Revista Portuguesa de Estudos Regionais, nº 70 2025, 161-181

Artigo submetido a 18 de Agosto 2024; versão final aceite a 17 de Outubro de 2024
Paper submitted on August 18, 2024; final version accepted on October 17, 2024
DOI: https://doi.org/10.59072/rper.vi70.714

Effect Of Financial Development on Economic Growth in Developed and Developing Economies: Is the Measurement of Financial Development Relevant?

Efecto del Desarrollo Financiero en el Crecimiento Económico en las Economías Desarrolladas y en Desarrollo: ¿Es Relevante la Medición del Desarrollo Financiero?

Byron Quito
byron.quito@unl.edu.ec
Economics career. Universidad Nacional de Loja (UNL). 11-01-11 Loja, Ecuador

Patricia Guerrero-Riofrío
pyguerrero1@utpl.edu.ec
Departamento de Economía de la Universidad Técnica Particular de Loja (UTPL), Loja, Ecuador

José Álvarez-García
pepealvarez@unex.es
Departamento de Economía Financiera y Contabilidad, Instituto Universitario de Investigación para el Desarrollo Territorial Sostenible (INTERRA), Universidad de Extremadura, Cáceres, España

Jorge Flores-Chamba
jeflores5@utpl.edu.ec
Departamento de Economía de la Universidad Técnica Particular de Loja (UTPL), Loja, Ecuador

Abstract

Financial institutions, together with stock markets, actively promote financial development in economies worldwide, which has significantly boosted the economic growth of some countries. By applying cointegration techniques, this study analyzes the long-term relevance between economic growth, financial development, human capital, globalization and primary energy use for a sample of 76 countries during the period from 1980 – 2019. Understanding the possible differences between developed and developing countries, this study shows that financial development in terms of banking institutions contributes significantly to the growth of developing economies, while financial development more oriented to stock markets contributes significantly to the growth of developed economies. The role of human capital is crucial in economic growth, both in developed and developing economies in the long term. On the other hand, globalization in political terms only affects developing economies, which, unlike developed economies, have a lower presence in the rest of countries. Finally, both developing and developed economies still base their growth on the use of primary energy.

Keywords: economic growth; financial development; developed countries; developing countries; panel data; cointegration.

JEL codes: O16, O40, E44.

Resumen

Las instituciones financieras, junto con los mercados de valores, promueven activamente el desarrollo financiero en las economías de todo el mundo, lo que ha impulsado significativamente el crecimiento económico de algunos países. Aplicando técnicas de cointegración, este estudio analiza la relevancia a largo plazo entre el crecimiento económico, el desarrollo financiero, el capital humano, la globalización y el uso de energía primaria para una muestra de 76 países durante el período de 1980 a 2019. Entendiendo las posibles diferencias entre países desarrollados y en desarrollo, este estudio muestra que el desarrollo financiero en términos de instituciones bancarias contribuye significativamente al crecimiento de las economías en desarrollo, mientras que el desarrollo financiero más orientado a los mercados de valores contribuye significativamente al crecimiento de las economías desarrolladas. El papel del capital humano es crucial en el crecimiento económico, tanto en las economías desarrolladas como en las que están en desarrollo en el largo plazo. Por otro lado, la globalización en términos políticos solo afecta a las economías en desarrollo, que, a diferencia de las economías desarrolladas, tienen una menor presencia en el resto de países. Finalmente, tanto las economías en desarrollo como las desarrolladas aún basan su crecimiento en el uso de energía primaria.

Palabras clave: crecimiento económico; desarrollo financiero; países desarrollados; países en desarrollo; datos de panel; cointegración.

Códigos JEL: O16, O40, E44.

1. INTRODUCTION

Nowadays, the impact of financial markets on economies around the world is indisputable. However, the crucial point that arises in the discussion of this topic generally revolves around establishing whether this impact is positive or negative for the economic growth processes of countries. On the one hand, and as mentioned by authors such as McKinnon and Shaw (1973), referents in the analysis of the effects of financial liberalization on economic growth, financial markets or systems contribute to the increase in the level of savings and investment and therefore, they positively affect the level of economic activity of countries. Likewise, authors such as Schumpeter (2017) argue that financial systems are fundamental for generating technological innovations, making it possible for economies with more efficient financial systems to grow faster than those that do not have such conditions.

On the other hand, in the Schumpeterian line of thought, King and Levine (1993) proposed an endogenous growth model, where the close relationship between finance and entrepreneurship is key not only to produce innovations, but also to manage business investment activities better, improving efficiency and productivity and generating sustainable growth processes. However, there are also opposing views, such as the one by Minsky (1978, 1992), who mentioned that capitalist market mechanisms do not guarantee a sustained equilibrium with stable prices and full employment in the markets for goods and services and in financial markets. There is a "financial fragility" inherent to the natural behavior of the maximizing agents of the economy, which can negatively affect investment and economic growth processes, due to the high levels of indebtedness and financial deregulation that usually precede events such as the "Great Depression" of 1932 and the real estate and financial crisis of 2008-2009 (Carvajal, 2015).

On the other hand, and as shown in the previous paragraph, the heterogeneity of financial markets is one of the main causes of uneven economic growth between developed and developing countries. Thus, for example, according to data from the International Monetary Fund (2020), on average, the financial development of developed countries represents approximately 2.43 times the development of the sector in developing countries, during the period 1980-2015; Something similar occurs with per capita income, whose average value is approximately 9.27 times higher in developing countries than in developing countries, during the same period.

Taking into account these data and the interest in establishing the effects of the development of financial markets on economic growth, the objective of this research is to estimate the long-term

relationship between economic growth and some relevant explanatory variables such as financial development, human capital, globalization and the use of primary energy. As a research hypothesis, it is considered that financial development contributes mostly to the growth of developed countries and to a lesser extent to that of developing countries. For this reason, using information on GDP per capita as a dependent variable; the Financial Development Index (FD), a proxy variable for financial development; the Financial Institutions Index (FI), which represents the importance of financial institutions in economies and; the Financial Markets Index (FM), which includes the impact of the stock market, as the main explanatory variables; and the control variables: Human Capital; the Political Globalization (PGL) index, which represents the dissemination of government policies and; Primary Energy use (PE), as control variables, a cointegration process is estimated for a panel of 81 countries worldwide, classified into developed countries and developing countries, during the period 1980-2015.

Among the main results found, the existence of cross-sectional dependence in the residuals of the main regression is evident, which suggests the use of statistical tests that consider such correlation; thus, by means of the CIPS unit root test, it was found that all variables must be differentiated once to become stationary series. Then, the Slope Homogeneity Test of Pesaran and Yamagata (2008) was applied, which provides statistical evidence to reject the null hypothesis of slope homogeneity, corroborating the results of the Pesaran cross-sectional dependence test (2007).

Continuing with the process, the Westerlund (2007) cointegration test was estimated, confirming the existence of long-term equilibrium between the model variables. Subsequently, using the FMOLS and DOLS estimators, a positive and statistically significant effect of financial development and the presence of financial markets on the economic growth of developed countries was identified, unlike what occurred with developing countries, where only the impact of financial institutions generates a statistically positive effect. Finally, through the causality test of Dumitrescu and Hurlin (2012), a relationship was obtained that goes from the FD, FI and FM indices to the GDP for developing countries and a relationship that goes from GDP to the FD and FI indices, in the case of developed countries. One of the main corollaries of the aforementioned results is that developing countries should implement economic policies aimed at boosting and developing their financial markets, mainly their stock markets, and their level of human capital, in order to generate a significant impact on their long-term growth processes.

It is important to highlight that unlike the literature that studies the effect of financial development on economic growth (Calderón & Liu, 2003; Khan & Senhadij, 2003; Abu-Bader & Abu-Qarn, 2008; Hassan et al., 2011; Valickova et al., 2015; Ibrahim & Alagidede, 2018; Cao et al., 2022; Kirikkaleli et al., 2022; Shahbaz et al., 2022; Hodijah & Hastuti, 2023), this research provides empirical evidence on the long-term relationship between these variables, using panel data and including some characteristics of developed and developing countries, which explain the disparate effects on economic growth between these two groups of countries. Furthermore, the study fills the gap regarding the specification of financial development. This is considered both from the market and institutional components, which boosts the differentiation of the type of financial development that promotes growth in developed and developing economies.

