Financial openness and economic growth: a Dynamic Common Correlated Effects (DCCE) approche for developed and developing economies

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Abstract

Despite decades of research, the literature still lacks consensus on whether financial openness fosters economic growth. This study addresses that gap by jointly analysing *de jure*, *de facto*, and hybrid measures of openness, and by comparing developed and developing economies. Using the Dynamic Common Correlated Effects (DCCE) estimator, the results reveal heterogeneous effects depending on both the type of openness and the country context. *De facto* inflows such as foreign direct investment (FDI) and portfolio equity promote growth, while broad measures of capital flows are negatively associated with it. *De jure* indicators show no significant impact, whereas hybrid indices yield positive effects overall. From a policy perspective, developed economies are better positioned to reap benefits, while developing economies require careful sequencing and stronger institutions.

Key words: Economic growth; Financial openness; Dynamic Common Correlated Effects; Economic policy.

1 Introduction

The relationship between financial openness and economic growth is one of the most debated issues in international economics. Since the liberalization reforms of the 1980s, scholars have examined whether deeper integration with international financial markets fosters economic development. Financial openness may bring substantial benefits in theory, including more efficient capital allocation, expanded access to external financing, risk diversification, and the diffusion of technology and knowledge (Levine, 2001; Alfaro et al., 2004; Grossman and Helpman, 1991; Moshirian et al., 2021). However, potential costs have also been identified, including increased exposure to financial crises, exchange rate appreciation that undermines tradable sectors, and vulnerabilities associated with weak institutional frameworks (Rodrik and Subramanian, 2009; Gizaw et al., 2024).

Empirical research has produced highly heterogeneous findings. Early studies reported no robust effects (Kraay, 1998), positive impacts (Levine, 2001; Bekaert et al., 2005), or mixed effects of financial openness on growth (Dreher, 2006; Garita, 2009, etc.). Subsequent studies have expanded the scope by using more sophisticated estimation tools, observing dynamic effects, and controlling for endogeneity or slope heterogeneity (Bussiere and Fratzscher, 2008; Kim et al., 2012; Gabriel and David, 2021; Seti et al., 2025, etc.). Nevertheless, the outcomes remain ambiguous. Some panel-based studies have emphasized how sensitive the results are to the choice of openness indicators (particularly *de jure* versus *de facto* measures), the level of development of the countries in the sample, and the econometric techniques used (Estrada et al., 2015; Gräbner et al., 2021; Romero Stéfani et al., 2024; Panagiotou, 2025).

An important issue when studying financial integration and economic growth in different countries is that there may be many unobserved factors and simultaneous economic shocks. However, the vast majority of previous empirical studies have ignored the cross-sectional dependence (CD) problem. Contrary to the premise that the variables in a regression analysis are independent of one another, CD can affect the reliability of the estimations.

The purpose of this article is to systematically assess the impact of different dimensions of financial openness on economic growth. The analysis distinguishes between *de jure*, *de facto*, and hybrid indicators and explicitly compares developed and developing economies. In this way, the study addresses a gap in the literature by examining these dimensions jointly within a unified empirical framework. A distinctive methodological contribution is the application of the DCCE estimator (Chudik and Pesaran, 2015; Chudik et al., 2016). This method offers significant advantages over traditional panel techniques. Unlike pooled ordinary least squares (POLS), panel data fixed effects (FE), random effects (RE), or dynamic generalized method of moments (GMM) approaches, DCCE simultaneously accounts for CD, slope heterogeneity, and endogeneity in macroeconomic panels. It is applicable to unbalanced samples, accommodates variables that are integrated of order one, and yields consistent and flexible long-run estimates. Since many earlier studies have been limited by econometric shortcomings, the use of this methodology represents a contribution to the literature.

The findings indicate that the effects of financial openness are neither homogeneous nor universal. Certain financial flows, particularly FDI and portfolio equity, are positively associated with growth, whereas aggregate measures of financial integration correlate negatively. *De jure* indicators do not show significant effects, suggesting that the removal of legal restrictions alone is insufficient to promote growth. Moreover, differences between developed and developing economies suggest that the level of development and institutional strength determine the extent to which financial openness contributes to economic performance.

The article is structured as follows. Section 2 reviews the relevant literature. Section 3 describes the data and methodological approach. Section 4 presents and discusses the empirical findings. Section 5 concludes and outlines directions for future research.

2 Literature review

As previously mentioned, the outcomes of empirical research on the topic are diverse. For instance, Kraay (1998) finds no robust effects of capital account liberalization on economic growth, using POLS and instrumental variables (IV) in a cross-sectional analysis and even controlling by institutional factors and macroeconomic volatility. In contrast, Levine (2001) and Bekaert et al. (2005) conclude that the stock market liquidity, as a measure of international financial openness, can accelerate growth.

Dreher (2006) developed a new set of globalisations indices and studied the nexus financial openness - growth for a panel data of 123 countries in 1970–2000. The dimensions most robustly related with growth refer to actual economic flows and restrictions in developed countries. However, political integration did not exert an influence on economic advancement. In this line, Quinn and Toyoda (2008) introduced a new measure of *de jure* openness, discovering a positive correlation between openness and growth among countries with varying levels of development. Garita (2009) uses different types of capital inflows to approximate openness. While FDI positively affects total factor productivity in both developed and developing countries, only portfolio-type flows stimulate capital accumulation in the former.

Conversely, despite Bussiere and Fratzscher (2008) demonstrating the short-term benefits of account liberalization for industrialized and developing economies, their findings using a dynamic panel data approach do not support long-term benefits. Using a similar approach, Kim et al. (2012) focus on the dynamic effects of financial integration on growth, employing the pooled mean group autoregressive distributed lag (PMG) model with annual data from 1975 to 2007 across ninety developing countries. The authors demonstrate that financial integration boosts economic growth in the long run, though there is significant heterogeneity in the short run.

Estrada et al. (2015) obtained mixed results when applying the Arellano-Bond generalized method of moments to a panel of 108 economies from 1977 to 2011. Actual financial openness has a positive and significant effect on economic growth, whereas *de jure* measures do not. Additionally, the impact of financial openness on growth tends to be weaker in developing countries.

Gräbner et al. (2021) consider an exercise through two-way FE applying alternately a large set of different measures of *de jure* and *de facto* openness to a substantial sample of economies between 1995-2014. Their main result is that the election of explanatory variables greatly conditions the estimation results.

Gabriel and David (2021) conducted the analysis for a group of sub-Saharan African countries within the period 1980 and 2017 using net FDI. By means of dynamic panel GMM and system GMM, they demonstrate that financial openness and the joint trade and financial openness do not spur economic growth. Also using GMM, Yu and Qayyum (2023) find that enhancing overall financial openness can increase economic complexity significantly, which is directly related to economic advancement.

