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Per capita income and institutions: an empirical analysis

Renda per capita e instituições: uma análise empírica

Luciano Ferreira Gabriel [1]
André Dannemann Werberich da Silva [2]
Luciano Dias de Carvalho [3]

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[1] Doutor em Economia pelo CEDEPLAR (UFMG); Bolsista de Produtividade em Pesquisa do CNPq; Associate Professor at UFJF; Pesquisador do Laboratório de Análises Territoriais e Setoriais - LATES; Vice coordenador do curso de Ciências Econômicas (UFJF), Juiz de Fora – MG. Correo electrónico: lucianofg@gmail.com. ORCID: https://orcid.org/0000-0002-8321-3022.

[2] Mestre em economia pela UFV, Economista pela UFV, Pesquisador do Departamento de Economia da UFV. Correo electrónico: andre.werberich@ufv.br. ORCID: https://orcid.org/0009-0008-7837-4615.

[3] Ele possui Mestrado e Doutorado em Desenvolvimento Econômico pela Universidade Federal do Paraná-UFPR. Atualmente, é professor adjunto na Universidade Federal de Viçosa-UFV. Foi coordenador do curso de Ciências Econômicas de 2015 a 2018. Tem experiência em Economia, com ênfase em Teoria Macroeconômica Keynesiana e Desenvolvimento Econômico, atuando principalmente nos seguintes temas: Crescimento Econômico, Macroeconomia Pós-Keynesiana e Sistemas Dinâmicos Não Lineares. Professor associado na UFV. Correo electrónico: lucianodc@gmail.com. ORCID: https://orcid.org/0000-0002-9031-4497.

Abstract

The main objective of this article is to empirically analyze how political and economic institutions quality influence the economic development of countries. For this purpose, a sample of 151 countries in the period from 2000 to 2020 was used for panel data estimations. The main results suggest that political and legal institutions that suffer from greater influence of the armed forces as well as the low quality of laws concerning property rights have a more intense and negative impact on *per capita* income of developing countries. In addition, it was verified that the greater income inequality, by benefiting a few society sectors with greater political representation, negatively influences the *per capita* income level.
Keywords: political institutions, economic institutions, *per capita* income.

JEL codes: C23; E02; O10.

Resumen

El objetivo principal de este artículo es analizar empíricamente cómo la calidad de las instituciones políticas y económicas influye en el desarrollo económico de los países. Para este propósito, se utilizó una muestra de 151 países en el período 2000-2020 para estimaciones con datos de panel. Los principales resultados sugieren que las instituciones políticas y jurídicas que sufren una mayor influencia de las fuerzas armadas así como la baja calidad de las leyes relativas a los derechos de propiedad tienen un impacto más intenso y negativo en el ingreso per cápita de los países en desarrollo. Además, se verificó que la mayor *desigualdad de ingresos*, al beneficiar a pocos sectores de la sociedad con mayor representación política, influye negativamente en el nivel de ingreso per cápita.
Palabras clave: instituciones políticas, instituciones económicas, ingreso per cápita.

1. Introduction

According to the institutionalist approach of Douglass North, political and economic institutions exist to reduce the uncertainties resulting from the process of human interaction, that is, they dictate laws, contracts, codes, and norms of conduct, both formal and informal, that govern societies and, thus, being able to determine and influence, through production, transaction and transformation costs, incentives for innovation and technological development. In this way, institutions are considered by the New Institutionalists to be the fundamental factors that determine, through intermediary channels of influence, the growth trajectory of countries and their *per capita* income. The differences observed in economic development processes are a direct consequence of the different forms of institutional organization in which societies are structured (AREND, CARIO, and ENDERLE, 2012).

According to Acemoglu and Robinson (2012), the process of economic development is a consequence of the historical trajectory of transformation of its political and economic institutions. Therefore, the differences observed in the levels of GDP and *per capita* income are a consequence of the different institutional structures existing in each country. These authors propose that to understand the different trajectories of growth and economic development observed throughout history, it is first necessary to understand the historical course that accompanied the development of societies and how the evolution of their different institutions influenced the growth and development of their economies.

From Acemoglu and Robinson (2012), it can be seen that the discrepancies observed in the economic growth trajectories of countries throughout history do not exclusively result from differences in the rates of capital and labor accumulation as presented by endogenous growth models, but from the existing asymmetry in the institutional structures adopted by the countries. Furthermore, the authors demonstrate that the existence of self-sustained growth paths is directly associated with the consolidation of more inclusive political and economic institutional structures.

Inclusive institutions can be characterized as a set of institutions that allow and ensure the existence and maintenance of individual rights and freedoms and that enable and encourage the participation of a large part of society in the political and economic systems. In addition, due to their nature of freedom and incentives, they allow the consolidation of plural market structures that stimulate investment in human capital and the development of new technologies, which, in turn, allows countries to reach self-sustaining paths of growth economic. Conversely, extractive institutions are institutions that allow only a small portion of society, usually an elite, to have access to the country´s political system and participate in and enjoy its economic activities, thus generating a strong disincentive to development (Acemoglu and Robinson, 2012).

Despite the econometric evidence supporting the results found by Acemoglu and Robinson (2012) that there is a relationship between the quality of institutions and economic growth, there is no consensus on the way (or the channels) in which the

quality of institutions influences this process. Thus, this paper seeks to analyze how the quality of political and economic institutions influences per capita income from a heterogeneous sample of countries from a new set of variables and controls.

The results of this work shed more light on the source of the conflicting findings in the literature because the impact of political regimes on per capita income cannot be understood solely in terms of a broad-brush distinction between democratic and non-democratic regimes.

In addition to this brief introduction, section 2 presents the interrelation between institutions, inequality, and *per capita* income level based on the empirical literature. Furthermore, it presents an empirical discussion on how the quality of political and economic institutions and their spillover channels can impact a country´s economic development trajectory. Section 3 presents the database, and the empirical specification of the model, and section 4 addresses the results and discussion. Finally, section 5 presents the final considerations.