The structure of the work after the introductory section is as follows: the second section presents the Literature Review, where empirical evidence documents that study this research topic are analyzed. The third section includes an Empirical Analysis, which includes the subsections of Data, Model Specification and Econometric Strategy. The fourth section presents the empirical results and their discussion and the fifth section highlights the main conclusions and policy recommendations regarding the topic studied.

2. LITERATURE REVIEW

In the study of the link between financial development and economic growth, empirical evidence suggests a broad debate without a defined consensus. From a theoretical point of view, authors such as Schumpeter (2017) and Goldsmith (1969) consider that the financial system has a direct relationship with growth and that it plays a crucial role in promoting it. Meanwhile, Robinson (1952) proposes the existence of an inverse relationship between the financial system and economic

activity. Similarly, from the empirical point of view, the literature shows different contributions for and against the relevance of the financial system.

In terms of empirical evidence that validates an inverse relationship between the variables, works such as those by Tinoco, Torres, & Venegas (2008) stand out, which examine for Mexico the long-term effect of financial regulation on economic growth, and financial intermediation on productive activity, and through a cointegration model and a causality analysis they find that neither financial development nor regulation affect the dynamics of GDP; however, they verify that regulation has a negative effect on financial development.

Along the same lines, Ductor & Grechyna (2013), in a study for 33 OECD countries, found that if the financial sector is not accompanied by growth in the real sector, the effect of financial development on economic growth becomes negative in the long term. Adeniyi et al. (2015) and Diallo (2017) also validated these results and suggest that financial development negatively affects growth. Ahmed, Hossain, & Tareque (2020) even suggest that in both the short and long term, financial development has a negative impact on growth. The authors' analysis considered Bangladesh as a case study using an autoregressive model with distributed delays (ARDL) as a methodology.

In contrast to these findings, there is also evidence in favor of the positive impact of financial development on a country's economic growth. Da Silva, et al (2017); Ibrahim, & Alagidede (2018); Mallick et al (2018); Ibrahima & Alagidede (2018); Kadozi (2019); Botev et al (2019) and Chu & Chu (2020) highlight that financial development is positively and significantly associated with economic growth. Some even highlight that this positive effect is mainly related to the institutional quality of case studies, considering that strong institutions facilitate the implementation of the functions of the financial sector in the efficient allocation of resources. Evidence suggests that weak institutions and poor government regulation can reduce productivity (Assefa & Mollick, 2017). Aluko & Ibrahim (2020), for example, in a study for 28 sub-Saharan African countries, by using threshold regressions, found that financing is positively associated with growth for countries with institutional quality above a particular threshold.

On the other hand, the presence of the stock market in the analysis also tends to be another determining factor of the impact of financial development on growth. Chu (2019) points out that in order to accelerate the growth of an economy, the financial system must be more market-based, in terms of activity and efficiency. Furthermore, in Botev et al (2019), they reveal that the positive effect of bank financing is greater in the presence of deeper capital markets and emphasize that finance has a stronger positive effect in more developed countries. In fact, in research that classifies the sample according to income level, such as the work of Berhane (2018), it is shown that financial development has a positive effect on economic growth in all countries, but in upper middle-income countries, the regressors are insignificant.

Similarly, a study for 168 countries classified by geographic region and income level shows that there is a positive association between finance and economic growth for developing countries, but the results are contradictory for high-income countries. Furthermore, it is pointed out that in developing countries, proper functioning of a financial system is a necessary, but not a sufficient condition to achieve sustained economic growth, since, in the real sector, trade and public spending play a crucial role (Hassana, Sanchez, & Yu, 2011).

In addition, it is also interesting to observe that the relationship between growth and financial development usually has a positive or negative effect depending on the indicator used to represent the latter. In particular, Adu, Marbuah, & Mensah (2013), in their research for Ghana, mention that when using private sector credit in relation to total credit, there is a positive and statistically significant effect of financial development on growth. However, this result changes when money supply is used as a proxy for financial development. In this case, the coefficient remains significant, but is now negative. On the other hand, in Adeniyi et al. (2015), a composite index of financial development is used, which considers the relationship between liquid liabilities and GDP and domestic credit to the private sector as a percentage of production, and verify that financial development negatively affected growth.

The literature clearly reveals a wide variety of studies in the analysis of the relationship between financial development and growth, typically evaluating the effect and causality between the variables, using mostly time series, and few studies, panel data with a classification of countries. Finally, it is still not clear whether the development of the financial sector contributes to economic

growth or not, and furthermore, the critical functions of the development stages of economies and the differences they comprise in relation to financial development have not been studied. In this regard, in this paper this gap in the literature is addressed by analyzing how financial development affects countries differently depending on the level of development, by using panel-type data cointegration as a methodology for the period 1980-2015.

3. EMPIRICAL ANALYSIS

3.1. Data

The selection of the sample and the study period was based on the availability of information for the 76 countries worldwide in the period from 1980 – 2019 (see Appendix 1). The entire sample is divided into two groups: developed and developing countries; these two groups make up the income classification by the World Bank Atlas method (2019), which is based on the gross national income per capita (GNI) of each country, since our interest focuses on examining the critical functions of the development stages of countries and the differences they comprise in relation to financial development. The group of developed countries considers 33 High-Income Countries (HICs) (US $12,695 or more), while the group of developing countries is made up of 43 upper-middle-income countries (UMICs) (US $4,096 – 12,695) and lower-middle income countries (LMICs) (US $1,046 – 4,095).

Likewise, Table 1 presents the variables used: GDP per capita (at constant 2015 prices) (GDP) is considered the dependent variable, which represents the economic growth of each economy under study. Furthermore, the use of this measure as a measure of economic growth has several advantages, such as its ability to offer a common and standardized metric (Song et al., 2021). As well as quantifying the total value of goods and services produced in an economy during a given period (Cuesta-Valiño et al., 2024; Gutiérrez-Rodríguez et al., 2024). Secondly, the independent variables that represent financial development were taken from the data presented by the International Monetary Fund (2020), which are the Financial Development Index (FD), representing the final financial development of an economy, the Financial Institutions Index (FI), which represents the level of presence of banking institutions in each economy and Financial Markets, which shows information more related to the presence of the stock market. According to the index calculation methodology (Svirydzenka, 2016), the measures that make up the final version of the index can be used, since the calculation of dimensions consists of (i) a normalization of the variables; (ii) aggregation of the normalized variables in the sub-indexes that represent a specific functional dimension; and (iii) aggregation of the sub-indexes in the final index.

On the other hand, as control variables, we considered Human Capital (HC), which represents the average educational level of the population of an economy. This was extracted from the Penn World Table version 10.0 (2020); the Political Globalization (PGL) index, which represents the institutionality, considering characteristics of policy diffusion with other economies, which was taken from the KOF Swiss Economic Institute (2020). Finally, the use of Primary Energy (PE) plays an important role in the long-term development of economies, influencing the sustainability of resources and their economic development (see Table 1).

Table 1. Descriptive statistics of the variables and statistical resources

Variable type	Variable name	Symbols	Variable definitions (measurement)	Source
Explained variable (Dependent variable)	*Economic Growth*	GDP	It is the gross domestic product divided by the population at mid-year, expressed in 2010 dollars.	WDI (2022)
Explanatory variable (Independent variable)	*Financial Development*	FD	Relative ranking of countries on the depth, access and efficiency of their financial institutions and financial markets.	IMF (2022)
	Financial Institutions	FI	It includes banks, insurance companies, mutual funds, pension funds, and other types of non-bank financial institutions.	IMF (2022)
	Financial Markets	FM	It includes mainly stock and bond markets.	IMF (2022)
Control variables	*Human Capital*	HC	It consists of the value given to the professional skills that an individual has, based on accumulated knowledge and experiences.	PWT 10.0 (2022)
	Political globalization	PGL	It includes features of government policy dissemination such as: Embassies, international organizations, international treaties, international NGOs among others.	KOF (2022)
	Energy	PE	It refers to use of primary energy before transformation to other end-use fuels.	WDI (2022)

Table 2 reports the descriptive statistics of each of the variables used in this research. The variables form an exactly balanced panel in both subgroups, with 1296 and 1620 observations respectively, for 36 years (T=1, 2, …,36) and 81 countries (i=1, 2, …,81). Real production per capita is taken as a measure that captures economic growth, while capturing changes in the total population, as it is a measure in per capita terms (Adu et al., 2013; Ben Jedidia et al., 2014; Durusu-Ciftci et al., 2017). By using the Financial Development Index, which represents the financial development of the country, authors such as Ibrahim and Alagidede (2018) and Zhang et al. (2012) consider that this indicator provides information on the interaction that the financial sector has on the economy, more specifically on the financial credit market, which generates the creation or increase of the productive system.

