & Pugh, 2015). Based on a panel analysis of a sample of 79 countries, the research results of Fabro & Aixalá (2012) showed that civil liberties and political rights have a positive impact on economic growth. In line with these results, Fayoumi (2016) uses a static and dynamic analysis to show that formal institutions, approximated by the index of economic freedom, have a significant impact on real GNI per capita. Using three different estimation methods (fixed effects panel, GMM

and instrumental variables estimation), Cooray & Nam (2025) highlight government efficiency as one of the most important factors that positively influences not only economic growth but also the efficiency of public social spending.

Furthermore, using dynamic panel analysis, the results of Eicher & Schreiber (2010) suggest that a 10% improvement in institutions leads to a 2.7% increase in the annual growth rate. Although the authors approximate the institutions differently than Efendic & Pugh (2015), their results are largely consistent. In contrast to previous authors, Paakkonen (2009) used the growth rate of real GDP per worker as the dependent variable. The results of her generalized method of moments show that investment, economic freedom and the size of the state are the most important determinants of economic growth. In addition, Redek & Sušjan (2005), who approximate institutions with the Heritage Foundation Index and use a fixed effects panel, conclude that the improvement of formal institutions has a positive effect on GNI per capita. In their paper, Deseau, Levai & Schmiegelow (2025) examine the impact of institutions (judicial systems) on economic growth in over 100 countries around the world. By approximating the impact of the judiciary by the number of judges per capita, the authors show that improving access to justice by one unit increases five-year GDP growth per capita by 0.4 percentage points. Fabris, Azevedo & Reis (2025) conducted a panel analysis on a sample of 133 countries in the period 1996-2014. The study showed that trade, institutions and geography are the most important determinants of economic growth, with the effect of trade being the strongest. In contrast, Amaxhekaj, Qehaja & Gara (2024) show in their study using GMM that trade openness has no effect on economic growth and that it is primarily determined by enrollment in tertiary education, government spending and the quality of institutions.

However, the literature review also identified papers that emphasizes the importance of institutions using methods other than panel analysis. Assane & Grammy (2003), using a regression analysis for a sample of 103 countries, come to the conclusion that good institutions increase efficiency and accelerate economic growth. In a similar vein, Knack & Keefer (1995) , using the ordinary least squares method, highlight property rights as a key determinant of investment and economic growth. Moreover, expanding the analysis, the same authors in their paper from 1997 also point out that institutions have a positive effect not only on economic growth but also on the convergence of countries.

Applying the same methodology to a sample of 25 countries, Sachs (1996) demonstrates in his study a positive relationship between economic growth and institutions, which is approximated by the index of reform progress. Similar to Sachs (1996), Selowsky & Martin (1997) demonstrate a positive correlation between GDP and the institutions approximated by the liberalization index. In contrast to the previous authors, Moers (1999) divides the institutions into formal and informal and uses the least squares method to investigate whether there is a positive correlation between them and economic growth. The results of the study show that formal institutions influence GNI per capita, while the same effect was absent for informal institutions. Scully (1988), who uses the method of least squares, also names political, civil and economic freedoms as the most important factors for the growth rate of real GNI per capita.

Furthermore, Beck & Laeven (2006), using least squares and two-step least squares methods, conclude that institutional development has a positive effect on GNI per capita. Moreover, Falcetti et al. (2002) and Falcetti et al. (2006) come to similar conclusions using the same methodology extended with the three-stage least squares method. These authors point out that, in addition to institutions, other variables such as initial conditions, oil prices, fiscal discipline and trade relations have a significant influence on economic growth in the selected countries. Using the instrumental two-stage least squares method, Duodu, Kwarteng & Ogajah Tawiah (2025) examine how Chinese and American imports affect economic growth in sub-Saharan Africa. The study found that Chinese imports stimulate economic growth in sub-Saharan African countries with strong institutions, while American imports stimulate economic growth in countries with strong and weak institutions.

Mauro (1995) concludes that formal institutions in the form of an efficient bureaucracy have a positive effect on investment and economic growth. Unlike the previous authors, Havrylyshyn & van Rooden (2003), using the least squares method and the generalized least squares method, point out that the institutional framework is important, but that macroeconomic stability and market-oriented reforms are much more important determinants of economic growth. Using a vector error correction model on a sample of 20 OECD countries, Röthel & Leschke (2025) show that institutions and education have a positive effect on economic growth, although the persistence of the relationship between education and institutions is not demonstrated.