2. Institutions, Inequality, and Per Capita Income Level

There is a great number of empirical works that confirm the existence of the interrelationship between the quality of institutions in a country and its level of economic growth and *per capita* income, such as Barro (1996), Tavares and Wacziarg (2001), Rivera-Batiz (2002), Ali and Crain (2002) and Acemoglu, Johnson, Robinson, and Yared (2008), among others. In particular, Barro (1996) proposes one of the first works

in the area that seeks to analyze the impact of a series of variables, among them democracy (used as a proxy to measure the quality of political institutions) on the economic growth trajectory of a country. As a result, the author shows that democracy, measured in terms of the degree of political rights of the population, has a positive effect on the economic growth of a country.

One of the first works to address the relationship between inequality and economic growth was proposed by Glaeser, Scheinkman, and Shleifer (2003). According to this research, there is a negative relationship between inequality, measured through the Gini index, and economic growth, measured in terms of *per capita* income growth because in highly unequal societies there is the possibility of subversion of the institutional apparatus in favor of extractive elites.

The main conclusion of Glaeser, Scheinkman, and Shleifer (2003) explains that in societies where a small share of the population is rich enough, the economic elite can use their wealth to subvert, through mechanisms such as bribes and donations to fund, political campaigns, the judiciary, legislative and executive systems for their benefit. As a consequence of institutional fragility, an environment is created in which fundamental rights, such as property rights, are no longer guaranteed, which discourages investment levels in physical capital and, consequently, the country´s economic growth.

A more sizable literature looks at the effects of democracy on redistribution and inequality and is reviewed and extended in Acemoglu *et al.* (2015). As redistribution is better and inequality decreases, the political power of an extractive elite reduces, in the same vein as Glaeser, Scheinkman, and Shleifer (2003). In this case the political power is composed of political power from resource distribution, since groups that have financial resources have greater ease in solving their collective problems and imposing their will on society.

Tavares and Wacziarg (2001), Glaeser, Scheinkman, and Shleifer (2003), Gradstein (2007) and Acemoglu and Robinson (2012), among others, explain that extractive regimes are formed, regardless of the political regime adopted, by low-quality institutions in which a small share of the population, an elite, uses its privileges to subvert institutions for its benefit and extract, through mechanisms such as rent-seeking, the wealth and income of the rest of the population. As a consequence, there is a significant increase in inequality indexes in society, in which a highly wealthy elite enriches at the expense of an impoverished society, in addition to a strong disincentive to investment in physical capital and technological development, which, in turn, prevents these countries from reaching self-sustaining trajectories of economic growth.

Ali and Crain (2002) propose one of the first works to separately analyze the impact of political and economic institutions on a country´s economic growth trajectory. The choice of separating the variables aims to deepen the discussion on the role of institutions in economic development and propose a methodological alternative to the

current models. The authors' main argument for this resides in the fact that works that investigate only the relationship between economic growth and the type of government, that is, the level of political rights of society, such as, for example, the works of Tavares and Wacziarg (2001) and Rivera-Batiz (2002) do not provide conclusive and robust results on the subject.

As a result, Ali and Crain (2002) show that only the variable used to measure the quality of economic institutions can impact *per capita* income growth. According to the authors, these results can be explained by the inability of proxies that take into account only the type of government (that is, the levels of political rights of a society) to determine the impact of political institutions on economic growth because other political factors directly impact the development trajectory of countries such as, for example, the ability of governments to adopt (regardless of the type of the political regime) economic institutions with a greater or lesser degree of institutional quality.

Acemoglu, Johnson, Robinson, and Yared (2008) find similar results to those of Ali and Crain (2002), by showing, through the use of a cross-section model with fixed effects, that there is no causal relationship between changes in income level of a country and changes in its political institutions, measured in terms of the level of political rights of the population. Acemoglu *et al.* (2008) show, however, that there is a direct relationship between the quality of political institutions in terms of their influence on economic institutions on *per capita* economic growth.

At the same time, Acemoglu *et al.* (2008) suggest that this relationship is because more inclusive political institutions, that is, with higher levels of institutional quality (such as in full democracy), allow the emergence of economic institutions capable of fostering the economic growth of a country. Therefore, the political institutions would only be able to impact economic growth when associated with changes in the quality of the country´s economic institutions. On the other hand, the military´s involvement in politics, for example, even at a peripheral level, decreases institutional accountability and may privilege a small share of society. Over the long term, a system of military government, a full autocracy, or a deficient democracy will certainly diminish effective governmental functioning or create an uneasy environment for national and foreign entrepreneurs, which negatively influence *per capita* income level and growth (Bacha, 2023).

Recently, Acemoglu *et al.* (2019) examined 184 countries from 1960 to 2010, which moved between political regimes. For this sample of countries, there were 122 cases of democratization and 71 of reversals to authoritarianism (theocracies or autocracies with military intervention). They found that countries that moved to democratic regimes experienced 20% gains in GDP over 25 years, compared to what would have happened had they remained autocratic[1]. Moreover, their results suggest that democracy increases future GDP by encouraging investment, increasing

[1] Acemoglu *et al.* (2019)´s empirical strategy rely on a dichotomous measure of democracy coded from several sources to reduce measurement error and controls for country-fixed effects and the rich dynamics of GDP, which otherwise confound the effect of democracy on economic growth.

schooling, inducing economic reforms, improving public good provision, and reducing social unrest.

In Young and Sheehan´s (2014) view, institutional quality is an essential ingredient for economic growth. The authors note that institutional quality is one channel through which aid flows may affect economic growth. Specifically, their study provides evidence on the different dimensions of institutional quality as likely channels through which aid affects growth. A consensus is that weak institutional infrastructure is a fundamental constraint on countries ability to accumulate productive factors (e.g. physical and human capital) and to innovate and adopt new technology (North, 1990).