Similarly, it can be seen that on average, the income of developed countries ($32,900.82) is higher than that of developing countries ($3,550.53). In addition, this difference occurs in financial development, with an average of 0.531 in developed countries compared to developing countries that reach 0.227. This same difference occurs when considering financial institutions and stock markets, within the subcategories of financial development indicators. Similarly, the rest of the variables show significant differences between the two subsamples considered for the analysis. For subsequent estimations, the natural logarithms of all the variables were considered, with the objective of measuring elasticities with respect to economic growth.

In relation to the normality tests, in both groups of countries, many variables have Skewness values close to 0, indicating symmetry in the distributions. Likewise, Kurtosis is less than 3 in many variables, indicating normal tails and the low existence of extreme values. Finally, in most of the variables, the Jarque-Bera test rejects the hypothesis of normality (given the significance value ***), which suggests that the distributions are normal.

Table 2. Descriptive statistics

Variables		Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis	Jarque-Bera
Developed countries								
GDP		36213.34	19534.99	2271.35	112417.9	1.172	4.995	533.03***
FD		0.538	0.210	0.010	1.000	0.008	2.142	42.920***
FI		0.619	0.200	0.010	1.000	-0.316	2.087	71.968***
FM		0.440	0.255	0.010	1.000	0.228	1.929	79.168***
HC		2.931	0.489	1.617	4.352	-0.367	2.488	46.722***
PGL		76.328	18.182	21.034	98.144	-0.768	2.586	147.58***
PE		4531.34	2978.66	414.62	18178.14	1.507	6.206	1129.52***
Developing countries								
GDP		3444.37	2716.32	181.18	14200.27	1.311	4.411	606.55***
FD		0.221	0.135	0.010	0.739	1.233	4.197	513.45***
FI		0.277	0.119	0.010	0.721	1.152	4.375	492.30***
FM		0.159	0.181	0.010	0.735	1.119	3.216	345.97***
HC		2.003	0.470	1.088	3.097	0.115	2.069	62.816***
PGL		66.260	14.702	21.781	92.585	-0.378	2.703	45.222***
PE		787.80	548.58	104.86	3515.13	1.936	7.294	2285.68***

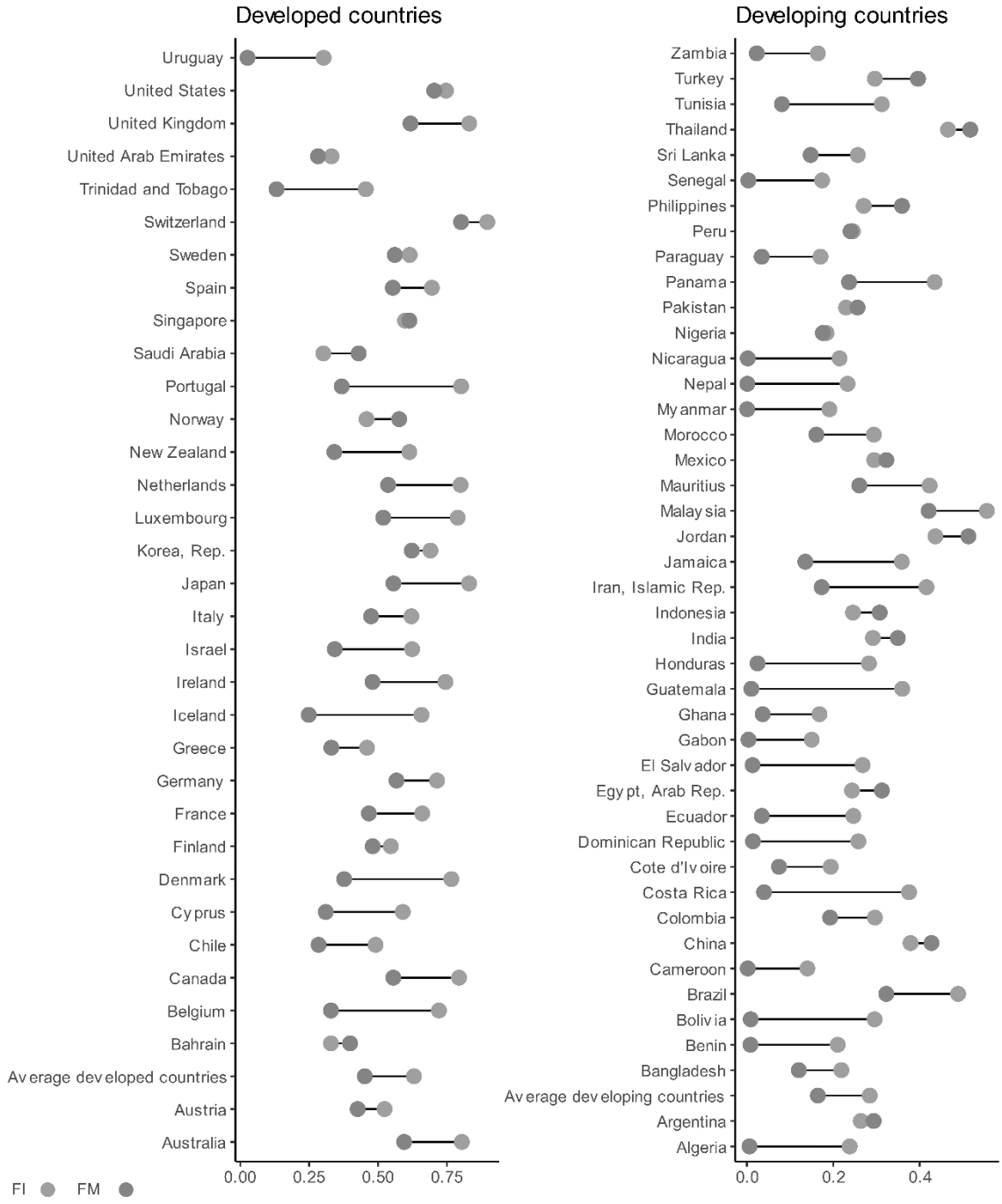
Figure 1 shows the spatial distribution of the 81 study countries divided into two subsamples, developed and developing economies for the three measures of financial, institutional and market development. It can be seen that economies such as the United States, Australia and most of Europe have high levels of financial development in the three study categories, while developing economies located in Latin America tend to show financial development with a trend towards the high presence of banking institutions, as in the case of Brazil. On the other hand, the development of the stock market is highly related to developed economies with high per capita growth, which is the case of the United States, Japan and the United Kingdom, countries where the development of these markets has a high presence and is linked to the growth of these economies.

Fig.1. Spatial distribution of study indicators at the global level

Notes: the arithmetic mean (1980 to 2015) of FM and FI is used.

Likewise, Figure 2 shows the differences in the means related to the financial variables FI and FM, in both subsamples and by country. It can be seen that FI is more significant in both subsamples, related to the development of banking institutions. These differences would show the level of development of this sector on the economies and the most significant impact on the economic growth of each subsample. As shown, there are few economies that maintain equal indices, both in FI and FM. However, it is evident to observe that in the sample of developed economies, unlike those in development, there is a higher average of FM linked to a greater presence of stock markets in these economies, so it is evident that the financial structure varies between the study subsamples.

Fig.2. Average financial indicators by country



Notes: the arithmetic mean (1980 to 2015) of FM and FI is used.

3.2. Model Specification

This study analyzes the relationship between economic growth and financial development worldwide, considering two analysis subsamples, evaluating the long-term relationships between these variables, taking into account institutionality and human capital, estimated from the following equation:

$$\ln(GDP)_{i,t} = \varphi_0 + \varphi_1 \ln FD_{i,t} + \varphi_2 \ln HC_{i,t} + \varphi_3 \ln PGL_{i,t} + \varphi_4 \ln PE_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where $\log(GDP)_{i,t}$ represents the logarithm of per capita production for country i in period t, $\ln FD_{i,t}$ represents financial development, $\ln HC_{i,t}$ human capital, $\ln PGL_{i,t}$ political globalization and $\ln PE_{i,t}$, the country's primary energy consumption i in period t. This last one is limited by the information available. Finally, $\varepsilon_{i,t}$ represents the error term; the results obtained at this stage are of interest because they indicate the sign and size of the effect of the independent variables on the dependent variable. The parameter $\ln FD_{i,t}$ is replaced by FI and FM for the analyses of each of these indicators in the estimates for each subsample.