Ultimately, the literature review identified a group of authors who, using different methodologies, highlight other factors that influence economic growth. Durlauf, Johnson & Temple (2004) analysing 43 growth studies point out that most determinants of economic growth can be reduced to three variables: investment, employment rate, and the current level of GNI per capita of a country. Sala-I-Martin (1997) also argue that only a few variables affect economic growth, highlighting the initial level of income, life expectancy and primary school enrolment rate. Mankiw, Romer & Weil (1992) using the method of ordinary least squares points out that differences in savings, population growth rate and education are the most important factors that explain differences between countries' economic development. Based on a sample of 155 countries, Afonso & Jalles (2013) concludes that an increase in public debt and the occurrence of a crisis negatively affect the GDP growth rate, while financial consolidation and general financial market development have a positive effect on economic growth. In correspondence with previous results, there is a negative non-linear relationship between the growth of public debt and the growth rate of GDP (Égert, 2015). However, the author also points out that in some cases the mentioned relationship can be positive (when the public debt is a function of development). Furthermore, according to Tica & Viljevac (2020) the initial level of development, employment rate, political stability, and investment rate are the most important factors of economic growth in transition countries.

Barro (1991), applying the least squares method to a sample of 98 countries, claims that price distortions and the share of government spending in GDP are two factors that negatively affect economic growth. On the other hand, a higher level of energy security has a positive impact on economic growth, while wartime, inflation and global conflict have a negative impact (Banna et al., 2023). Using an identical methodology, Batrancea et al. (2022) attempt to examine the key financial determinants of economic growth. Although the study is limited to only 7 countries, the analysis shows that only the bank's capital to assets ratio has a positive effect on economic growth. Applying the Dumitrescu–Hurlin panel causality test, Bazaluk, Kader, Zayed, Chowdhury, Islam, Nitsenko & Bratus (2024) list foreign direct investments, population growth, investments and the literacy rate as the most important growth factors. In contrast, authors such as Hobbs et al. (2021) and Hammad et al. (2024) conducted the analysis at the level of only one country, namely Albania and Iraq. Using methods such as unit root tests, Johansen cointegration analysis, Granger causality test and autoregressive distributed lag models, the researchers showed that exports in Albania and domestic public debt in Iraq significantly affect economic growth. Khan (2022) in his paper highlights public policies, infrastructure, business environment, finance and specialized skills as the key determinants of economic growth. Similar to Hobbs et al. (2021), Shan, Rather & Dar (2024) demonstrate that there is a positive relationship between trade openness and economic growth in 22 Asian countries.

Taking into account all of the above, a literature gap has been identified in terms of studying the determinants of economic growth in countries at different levels of development. With the exception of Assane & Grammy (2003) , all authors in their analyses have classified countries into the same basket, without taking into account the level of their development. In order to eliminate the aforementioned gap, this paper examines the influence of the institutional framework in low, middle, and high-income countries.

When analysing the theoretical framework as a basis for empirical analysis, it is necessary to distinguish between classical, neoclassical and endogenous growth theories. According to the classical approach (Malthus, 1798; Ricardo, 1817; Smith, 1776), economic growth is primarily

determined by the accumulation of capital, land and population. An increase in these factors leads to economic growth in the short term, but this growth is limited by the law of diminishing returns. Above a certain level, a further increase in land and capital leads to a decline in economic growth. On the other hand, uncontrolled population growth can also represent a limit to economic growth after a certain point (e.g. China). This limitation is reflected in a shortage of food and space, which leads to a decline in wages, living standards and eventually to stagnation. Given the shortcomings of the classical approach to economic growth, the neoclassicals (especially the Solow (1956) and Swan (1956)) emphasize technology in their approaches as the key determinant of long-term and short-term economic growth in their approaches. According to the neoclassical approach, technology is exogenous and can be improved by the policies implemented by the government of a particular country. Finally, Lucas (1988) and Romer (1990) emphasize factors such as human capital, innovation and R&D investment as the main components of endogenous growth theories. In contrast to the neoclassicals, the representatives of endogenous growth theories do not focus on the role of the government but assume that the technological process is mainly influenced by investments in R&D. Considering all approaches to the issue of economic growth, the institutional framework can be classified as a technology. With a greater degree of its efficiency and quality, countries have a greater chance of achieving stronger growth rates and convergence towards the most developed countries in the world. It is clear from the theoretical framework and the literature review that the institutional framework is a prerequisite, without which it is not possible to achieve significant growth rates in the economy.