Uzoechina et al. (2022) examined the role of financial openness in the BRICS covering the period from 1996 to 2020 with a panel data RE model. The results are mixed once again: while FDI inflows and capital account openness had a positive impact on growth, the influences of FDI outflows was not significant. Romero Stéfani et al. (2024) examined a large sample of 167 economies from 1960 to 2019 and concluded that, in both high- and low-income countries, total foreign assets and liabilities negatively affect growth. However, in middle-income economies, a higher ratio of portfolio equity assets and liabilities to GDP is positively linked to growth. For middle-income economies, reducing capital controls is associated with lower growth. In contrast, there is some evidence of a positive relationship between reducing controls and growth for high-income economies.

Seti et al. (2025) discovered that financial and trade openness both had a positive impact on economic growth in a group of ten emerging economies implementing a GMM method. Panagiotou (2025) employed augmented mean group (AMG), cross-sectional autoregressive distributed lags (CS-ARDL), fully modified grouped OLS and threshold models. He concludes that globalisation displays positive influence, although this varies depending on income level.

Finally, several meta-analyses have reached a consensus that the results are not uniform and may differ depending on the country's level of development, financial openness, dimension, and methodology (Bumann et al., 2013; Bijlsma et al., 2018; Abd Latib and Mohamad, 2023).

Despite the extensive empirical literature on the subject, the correlation between different dimensions of financial openness and economic growth among various groups of countries remains unresolved, due to a lack of consistent empirical findings. Revised papers differ not only in terms of the indicators and samples used, but also in terms of the methodology applied. Most of the literature relies on non-dynamic parametric techniques (such as different versions of POLS, FE or RE, and so on) or dynamic methods (such as GMM or CS-ARDL). Some of these approaches take into account issues or econometric problems such as serial correlation, endogeneity, lack of data or unbalanced panels, the heterogeneity of regressors, among others. However, according to Goldin (1966), CD is the most crucial problem to be addressed in a macroeconomic panel dataset. For example, although Seti et al. (2025) recognize the presence of cross-sectional dependency between countries in their study, yet do not implement any specific measures to mitigate it.

In fact, few studies address the CD problem. For example, Camarero et al. (2023) inquire if capital mobility has risen along the last 50 years in a group of 15 European economies. Using the DCCE strategy, they examine the long-run and short-run links between domestic investment and saving, showing highly mobile short-run capital but imperfect long-run capital mobility.

Gizaw et al. (2024) investigate the relationship between financial openness, financial development and growth in the context of 22 emerging African and Asian countries between 1981 and 2021. For emerging African countries, the PMG and the mean group autoregressive distributed lag (MG) estimation suggest that globalisation has a positive long-term impact on economic growth, but not in the short term. Furthermore, only the MPG estimation indicates positive and significant long-run effects on growth for emerging Asian countries. However, the authors acknowledge that the MG and PMG methods lack mechanisms to control CD in the panels, which can lead to inconsistent estimators. When they implement the DCCE method, globalisation has no effect on growth.

Wang et al. (2024) also introduced the DCCE, covering 12 Asian countries over a period of 26 years (1995–2020) and checking the relation between growth and financial development index from IMF (a measure of development financial system, rather than financial openness). The association between financial development and economic growth is strongly negative for underdeveloped countries, but positive for moderately and highly developed countries.

In light of this, the purpose of the present paper is twofold: first, to examine the relationship between different aspects of financial openness and economic growth; and second, to implement an innovative technique that facilitates the resolution of CD issues. Assuming that the observed inconsistency in outcomes across previous literature is attributable to estimation bias, we propose the DDCE methodology for analysing the relationship between financial openness measures and growth, while distinguishing between *de jure* and *de facto* measures, and across groups of countries with different levels of development.

3 Data and methodology

3.1 Data source and variable description

A panel database for 49 developing and developed countries for the period 1980-2022 annual data was constructed. The sample was split into two groups based on the income level: 25 developing and 24 developed economies (see Table 3 in the Appendix for details). The data was extracted from World Development Indicators (WDI) of the World Bank, International Monetary Fund (IMF), and Lane and Milesi-Ferreti (LMF) (2024) and Gräbner et al. (2021) datasets. The majority of the variables utilised in this study were selected in accordance with the contributions of Levine and Renelt (1992), Barro and Sala-i Martin (1995), Rojas et al. (2019) and Rojas et al. (2021). The control variables (with the exception of the financial openness variables) are as follows:

- *Economic growth*, as the logarithm of real GDP per capita (in constant US$ 2015);
- *Initial GDP*, as the first lag of the logarithm of real GDP per capita (in constant US$ 2015);
- *Investment*, as the logarithm of the gross capital formation per capita (in constant US$ 2015);
- *Public expenditure*, as the logarithm of the government´s final consumption per capita (in constant US$ 2015);
- *Trade openness*, as the sum of imports and exports of goods and services as percentage of real GDP;
- *Inflation*, as a proxy of macroeconomic instability variable, measured by the consumer price index.

The financial openness indicators are classified into three main categories: *de jure*, *de facto* and hybrid (Garita, 2009; Estrada et al., 2015; Steiner and Saadma, 2016; Gräbner et al., 2021). As posited by Gräbner et al. (2021), *de facto* and *de jure* measures are to be regarded as aggregates of economic statistics. By contrast, *de jure* indicators are to be understood as assessments of the institutional foundations of economic openness, such as the restrictions imposed by law on financial transactions. Specifically, *de facto* financial indicators evaluate outcomes, such as the amount of FDI inflows or outflows, or foreign portfolio assets or liabilities. With regard to hybrid measures, it is essential to incorporate information of both *de jure* and *de facto* types. In consideration of the classification the analysis incorporated four *de facto*, two *de jure* and one hybrid financial openness indicator, with the objective of assessing the impact of different dimensions of financial openness on economic growth.

In order to achieve this objective, the financial openness index developed by Lane and Milesi-Ferreti (Lane and Milesi-Ferretti, 2007, 2017) was initially considered. This index is defined as the volume of a country's foreign assets and liabilities relative to its GDP. Secondly, the equity-based financial integration index is expressed as the sum of portfolio equity assets and liabilities stocks as a percentage of GDP. The third *de facto* indicator is derived from the UNCTAD database (UNCTAD, 2024) and represents the total stock of FDI. Furthermore, *de jure* indicator is the Chinn-Ito index, which is based on data concerning the restrictions on cross-border financial transactions from the IMF AREAER report (Chinn and Ito, 2006, 2008). Finally, three indicators belonging to the Financial Globalisation dimension of the KOF Index are examined (Gygli et al., 2019). A weighted composite index has been developed, the calculation of which is based on the Chinn-Ito index, investment restrictions as outlined in the WEF Global Competitiveness Report, and the number of international investment agreements. The classification of each indicator as *de facto*, *de jure* or hybrid is determined by the predominant component in its composition.