Specifically, the methodology starts with the estimation of the cross-sectional dependence test of Pesaran (2007), in order to establish the relevance of the use of statistical tests that consider the correlation of the error between the cross-sections; then the Im, Pesaran and Shin unit root test of augmented cross section (CIPS) is applied, seeking to determine the stationarity of the series used; subsequently, the Westerlund (2007) cointegration test, the fully modified OLS estimators (FMOLS) and the dynamic OLS estimator (DOLS) are estimated, with the objective of finding the long-term relationship between the analyzed variables; finally, the causality test for panel data by Dumitrescu and Hurlin (2012) is carried out to establish, for example, if causality goes from financial development to economic growth, as suggested by Schumpeter (2017) and Goldsmith (1969), or if on the contrary, it goes from economic growth to financial development, as indicated by authors such as Robinson (1952).

3.3. Econometric Strategy

Pesaran (2004) and (2007) point out that panel data are likely to show considerable cross-sectional dependence in the error terms, due to unobserved and common shock factors. The effect of cross-sectional dependence is estimated variably and is based on common unobserved factors such as the nature of cross-sectional dependence, as well as the magnitude of correlations between cross-sections. The common effect of cross-sectional dependence gives rise to standard errors, causing biases in the estimation, whereas fixed effects (FE) and random effects (RE), although they are not efficient, they have consistent estimators. To deal with this problem, the use of the approach, which is proposed by Driscoll & Kraay (1998), may not work, and the FE and RE estimators would be biased. Another method is to use the instrumental variables (IVs) approach. However, finding IVs in practice is not easy. In equation (1) above, T denotes the temporal dimension of the panel, N denotes the cross-sectional dimension, and uit denotes the "error term". The hypotheses are:

$H_0: p_{ij} = p_{ij} = cor(u_{it}, u_{jt}) = 0$ for $i \neq j$

$H_a: p_{ij} = p_{ij} \neq 0$ for some $i \neq j$

where p_{ij} is the pairwise correlation coefficient of the error term:

$$p_{ij} = p_{ji} \frac{\sum_{t=2}^{T} u_{it} u_{jt}}{\left(\sum_{t=1}^{T} u_{it}^2\right)^{\frac{1}{2}} \left(\sum_{t=1}^{T} u_{jt}^2\right)^{\frac{1}{2}}} \quad (2)$$

With the test of Pesaran (2004) and (2007), Pesaran developed the following CD statistic, which is based on the LM statistic of Breusch & Pagan (1980):

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \right) \quad (3)$$

This CD statistic is better than the LM statistic because the exact mean for the fixed numbers T and N includes heterogeneous/homogeneous and non-stationary models.

3.3.1. Unit Root Test

Pesaran (2007) introduced a panel unit root test using augmented Dickey-Fuller regression (ADF) with the cross-sectional averages of the lagged level variable and the first difference operator

of the individual series. With N cross section of countries and T time period, this study uses the heterogeneous linear dynamic model, following Pesaran (2007) and is written as:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \gamma \bar{y}_{t-1} + \delta_i \Delta \bar{y}_t + \varepsilon_{it} \tag{4}$$

Where $y_{t-1} = \frac{1}{N}\sum_{i=1}^{N} I_{it-1}$ and $\Delta\bar{y}_t = \frac{1}{N}\sum_{i=1}^{N} y_{it}$, the mean of the cross section of the lagged levels I_{t-1} and of the first difference $\Delta\bar{I}_t$ of each series indicates the the cross section dependence through a factorial structure. Pesaran (2007) obtains the modified IPS statistics from the average of the cross-sectional augmented individual Dickey-Fuller distribution (CADF) presented as a cross-sectional augmented IPS (CIPS). The CIPS for the ith cross-sectional unit is given as follows:

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} CADF_i \tag{5}$$

3.3.2. Cointegration Test

This study identifies the cointegration between income inequality, economic development and economic development squared, for different groups of countries according to income level. The null hypothesis of no cointegration versus cointegration between the variables is considered. Therefore, the cointegration test introduced by Westerlund (2007) is used for the panel data. This considers structural dynamics rather than residual dynamics; therefore, we do not place any restrictions on any common factors. Furthermore, Westerlund's (2007) error correction model assumes that all variables are integrated in order 1 or I (1) and is written as follows:

$$\Delta x_{it} = \theta_i d_i + \pi_i(x_{it-1} - \grave{\beta_i} y_{it-1}) + \sum_{j=1}^{m} \pi_{ij}\Delta x_{it-j} + \sum_{j=1}^{m} \varphi_{ij}\Delta y_{it-j} + \varepsilon_{it} \tag{6}$$

Where $d_t = (1-t)\grave{}$ contains the deterministic components and $\grave{\theta} = (\theta_{1i}, \theta_{2i})\grave{}$ is the vector of unknown coefficients to estimate. The error correction coefficient π_i is estimated using the ordinary least squares method. The above equation can be written as:

$$\Delta x_{it} = \theta_i d_i + \pi_i(x_{it-1} - \grave{\tau_i} y_{it-1}) + \sum_{j=1}^{m} \pi_{ij}\Delta x_{it-j} + \sum_{j=1}^{m} \varphi_{ij}\Delta y_{it-j} + \varepsilon_{it} \tag{7}$$

Where π_i indicates the speed of adjustment to adjust the system back to equilibrium. The previous equation confirms that the coefficient π_i is not affected by imposing an arbitrary $\grave{\tau_i}$. We apply the test in the least squares estimator π_i and we calculate the t-ratio for each cross-section of countries. These are known as group mean statistics and are written as:

$$G_1 = \frac{1}{N}\sum_{i=1}^{N} \frac{\pi_i}{S.E(\hat{\pi}_i)} \qquad \text{And} \qquad G_2 = \frac{1}{N}\sum_{i=1}^{N} \frac{T\pi_i}{\hat{\pi}_i(1)}$$

G1 and G2 test the null hypothesis that $H_0: \pi_i = 0$ for all i against $H_1: \pi_i < 0$ for some i. If the null hypothesis is rejected, then it shows the cointegration relationship of at least one cross-sectional unit. The other two test statistics are presented as:

$$P_1 = \frac{\hat{\pi}_i}{S.E(\hat{\pi}_i)} \qquad \text{And} \qquad P_2 = T\hat{\pi}_i$$

P1 and P2 test the null hypothesis that $H_0: \pi_i = 0$ for all i against $H_1: \pi_i < 0$ for some i. Rejection of the null hypothesis implies rejection of a non-cointegration relationship for the panel of countries as a whole. If there is a cointegration relationship between variables, then this study uses the panel technique to estimate the long-run and short-run coefficients.

3.3.3. Long-Term Estimates

Once a cointegration relationship has been determined between the variables of the empirical model, we are practically interested in estimating the consistent parameters of the variables discussed in the empirical model.

However, according to Behera & Dash (2017), the use of the standard ordinary least squares (OLS) technique on non-stationary panel data may lead to false inferences in the estimation equation. Therefore, to avoid the type of inconsistency with respect to the OLS method, it is necessary to apply the fully modified OLS estimator (FMOLS) proposed by Pedroni (2001) and the dynamic OLS estimator (DOLS) proposed by Stock & Watson (1993). FMOLS is believed to eliminate the problem of endogeneity in the regressors and serial correlation in the errors, which can lead to a consistent estimation of parameters in a relatively small sample. Similarly, the DOLS estimator solves the problem of endogeneity, multicollinearity, and serial correlation by including the leads and lags of the I (1) regressors in the regression. This paper uses the Pedroni (2004) model:

$$Y_{it} = \alpha_i + \beta_i EC_{it} + \mu_{it}; i = 1,2, \dots, N \text{ and } t = 1,2, \dots, T$$

Where Y_{it} denotes the dependent variable and EC denotes the residual and different stationarity vector.

$$Y_{it} = \alpha_i + \beta_i EC_{it} + \sum_{k=-k_j}^{k_i} \gamma_{ik} \Delta EC_{it-k} + \mu_{it}; i = 1,2, \dots, N$$