As for the theoretical framework, this paper will use Mankiw's et al. (1992) version of the Solow (1957) model with technology, which has the following form:

$$ln\left(\frac{Y}{L}\right) = lnA_0 + gt + \frac{\alpha}{1-\alpha} ln(s) - \frac{\alpha}{1-\alpha} ln(n+g+\delta) + e \qquad (1)$$

where Y represents income, L labor, A_0 initial level of technology, gt technological progress over time, α a constant (the elasticity of output in relation to capital), s the saving rate, n the population growth rate, g the technological progress rate, δ the depreciation rate, and e the random error. According to equation (1), the savings rate should have a positive effect and the population growth rate in combination with the rate of technical progress and the rate of depreciation rate should have a negative effect on output per worker.

3. DATA DESCRIPTION

3.1. Dependent variable

In earlier empirical studies, authors have used different versions of GDP to approximate economic growth. According to Nuxoll (1994), the use of domestic prices leads to a much better approximation of economic growth as they take into account the trade-offs faced by the various decision-makers within the economy. On the other hand, the use of international prices has proven to be the better option when adjusting GDP estimates. Following the above, this paper uses the logarithmic value of GNI per capita in constant units of national currency as the dependent variable, and to test for convergence across countries, GNI per capita in purchasing power parity ($) is used as one of the independent variables. Of the 78 countries included in the analysis, 18 belong to Africa, 14 to Asia, 30 to Europe, 9 to North America, 5 to South America and 2 to Australia. According to the data available for 2022, the highest value of the dependent variable (*loggdppclcu*) in Africa had Côte d'Ivoire (14.17795), in Asia Indonesia (17.56515), in Europe Iceland (15.82293), in North America Costa Rica (15.83387), in South America Paraguay (17.27268) and in Australia Australia (11.40445). On the other hand, Sierra Leone (7.132906) in Africa, Turkey (10.12549) in Asia, Bosnia and Herzegovina (9.309823) in Europe, Belize (9.423621) in North America, Uruguay (13.19637) in South America and Fiji (9.293732) in Australia had the lowest values of the dependent variable in 2022.

3.2. Independent variables

The selection of independent variables was in line with the theoretical framework and the approach of other authors in researching the determinants of economic growth. As can be seen in Table 1, all variables are taken from four sources: the World Bank, the International Monetary Fund, the CIA – World Factbook and the paper of La Porta, Lopez-de-Silanes, Shleifer & Vishny (1999). Variables such as population (pop), central government debt (*cgdimf*), investments (*gfc*) and employment rate (*erilo*) were selected based on the theoretical background explained in the previous chapter, while variables such as GNI per capita in purchasing power parity (*gdppcppp*), trade (*trade*), domestic credit to the private sector (*dctps*) and foreign direct investments (*fdi*) were selected based on the approach of other authors (Bazaluk et al., 2024; Chambers & Munemo, 2019; Efendic et al., 2011; Hammad et al., 2024; Khan, 2022; Shan et al., 2024; Tica & Viljevac, 2020). The external instruments were selected based on the theoretical framework that countries further away from the equator and with a longer period of independence should be more developed than countries closer to the equator and with a shorter period of independence. The key variables of interest were selected based on the identified literature gap.

From table 1 it can be seen that most of the control variables are measured as a % of GDP, except for population (pop), which is measured as the total number of people in a country, GNI per capita at purchasing power parity (*gdppcppp*), which is measured in dollars, and the employment rate (*erilo*), which is expressed as the percentage of people employed in relation to the working-age population. The distance from the equator (*dfe*) is normalized and ranges from 0 to 1, with a higher value meaning a greater distance of the country from the equator, i.e. where 0 represents the equator itself. On the other hand, the number of years of independence (*bgn*) measures the number of years since a country declared independence until the year 2022.

Table 1 Description of variables

Variables	Measure	Source
Control variables		
pop	Population, total.	World Bank
cgdimf	Central Government Debt (% of GDP).	International Monetary Fund
gdppcppp	GNI per capita, PPP (current international $).	World Bank
gcf	Gross capital formation (% of GDP).	World Bank
erilo	Employment to population ratio, 15+, total (%) (modeled ILO estimate).	World Bank
trade	Trade (% of GDP).	World Bank
dctps	Domestic credit to private sector (% of GDP).	World Bank
fdi	Foreign direct investment, net inflows (% of GDP).	World Bank
External instruments		
dfe	Distance from the equator, value normalized on a scale from 0 to 1, higher value represents greater distance from the equator.	(La Porta et al., 1999)
bgn	Number of years of independence – number of years from the year of declaration of independence until 2022.	CIA – World Factbook
Key variables of interest		
io5	Institutional framework – a higher value of the index implies a more efficient and better institutional framework	Author's calculation/World Bank
lmh	A dummy variable - takes the value 0 if the country is at a low-income level, 1 at a middle-income level, and 2 at a high-income level.	Author's calculation/World Bank
lmh x io5	Interaction of dummy variable and institutional framework	Author's calculation/World Bank

Source: Author's calculation

The institutional framework (io5) was calculated using Principal Component Analysis (PCA), which took into account six variables of the Worldwide governance indicators database: Control of Corruption (*cc*), Political Stability and Absence of Violence/Terrorism (*ps*), Rule of Law (*rq*), Government Effectiveness (*ge*), Regulatory Quality (*rq*) and Voice and Accountability (*va*).