The following table details the financial variables description:

Table 1. Financial variables - description

Variable	Type	Name	Source	Description
Total financial integration	*De facto*	LMF open	LMF dataset, Gräbner et al. (2021)	Sum of Total Foreign Assets and Liabilities in % of GDP, including FDI, portfolio equity, debt liabilities, other investments, derivatives, and reserves.
Portfolio equity financial openness	*De facto*	LMF EQ	LMF dataset, Gräbner et al. (2021)	Sum of portfolio equity assets and liabilities (stocks) as % of GDP.
Total FDI	*De facto*	UNC FDI	LMF dataset, Gräbner et al. (2021)	Sum of inward and outward FDI stocks in % of GDP. Inward FDI represents resident investors' equity and net loans in foreign enterprises.
Institutional financial openness	*De jure*	KAOPEN	Chinn-Ito index, Gräbner et al. (2021)	Measures a country's degree of capital account openness using four binary dummies from IMF AREAER reports. Index ranges from -1.90 to 2.37.
Total de facto financial globalisation	*De facto*	KOF finance df	Gygli et al. (2019), from Gräbner et al. (2021)	Country openness to international financial flows based on FDI (27.5%), Portfolio (13.3%), International debt (27.2%), Reserves (2.4%), Income payments (29.6%).
Total de jure financial globalisation	*De jure*	KOF finance dj	Gygli et al. (2019), from Gräbner et al. (2021)	Openness via capital account: Chinn-Ito index and investment restrictions. Components: investment restrictions (21.7%) and capital account openness (78.3%).
Total (hybrid) financial globalisation	Hybrid	KOF finance	Gygli et al. (2019), from Gräbner et al. (2021)	Average of *de jure* and de *facto* financial globalisation measures.

Source: Own elaboration based on Gygli et al. (2019) and Gräbner et al. (2021).

The variables of total financial integration, portfolio equity financial openness and total FDI, are taken in natural logs, whereas the rest of financial openness indicators (KAOPEN and KOF indexes) are considered in levels.

3.2 Econometric methodology and regression model

In order to fulfil the aim of the present study, parametric panel models were estimated based on the following regression model:

$$\gamma_{it} = \theta_i + \zeta_t + \gamma_{i,t-1}\lambda_i \; + FO_{it}\alpha_i \; + X_{it}\beta_i \; + \varepsilon_{it} \tag{1}$$

or equivalently in factor structure form:

$$\varepsilon_{it} = \sum_{l=1}^{\rho_f} \varphi_{i,l} f_{i,l} + \sum_{l=1}^{\rho_n} \nu_{i,l} n_{i,l} + \mu_{it}, \tag{2}$$

with $i = 1, \ldots, N$ and $t = 1, \ldots, T_i$.

Where i and t are the individual-specific and time fixed effects, respectively; ε_{it} is a cross-section unit-specific independent and identically distributed (iid) error term; $f_{i,l}$ and $n_{i,l}$ are unobserved common factors, $f_{i,l}$ is a strong common factor and $n_{i,l}$ is a weak, semi-weak or semi-strong common factor; ρ_f and ρ_n are the total number of factors; $\varphi_{i,l}$ and $\nu_{i,l}$ are heterogeneous factor loadings (Chudik and Pesaran, 2015; Ditzen, 2018, 2021). In this setting, the dependent variable, γ_{it}, represents the economic growth of country i in year t (see Table 1); $\gamma_{i,t-1}$ is the lagged economic growth of country i in year $t-1$; FO_{it} represents the degree of financial openness reflected in the different indicator used; X_{it} is a column vector of control variables with dimension $K \times 1$; λ_i, α_i and β_i capture the marginal impact of the lagged dependent variable, the financial openness measures, and the observed covariates on economic growth, respectively.

This model allows for heterogeneous coefficients, which are assumed randomly distributed around a common mean, such that $\lambda_i = \lambda + \kappa_i,\ \kappa_i \sim \text{IID}(0, \Omega_\kappa)$, $\beta_i = \beta + \delta_i,\ \delta_i \sim \text{IID}(0, \Omega_\delta)$, and $\alpha_i = \alpha + \epsilon_i,\ \epsilon_i \sim \text{IID}(0, \Omega_\epsilon)$.

The common factors simultaneously affect all cross-sectional units generating interdependence among themselves, although with different intensity (Hsiao, 2003, Pesaran, 2015b). On the other hand, slope heterogeneity means that each individual unit has its own coefficients, which are specific to that unit rather than being assumed common across all units (Pesaran, 2015b).

Both the presence of CD and non-homogeneous slopes required an appropriate treatment; otherwise the POLS, RE or FE estimators may be biased and inconsistent due to omitted variables, and may also be inefficient (Pesaran, 2015a; Everaert and De Groote, 2016). Moreover, when it is assumed that the lagged-dependent variable is included as an explanatory variable and statistically significant fixed effects are present, the estimates may suffer from the Nickell bias (Nickell, 1981; Blundell and Bond, 1998). In fact, the Arellano–Bond and Blundell–Bond estimators (Arellano and Bond, 1991; Blundell and Bond, 1998), based on the difference and system GMM technique, are also not appropriate in this scenario. While they address endogeneity and correct for heteroskedasticity, these methods rely on the assumption of homogeneous slope coefficients across cross-sectional units. Also, it does not correct the CD. Therefore, a series of tests are carried out.

Firstly, the Pesaran (2004, 2015a, 2021) tests are performed to evaluate residuals and variables for the presence of weak cross-section dependence, while the weighted CD test (CDw) (Juodis and Reese, 2022), CDw test with power enhancement (Fan et al., 2015), and the CD* test (Pesaran and Xie, 2021), are implemented to test CD at variables. In all of them, the null hypothesis is the presence of weak cross-section dependence, whereas the alternative hypothesis warns of the existence of strong cross-section dependence. Strong CD occurs if common factors (interactive FE) are part of the observed variables (Ditzen, 2021). The test statistics for each of the tests are presented below.

- Pesaran (2015a, 2021) test statistic:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \rho_{ij}$$

where ρ_{ij} is the correlation coefficient between units i and j.

Under the null hypothesis, the statistic is asymptotically distributed as:

$$CD \sim N(0,1)$$

- The CDw test weights each observation by cross-section specific Rademacher weights (Juodis and Reese, 2022). The pairwise correlations are calculated as:

$$\rho_{ij} = \sum_{t=1}^{T} w_i \epsilon_{it} \epsilon_{jt} w_j$$

[0]Following Ditzen (2021), the floor of $\sqrt[3]{T}$ lags of the cross-sectional averages is added. However, the CD can be corrected with fewer lags.

where w_i and w_j are the Rademacher weights which take on the values 1 or -1 with equal probability.

- Power-Enhanced CD test (CDw+, PEA). This test (Fan et al., 2015) enhances the power of the classical CD test when N is large:

$$CD_{\text{PEA}} = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \rho_{ij} + \sum_{i=2}^{N} \sum_{j=1}^{N-1} |\rho_{ij}| \cdot \mathbf{1} \left(|\rho_{ij}| > \sqrt[3]{\frac{\log(\log(N))}{T}} \right)$$

- CD* statistic (Pesaran and Xie, 2021) is defined as:

$$CD^* = \frac{CD + \sqrt{\frac{T}{\gamma}}\Theta}{1 - \Theta}$$

where Θ is the bias correction and a function of the estimated factor loadings.