Put more clearly, weak institutions lead to expropriation activities because of a lack of proper checks and balances mechanisms on political power, judicial manipulation, entry barriers to new entrepreneurs and technologies, corruption, and inefficient bureaucracy (Slesman et al., 2015).

In contrast to the popular claims that democracy is bad for growth at early stages of economic development, Acemoglu *et al.* (2019) find no heterogeneity by level of income. There is some heterogeneity depending on the level of human capital, but, according to them, these effects are not large enough to lead to negative effects of democracy for countries with low human capital.

Acemoglu *et al.* (2019) find evidence that democratizations take place in regional waves: a country is more likely to transition to democracy or nondemocracy when the same transition recently occurred in other countries in the same region. We exploit this source of variation to identify the effect of democracy on GDP. Using regional waves as an instrument for democracy, we corroborate our finding that democracy increases GDP.

When taking into count municipalities Nakabashi *et al.* (2013) findings suggest that an increase by one point in the average quality of the institutions can increase the average GDP *per capita* by around 20 percent. This means that each point of increase in the quality of the municipality institutions can increase the municipality´s GDP *per capita* by R$1,000 (around US$600). Furthermore, according to Nakabashi *et al.* (2013) institutional quality seems to be more essential in greater municipalities. One potential explanation for this result is that informal institutions matter in small municipalities because people know each other, while in bigger cities formal institutions have a more important role. On the contrary, human capital is more important in small ones (Nakabashi *et al.*, 2013).

According to Bacha (2023) twelve countries grew by 7% or more yearly after the Second World War for at least 25 years. Common features of these countries were the following: (i) they were fully connected economies by foreign trade; (ii) they maintained

macroeconomic stability; (iii) they generated high savings and investment rates; (iv) they allowed markets to allocate resources, and (v) had governments committed, credible and capable, but not necessarily democratic. Considering the classification of the Matrix of Democracy of the University of Würzburg, seven of these countries are now democratic: Botswana, South Korea, Indonesia, Japan, Malaysia, Malta, and Taiwan; three have hybrid regimes: Singapore, Hong Kong, and Thailand; and two are autocracies: China and Oman.

Bacha (2022) identified twelve countries that in the postwar period made the transition from middle-income to high-income considering institutional features. These countries are Singapore, South Korea, Hong Kong, and Taiwan, Israel, Spain, Greece, Ireland and Portugal, Australia, Norway, and New Zealand. A common feature to them is its high degree of openness to foreign trade, a medium or small population (5 to 50 million inhabitants), and low inequality of income distribution. Except for Singapore and Hong Kong, which are hybrid regimes, none of the other ten countries are autocracies.

Based on the above discussion, one can conclude that: i) the relation between democracy, economic growth, and *per capita* income is not linear or direct; ii) the interrelationship among political institutions and economic institutions matters for catching up; and iii) different proxy variables on political and economic institution can result in different conclusions. Therefore, in the next section, two distinct sets of variables were used to quantify the isolated effect of the quality of political and

economic institutions to shed more light on what qualitative dimensions of them may influence *per capita* income level.

3. Database and Empirical Specification

Based on the discussion in the previous sections and to determine how institutions can affect the *per capita* income of a heterogeneous sample of countries, a log-linear specification for panel data was used.

The use of a log-linear model allows to test how the *per capita* income is econometrically influenced in terms of the political and economic institutional proxies over time. In this way, the following model is specified:

$$ln(y_{ct}) = \alpha + \sum_{w=1}^{K} \beta_w IP_{i,tw} + \sum_{y=2}^{K} \beta_y IE_{i,ty} + \sum_{J=3}^{K} \beta_j Z_{i,tj} + \mu_t + c_i + \varepsilon_{it} \quad (1)$$

in which $i = 1, \dots, 151;\ t = 2000, \dots, 2020;\ w = 1, \dots, K; y = 1, \dots, K; j = 1, \dots, K$. The β's are the parameters to be estimated for each group of independent variables, explained below. The dependent variable is the $ln(y_{ct})$, i. e., the *per capita* income level of each country *i* in the analyzed period *t* in terms of its natural logarithm; $IE_{i,ty}$ is the set of variables that capture the quality of economic institutions in each country; $IP_{i,tw}$ is the set of variables that capture the quality of political institutions for each country; $Z_{i,tj}$ are the control variables; μ_t is the specific effect of time; c_i captures the unobserved effects of each country *i* that are time-invariant and ε_{it} is the idiosyncratic error term.

The proxy variables that seek to determine the quality of the Political Institutions (PI) are Gini Index —gini—, military intervention —militaryinter— and the fulfillment of contracts —legalenforce.

The first variable, the Gini index, is an indicator that determines, on a scale from 0 to 1, how far the income distribution is from an egalitarian condition, that is, the index shows how unequal a country is. Income inequality depends mainly on the actions of the political class in the approval of laws related to regressive/progressive taxation, provision of public goods, such as, for example, educational institutions, wages in the public sector, and the role of unions in the private sector, this index measures, even if indirectly, how the political classes act in the sense of guaranteeing less extractivism (or less social unrest of workers) about income distribution.

Thus, the inclusion of the Gini index to measure the quality of political institutions makes it possible to determine whether a country´s economic growth results in improvements in society´s levels of well-being or whether this effect is captured by an extractive elite that subverts political institutions and enriches itself at the expense of the rest of society.

The second variable called militaryinter —military interference in the rule of law and politics— is an indicator that measures, on a scale from 0 to 10, the level of involvement in politics of the armed forces of a given country. The indicator considers that, as armed forces officers are not elected through universal suffrage, any level of

political involvement negatively impacts a country´s political freedom and may, in the long run, affect the level of international trust, and the full functioning of the government and increase levels of corruption. Thus, the lower (higher) the political involvement of the armed forces, the higher (lower) the country scores. The variable is constructed based on information from the International Country Risk Guide.