Principal component analysis (PC) generates as many eigenvalues as there are clusters (in our case 6 variables - 6 clusters), but only eigenvalues greater than 1 are considered. In other words, Comp1 explains 87.1% of the variation of the 6 institutional variables used in the PC analysis, which means that Comp1 represents our key variable of interest (io5), whose higher value implies higher quality and a more efficient institutional framework (see table 2 in appendix). Finally, the appropriateness of the PC analysis is checked using the Kaiser-Meyer-Olkin test, whose overall value is 0.908, with a value above 0.5 being considered acceptable (see table 3 in appendix).

Furthermore, the variable *lmh* indicates whether the country belongs to the group of low, middle or high-income countries. According to the World Bank's official classification (Atlas method), all countries that had a GNI per capita ($) of less than or equal to $1,135 in 2022 belong to low-income countries, between $1,136 and $4,465 to lower-middle-income countries, between $4,466 and $13,845 to upper-middle-income countries and above $13,845 to high-income countries. For the sake of simplicity and due to the sample of 78 countries, lower-middle-income and upper-middle-income countries are grouped together as middle-income countries. Accordingly, in this paper, all countries with a GNI per capita of less than or equal to $1,135 in 2022 belong to low-income countries, countries with a GNI per capita between $1,136 and $13,845 belong to middle-income countries and all countries with a GNI per capita of more than $13,845 belong to high-income countries. The variable *lmh* takes the value 0 if the country is a low-income country, 1 if it is a middle-income country, and 2 if it is a high-income country. All models are built on a sample of 78 countries, with 82 observations for low-income countries, 411 observations for middle-income countries and 365 observations for high-income countries.[1] Finally, the variable *lmh* x io5 indicates the interaction between the institutional framework and countries with different income levels.

Table 4 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
loggdppclcu	858	11.731	2.247	7.057	17.565
pop	858	30866486	50644543	276197	2.755e+08
cgdimf	858	55.821	37.315	2.063	226.115
gdppcppp	858	26715.077	25043.574	1129.638	163542.78
gcf	858	23.669	6.655	9.209	55.899
erilo	858	56.222	8.72	32.854	88.518
trade	858	91.784	56.027	24.32	393.141
dctps	858	64.797	44.133	.005	255.31
fdi	858	4.498	24.038	-394.472	280.146
io5	858	.011	2.313	-5.16	4.337
lmh	858	1.33	.642	0	2

Source: Author's calculation

[1] It should be noted that this is the number of observations, not the number of countries. Namely, when creating panel data, country x can be in the group of countries with a low-income level in one year, and to move to the group of countries with a middle- income level in the following year. Furthermore, the number of countries remains the same in all panel models (78), but due to the more complex methodology in the DGMM panel variant, the number of observations is reduced from 858 to 702.

Detailed statistics for all variables used in the model can be seen in Table 4. The index of the key independent variable of interest (io5) ranges from -5.16 to 4.337, while the dependent variable (*loggdppclcu*) ranges from 7.057 to 17.565 units.

4. METHODOLOGY

The empirical part of the analysis includes an investigation of the impact of the institutional framework on economic growth in countries with different income levels. The study is conducted on a sample of 78 countries in the period from 2012 to 2022 using four different methods: pooled OLS, fixed effects panel, random effects panel and difference generalized method of moments. The basic analysis model where *i* represents the country and *t* represents time is as follows:

$$\log(Y_{it}) = \alpha_1 - B_1 pop_{it} - B_2 cgdimf_{it} + B_3 gdppcppp_{it} + B_4 gcf_{it} + B_5 erilo_{it} + B_6 trade_{it} + B_7 dctps_{it} + B_8 fdi_{it} + B_9 io5_{it-5} + \varepsilon_{it} \quad (2)$$

where $log(Y_{it})$ represents the logarithmic value of gni – a per capita in constant national units, pop_{it} population, $cgdimf_{it}$ central government debt, $gdppcppp_{it}$ gni per capita in purchasing power parity, gcf_{it} gross capital formation, $erilo_{it}$ employment rate, $trade_{it}$ trade, $dctps_{it}$ domestic credits to the private sector, fdi_{it} foreign direct investment, $io5_{it-5}$ institutional framework and ε_{it} random error.