Additionally, for completeness, the Modified Wald test (Greene, 2000) can be used to test for the presence of heteroskedasticity, under the null hypothesis of homoscedasticity.

Secondly, the Pesaran and Yamagata (2008) test for slope homogeneity is implemented. The null hypothesis of the test is that the slopes are homogeneous, which implies that all slope coefficients are identical across cross-sectional units. This test provides the Delta (Δ) and adjusted Delta ($\tilde{\Delta}$) statistics, where the latter corrects for the small sample bias when T is small or moderate.

The third step consists in determining the stationarity of the panel series. The assessment of stationarity and co-integration is fundamental to ensure that the findings represent long-term relationships among the variables and not spurious associations. Specifically, the relationships are meaningful only if the mean and variance of the series are constant.

According to Baltagi (2009), cross-sectional correlation in panel data can considerably undermine the reliability of widely used panel unit root tests, such as those proposed by Pedroni (2004), Kao (1999), and Im et al. (2003), since these procedures generally rely on the assumption of independence across units. Therefore, when applied in the presence of CD, these tests may experience substantial size distortions (O'Connell, 1998, in Baltagi, 2009). Consequently, if the presence of CD and heterogeneity slopes is verified, application of the so-called second-generation tests is required. Specifically, the cross-section Augmented Dickey-Fuller (CADF) (Pesaran, 2003) and cross-section Im-Pesaran-Shin (CIPS) (Pesaran, 2007) test are implemented under the null hypothesis that all series are non-stationary. When the null hypothesis is rejected, it is necessary to differentiate the series, and test again. If the first-differenced series does not lead to rejection of the null hypothesis, the series is said to be integrated of order one, $I(1)$. Conversely, if the null hypothesis is initially accepted the series is stationarity $I(0)$.

Fourthly, and in line with the previous steps, if the series are $I(1)$ Westerlund (2007) second-generation error-correction-based panel co-integration test was applied, in order to evaluate whether a long-run relationship exists between the variables. In this case, the rejection of the null hypotheses should be taken as evidence of co-integration for the panel as a whole. Formally, considering the following error correction model whose series are $I(1)$,

$$\Delta y_{it} = c_i + \sum_{j=1}^{p} a_j \Delta y_{i,i-j} + \sum_{j=1}^{p} b_j \Delta x_{i,i-j} + a_i \left(y_{i,i-1} - b x_{i,i-1} \right) + u_{it}$$

where Δ operator represents the first difference of the variable, c_i is a specific effect for panel i, and a_i provides an estimate of the speed of error-correction towards the long run equilibrium for that series i. This test provides four statistics. The Ga and Gt test statistics test $H_0 : a_i = 0 \; \forall \; i$ versus $H_1 : a_i < 0$ for at least one i. Rejection of null hypotheses should be taken as evidence of cointegration of at least one of the cross-sectional units. The Pa and Pt test statistics pool information over all the cross-sectional units to test $H_0 : a_i = 0 \; \forall \; i$ versus $H_1 : a_i < 0 \; \forall \; i$. Rejection of the null hypotheses should therefore be taken as evidence of cointegration for the panel as a whole.

In light of the above, equation (1) is estimated using the DCCE method, proposed by Chudik and Pesaran (2015) and Chudik et al. (2016), which allows for addressing CD, admits heterogeneous slope coefficients, and deal with the endogeneity problem arising for the use of a dynamic panel data specification. This technique is suitable in cases where the series are not co-integrated, provided that the variables are at most integrated of order one, $I(1)$. Moreover, it supports the Common Correlate

Effects (CCE), Mean Group (MG) and Pooled Mean Group (PMG) estimators (Ditzen, 2021; Gizaw et al., 2024). Among other advantages, this method stands out for supporting instrumental variables estimations, allowing Jackknife correction for dealing with small-samples bias, providing a more realistic representation and can handle non-linear or discrete explanatory variables without modifications (Gizaw et al., 2024), offering flexibility in estimating long-term effects, and being scalable to large panels, among others.

4 Results

The results of both descriptive and econometric analyses are presented in this section. The empirical exercises were performed using Stata 17 software.

4.1 Descriptive analysis

The results of the descriptive analyses are summarized in tables 2 and 3. Table 2 displays the main descriptive statistics for the total sample, including the mean, standard deviation, minimum and maximum values and the number of observations overall, between and within. These are of particular importance in elucidating the structural heterogeneity across units (between) and the temporal variation within each unit (within). Similarly, Table 3 presents the descriptive analyses for each group of economies.

The results demonstrate considerable dispersion and wide ranges, which can be attributed to the length of the analyzed period and the diversity of the countries included in the sample. In particular, financial openness variables (LMF open and LMF EQ, UNC FDI, KAOPEN, KOF indexes) variables show substantial variation and a considerable number of observations, thus supporting their use in cross-country growth analysis.

The natural logarithm of real per capita GDP exhibited an overall mean value of 9.228 during the period under analysis, which corresponds to a real per capita income of 10,178.16 (in 2015 constant US dollars) for the entire sample. Utilising the mean value of the lagged natural logarithm of per capita GDP together in conjunction with the current mean, an average annual growth rate of 0.8% is derived for the specified period under analysis. In a similar vein, per capita GDP growth was recorded at approximately 0.9% for developing countries and 0.8% for developed countries during the period under scrutiny, as determined by the mean log values.

Furthermore, Figure 1 illustrates a growing process of financial integration across these economies (total sample), particularly from the mid-1990s onward. Panel B of this figure demonstrates a continuous increase in FDI. In contrast, Panel A of Figure 2 illustrates the behaviour of the Chinn-Ito index. This index exhibits a gradual *de jure* financial liberalization from the 1980s, with an accelerated increase in the 1990s, followed by a reversal in the mid-decade. Subsequent to the year 2000, the index has exhibited a marked tendency towards stagnation. The series of KOF financial indicators also reflect a slowdown and/or reversal of the process of financial globalisation, which commenced in the 2000s.

Moreover, the appendix of this study presents the pairwise correlation matrices for each sample (see Figure 3, 4 and 5). It can be observed that, within each subsample, the highest correlations arise between the indicators of financial openness. Nonetheless, this does not engender a multicollinearity issue, since each indicator is incorporated separately into the regression models. Furthermore, it is important to emphasise the low correlation between trade openness and the financial indicators, which supports the joint inclusion of both types of variables in the regression analysis.