The third and final variable used to determine the quality of the Political Institutions (IP) is the enforcement of contracts —Legal Enforcement of Contracts—, which is an indicator that varies from 0 to 10 and seeks to measure the time and associated costs to be able to collect a debt through the use of the judicial system. The variable is constructed based on the aggregation of two different subcomponents, the first measuring the time spent between the opening of the process until the moment of payment of the debt and the second, the financial costs related to the process.

The variables used to determine the quality of Economic Institutions (IE) in a country are the opening of new businesses —scoresb— and property rights —proprights. The first variable scoresb —starting a business score— is an indicator, which varies from 0 to 100, and seeks to measure the amount of time and cost to open a new business in a given nation. Countries that require more time and/or greater capital investment receive lower scores. The variable is constructed based on five different World Bank indicators, the first measuring the number of procedures required to open a new business, the second the time, measured in days, and the third the monetary costs involved in opening. The fourth indicator measures reforms in

legislation related to opening new businesses and the last one measures the cost of the minimum wage in the country.

The second and last variable used to determine how inclusive the economic institutions of a country are is called proprights —protection of property rights—, it is an indicator that measures, on a scale from 0 to 10, the quality of laws and the institutions that protect and secure property rights in a given country, where the higher the score, the greater the protective quality of laws and institutions.

Based on the empirical literature discussed in section 2 and 3 several control variables were used. The following controls were included in the model: gross physical capital formation as a GDP share —*fbkf*—, which measures the increase in physical capital and inventories in a given country each year; inflation —*infla*— which represents the inflation rate of a country, *per* year, through the percentage variation of the average costs of acquiring a certain basket of products and services; government spending as a GDP share —*govexp*—, which determines how much government spending was allocated to purchase goods and services; trade openness as a percentage of GDP —*openness*— which measures yearly the total imports and exports of a given country divided by GDP, the technological gap —*techgap*—, which measures the existing technological gap between a given country and the technological frontier (USA), following the methodology of Verspagen (1993); and the population —*pop*—, which represents the total population of a given country in each year in thousands of

inhabitants, thus controlling the results based on a proxy for the size of the country. All variables used, abbreviations, and sources are shown in table 1[2].

Table 1. Variables used to measure the quality of political and economic institutions and as a control

Variable	Abbreviation	Meaning	Source
Real per capita income (in n. logarithm)	logpcGDP	Real per capita income (i.e., in constant 2015 US dollar)	Penn World Table 10.0
Gini index	*Gini*	The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	World Bank
Military interference	*militaryinter*	Measures the level of involvement of the armed forces in politics and rule of law. The index ranges from 0 to 10.	Economic Freedom of the World Index - International Country Risk Guide – Fraser Institute
Fulfillment of contracts	*legalenforce*	It measures the time and costs to collect a debt through the court system. The index ranges from 0 to 10.	Economic Freedom of the World Index - Fraser Institute
Starting a New Business	*Scoresb*	It measures the time and cost of opening a new business in a country. The index ranges from 0 to 100.	World Bank
Property rights	*proprights*	It measures the quality of laws and institutions that protect and secure property rights. The index ranges from 0 to 10.	Economic Freedom of the World Index - Fraser Institute

[2] In addition to data from the Fraser Institute, World Bank, and Penn World Tables, were considered the democracy indexes consolidated by the Polity Project and The Freedom House as possible proxies to measure the quality of political institutions. However, none of the indicators showed enough variability to be used in econometric estimations. In addition, they had higher data missing problems.

Gross physical capital formation	*Fbkf*	Country´s level of investment as a GDP share.	World Development Indicators
Inflation	*Infla*	Represents the inflation rate of a country. It is measured by the year-over-year percentage change.	World Development Indicators
Government spending	*Govexp*	Measures government spending on the consumption of goods and services. It is measured as a percentage of GDP.	World Development Indicators
Degree of international trade openness	*Openness*	Total Imports and Exports in relation to GDP.	World Development Indicators
Technological gap	*Techgap*	Technological gap (*G*) between countries following Verspargen (1993) methodology, i.e, $G = (aproduc_{usa,t}/aproduc_{i,t})$, where *aproduc* is the overall average work productivity for each country.	Own elaboration based on Penn World Table 10.0 data
Population	*Pop*	Measures the total population of a country. It is measured in numbers of inhabitants.	Penn World Table 10.0

Source: own elaboration.

The final sample of analyzed countries is formed by 151 countries of which 36 are considered, according to the classification of the World Bank, developed[3] and 115 non-developed[4] and comprises the period from 2000 to 2020 (longer period available).

[3]Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States.

[4] Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burundi, Cape Verde, Cambodia, Cameroon, Chad, Chile, China, Colombia, Congo, Dem. Rep., Congo, Rep., Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Eswatini, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Guatemala, Guinea, Guinea- Bissau, Guyana, Haiti, Honduras, Hong Kong, India, Indonesia, Iran, Islamic Rep., Iraq, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Korea, Rep., Kuwait, Kyrgyz Republic, Lao PDR, Lebanon, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique,

4. Results and Discussion

It is necessary to define which estimator is the most suitable for the econometric specification of equation (1). One way to compare random effects estimates with fixed effects estimates is by using the Hausman test. In the context of this work, it is possible to observe that the Hausman test has the value of $Chi^2(12) = 44{,}64$, with value $Prob > Chi^2 = 0.0000$. Therefore, the null hypothesis is rejected, with the fixed effects model being the most appropriate for both the group of developed countries and the group of developing countries.

Applying the Wooldridge test for autocorrelation in panel data for the complete model given by equation (1), the null hypothesis of no first-order autocorrelation was rejected with 5% statistical significance. Furthermore, the modified Wald test for groupwise heteroskedasticity in the fixed effect regression model rejected the null hypothesis of homoskedasticity with 5% statistical significance. Additionally, it was applied the Collin test for multicollinearity in the complete model. Usually, individual variance inflation factor (VIF) greater than 10 should be inspected and average VIF greater than 6 suggests caution and search for correctional procedures. Indeed, individual VIF was less than 1.70 and average VIF was less than 2.05 in all specifications.

Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Russian Federation, Rwanda, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Sri Lanka, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, Uruguay, Venezuela, RB, Vietnam, Yemen, Rep., Zambia, Zimbabwe.

Given these test results, one of the most common ways to correct the heteroscedasticity of the errors that is consistent with the existence of correlation in the data is through the incorporation, in the model, of robust standard errors. According to Hoechle (2007), one of the most used methods for correcting this type of violation of assumptions is through the application of the Generalized Method of Moments (GMM). It is important, however, to observe that although the GMM method produces robust estimators, they do not take into account the effects caused by the correlation of cross-sectional-spatial-samples. Thus, this type of method is based on the assumption that the residuals are correlated between the elements of the same sampling unit, but not between cross-sections, which can reduce the inference capacity of the model.

One of the first methodological attempts to simultaneously include, in the analysis, the effects of temporal and spatial correlations are through the FGLS estimator —*feasible generalized least-squares*— the model, however, tends to underestimate the standard error of the sample. An alternative to the FGLS estimator, which corrects the sample underestimation problem, is the use of pooled models with standard error correction through the PCSE method —*panel*— *corrected standard errors.* However, Hoechle (2007) points out that for short panels, where N > T, both estimators will be inefficient.

Driscoll and Kraay (1998) propose a non-parametric estimator for the covariance matrix capable of producing efficient estimators that consider both the effects caused by temporal and spatial correlation that remain valid for short and long panels with heteroscedasticity.

Table 2 presents the estimation results of model (1) using Driscoll and Kraay (1998) estimators splitting the sample between developing and developed countries. In both country samples, the variables related to the quality of economic institutions, scoresb, and proprights are positive and statistically significant. Taking into account the complete model, the impact of opening a business and protecting property rights is stronger in the sample of non-developed countries. The first variable has an impact 1.80 times greater and the second is 6.39 times greater on the per capita income of this sample of countries.

It can be noticed that while the economic institutions´ quality variables affect more undeveloped countries when compared to the developed ones, the control variables associated with the technological gap and degree of economic openness affect this last group of countries to a greater extent. These results suggest that international trade and the distance from the technological frontier, captured by the control variables, affect developed economies more intensely, while the quality of laws and institutions that protect and ensure property rights, as well as how the time and cost of starting a new businesses affect non developed countries the most.

These results are in line with what Acemoglu and Robinson (2012) explained, which shows that economic institutions are only able to influence the growth trajectory of a given country when they create an environment of stimulation and protection that enables the promotion of economic activity. Thus, the higher the quality of a country´s economic institutions, the closer they are to institutions capable of guaranteeing a higher level of *per capita* income.

The significance of scoresb and proprights both for developed countries and developing countries is due, according to Acemoglu and Robinson (2012), to the fact that the existence of inclusive economic institutions is not necessarily conditioned to the existence of inclusive political institutions, that is, countries with lower institutional quality can develop stimulus and protection environments that allow the promotion of economic activity and the development of new technologies. The result is also corroborated by Ali and Crain (2002) that when analyzing the effects of political and economic institutions on the growth trajectory of countries, show that the economic growth and per capita income of a country are independent of the type of government, but more dependent on the quality of their economic institutions. Therefore, regardless of the type of government, countries can adopt economic institutions with a greater or lesser degree of freedom and quality capable of promoting, to a greater or lesser extent, the economic growth of a country.

Regarding the proxies variables used to measure the quality of political institutions —gini, militaryinter, and legalenforce— the corrected model shows that for developing countries the variables gini and militaryinter were statistically significant and showed an inverse relationship, that is, increases in these variables result in decreases in *per capita* income levels of up to 0.664% per year and 1.45% per year, respectively. For this group of variables in the sample of developed countries, the only variable that showed significance was legalenforce, which also showed an inverse relationship, that is, the time and costs associated with recovering liabilities in the judicial system can be reduced by up to 2.99% per year the per capita income level.

For this last variable, the longer the time and associated costs to be able to fulfill contracts and collect a debt through the use of the judicial system, the scarcer resources are reallocated outside of productive activity for longer periods, in such a way that their impact on *per capita* income is negative. Furthermore, the greater the financial costs related to the process, the greater its negative effects tend to be.

Table 2. Developing and Developed Countries with Driscoll and Kraay standard errors for the period from 2000 to 2020

	Development countries			Developed		
	(1)	(2)	(3)	(4)	(5)	(6)
	logpcGDP	logpcGDP	logpcGDP	logpcGDP	logpcGDP	logpcGDP
Legalenforce	0.0120 *	-0.0209	-0.0164	-0.0444 **	-0.0391 **	-0.0299 **
	(2.59)	(-1.49)	(-1.13)	(-3.31)	(-3.16)	(-3.29)
Militaryinter	-0.00841	-0.0326 ***	-0.0145 *	-0.115 *	-0.0934 *	-0.00539
	(-2.05)	(-4.66)	(-2.87)	(-2.31)	(-2.27)	(-0.41)
Scoresb	0.00486 ***	0.00531 ***	0.00317 ***	0.00574 **	0.00666 ***	0.00176 *
	(10.67)	(9.31)	(6.28)	(4.05)	(6.24)	(2.52)
Proprights	0.0521 ***	0.0842 ***	0.0568 ***	0.0475 ***	0.0422 **	0.00888 *
	(4.84)	(6.78)	(5.82)	(5.53)	(3.53)	(2.57)
Gini		-0.0137 ***	-0.00664 **		0.00332	-0.00192
		(-5.41)	(-3.51)		(1.06)	(-1.03)
Fbkf		-0.00114	-0.000634		0.00724 ***	0.00469 **
		(-0.78)	(-1.56)		(4.84)	(3.41)
Infla		-0.000443	-0.000150		-0.00665 **	-0.00112
		(-1.22)	(-1.43)		(-3.22)	(-0.60)
Govexp		-0.00384	-0.00199		-0.0122 ***	-0.00665 *
		(-1.29)	(-0.73)		(-5.17)	(-2.91)
Openness			-0.000901 *			0.00110 *
			(-2.32)			(2.81)
Techgap			-0.0282 ***			-0.232 ***
			(-11.54)			(-9.12)
Pop			0.0105 **			0.0134 ***
			(3.86)			(10.29)
_Cons	7,502 ***	8,332 ***	8,669 ***	10.78 ***	10.48 ***	10.49 ***
	(78.23)	(98.94)	(158.47)	(29.33)	(33.52)	(52.02)
No	1474	887	887	739	713	703