Below are the FMOLS and DOLS estimators:

$$\beta^*_{fmols} = N^{-1} \sum_{1}^{N} \left(\sum_{t=1}^{T} (EC_{it} - \overline{EC_\iota})^2 \right)^{-1} \left(\sum_{t=1}^{T} (EC_{it} - \overline{EC_\iota})\, y^*_{it} - T_{\hat{\gamma}_\iota} \right) \tag{8}$$

$$\beta^*_{dols} = N^{-1} \sum_{t=1}^{N} \left(\sum_{t=1}^{T} z_{it}\, z^i_{it} \right)^{-1} \left(\sum_{t=1}^{T} z_{it}\, Y^*_{it} \right) \tag{9}$$

Where Z_{it} is the $2(K+1) \times 1$ vector of regressors.

$$Z_{it} = \left\{ \left(X_{i,t} - \overline{X_\iota} \right), \Delta X_{i,t-k}, \dots, \Delta X_{i,t+k} \right\}; \tilde{Y}_{i,t} = Y_{i,t} - \overline{Y_\iota}$$

3.3.4. Causality Test

The existence of a cointegration relationship suggests that there is a long-term equilibrium between the variables, so we proceed to examine the causal relationship between these variables. In this study, the Dumitrescu and Hurlin (2012) panel causality test was chosen, since it has good properties in small samples, in addition to being able to integrate cross-sectional dependence in its analysis. The Dumitrescu and Hurlin (2012) test considers the following model:

$$Y_{i,t} = \varphi_i + \sum_{k=1}^{k} \gamma_i^{(k)} Y_{i,t-k} + \sum_{k=1}^{k} \theta_i^{(k)} X_{i,t-k} + \varepsilon_{it} \tag{10}$$

Where $K \in N^*$ and $\theta_i = \left(\theta_i^{(1)}, \dots, \theta_i^{(k)} \right)$. The null hypothesis is defined as $H_0: \theta_i = 0, \forall\, i = 1, 2 \dots N$ and the alternative hypothesis is defined as $H_1: \theta_i = 0, \forall\, i = 1, 2 \dots N_1$ and $\theta_i \neq 0, \forall\, i = N_1 + 1, N_1 + 1, \dots, N$. Specifically, the null hypothesis states that there is no homogeneous Granger

causality in the panel, while the alternative hypothesis states that at least one causality can be found in the panel.

4. EMPIRICAL RESULTS

Recent empirical evidence (Mercan et. al (2015); Ho (2015); Månsson & Sjölander (2014); Solberger (2011)) points out the importance of considering cross-sectional dependence (CD) in panel data estimates, with the objective of not generating biased coefficients (Pesaran, 2004). The results shown in Table 4 reject the null hypothesis of independence of CD at 1%, thus highlighting the importance of integrating CD among the sample of study countries. The test on the global sample is estimated, since regional proximity does not apply to the economic structure of the countries, but to their level of economic growth.

Table 4. Cross-sectional dependence tests

Variables	lnGDP	lnFD	lnFI	lnFM	lnHC	lnPGL	lnPE
CD-test	228.424***	173.21***	144.13***	137.30***	321.86***	283.84***	106.11***

Notes: The CD-test performs the null hypothesis of cross-sectional independence. The test statistic follows the normal standard distribution N (0, 1). *** denotes significant at the 1% level.

In the second stage of the analysis, the CIPS unit root test was applied, which is the same test that integrates the CD, generating accurate results. The results of this test are shown in Table 5. They show that after the first differentiation, all the variables are stationary at 1% in the two study subsamples. Therefore, there is a need to test for cointegration in the set of variables of both subsamples, developed and developing economies.

Table 5. Pesaran's (2007) CIPS test.

		Developed countries			Developing countries	
		Without trend	With trend		Without trend	With trend
lnGDP	level	-2.663	-2.959		-2.028	-2.442
	First difference	-3.860	-4.253		-4.591	-4.812
lnFD	level	-2.403	-2.848		-2.392	-3.001
	First difference	-5.816	-6.054		-5.796	-6.023
lnFI	level	-2.415	-2.939		-2.617	-3.197
	First difference	-5.708	-5.829		-5.870	-5.979
lnFM	level	-2.824	-2.909		-2.302	-2.605
	First difference	-5.800	-5.920		-5.446	-5.611
lnHC	level	-1.320	-2.529		-1.783	-2.524
	First difference	-1.587	-2.643		-1.849	-2.637
lnPGL	level	-2.233	-2.312		-2.537	-2.583
	First difference	-5.867	-6.000		-5.849	-5.987
lnPE	level	-1.903	-2.964		-1.820	-2.050
	First difference	-5.690	-5.884		-5.391	-5.772

Notes: ***, **, and * denote a significance of 1%, 5% and 10%, respectively. The critical values of CIPS without trend in level are −2.05, −2.11, and – 2.23 for 10%, 5%, and l% level, respectively. The critical values of CIPS with trend in the first difference are −2.55 −2.60, and −2.72 for 10%, 5%, and l% level, respectively.

Table 6 shows the slope homogeneity results (Pesaran & Yamagata, 2008). This approach is used in various studies (Breitung & Salish (2021); Ahmad et al, (2020); Mensah et al (2019); Ando & Bai (2015); Blomquist Westerlund (2013)), prior to cointegration analysis. In this case, the results provide evidence to reject the null hypothesis of homogeneity of the slope, since the probability of the statistics Δ and Δ_{adj} are equal to zero. The null hypothesis ensures that there is homogeneity in the slopes. Homogeneity in the panels is an essential characteristic for the estimators of panel data models to be efficient and unbiased. On the other hand, heterogeneity in the panel slope conditions the use of heterogeneous panel methods to the requirements of efficiency to unbiased, where parameters may change between cross sections.

Table 6. Test for slope homogeneity of Pesaran & Yamagata (2008).

Tests	Delta	p-values
$\tilde{\Delta}$	59.783***	0.000
$\tilde{\Delta}_{adj}$	66.840***	0.000

H0: slope coefficients are homogenous. *t* statistics in brackets * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ and p-value in brackets

Continuing the analysis, Westerlund (2007) developed a panel cointegration test based on error correction that is robust, even in the presence of (CD), commonly known as the second- generation test. The idea of this test is to examine the absence of cointegration by determining whether there is error correction between individual members of the panel (Gt and Ga) or between the entire panel (Pt and Ga). Specifically, the test generates a sample through the Bootstrap method (100) and uses a new sample to construct statistics of the mean of two groups and two panels. The results of each subsample, using each of the financial indicators, reject the null hypothesis of no cointegration and confirm the existence of a balance between the long-term variables (See table 7). In other words, there is a joint variation in economic growth, with each of the financial indicators used (FD, FI and FM), globalization, human capital and non-renewable energy.

Table 7. Results of the Westerlund ECVM error correction model

Variable	Group	Stat	Value	Z-value	P-value	Robust P-value	Cointegration
Financial development	*Developed countries*	Gt	-4.275	-11.336	0.000	0.000	Yes
		Ga	-18.663	-4.407	0.000	0.000	Yes
		Pt	-23.292	-9.768	0.000	0.000	Yes
		Pa	-19.048	-7.602	0.000	0.000	Yes
	Developing countries	Gt	-4.574	-14.271	0.000	0.000	Yes
		Ga	-20.452	-6.264	0.000	0.000	Yes
		Pt	-30.275	-15.248	0.000	0.000	Yes
		Pa	-22.055	-10.768	0.000	0.000	Yes
Financial Institutions	*Developed countries*	Gt	-4.145	-10.532	0.000	0.000	Yes
		Ga	-18.885	-4.532	0.000	0.000	Yes
		Pt	-23.249	-9.729	0.000	0.000	Yes
		Pa	-19.106	-7.647	0.000	0.000	Yes
	Developing countries	Gt	-4.538	-14.029	0.000	0.000	Yes
		Ga	-20.144	-6.007	0.000	0.000	Yes
		Pt	-30.735	-15.673	0.000	0.000	Yes
		Pa	-22.474	-11.121	0.000	0.000	Yes
Financial Markets	*Developed countries*	Gt	-4.227	-11.040	0.000	0.000	Yes
		Ga	-18.736	-4.463	0.000	0.000	Yes
		Pt	-22.727	-9.247	0.000	0.000	Yes
		Pa	-18.769	-7.384	0.000	0.000	Yes
	Developing countries	Gt	-4.546	-14.084	0.000	0.000	Yes
		Ga	-20.628	-6.412	0.000	0.000	Yes
		Pt	-29.773	-14.785	0.000	0.000	Yes
		Pa	-22.007	-10.727	0.000	0.000	Yes

Note: *** denotes significant at the 1% level.