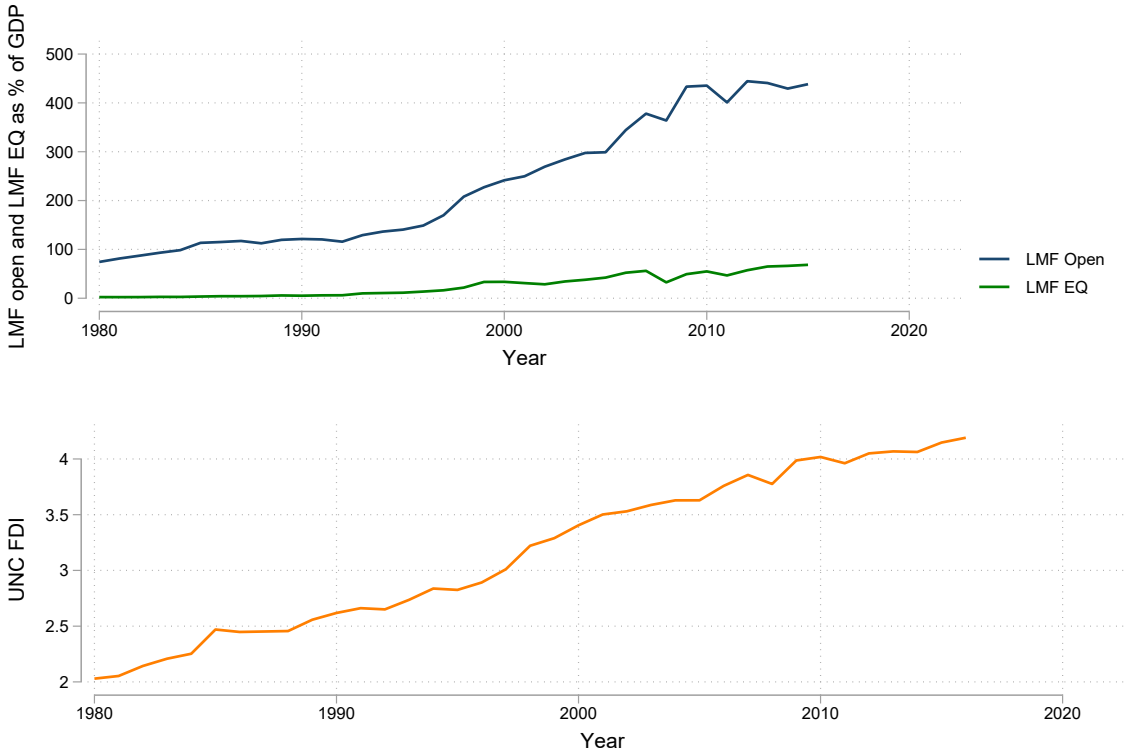

Figure 1: Evolution of LMF financial openness indicators in total sample

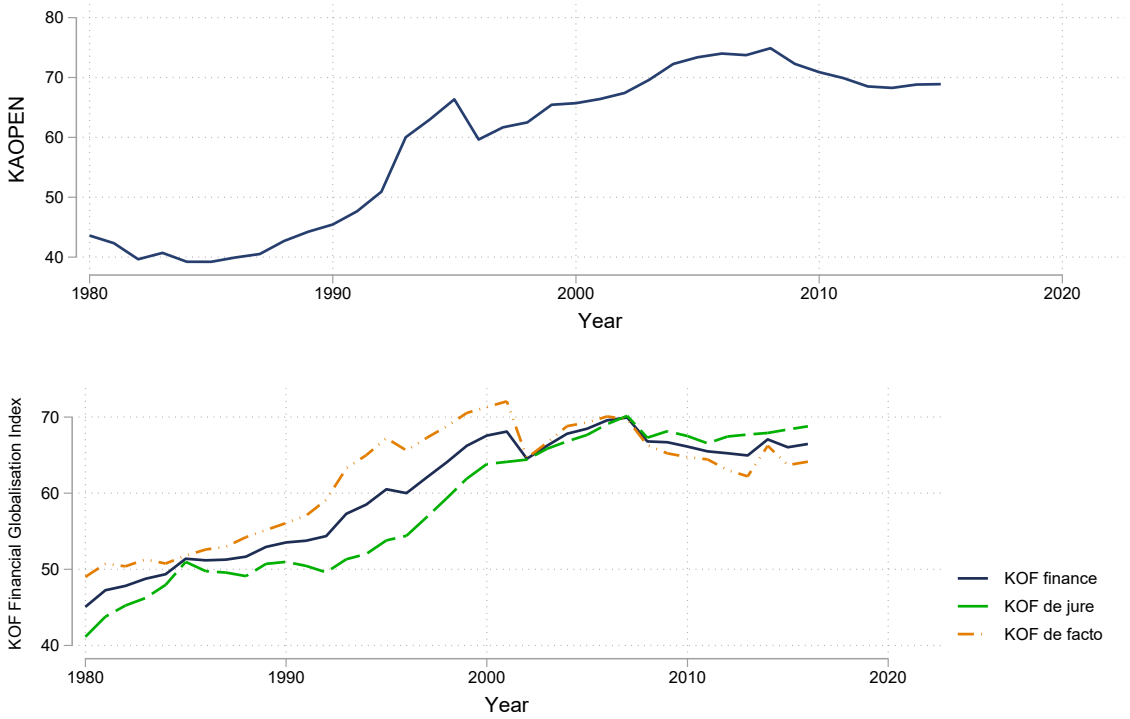

Figure 2: Evolution of KOF and Chinn-Ito indexes in total sample

Table 2. Summary data for the overall sample

Variable	Statistic	Mean	Std. dev.	Min	Max	Observations
Economic growth	Overall	9.228	1.279	5.963	11.486	N = 2107
	Between	9.262	1.262	6.733	11.037	n = 49
	Within	9.228	0.272	7.905	10.208	T = 43
Investment	Overall	7.647	1.336	4.134	10.590	N = 1972
	Between	7.647	1.301	5.313	9.677	n = 49
	Within	7.647	0.415	5.850	9.229	$\bar{T}$ = 40.245
Public expenditure	Overall	7.452	1.485	3.711	9.807	N = 2094
	Between	7.452	1.470	4.539	9.532	n = 49
	Within	7.452	0.272	6.391	8.503	$\bar{T}$ = 42.735
Inflation	Overall	25.685	332.842	-4.448	11749.640	N = 2057
	Between	25.685	72.672	0.971	326.345	n = 48
	Within	25.685	325	-299.923	11448.980	$\bar{T}$ = 42.854
Trade openness	Overall	70.770	52.771	11.546	437.327	N = 2107
	Between	70.770	50.726	23.025	349.771	n = 49
	Within	70.770	16.216	8.493	167.019	T = 43
LMF open	Overall	4.955	0.845	2.783	8.289	N = 1764
	Between	4.955	0.640	3.701	6.691	n = 49
	Within	4.955	0.560	3.361	6.927	T = 36
LMF EQ	Overall	1.899	1.593	0.000	7.147	N = 1764
	Between	1.899	1.228	0.000	4.594	n = 49
	Within	1.899	1.029	-1.555	5.162	T = 36
UNC FDI	Overall	3.196	1.157	-1.244	7.483	N = 1705
	Between	3.196	0.839	0.958	5.168	n = 49
	Within	3.196	0.818	-0.551	5.511	$\bar{T}$ = 34.796
KAOPEN	Overall	58.884	36.442	1.000	101	N = 1764
	Between	58.884	28.527	13.888	101	n = 49
	Within	58.884	23.031	-18.509	120.156	T = 36
KOF finance	Overall	60.113	17.444	9.370	94.237	N = 1813
	Between	60.113	14.524	26.113	87.944	n = 49
	Within	60.113	9.877	23.318	89.178	T = 37
KOF finance *de facto*	Overall	58.294	19.597	10.476	98.144	N = 1813
	Between	58.294	15.596	24.296	92.285	n = 49
	Within	58.294	12.069	11.817	95.913	T = 37
KOF finance *de jure*	Overall	61.933	19.393	8.259	93.165	N = 1813
	Between	61.933	15.822	27.880	87.357	n = 49
	Within	61.933	11.433	25.794	102.077	T = 37

Source: own elaboration.