As can be seen from equation (2), no interactions are used in the baseline model, which means that the baseline model examines how the institutional framework affects economic growth in 78 countries. It is also noted that the main independent variable of interest (io5) is lagged by 5 periods. The reason for using lags is to avoid the problem of simultaneity (endogeneity), i.e. possible feedback between the key dependent variable (GNI per capita) and the key dependent variable of interest (io5). The extended version of the model includes the introduction of interactions and the study of the impact of the institutional framework on economic growth in countries with different income levels. Accordingly, the extended version of the model takes the following form:

$$\log(Y_{it}) = \alpha_1 - B_1 pop_{it} - B_2 cgdimf_{it} + B_3 gdppcppp_{it} + B_4 gcf_{it} + B_5 erilo_{it} + B_6 trade_{it} + B_7 dctps_{it} + B_8 fdi_{it} + B_9 io5_{it-5} * B_{10} lmh_{it} + \varepsilon_{it} \quad (3)\ [2]$$

where $B_9 io5_{it-5} * B_{10} lmh_{it}$ represents the interaction between the institutional framework and countries at low, middle and high - income levels. The basic model and the extended model also contain dummy variables for years to control for the effects of structural breaks. Model diagnostics will include the following tests: R^2 and Wald test for pooled OLS, F–test, Wald test, R^2 and Pesaran test for fixed and random effects models, as well as Arellano-Bond test for AR (1), Arellano-Bond test for AR (2) and Hansen test for the generalized method of moments.

Table 5 (see appendix) shows the correlation matrix of all variables used in the model. As can be seen, apart from *io5* and *io5xlmh2* (0.873), there is no correlation between the two variables that is higher than 0.74. In other words, all variables can be included in the model specification at the same time. The high correlation between *io5* and *io5 x lomh2* (0.873) is negligible since the models will be estimated separately, first for *io5* and then for *io5 x lmh2*.

5. RESULTS

Table 6 shows the results of a panel analysis for a sample of 78 countries in the period 2012-2022 using four different estimation methods: pooled OLS, fixed effects panel, random effects panel and

[2] It should be noted that GMM models include a one-year lagged dependent variable as an integral part of the models.
$\log(Y_{it}) = \alpha_1 + log\hat{B}Y_{it-1} - B_1 pop_{it} - B_2 cgdimf_{it} + B_3 gdppcppp_{it} + B_4 gcf_{it} + B_5 erilo_{it} + B_6 trade_{it} + B_7 dctps_{it} + B_8 fdi_{it} + B_9 io5_{it-5} + \varepsilon_{it}$
$\log(Y_{it}) = \alpha_1 + log\hat{B}Y_{it-1} - B_1 pop_{it} - B_2 cgdimf_{it} + B_3 gdppcppp_{it} + B_4 gcf_{it} + B_5 erilo_{it} + B_6 trade_{it} + B_7 dctps_{it} + B_8 fdi_{it} + B_9 io5_{it-5} * B_{10} lmh_{it} + \varepsilon_{it}$

difference generalized method of moments. All models are made with two variants, using only the institutional framework and introducing interactions between the institutional framework and countries at low, middle and high - income levels.

The analysis of the models (1, 3, 5 and 7), in which only the institutional framework was used, leads to the conclusion that the institutional framework has a positive influence on economic growth in 78 countries. In all variants of the model, the institutional framework is positive and statistically significant at the 1% level. Using pooled OLS, fixed effects panels and random effects panels (1, 3 and 5), the model diagnostics are satisfactory. R^2 (0.6802 in all three models) indicates a satisfactory level of representativeness of the models, while the results of the F-tests and Wald tests suggest that all models are well specified. In addition, the results of the Pesaran test (1.9647-1.9649) demonstrate the lack of serial correlation of the residuals. In models 1, 3 and 5, the effect of the institutional framework is identical (0.045), which means that its increase by one unit, with other variables unchanged, leads to an increase in GNI per capita by 4.5% in 78 countries. However, due to the complexity of the methodology used, particular attention should be paid to the results of the generalized method of moments (model 7). Compared to models 1, 3 and 5, in model 7 the effect of the institutional framework is 3.4 percentage points lower. Specifically, if we improve the institutional framework by 1 unit, with other variables unchanged, GNI per capita will increase by 1.1% in 78 countries. According to the recommendations of Roodman (2009), the model diagnostics (model 7) show the absence of a second-order autocorrelation (AR (2) - 0.155), a good specificity and validity of the instruments used (Hansen test - 0.149) and a consistent model evaluation (rule of thumb - the number of instruments must be less than the number of groups - 63 < 78).