Note. t statistics in parentheses; *p < 0.05, **p < 0.01, ***p < 0.001
Source: own elaboration, 2022 (from STATA 15 output).

The statistical significance of the variables military intervention —militaryinter— and the gini index only for developing countries is in line with the literature presented in sections 2 and 3. For this country group the minimum score of militaryinter was 1.11, with a standard deviation (average) of 2.31, approximately, between panels (considering all years). As explained in the last section, the lower (higher) political involvement of the armed forces, the higher (lower) the country scores. Therefore, lower scores of militaryinter are negatively associated with *per capita* income for this sample of countries.

As developing countries are, for the most part, nations that have low-quality institutional factors such as the interference of the armed forces in politics and rule of law, as well as considerable levels of income inequality, can be used as instruments to subvert political institutions, thus creating institutions that use extractive mechanisms that benefit a small political and economic elite that enriches itself at the expense of the rest of society. Since in these societies, there are no consolidated enough checks and balances that prevent the political system from being used excessively, arbitrarily, or in a way that benefits an individual or even a small group of society, these institutions hamper the increase in the level of *per capita* income.

The statistical significance of the Gini index for this group of countries implies that where there is not enough institutional maturity, the economic elite can use their wealth to subvert, through bribes and illegal donations to campaign funds and political institutions for their own benefit (Glaeser, Scheinkman and Shleifer, 2003). In addition, according to Gradstein (2007), the general institutional quality of a country is directly associated with the level of inequality in society, that is, countries with higher levels of

inequality are countries with lower institutional quality, since in societies with low levels of inequality the economic elite cannot use its wealth to subvert, for its benefit, the political institutions.

Concerning developed countries, the lack of significance of the Gini index (in the model with all controls) and militaryinter can be explained by the high institutional quality of this sample of economies, since there are consolidated mechanisms capable of preventing the subversion of political institutions to benefit just a small share of the society (Acemoglu and Robinson, 2012)[5]. Thus, unlike what was found for developing countries, there is no mutual reinforcement between the level of involvement of the armed forces in politics and the rule of law (which tends to privilege smaller shares of society) and the level of economic inequalities. In other words, when considering several important covariates that influence *per capita* income it is harder to isolate inequality effects on it[6].

In order to control for individual unobserved characteristics of the sample that affect the dependent variable and the possible endogeneity of independent variables we use the methodology of dynamic panel (GMM) in equation (1) for developing and developed countries (See Appendix A)[7]. Thereby, we applied the system GMM by

[5] It´s noteworthy that the minimum value for militaryinter for developed countries was 7.84, with a standard deviation of 0.847 (between panels). Therefore, the score is higher and with lower variability when compared to non-developed countries.

[6] It should be said that when time dummies are included for the periods 2007-2009 (subprime USA crises) and 2019 (SARS-CoV-2 pandemic) both are statistically significant, harming *per capita* income for developing and developed countries. Notwithstanding, it is beyond the objective of this paper to analyze how these crises affected long-term growth trajectories.

[7] Endogeneity implies the correlation between the covariates and the error term, that is, $E(X_{it}u_{it}) \neq 0$. In the dynamic model will be taking into account logpcGDP lagged effects on the present, so the conventional method (OLS) to panel data leads to inconsistent estimates since this variable is correlated with the error term c_i. Moreover, the traditional sources of

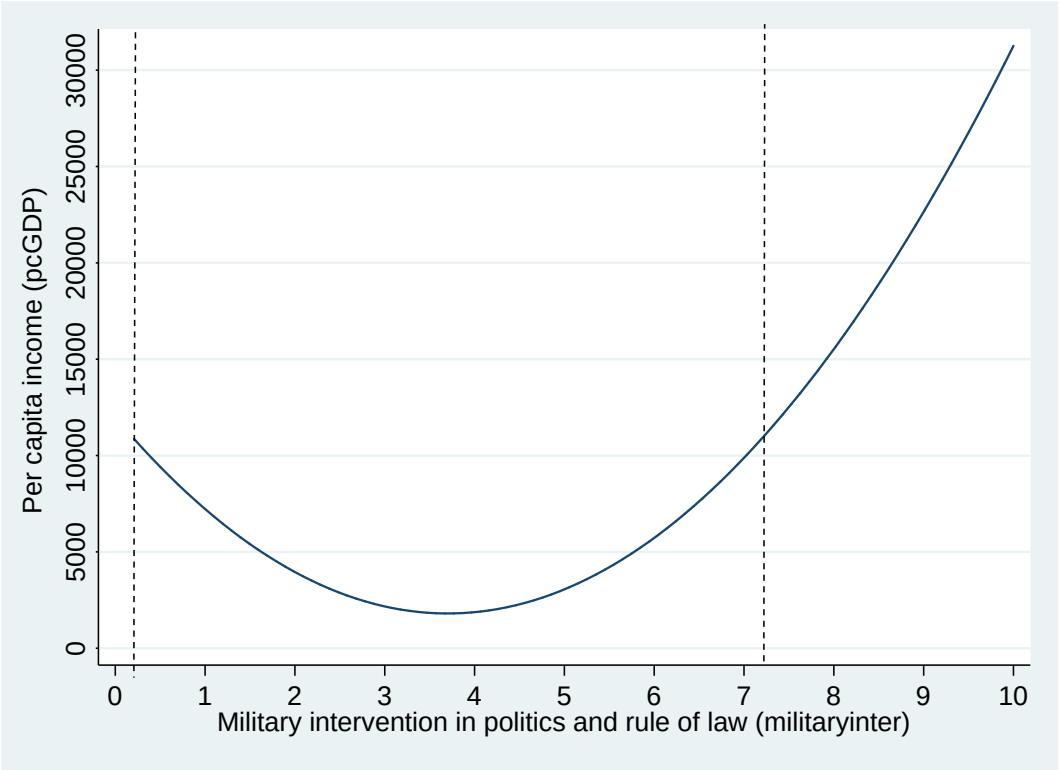
Arellano and Bover (1995) and Blundell and Bond (1998). This method creates a system of regressions in difference and level. The instruments of the regressions in the first difference remain the same as in the GMM difference. The instruments used in the regressions in level are the lagged differences of the explanatory variables.