Having determined the cointegration relationship between non-stationary variables, the long-run coefficients must be estimated through cointegration estimators. The present study investigates long-term analysis, which is the key focus of the empirical strategy. This paper uses econometric tools such as fully modified ordinary least squares (FMOLS) estimators and dynamic ordinary least squares (DOLS) estimators. FMOLS and DOLS are highly efficient in dealing with the problem of endogeneity between regressors and serial correlations in the error terms. The FMOLS method uses a non-parametric approach that controls the problem of endogeneity and autocorrelation, while the DOLS method eliminates the problems through the parametric approach by including lags and leads from the explanatory variables (Kao & Chiang, 2000). In particular, the DOLS technique is able to deal with cross-sectional dependence based on obtaining country-specific coefficients and to produce unbiased, efficient and consistent estimates. The results of the FMOLS and DOLS estimators are shown in Table 8 for the two study subsamples and for each of the financial indicators.

Table 8. Results for FMOLS and DOLS

	Developed countries					Developing countries			
	FMOLS		**DOLS**			**FMOLS**		**DOLS**	
Financial Institutions									
FI	0.035* [0.053]	1.940	0.025[0.519]	0.645		0.077*** [0.000]	5.937	0.099*** [0.000]	3.756
HC	2.571*** [0.000]	18.951	2.083*** [0.000]	12.373		0.708*** [0.000]	8.797	0.479*** [0.000]	4.866
PGL	-0.093*** [0.001]	-3.263	-0.057[0.337]	-0.967		0.103*** [0.000]	3.528	0.161*** [0.002]	3.111
PE	0.208*** [0.000]	10.934	0.333*** [0.000]	8.998		0.345*** [0.000]	11.695	0.552*** [0.000]	10.943
Financial Markets									
FM	0.019*** [0.005]	2.839	0.061*** [0.000]	4.511		-0.012* [0.082]	-1.742	-0.022* [0.085]	-1.726
HC	2.464*** [0.000]	18.975	2.035*** [0.000]	12.082		0.747*** [0.000]	8.449	0.576*** [0.000]	5.364
PGL	-0.049*** [0.082]	-1.742	-0.111*** [0.082]	-1.738		0.082*** [0.004]	2.850	0.184*** [0.002]	3.146
PE	0.232*** [0.000]	12.213	0.297*** [0.000]	7.727		0.437*** [0.000]	14.166	0.613*** [0.000]	10.566
Financial Development									
FD	0.018*** [0.000]	4.857	0.046*** [0.000]	5.042		0.032*** [0.008]	2.653	0.011 [0.659]	0.442
HC	0.569*** [0.000]	14.283	0.522*** [0.000]	8.377		0.790*** [0.000]	8.961	0.525*** [0.000]	4.896
PGL	0.419*** [0.000]	48.659	0.403*** [0.000]	20.469		0.084*** [0.004]	2.881	0.166** [0.003]	2.965
PE	0.019*** [0.002]	3.169	0.031** [0.020]	2.328		0.417*** [0.000]	13.439	0.591*** [0.000]	10.378

Note: t statistics in brackets * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ and p-value in brackets

These results show that a financial market based on the presence of FI banking institutions generates a significant impact on developing economies (0.064, $p = 0.000$) at 1%, while the growth of developed economies is benefitted by a financial market based more on the FM stock market, so the impact of FI is not very significant (0.138, $p = 0.043$) in developed economies. On the other hand, developing economies do not benefit from FM, due to no or limited presence of this type of financial market in these economies. Hassan et. al (2011) agree that there has been a positive association between finance and economic growth for developing countries, but contradictory results for high-income countries. Durusu-Ciftci et al (2017) also point out that although the results vary between countries, both the credit market and the stock market have positive long-term effects on the steady-state level of GDP per capita. In this sense, according to the financial structure, the effect of financial development on economic growth is differentiated in the two subsamples analyzed. On the one hand, there are developing economies that are more closely related to the financial market, and on the other hand, developed economies with a stock market that has a more significant impact on economic growth.

However, if we consider financial development as a whole FD, i.e., based on the development of both FI and FM market structures, the impact is significant in developed economies, since the security of the markets can create more active and dynamic financial intermediaries (Durusu-Ciftci et al, 2017). Thus, a market structure where FI and FM have been developed generates such depth in financial activities that they converge in a positive effect on their levels of economic growth. On the contrary, and taking into account that the role of the stock market over banks is strengthened with the development of the financial sector (Chu, 2020), developing economies that do not have a financial structure that boosts both market structures, results in the potential effects of financial development having no impact on the economic growth of these economies.

Human capital is another variable that affects the study subsamples. In fact, in the empirical evidence developed by Ahmed et. al (2020); Khan et. al (2020); Botev et. al (2019) and Quito et al. (2020), it is highlighted that the role of human capital in financial development can generate interaction with technical innovations and support the development of this sector to ultimately promote sustainable economic growth. Particularly in this study, the results show, on the one hand, that in developed economies and with a high presence of FM, there is a greater effect on economic growth. On the other hand, in developing economies, the presence of FI causes human capital to

have a significant impact on the economic growth of these countries at .01% in both estimators. By contrast, if the financial structure is based on the stock market, which is not very developed in developing economies, human capital does not generate any impact on economic growth. In these economies, in addition to human capital, a higher level of financing is required as a necessary condition to generate long-term growth (Ibrahim & Alagidede, 2018).

On the other hand, globalization, which is another control variable, does not generate any impact on the economic growth of developed countries; this same result is observed when considering the FI, FM and FD. Furthermore, in developing economies, a positive effect on economic growth is evident in response to the process of growth and global integration that these countries are currently undergoing. This is contrary to developed economies, where there is already a high level of globalization, which may not exert an effect within these same economies. Berhane (2018) found similar results in a study for a group of countries classified according to their income level, and shows that globalization indices have a positive and significant effect on long-term economic growth in low-income countries, while the relationship is insignificant for upper-middle-income countries, concluding that globalization varies between countries and income levels due to the heterogeneous nature of economic structures, and the way in which countries are integrated in the global economy.

Regarding the use of primary energy, it can be seen that there is a positive and significant effect in both developed and developing economies. Developing economies, which are generally characterized by their growth being based on the use of primary energy, show the largest effect, 0.240 and 0.415 significant at 1% in both estimators, respectively.

Finally, once the long-term relationship is determined, it is important to detect the direction of causality for such relationships. Therefore, the Dumitrescu-Hurlin panel heterogeneous causality test is used to understand the nature of the causal relationship between the study variables. This causality approach is useful for correcting CD and heterogeneity problems (Dumitrescu & Hurlin, 2012). The results of the causality test are described in Table 9. Economic growth has a causal relationship on FD (GDP → FD), a causal relationship that is also evident in developing economies. Likewise, in developing countries, the causal relationship is bidirectional between financial development and economic growth (FD ↔ GDP), mainly due to the characteristics of these economies. These results are consistent with the findings of Christopoulos and Tsionas (2004), who found that the direction is from financial development to growth. Ghirmay (2004) also found similar results for 8 countries in sub-Saharan Africa, verifying that financial development causes economic growth. In addition, our findings are supported by those presented by Gurley and Shaw (1967), Goldsmith (1969) and Jung (1986), who hypothesized that in developing countries, growth drives finances due to the increasing demand for financial services.

Similarly, if we observe the FI, it has a causal relationship with economic growth (GDP → FI), where economic growth has an impact on the FI of developed countries. On the contrary, in developing economies there is a bidirectional causal relationship between these indicators, where a financial sector based on a banking structure impacts on economic growth and vice versa. Precisely Wu et. al (2020), in a study for China found similar results, positive causality that goes from financial development, measured by the amount of private credit lent, to economic growth. In contrast, if we observe FM, it maintains a causal relationship with economic growth, where the latter impacts on FM (GDP → FM) in both developing and developed countries. As Karimo & Ogbonna (2017) find in Nigeria, measuring FM with stock market capitalization ensures that an increase in business activities brings about development of stock market operations, while promoting ownership of securities and efficiency in the stock market.

On the other hand, it is observed that economic growth manages to impact on human capital (GDP → HC); this causal relationship is evident in both developed and developing economies. Thus, the growth of economies would result in an increase in the standard of living, which would provide an improvement in the human capital of the population (Azam, 2019). On the other hand, Fahimi et al. (2018) considers that human capital and economic growth have mutual predictive power, unlike the present result.