A similar conclusion emerges when analysing models using interactions between the institutional framework and low, medium and high-income countries. In all variants of the model (2, 4, 6 and 8), the institutional framework has a positive effect on economic growth in countries with low, middle and high-income countries. As in the previous case of models 1, 3 and 5, the diagnostics of models 2, 4 and 6 show a good representativeness of the model (R^2 - 0.6884 in all three models), the specificity of the model (results of the F-tests and Wald tests) and the absence of serial correlation of the residuals in models 4 and 6 (Pesaran test - 1.9642 - 1.9643). In model 8 diagnostics again indicate the absence of second-order autocorrelation (AR (2) - 0.151), good specificity and validity of the instruments used (Hansen test - 0.140), and a consistent assessment of the model (rule of thumb - the number of instruments must be less than the number of groups - 65 < 78).

In the category of low-income countries, the effect of the institutional framework is completely identical in models 2, 4 and 6 (0.051), while it is 0.011 in model 8. In the category of low-income countries, the effect of the institutional framework in the dynamic panel is 4 percentage points lower than in the models of the static analysis (models 2, 4, 6). Additionally, the effect of the institutional framework in the low-income countries (0.011) is identical to the effect of the institutional framework in all 78 countries (0.011). An improvement in the institutional framework by 1 unit leads to an increase in GNI per capita by 1.1% in the low-income countries, with all other variables unchanged.

Furthermore, in the category of middle-income countries, the effect of the institutional framework is identical in models 2, 4 and 6 (0.034), while it is 0.007 or 2.7 percentage points lower in model 8. In this case, the effect of the institutional framework in middle-income countries (0.007) is not equal to the effect of the institutional framework in all 78 countries (0.011), as it was in the case of low-income countries. This means that an increase in the institutional framework by 1 unit leads to an increase in GNI per capita by 0.7% in middle-income countries, with other variables unchanged.

Finally, in the category of high-income countries, there are certain differences regarding the effect of the institutional framework. In models 2 and 6, the effect is identical (0.063), while in model 4 it is 0.064 and in model 8 it is 0.016. In other words, in the dynamic panel analysis, the effect of the institutional framework is 0.5 percentage points higher in high-income countries (model 8) than in all 78 countries (model 7). A one-unit improvement in the institutional framework leads to a 1.6% increase in GNI per capita in high-income countries, with other variables unchanged.

Moreover, the application of the generalized method of moments also allows for long-term estimates with respect to the main independent variables of interest. It can be concluded from Table 7 that the long-run estimates increase the effect of the institutional framework compared to the standard estimates explained in Models 7 and 8. A long-term improvement in the institutional framework by one unit, with other variables unchanged, increases economic growth by 4.4 %, which is 3.3 percentage points more than the standard estimate (model 7).

On the other hand, holding all other variables constant, a long-term improvement in the institutional framework by one unit increases economic growth by 4.2 % in low-income countries, 2.6 % in middle-income countries and 6.4 % in high-income countries. Compared to the standard estimates (model 8), a long-term improvement in the institutional framework increases economic growth by 3.1 percentage points in low-income countries, by 1.9 percentage points in middle-income countries and by 4.8 percentage points in high-income countries. The analysis of the other independent variables shows that population, central government debt and GNI per capita (PPP) have statistically significant and expected signs in all models, although their effects are very weak. Investment has a statistically significant and expected sign in all models, and its effect is between 0.2% and 0.03%. The employment rate is statistically significant with the expected signs in all static models, while it is not statistically significant in the last two dynamic models. Of the other independent variables, trade and foreign direct investment are only statistically significant with the expected sign in the dynamic models (models 7 and 8).

Table 7 Long-term estimates of the generalized method of moments

loggdppclcu	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
io5	0.0447407	0.010	4.360	0.000	0.025	0.065
io5 x lmh0	0.0424902	0.011	3.970	0.000	0.021	0.063
io5 x lmh1	0.0261625	0.011	2.330	0.020	0.004	0.048
io5 x lmh2	0.0645954	0.011	5.640	0.000	0.421	0.087

Source: Author's calculation

It can be observed that in all variants of the model (including the long-run estimation) the effect of the institutional framework is larger in low- and high-income countries than in middle-income countries. One possible theoretical explanation for the results of the middle-income countries is the middle-income trap. Namely, Kharas & Gill (2007), who were the first to introduce the concept of the middle-income trap, investigated the reasons for the failure of some East Asian countries to transition from middle-income to high-income status. According to the results of their study, the lack of institutional reforms proved to be one of the key factors for some countries remaining in the middle-income category.