Table 3. Summary data for the two subsamples

Variable	Developing countries					Developed countries				
	Obs.	Mean	Std. dev.	Min	Max	Obs.	Mean	Std. dev.	Min	Max
Economic growth	1,075	8.133	0.758	5.963	9.564	1,032	10.369	0.433	8.308	11.486
Investment	1,024	6.563	0.875	4.134	8.778	948	8.817	0.495	7.079	10.590
Public expenditure	1,062	6.183	0.887	3.712	7.822	1,032	8.759	0.546	6.878	9.807
Inflation	1,025	46.182	470.398	-4.141	11749.640	1,032	5.327	17.831	-4.448	373.216
Trade openness	1,075	60.514	32.607	11.546	220.407	1,032	81.453	66.007	15.723	437.327
LMF open	900	4.567	0.480	2.783	5.776	864	5.359	0.948	3.328	8.289
LMF EQ	900	1.043	1.180	0.000	4.474	864	2.790	1.474	0.000	7.147
UNC FDI	851	2.856	1.005	-1.244	4.996	854	3.534	1.200	0.667	7.483
KAOPEN	900	38.657	30.695	1.000	101.000	864	79.954	29.333	1.000	101.000
KOF finance	925	50.463	12.884	9.370	81.403	888	70.166	15.825	24.901	94.237
KOF finance *de facto*	925	48.761	13.539	10.476	83.608	888	68.224	20.002	18.737	98.144
KOF finance *de jure*	925	52.166	16.548	8.259	88.639	888	72.107	16.731	9.313	93.165

Source: own elaboration.

4.2 Empirical results

4.2.1 Cross-sectional dependence

In this subsection, the results of the CD test are presented. In the field of macroeconomics, CD represents the most significant challenge that must be confronted when analysing a macroeconomic panel dataset (Goldin, 1966). Specifically, the variables in one country are correlated with others. This is due to the fact that global economic shocks can impact variables in one country that are influenced by variables in another. As previously discussed, estimating the regression model while omitting these effects results in inconsistent estimators. Table 4, displays the statistics and p-values of the cross-sectional tests. It is important to note that the CDw and CDw+ statistics typically demonstrate lower power, whereas CD and CD* are regarded as the most reliable alternatives. The null hypothesis is rejected for both the full sample and the two subgroups, indicating the presence of strong CD.

4.2.2 Stationarity and co-integration

The stationarity of the variables was examined using the second-generation CADF unit root test proposed by Pesaran (2003), both with and without deterministic trend in the specification. This was based on the results of the slope homogeneity and cross-sectional dependence tests. In the present study, it was only possible to implement the CADF test, since the CIPS test requires strictly balanced panels.

Table 5 presents the integration degree of each variable in every subsample, with further details available in Table 2 of the appendix. As demonstrated in Table 5, the majority of the variables exhibit non-stationarity at levels but achieve stationarity in their first differences, suggesting that most are $I(1)$. It is notable that only inflation remains stationary in levels across all subsamples, whereas investment becomes nonstationarity in developed countries, and the KOF finance *de jure* index is stationarity in developing countries. This finding provides the basis for conducting co-integration tests.

The results of the second generation Westerlund cointegration test are reported in Table 6. As demonstrated by the statistical analysis, the majority of the findings indicate the absence of cointegration among the variables employed in this study. However, it is important to note that the CADF test implemented to check for unit roots allows for the inclusion of both a trend and a constant in the specifications, but it does not account for potential structural breaks. Consequently, the stationarity of the variables was also verified using the Karavias and Tzavalis (2014) test, which can be applied in the presence of CD. This test performs panel unit root tests that allow for breaks in the intercepts of the individual series or in both intercepts and linear trends. In this particular instance, the investigation revealed that all variables, with the exception of public expenditure, exhibited a stationary level ($I(0)$) at a significance level of 1%. This finding substantiates the presence of a long-run relationship among the variables.

At this point, is important to emphasize once again that if the variables are not co-integrated, this actually justifies the use of the DCCE method, as it is suitable for working with non-cointegrated series; the presence of co-integration does not constitute a prerequisite for its implementation.

Table 4. Cross-sectional dependence tests by variable and subsample

Variable	Total sample				Developing countries				Developed countries			
	CD	CDw	CDw+	CD*	CD	CDw	CDw+	CD*	CD	CDw	CDw+	CD*
Economic growth	182.72	-2.69	6384.19	0.18	102.98	1.46	1709.55	-0.42	87.64	-1.28	1541.82	-0.77
	(0.000)	(0.007)	(0.000)	(0.854)	(0.000)	(0.145)	(0.000)	(0.673)	(0.000)	(0.202)	(0.000)	(0.444)
Initial GDP	181.35	2.32	6354.54	2.96	102.88	-4.18	1717.09	-2.21	86.77	7.90	1533.49	1.56
	(0.000)	(0.020)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.027)	(0.000)	(0.000)	(0.000)	(0.118)
Investment	97.68	-0.37	3855.87	1.39	57.28	6.63	1009.16	-2.25	50.93	-2.99	966.38	-3.05
	(0.000)	(0.714)	(0.000)	(0.164)	(0.000)	(0.000)	(0.000)	(0.024)	(0.000)	(0.003)	(0.000)	(0.002)
Public expenditure	177.27	-2.78	6100.44	4.24	86.80	5.14	1552.02	0.78	95.34	8.92	1647.35	-3.83
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.435)	(0.000)	(0.000)	(0.000)	(0.000)
Inflation	91.45	0.06	3226.49	11.06	80.37	-1.76	1332.12	-4.53	29.63	3.49	552.17	3.55
	(0.000)	(0.956)	(0.000)	(0.000)	(0.000)	(0.079)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade openness	80.40	-0.84	3638.41	1.79	59.34	-3.41	1049.52	4.16	27.72	4.31	815.48	4.18
	(0.000)	(0.402)	(0.000)	(0.073)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LMF open	123.74	1.69	4524.29	-1.78	97.34	-0.34	1617.08	1.90	41.36	1.18	834.59	-1.45
	(0.000)	(0.091)	(0.000)	(0.076)	(0.000)	(0.737)	(0.000)	(0.057)	(0.000)	(0.238)	(0.000)	(0.147)
LMF EQ	153.79	-1.05	5273.43	43.00	102.73	0.91	1720.29	-1.34	61.55	3.09	1071.75	20.22
	(0.000)	(0.294)	(0.000)	(0.000)	(0.000)	(0.362)	(0.000)	(0.181)	(0.000)	(0.002)	(0.000)	(0.000)
UNC FDI	117.93	-3.68	6277.85	2.42	72.07	-4.09	1373.55	-1.54	25.36	4.79	1460.79	-2.54
	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)	(0.124)	(0.000)	(0.000)	(0.000)	(0.011)
KAOPEN	133.49	2.58	4601.02	2.49	81.02	-1.75	1348.08	16.20	52.66	-4.00	933.62	2.22
	(0.000)	(0.010)	(0.000)	(0.013)	(0.000)	(0.080)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.027)
KOF finance	133.72	13.35	4968.55	-0.71	98.06	1.92	1631.00	7.98	42.15	-1.97	904.25	-0.85
	(0.000)	(0.000)	(0.000)	(0.476)	(0.000)	(0.055)	(0.000)	(0.000)	(0.000)	(0.048)	(0.000)	(0.393)
KOF finance *de facto*	128.14	11.47	4649.51	0.23	74.29	-0.74	1549.96	-1.20	41.15	-2.40	848.24	-1.88
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.457)	(0.000)	(0.230)	(0.000)	(0.017)	(0.000)	(0.060)
KOF finance *de jure*	89.92	7.14	4191.70	6.96	92.56	-1.26	1274.34	2.48	23.26	-3.97	946.63	0.50
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.207)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.617)