Table 9. Dumitrescu-Hurlin causality tests

Null hypothesis	Developed countries				Developing countries		
	W-stat.	p-value	Causality		W-stat.	p-value	Causality
GDP does not homogeneously cause FD	5.366	0.020	GDP → FD		4.218	0.000	GDP → FD
FD does not homogeneously cause GDP	2.879	0.820			5.904	0.000	FD → GDP
GDP does not homogeneously cause FI	5.398	0.020	GDP → FI		3.502	0.060	GDP → FI
FI does not homogeneously cause GDP	3.445	0.560			7.042	0.000	FI → GDP
GDP does not homogeneously cause FM	4.975	0.020	GDP → FM		3.999	0.000	GDP → FM
FM does not homogeneously cause GDP	3.387	0.600			3.576	0.300	
GDP does not homogeneously cause HC	6.356	0.080	GDP → HC		8.903	0.000	GDP → HC
HC does not homogeneously cause GDP	5.051	0.080	HC → GDP		3.450	0.400	
GDP does not homogeneously cause PGL	3.747	0.220			5.866	0.000	GDP → PGL
PGL does not homogeneously cause GDP	5.972	0.020	PGL → GDP		3.581	0.620	
GDP does not homogeneously cause PE	2.069	0.980			2.995	0.500	
PE does not homogeneously cause GDP	6.767	0.000	PE → GDP		5.505	0.000	PE → GDP

If we observe political globalization, we can see a unidirectional relationship that goes from growth to political globalization (GDP → PGL), only in developing economies. This result is similar to that found by Latif et al. (2018) for the BRICS, where growth maintains a causal relationship towards globalization. However, Hassan et al. (2019) found no causal relationship between these variables, for their study in Pakistan. Finally, primary energy manages to impact unidirectionally on economic growth (PE → GDP) of both subsamples. This result is similar to that found by Ozcan et al. (2020) in the OECD, where in addition to presenting such a causal relationship, they find a bidirectional relationship between both variables, which responds to a complementarity between economic growth and primary energy consumption.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

The main objective of this document is to analyze the long-term impact of financial development on economic growth, considering the level of development of case studies by applying cointegration techniques. The analysis includes the Financial Development Index, Financial Institutions Index and Financial Markets as a proxy for financial development; in addition, the use of primary energy, the index of political globalization and human capital are used as control variables. The main findings allow us to conclude that although financial development has a significant impact on the growth of economies, there is an important difference depending on the degree of development of the economy and the proxy that measures financial development. For developing countries, it is evident that the impact of FI is very significant, but not for developed countries, since they benefit more from a financial market based on FM. Both Durusu-Ciftci et al (2017) and Hassan et. al (2011) agree with these findings, highlighting the significant link that connects economic growth with financial development. It is important for public policy makers to consider these findings to ensure sustained growth both in developed economies by increasing financial development towards the stock market, and in developing economies by strengthening institutions to exercise adequate supervision of the stock market sector. Chu (2020) also suggests enacting laws and adopting a countercyclical capital buffer to guide credit growth.

On the other hand, with respect to the control variables, the importance of human capital is highlighted in both developed and developing economies, showing a unidirectional causal link that goes from growth to human capital. Likewise, the use of primary energy is evident for the two groups of countries; a unidirectional impact is also observed. Finally, it is interesting to observe the effect of globalization in political terms. In the case of developed countries, no impact on economic growth is observed, while in developing economies there is a positive effect, mainly due to the process of global integration of economies. Globalization is a key factor in these countries to boost growth, Berhane (2018) emphasizes that active development strategies must be designed and implemented to benefit from the components of globalization with technological innovations, efficiency and economies of scale, but also taking care to counteract the possible negative effects that it can bring.

The limitation of this research is related to the general lack of information for the 81 study countries, especially related to the use of primary energy and political globalization. Given that countries worldwide are making continuous progress in financial issues, it is important for future research to incorporate other factors that measure financial development and its potential for economic growth in their analyses. Analysis can be carried out with more advanced econometric techniques that allow for the inclusion of spatial components.

REFERENCES

Abu-Bader, S., & Abu-Qarn, A. S. (2008). Financial development and economic growth: The Egyptian experience. *Journal of Policy Modeling*, 30(5), 887-898.

Adu, G., Marbuah, G., & Mensah, J. T. (2013). Financial development and economic growth in Ghana: Does the measure of financial development matter? *Review of Development Finance*, 3(4), 192–203.

Ahmed, F., Hossain, M. J., & Tareque, M. (2020). Investigating the Roles of Physical Infrastructure, Financial Development and Human Capital on Economic Growth in Bangladesh. *Journal of Infrastructure Development*, 12(2), 154–175.

Ando, T., & Bai, J. (2015). A simple new test for slope homogeneity in panel data models with interactive effects. *Economics Letters*, 136, 112-117.

Ahmad, M., Jiang, P., Majeed, A., Umar, M., Khan, Z., & Muhammad, S. (2020). The dynamic impact of natural resources, technological innovations and economic growth on ecological footprint: an advanced panel data estimation. *Resources Policy*, 69, 101817.

Azam, M. (2019). Relationship between energy, investment, human capital, environment, and economic growth in four BRICS countries. *Environmental Science and Pollution Research*, 26(33), 34388–34400.

Behera, S. R., & Dash, D. P. (2017). The effect of urbanization, energy consumption, and foreign direct investment on the carbon dioxide emission in the SSEA (South and Southeast Asian) region. *Renewable and Sustainable Energy Reviews*, 70(November 2015), 96–106.

Ben Jedidia, K., Boujelbène, T., & Helali, K. (2014). Financial development and economic growth: New evidence from Tunisia. *Journal of Policy Modeling*, 36(5), 883–898.

Berhane, K. (2018). The role of financial development and institutional quality in economic growth in Africa in the era of globalization. In Determinants of economic growth in Africa (pp. 149-196). Palgrave Macmillan, Cham.

Blomquist, J., & Westerlund, J. (2013). Testing slope homogeneity in large panels with serial correlation. *Economics Letters*, 121(3), 374-378.

Botev, J., Égert, B., & Jawadi, F. (2019). The nonlinear relationship between economic growth and financial development: Evidence from developing, emerging and advanced economies. *International Economics*, 160, 3-13.

Breitung, J., & Salish, N. (2021). Estimation of heterogeneous panels with systematic slope variations. *Journal of Econometrics*, 220(2), 399-415.

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics. *The Review of Economic Studies*, 47(1), 239.

Calderón, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of Development Economics*, 72(1), 321-334.

Cao, X., Kannaiah, D., Ye, L., Khan, J., Shabbir, M. S., Bilal, K., & Tabash, M. I. (2022). Does sustainable environmental agenda matter in the era of globalization? The relationship among financial development, energy consumption, and sustainable environmental-economic growth. *Environmental Science and Pollution Research*, 29(21), 30808-30818.

Carvajal, S. (2015). Fragilidad financiera endógena en economías abiertas y dolarización. Quito: FLACSO Ecuador.

Chu, L. K. (2020). Financial structure and economic growth nexus revisited. *Borsa Istanbul Review*, 20(1), 24-36.

Cuesta-Valiño, P., Gutiérrez-Rodríguez, P., García-Henche, B., & Núñez-Barriopedro, E. (2024). The impact of corporate social responsibility on consumer brand engagement and purchase

intention at fashion retailers. Psychology & Marketing, 41(3), 649–664. https://doi.org/10.1002/mar.21940+

Diallo, B. (2017). Corporate governance, bank concentration and economic growth. *Emerging Markets Review*, 32, 28–37.

Driscoll, J. C., & Kraay, A. C. (1998). Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. *Review of Economics and Statistics*, 80(4), 549–560.

Dumitrescu, E.-I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, 29(4), 1450–1460.

Durusu-Ciftci, D., Ispir, M. S., & Yetkiner, H. (2017). Financial development and economic growth: Some theory and more evidence. *Journal of Policy Modeling*, 39(2), 290–306.

Fahimi, A., Akadiri, S. Saint, Seraj, M., & Akadiri, A. C. (2018). Testing the role of tourism and human capital development in economic growth. A panel causality study of micro states. *Tourism Management Perspectives*, 28(August), 62–70.

Goldsmith, R. W. (1969). Financial structure and development. New Haven, CT: Yale University Press.

Ghirmay, T. (2004). Financial development and economic growth in Sub-Saharan African countries: evidence from time series analysis. *African Development Review*, 16(3), 415-432.