When controlling for possible endogeneity scoresb, propright and militaryinter are statistically significant. These results reinforce what was found before, i.e., economic institutions are only capable of impacting income levels when associated with the protection of property rights, which enables the promotion of economic activity and technological progress.

In all estimations reported in Appendix A, it is not rejected the null hypothesis that overidentified restrictions are valid at the 1% level of significance. Similarly, it does not reject the null hypothesis that there is no autocorrelation for higher order. Furthermore, with the two-step estimations it was obtained efficient and robust parameters for any standard of heteroscedasticity, whereas Windmeijer´s (2005) standard errors avoided the downward bias for the standard errors in the estimators. To make the last results clearer, Figure 1 presents the relationship between *per capita* income and the variable militaryinter. The first thing to note is that there is no linearity between these two variables, which helps in explaining the econometric results. The second, and more important issue, closer to *per capita* income of eleven thousand dollars (approximately) one can observe, respectively, low (closer to 7.2) and high (closer to zero) military involvement in politics and rule of law. Notwithstanding, after

endogeneity are due to dynamic effects such as cited, simultaneity between variables, omitted variables, or measurement errors of variables (Greene, 2012).

this threshold of income, only countries with greater scores, i.e., lower political involvement of the armed forces in politics and rule of law achieve higher income. These results suggest that when analyzing just the two variables, the greater *per capita* income is associated with regimes closer to full democracies, in which military forces are not involved in politics and the rule of law.



Note. Figure 1 results were weighted by all years.
Source: own elaboration (based on STATA 15 output).

Figure 1. Per capita income (in 2015 US dollars) and militaryinter – 2000 – 2020 – broad sample

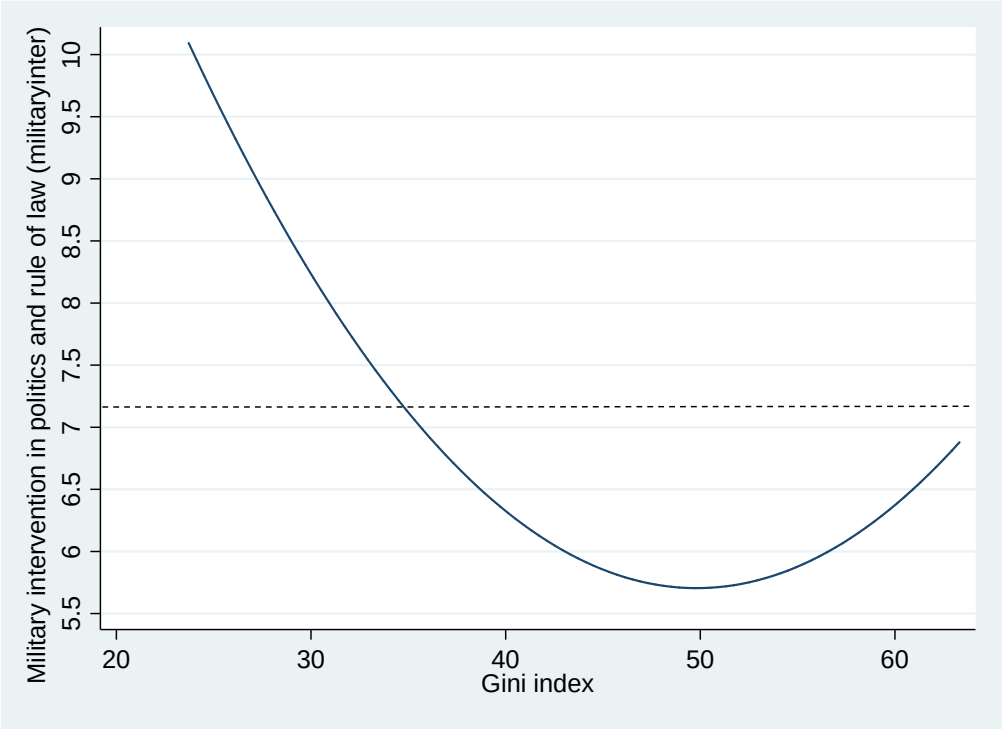
Finally, the statistical significance of the variable legalenforce only for the group of developed countries can be explained by the fact that political institutions only can influence the per capita income when associated with changes in the quality of governance, that is, the determination of per capita income level is directly linked to the quality of effective legislation for the enforcement of contracts by the judicial system, which is very influenced by the political system. As the quality of the latter is worse in non-developed countries, according to Rivera-Batiz (2002), this helps in explaining the lack of statistical significance for this sample of countries.