The research results obtained are in line with several other scientific studies (Assane & Grammy, 2003; Beck & Laeven, 2006; Efendic & Pugh, 2015; Eicher & Schreiber, 2010; Falcetti et al., 2006; Kharas & Gill, 2007). As in the aforementioned studies, the institutional framework also proved to be an important factor for economic growth in this study. However, certain differences were found compared to previous studies. All previous authors mostly categorized countries in the same basket without distinguishing between their level of development, while Assan and Grammy (2003) conducted an analysis on less developed and more developed countries, but their classification of countries is not identical to the classification used in this paper. Moreover, none of the previously mentioned studies included a long-term assessment of the impact of the institutional framework, which is the added value of this paper. Finally, in contrast to previous studies, this research confirms that the institutional framework has the strongest impact on the economic growth of all the independent variables included in the analysis.

Table 6 Results of analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	loggdppclcu	loggdppclcu	loggdppclcu	loggdppclcu	loggdppclcu	loggdppclcu	loggdppclcu	loggdppclcu
	Pooled OLS	Pooled OLS	FE	FE	RE	RE	DGMM	DGMM
_cons	10.979***	10.984***	10.985***	10.99***	10.979***	10.984***		
	(.25)	(.252)	(.085)	(.084)	(.25)	(.252)		
L.loggdppclcu							.751***	.749***
							(.023)	(.023)
pop	0***	0***	0***	0***	0***	0***	0***	0**
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
cgdimf	-.001***	-.001***	-.001***	-.001***	-.001***	-.001***	-.002***	-.002***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
gdppcppp	0***	0***	0***	0***	0***	0***	0***	0***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
gcf	.002***	.001**	.002***	.001**	.002***	.001**	.0004 **	.0003*
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(0)	(0)
erilo	.01***	.01***	.01***	.01***	.01***	.01***	.001	.001
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
trade	-.0003	-.0002	-.0003	-.0002	-.0003	-.0002	.0003***	.0003742***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
dctps	-.0003**	-.0004**	-.0003**	-.0004**	-.0003**	-.0004**	-.001***	-.001***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
fdi	.0001	.0001	.0001	.0001	.0001089	.0001	.00007***	.00007***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
io5	.045***		.045***		.045***		.011***	
	(.007)		(.007)		(.007)		(.003)	
io5 x lmh0		.051***		.051***		.051***		.011***
		(.008)		(.008)		(.008)		(.003)
io5 x lmh1		.034***		.034***		.034***		.007**
		(.007)		(.007)		(.007)		(.003)
io5 x lmh2		.063***		.064***		.063***		.016***
		(.01)		(.01)		(.01)		(.003)
yr_1	-.127***	-.125***	-.127***	-.125***	-.127***	-.125***		
	(.011)	(.011)	(.011)	(.011)	(.011)	(.011)		
yr_2	-.107***	-.106***	-.107***	-.106***	-.107***	-.106***	.009*	.007
	(.011)	(.011)	(.011)	(.011)	(.011)	(.011)	(.005)	(.005)
yr_3	-.089***	-.089***	-.089***	-.089***	-.089***	-.089***	.017***	.015***
	(.011)	(.01)	(.011)	(.01)	(.011)	(.01)	(.005)	(.005)
yr_4	-.074***	-.075***	-.074***	-.074***	-.074***	-.075***	.022***	.021***
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.004)	(.005)
yr_5	-.06***	-.059***	-.06***	-.059***	-.06***	-.059***	.029***	.028***
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.004)	(.004)
yr_6	-.042***	-.04***	-.042***	-.04***	-.042***	-.04***	.039***	.038***
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.003)	(.003)
yr_7	-.03***	-.03***	-.03***	-.03***	-.03***	-.03***	.041***	.04***
	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)	(.003)	(.003)
yr_8	-.022**	-.022**	-.022**	-.022**	-.022**	-.022**	.042***	.041***
	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)	(.002)	(.002)
yr_9	-.044***	-.043***	-.043***	-.043***	-.044***	-.043***		
	(.009)	(.009)	(.009)	(.009)	(.009)	(.009)		
yr_10	-.01	-.009	-.01	-.009	-.01	-.009	.085***	.084***
	(.008)	(.008)	(.008)	(.008)	(.008)	(.008)	(.004)	(.004)
yr_11							.07***	.07***
							(.003)	(.003)
Observations	858	858	858	858	858	858	702	702
Within R^2	0.6802	0.6884	0.6802	0.6884	0.6802	0.6884	-	-
N	78	78	78	78	78	78	78	78
F test	-	-	85.18	79.84	-	-	-	-
Prob > F	-	-	0.0000	0.0000	-	-	-	-
Wald test	1604.70	1665.67	-	-	1604.70	1665.67	-	-
Prob > chi2	0.0000	0.0000	-	-	0.0000	0.0000	-	-
Pesaran test	1.9647	1.9643	1.9649	1.9642	1.9647	1.9643	-	-
Predetermined variable	-	-	-	-	-	-	L1.loggdppclcu	L1.loggdppclcu
Number of groups	-	-	-	-	-	-	78	78
Number of instruments	-	-	-	-	-	-	63	65
AR(1)	-	-	-	-	-	-	0.000	0.000
AR(2)	-	-	-	-	-	-	0.155	0.151
Hansen test	-	-	-	-	-	-	0.149	0.140

Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Source: Author's calculation

6. CONCLUSION

The institutional framework is one of the most important determinants of economic growth in low, middle and high - income countries. The studies carried out have shown that its effect is stronger than the effect of the employment rate and investments. With all other variables unchanged, a one-unit improvement in the institutional framework leads to an increase in GNI per capita by 1.1% in all 78 countries, by 1.1% in low-income countries, by 0.7% in middle-income countries and by 1.6% in high-income countries. Considering the long-term estimates, the impact increases from 1.1% to 4.4% for all 78 countries, from 1.1% to 4.2% for low-income countries, from 0.7% to 2.6% for middle-income countries and from 1.6% to 6.4% for high-income countries. The estimates clearly show that the impact of the institutional framework is strongest in the countries with the most efficient and highest quality institutions (high-income countries).

In addition, the analysis carried out indicates that the effect of the institutional framework is stronger in low and high-income countries than in middle-income countries. The above results suggest that there may be a middle-income trap into which a country can fall if it fails to implement the necessary institutional reforms. For this reason, economic policy makers must make additional efforts to improve the efficiency and quality of their institutional frameworks. Against the backdrop of globalization and the instability of the macroeconomic environment, policymakers must continuously adapt their institutional frameworks to new circumstances. Measures aimed at simplifying, adapting and making them more flexible are seen as more than welcome.

However, it should be borne in mind that this study has several limitations. Namely, the study was conducted based on aggregated data with an institutional framework created by a PC analysis. In this way, it is not possible to determine which components of the institutional framework have the greatest impact on economic growth in the selected countries. It should also be borne in mind that formal institutions are a complex phenomenon in economic research and that it is very difficult to find two countries that have an identical institutional framework. Improving all or a specific part of the institutional framework may lead to different effects in two different countries.

The aim of future research is to conduct a disaggregated analysis with a larger number of countries in the sample, using variables that measure the impact of formal and informal institutions in the economy. In this way, it will be possible to investigate which components of the institutional framework have the greatest impact on economic growth and whether and to what extent they interact with individual components of informal institutions.

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APPENDIX

Table 2 Principal Component Analysis

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.226	4.900	0.871	0.871
Comp2	0.326	0.067	0.054	0.925
Comp3	0.259	0.144	0.043	0.969
Comp4	0.115	0.069	0.019	0.988
Comp5	0.046	0.018	0.008	0.995
Comp6	0.028	.	0.005	1.000

Source: Author's calculation

Table 3 Results of Kaiser-Meyer-Olkin test

Control of Corruption (*cc*)	0.906
Government Effectiveness (*ge*)	0.898
Political Stability and Absence of Violence/Terrorism (*ps*)	0.979
Regulatory Quality (*rq*)	0.900
Rule of Law (*rol*)	0.856
Voice and Accountability (*va*)	0.943
Overall	0.908

Source: Author's calculation

Table 5 Matix of correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) pop	1.000											
(2) cgdimf	0.074	1.000										
(3) gdppcppp	-0.141	0.051	1.000									
(4) gcf	0.031	-0.291	0.111	1.000								
(5) erilo	-0.013	-0.211	0.209	-0.001	1.000							
(6) trade	-0.369	-0.050	0.505	0.038	-0.007	1.000						
(7) dctps	0.025	0.361	0.458	-0.058	-0.025	0.126	1.000					
(8) fdi	-0.058	0.114	-0.025	-0.036	-0.012	0.079	0.153	1.000				
(9) io5	-0.203	0.241	0.738	-0.037	0.040	0.420	0.630	0.060	1.000			
(10) io5xlmh0	0.046	0.113	0.304	0.049	-0.078	0.194	0.287	0.018	0.363	1.000		
(11) io5xlmh1	-0.257	0.225	0.430	-0.026	-0.007	0.287	0.357	0.053	0.708	-0.181	1.000	
(12) io5xlmh2	-0.142	0.147	0.706	-0.067	0.120	0.352	0.598	0.046	0.873	0.221	0.415	1.000

Source: Author's calculation