Gutiérrez-Rodríguez, P., Cuesta-Valiño, P., Ravina-Ripoll, R., & García-Henche, B. (2024). Purchase intention of fashion brand retailers: a journey through consumer engagement and happiness. Management Decision, 62(2), 381–402. https://doi.org/10.1108/MD-04-2023-0541

Hashem Pesaran, M., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of Econometrics*, 142(1), 50–93.

Hassan, M. K., Sanchez, B., & Yu, J. S. (2011). Financial development and economic growth: New evidence from panel data. *The Quarterly Review of Economics and Finance*, 51(1), 88-104.

Hassan, S. T., Xia, E., Huang, J., Khan, N. H., & Iqbal, K. (2019). Natural resources, globalization, and economic growth: evidence from Pakistan. *Environmental Science and Pollution Research*, 26(15), 15527–15534.

Ho, T. W. (2015). Income inequality may not converge after all: Testing panel unit roots in the presence of cross-section cointegration. *The Quarterly Review of Economics and Finance*, 56, 68-79.

Hodijah, S., & Hastuti, D. (2023). Financial development and economic growth of ASEAN countries during the COVID-19 pandemic. Urbanizing the Regional Sector to Strengthen Economy and Business to Recover from Recession, 21.

Ibrahim, M., & Alagidede, P. (2018). Effect of financial development on economic growth in sub-Saharan Africa. *Journal of Policy Modeling*, 40(6), 1104–1125.

Ibrahim, M., & Alagidede, P. (2018). Effect of financial development on economic growth in sub-Saharan Africa. *Journal of Policy Modeling*, 40(6), 1104-1125.

Ibrahim, M., & Alagidede, P. (2018). Nonlinearities in financial development–economic growth nexus: Evidence from sub-Saharan Africa. *Research in International Business and Finance*, 46, 95-104.

Khan, M. S., & Senhadji, A. S. (2003). Financial development and economic growth: A review and new evidence. *Journal of African Economies*, 12(suppl_2), ii89-ii110.

Khan, Z., Hussain, M., Shahbaz, M., Yang, S., & Jiao, Z. (2020). Natural resource abundance, technological innovation, and human capital nexus with financial development: a case study of China. *Resources Policy*, 65, 101585.

Kao, C., & Chiang, M. H. (2000). On the estimation and inference of a cointegrated regression in panel data. In Advances in Econometrics (Vol. 15).

Karimo, T. M., & Ogbonna, O. E. (2017). Financial deepening and economic growth nexus in Nigeria: Supply-leading or demand-following? *Economies*, 5(1), 1–18.

Kirikkaleli, D., Güngör, H., & Adebayo, T. S. (2022). Consumption-based carbon emissions, renewable energy consumption, financial development and economic growth in Chile. *Business Strategy and the Environment*, 31(3), 1123-1137.

King, R., and Levine, R., (1993). Finance and Growth: Schumpeter Might Be Right, Quarterly Journal of Economics, CVIII.

Latif, Z., Mengke, Y., Danish, Latif, S., Ximei, L., Pathan, Z. H., Salam, S., & Jianqiu, Z. (2018). The dynamics of ICT, foreign direct investment, globalization and economic growth: Panel

estimation robust to heterogeneity and cross-sectional dependence. *Telematics and Informatics*, 35(2), 318–328.

Månsson, K., & Sjölander, P. (2014). Testing for nonlinear panel unit roots under cross-sectional dependency—With an application to the PPP hypothesis. *Economic Modelling*, 38, 121-132.

McKinnon, R., & Shaw, E. (1973). Financial deepening in economic development. Washington, Brookings Institution.

Mensah, I. A., Sun, M., Gao, C., Omari-Sasu, A. Y., Zhu, D., Ampimah, B. C., & Quarcoo, A. (2019). Analysis on the nexus of economic growth, fossil fuel energy consumption, CO2 emissions and oil price in Africa based on a PMG panel ARDL approach. *Journal of Cleaner Production*, 228, 161-174.

Mercan, M., Kızılkaya, O., & Okde, B. (2015). Are The Kaldor's Laws Valid? Panel Data Analysis under Cross Section Dependency for NIC Countries. *Procedia Economics and Finance*, 23, 140-145.

Minsky, H. (1978). The Financial Instability Hypothesis: A Restatement. En Can "It" Happen Again?, Hyman Minsky: 90-116. New York: M. E. Sharpe.

Minsky, H. (1992). The Financial Instability Hypotesis. Jerome Levy Economics Institute of Bard College.

Ozcan, B., Tzeremes, P. G., & Tzeremes, N. G. (2020). Energy consumption, economic growth and environmental degradation in OECD countries. *Economic Modelling*, 84(April), 203–213.

Pedroni, P. (2001). Purchasing Power Parity Tests in Cointegrated Panels. *Review of Economics and Statistics*, 83(4), 727–731.

Pedroni, P. (2004). Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis (Issues 2004–15).

Pesaran H., M. (2004). General diagnostic tests for cross-section dependence in panels. Faculty of Economics, 1240, 1–39.

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), 265–312.

Quito, B., Sánchez, M. L., Ponce, P., García, J. Á., & De, M. (2021). Comparative review of the income gap between the public and private sectors in Ecuador from the equalization policies. *Contaduría y Administración*, 66(4), 1–25.

Robinson, J. (1952). The generalization of the general theory. In The Generalization of the General Theory and Other Essays (pp. 1-76). Palgrave Macmillan, London.

Shahbaz, M., Nasir, M. A., & Lahiani, A. (2022). Role of financial development in economic growth in the light of asymmetric effects and financial efficiency. *International Journal of Finance & Economics*, 27(1), 361-383.

Schumpeter, J. A. (2017). The Theory of Economic Development: An Inquiry into Profits, Capita I, Credit, Interest, and the Business Cycle. Routledge.

Solberger, M. (2011). Demeaning the data in panel-cointegration models to control for cross-sectional dependencies. *Economics Letters*, 110(3), 252-254.

Song, C.-Q., Chang, C.-P., & Gong, Q. (2021). Economic growth, corruption, and financial development: Global evidence. Economic Modelling, 94, 822–830. https://doi.org/10.1016/j.econmod.2020.02.022

Stock, J., & Watson, M. (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica*, 61(4), 783–820.

Svirydzenka, K. (2016). Introducing a New Broad-based Index of Financial Development. IMF Working Papers, 16(05), 1. https://doi.org/10.5089/9781513583709.001

Valickova, P., Havranek, T., & Horvath, R. (2015). Financial development and economic growth: A meta-analysis. *Journal of Economic Surveys*, 29(3), 506-526.

Westerlund, J. (2007). Testing for Error Correction in Panel Data. *Oxford Bulletin of Economics and Statistics*, 69(6), 709–748.

Wu, C. F., Huang, S. C., Chang, T., Chiou, C. C., & Hsueh, H. P. (2020). The nexus of financial development and economic growth across major Asian economies: Evidence from bootstrap ARDL testing and machine learning approach. *Journal of Computational and Applied Mathematics*, 372, 112660.

Zhang, J., Wang, L., & Wang, S. (2012). Financial development and economic growth: Recent evidence from China. *Journal of Comparative Economics*, 40(3), 393–412.

Appendix 1. Sample of study countries

Developed countries			*Developing countries*		
Australia	Mauritius		Algeria	India	Tunisia
Austria	Netherlands		Argentina	Indonesia	Turkey
Bahrain	New Zealand		Bangladesh	Iran, Islamic Rep.	Zambia
Belgium	Norway		Benin	Jamaica	
Canada	Panama		Bolivia	Jordan	
Chile	Portugal		Brazil	Malaysia	
Cyprus	Saudi Arabia		Cameroon	Mexico	
Denmark	Singapore		China	Morocco	
Finland	Spain		Colombia	Myanmar	
France	Sweden		Costa Rica	Nepal	
Germany	Switzerland		Cote d'Ivoire	Nicaragua	
Greece	Trinidad and Tobago		Dominican Republic	Nigeria	
Iceland	United Arab Emirates		Ecuador	Pakistan	
Ireland	United Kingdom		Egypt, Arab Rep.	Paraguay	
Israel	United States		El Salvador	Peru	
Italy	Uruguay		Gabon	Philippines	
Japan			Ghana	Senegal	
Korea, Rep.			Guatemala	Sri Lanka	
Luxembourg			Honduras	Thailand	