It is noteworthy that for a different sample of countries and methods, Bacha (2023) found similar results to the results discussed above. For a sample of 164 countries and data for the year 2019 and using the democracy index from Würzburg University (Democracy Matrix, 2019)[8], the author found that only full democracies have very high per capita income levels[9]. Moreover, there are no moderate autocracies with very high income levels. The other three types of political regimes classified as deficient democracies, hybrid regimes, and full autocracies (organized by income levels) present full autocracies with income levels of around US$10,000. In particular, according to Bacha (2023, p. 5), there are just three full autocracies with very high per capita income, all of them oil producers in the Middle East, such as Saudi Arabia, Qatar, and the United Arab Emirates.

[8] This index ranges from zero to one, where lower values indicate autocracies full, followed by moderate autocracies, hybrid systems, democracies disabled, and, at the highest levels, functioning democracies.
[9] Measured in constant 2019 US dollar.

Bacha (2023) considers until US$ 10,000 in per capita income levels, there is slight variation in the democracy index with values are around 0.5 (representing disabled democracies, hybrid regimes, and moderate autocracies). However, from per capita incomes greater than US$10,000 there is a positive relationship between per capita income and democracy.

Figure 2 presents Gini index and militaryinter scores for a broad sample of countries. As seen in Figure 1, per capita income greater than US$ 10,000 is just verified for countries with militaryinter scores greater than 7,2, approximately. Figure 2 shows a negative relation between military influence in politics and the rule of law for most of the curve. More importantly, increasing equality countries (Gini index < 35) are associated with less involvement of the armed forces in politics and the rule of law (militaryinter < 7,2).



Note. Figure 1 results were weighted by all years.
Source: own elaboration (based on STATA 15 output).

Figure 2. Gini index and militaryinter score – 2000 – 2020 – broad sample

5. Final Remarks

The main objective of this work was to examine the relationship between the quality of political and economic institutions and the level of per capita income through the application of a log-linear panel data model. Unlike other works, new dimensions of political and economic institutions were incorporated. In this way, it was possible to determine, in isolation, the real impact of the quality of political and economic institutions of heterogeneous samples of developed and non-developed countries.

As a result, the log-linear panel data model with fixed effects and Driscoll-Kraay estimator showed that for the variables used to measure the quality of political institutions —gini, militaryinter, and legalenforce—, for the set of developing countries, the variables gini and militaryinter were significant and showed a negative relationship. Thus, the higher (lower) level of economic inequality and the higher (lower) involvement of the armed forces in politics result in decreases (increases) in the level of per capita income.

The statistical significance of the gini and militaryinter variables only for developing countries is in line with the fact that most developing countries have institutions of low functional quality in terms of governance, transparency, and accountability, where inequality and greater military involvement in governments can be used as instruments to subvert political institutions due to the lack of consolidated containment mechanisms (checks and balances) that prevent this system from being used arbitrarily, excessively or in a way that benefits a small share of society, as explained by Glaeser, Scheinkman and Shleifer (2003) and Gradstein (2007).

For the variables used to measure the quality of economic institutions scoresb and proprights, the results suggest that both for the group of developed countries and for group of developing countries, both variables are significant and present a positive relationship, that is, the improvement of the business environment and the guarantee of property rights positively influence the level of *per capita income*.

The statistical significance of both variables for both groups of countries shows that economic institutions are only capable of impacting income levels when associated with the protection of property rights, which enables the promotion of economic activity

and technological progress. The results also suggest that the level of per capita income depends on the degree of influence of the armed forces on political activity, since more authoritarian governments can adopt economic institutions with a lower degree of economic freedom and guarantee benefits only to an extractive elite.

In general terms, and from a broader perspective, the results suggest that the economic development of a country depends on the existence of an economic environment that guarantees the existence of incentives and legal protection for economic activity, or as defined by Acemoglu and Robinson (2012), of inclusive economic institutions. In the political dimension, institutions have the function of preventing a share of society from subverting the economic system for their benefit, increasing inequality.

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Appendix A

Table A.1. System dynamic panel-data estimation - two steps robust

	Developing Countries	**Developed Countries**
	logpcGDP	logpcGDP
l.logpcGDP	0.821***	0.744***
	(69.04)	(37.96)
Legalenforce	-0.0105**	-0.00361
	(-2.82)	(-1.30)
Militaryinter	-0.00252*	-0.00917*
	(-2.95)	(-2.09)
Scoresb	0.0000540*	0.000552*
	(2.27)	(2.05)
Proprights	0.0151***	0.00784***
	(6.67)	(4.52)
Gini	-0.000982	0.00119
	(-1.51)	(1.58)
Fbkf	0.00105***	0.00263***
	(4.02)	(7.19)
Infla	-0.00172***	-0.00206***
	(-7.23)	(-3.95)
Govexp	-0.00688***	-0.00794***
	(-8.52)	(-6.58)
Openness	0.00122***	0.000397***
	(8.85)	(5.34)
Techgap	-0.00596***	-0.0741***
	(-10.45)	(-11.55)
Pop	0.000719**	0.00123***
	(2.80)	(4.47)
_cons	1.623***	2.741***
	(15.27)	(12.61)
Arellano and Bond´s test for AR(1) – *A*	z = -3.89 Pr > z = 0.000	z = -3.47 Pr > z = 0.001
Arellano and Bond´s test for	z = 0.53 Pr > z = 0.615	z = 0.93 Pr > z = 0.457

AR(2) – *A*		
Hansen test of joint validity of instruments (p-value) - *B*	chi2(39) = 42.24 Prob > chi2 = 0.333	chi2(37) = 41.20 Prob > chi2 = 0.292

Note. *t* statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Two-step standard errors are robust to heteroscedasticity (Windmeijer, 2005). The *t* (s) statistics are in brackets; * p<0.05, ** p<0.01, *** p<0.001. In *A* – The null hypothesis: there is no "n" order correlation in the residues. In *B* – The null hypothesis: the model is correctly specified and all overidentifications are correct.
Made by the author, 2022 (from STATA 15 output).