Source: own elaboration.

4.2.3 Homogeneous coefficients

In this step, since some series contained missing values, linear interpolation and extrapolation were performed in order to implement the slope homogeneity test of Pesaran and Yamagata (2008) (Little and Rubin, 2002; Schlittgen et al., 2016). This test was applied to each regression model, considering one financial openness variable for each subsample, while varying inflation and trade openness as control variables. In all cases, the Delta (Δ) and adjusted Delta ($\tilde{\Delta}$) statistics suggest rejecting the null hypothesis of slope homogeneity. This result indicates the presence of heterogeneous coefficients in both the full sample and the subsamples. The results of this test are reported in Table 1 of the appendix.

Table 5. Degree of variable integration

Variable	**Second generation unit root CADF test**		
	Total sample	Developing countries	Developed countries
Economic growth	$I(1)$	$I(1)$	$I(1)$
Investment	$I(0)$	$I(0)$	$I(1)$
Public expenditure	$I(1)$	$I(1)$	$I(1)$
Inflation	$I(0)$	$I(1)$	$I(0)$
Trade openness	$I(1)$	$I(1)$	$I(1)$
LMF open	$I(1)$	$I(1)$	$I(1)$
LMF EQ	$I(1)$	$I(1)$	$I(1)$
UNC FDI	$I(1)$	$I(1)$	$I(1)$
KAOPEN	$I(1)$	$I(1)$	$I(1)$
KOF finance	$I(1)$	$I(1)$	$I(1)$
KOF finance *de facto*	$I(1)$	$I(1)$	$I(1)$
KOF finance *de jure*	$I(1)$	$I(0)$	$I(1)$

Source: own elaboration.

Table 6. Co-integration test results (robust p-values)

Variable	Total sample				Developing countries				Developed countries			
	Gt	Ga	Pt	Pa	Gt	Ga	Pt	Pa	Gt	Ga	Pt	Pa
Initial GDP	0.000	0.940	0.000	0.000	0.000	0.940	0.000	0.000	0.000	0.920	0.000	0.000
Investment	0.120	0.100	0.200	0.120	0.900	0.780	0.660	0.560	0.980	0.980	0.980	0.980
Public expenditure	0.480	0.080	0.580	0.080	0.040	0.020	0.160	0.020	0.940	0.500	0.980	0.700
Inflation	0.060	0.000	0.200	0.360	0.460	0.280	0.540	0.420	0.760	0.400	0.800	0.500
Trade openness	0.680	0.120	0.780	0.160	0.040	0.020	0.120	0.040	0.960	0.600	0.980	0.680
LMF open	0.760	0.920	0.760	0.760	0.660	0.120	0.820	0.260	0.820	0.920	0.700	0.820
LMF EQ	0.081	0.000	0.206	0.001	0.050	0.050	0.450	0.500	0.750	0.400	0.800	0.400
UNC FDI	0.220	0.020	0.580	0.560	0.040	0.000	0.480	0.400	0.700	0.200	0.850	0.600
KAOPEN	0.450	0.250	0.500	0.300	0.350	0.250	0.500	0.400	1.000	0.350	0.800	0.350
KOF finance	0.200	0.000	0.400	0.100	0.050	0.050	0.350	0.350	0.600	0.050	0.700	0.200
KOF finance *de facto*	0.750	0.250	0.800	0.400	0.300	0.300	0.450	0.350	0.950	0.350	0.900	0.550
KOF finance *de jure*	0.350	0.050	0.550	0.100	0.100	0.100	0.450	0.400	0.650	0.150	0.750	0.100

Source: own elaboration. Note: p-values are reported in parentheses.

4.2.4 Estimation results

In this section the estimations for the total sample as well as for developing and developed countries are presented in Tables 7 to 12. The estimators employed are based on the DCCE-MG approach. The variables suspected of endogeneity were instrumented using their first or second lag, and the robust two-step GMM estimator was applied to improve efficiency and ensure consistency in the presence of heteroskedasticity and autocorrelation. Furthermore, the tables report the CD statistic and the p-value in parentheses. As demonstrated, in all cases the null hypothesis of weak CD is accepted, indicating that strong CD was corrected.

The internal drivers of economic growth are, in general, consistent with previous literature on the subject. The investment results are positive and statistically significant (at least at 1%) according to Levine and Renelt (1992), while the public expenditure is positively correlated with economic growth. However, the lag of (log) GDP per capita is positive in all cases, which can be interpreted as indicative of divergence, in contrast to the relative convergence hypothesis (Barro and Sala-i Martin, 1995). This outcome may be attributed to the annual frequency of the data employed.

Conversely, the impact of inflation, the degree of trade openness, and —most significantly for the present study— the financial openness indicators, vary across the samples.

Table 7. DCCE-MG estimation results - total sample

Variable	Total sample						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP	0.3182***	0.3700***	0.3634***	0.3921***	0.2747***	0.2930***	0.3087***
	(0.061)	(0.0365)	(0.067)	(0.030)	(0.047)	(0.044)	(0.046)
Investment	0.1580***	0.1447***	0.1154***	0.1594***	0.1281***	0.1454***	0.1213***
	(0.0147)	(0.0136)	(0.023)	(0.012)	(0.015)	(0.015)	(0.016)
Public expenditure	0.1339***	0.1259***	0.0802*	0.1072***	0.1215***	0.1081**	0.2143***
	(0.046)	(0.0326)	(0.045)	(0.032)	(0.040)	(0.047)	(0.046)
Inflation	-	-	-	-	-	-	-
Trade openness	0.007***	0.0031	0.0002	0.0008***	0.0001	0.0003	0.0005
	(0.0002)	(0.0003)	(0.0004)	(0.0002)	(0.003)	(0.0003)	(0.0003)
LMF open	-0.0312**						
	(0.015)						
LMF EQ		0.0205**					
		(0.008)					
UNC FDI			0.0232*				
			(0.013)				
KAOPEN				0.0005			
				(0.001)			
KOF finance					0.0015***		
					(0.0005)		
KOF finance *de facto*						0.0001	
						(0.0005)	
KOF finance *de jure*							0.0003
							(0.0003)
Constant	2.225	-1.0008	1.146	0.5778	1.1038	1.2174	0.7353
	(1.603)	(1.365)	(1.083)	(0.553)	(0.840)	(1.076)	(0.4793)
CD statistic	-1.60	0.95	-0.63	-0.60	-1.21	-0.60	-0.84
	(0.1087)	(0.3421)	(0.5284)	(0.5474)	(0.2252)	(0.5481)	(0.4013)
Number of observations	1408	1495	1324	1495	1473	1473	1473
Number of countries	44	46	42	46	45	45	45

Note: ***, ** and *: statistically significant at 1%, 5% and 10%, respectively. Standard errors in parentheses. Source: own elaboration.

Table 8. DCCE-MG estimation results - total sample

Variable	Total sample						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP	0.3520***	0.3384***	0.4079	0.4300***	0.4835***	0.4671***	0.5000***
	(0.0584)	(0.051)	(0.923)	(0.056)	(0.030)	(0.040)	(0.032)
Investment	0.1598***	0.1254***	0.1464***	0.1517***	0.1459***	0.1423***	0.1471***
	(0.0176)	(0.0192)	(0.012)	(0.0174)	(0.010)	(0.012)	(0.012)
Public expenditure	0.1196***	0.0864*	0.0420	0.1381***	0.0711***	0.0871***	0.0754***
	(0.041)	(0.045)	(0.033)	(0.044)	(0.024)	(0.028)	(0.026)
Inflation	-0.0004	-0.0003	-0.0002	-0.0002	-0.0011***	-0.0007*	-0.0013***
	(0.0008)	(0.0005)	(0.0004)	(0.0006)	(0.0004)	(0.0004)	(0.0004)
Trade openness	-	-	-	-	-	-	-
LMF open	-0.0183						
	(0.014)						
LMF EQ		0.0022					
		(0.006)					
UNC FDI			0.0062				
			(0.0068)				
KAOPEN				-0.0020			
				(0.0025)			
KOF finance					0.0009**		
					(0.0003)		
KOF finance *de facto*						0.0012***	
						(0.0003)	
KOF finance *de jure*							0.0001
							(0.0002)
Constant	-1.3939	-0.5733	0.4942	-0.4189	0.5692	1.3480*	0.3530
	(1.596)	(1.567)	(0.923)	(0.778)	(0.393)	(0.742)	(0.3345)
CD statistic	-1.22	-0.66	-0.96	1.87	1.09	0.00	0.97
	(0.2209)	(0.5072)	(0.3366)	(0.0613)	(0.2760)	(0.9992)	(0.3321)
Number of observations	1403	1403	1369	1403	1560	1514	1560
Number of countries	44	44	42	44	45	45	45

Note: ***, ** and *: statistically significant at 1%, 5% and 10%, respectively. Standard errors in parentheses. Source: own elaboration.

In the total sample, the trade openness only exerts a positive and statistically significant effect on the economic growth when the total financial integration (LMF open) and *de jure* Chinn-Ito index (KAOPEN) are taken into account.

As illustrated in the above table, there appears to be a negative correlation between the Lane and Milesi-Ferreti indicator of total financial integration and economic growth. This suggests the hypothesis that a greater degree of financial integration may have a detrimental effect on long-term macroeconomic performance However, the findings indicate a positive correlation between the portfolio equity and total

FDI variables and economic growth. These findings are consistent with Levine (2001) and Alfaro et al. (2004), who emphasize the role of financial openness in fostering productivity through capital deepening and technology transfer. They also resonate with Bekaert et al. (2005), who reported positive growth effects from equity market liberalization. At the same time, the results align with Garita (2009), who found that FDI contributes positively to productivity in both developed and developing countries, while portfolio inflows stimulate capital accumulation mainly in advanced economies.

The evidence may indicate that such financial flows are linked to real productive investment, which appears to stimulate economic growth. The findings could also suggest that portfolio debt stock assets and liabilities, financial derivatives, and other investments have harmful effects on growth, offsetting the positive impact of the former. These negative effects could be due to types of financial flow that are highly volatile and may generate instability in output. Moreover, higher levels of financial integration make economies more susceptible to potential international financial crises.

Furthermore, the hybrid financial openness measure demonstrates a positive correlation with economic growth. The result remains consistent when inflation is incorporated as a measure of macroeconomic instability.

Inflation exhibits a negative and statistically significant correlation with economic growth, only for the models (5), (6) and (7) which include the KOF indexes. When controlling for inflation, most of the aforementioned results are no longer sustained. Only the hybrid indicator keeps the positive relationship with the dependent variable, and KOF finance *de facto* becomes positively and highly significantly correlated with growth.

With regards to *de jure* indicators, a decrease in institutional barriers to financial openness does not appear to foster the growth process, since these indicators do not present a statistically significant impact on growth. The lack of significant effects for *de jure* indicators reinforces the results of Estrada et al. (2015), who showed that actual integration matters more than formal legal openness. Similarly, the divergence between *de jure* and *de facto* effects is consistent with Quinn and Toyoda (2008), who noted that institutional quality conditions the impact of liberalization.

Table 9. DCCE-MG estimation results - developing countries

Variable	Developing countries						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP	0.4557***	0.4335***	0.2970***	0.2733***	0.4729***	0.4059***	0.2585*
	(0.044)	(0.049)	(0.062)	(0.102)	(0.043)	(0.057)	(0.155)
Investment	0.1244***	0.1145***	0.1066***	0.1178***	0.1152***	0.1369***	0.1784**
	(0.016)	(0.018)	(0.015)	(0.015)	(0.018)	(0.023)	(0.071)
Public expenditure	0.1360***	0.1418***	0.2431***	0.1689**	0.1183***	0.1551***	0.1766
	(0.037)	(0.036)	(0.082)	(0.070)	(0.026)	(0.058)	(0.160)
Inflation	-	-	-	-	-	-	-
Trade openness	0.00001	0.0002	-0.0004	-0.0003	0.0001	-0.0007	0.0012
	(0.0003)	(0.0003)	(0.0007)	(0.0003)	(0.0003)	(0.005)	(0.002)
LMF open	0.0130						
	(0.014)						
LMF EQ		0.0057					
		(0.009)					
UNC FDI			0.033*				
			(0.018)				
KAOPEN				-0.0112			
				(0.010)			
KOF finance					-0.00002		
					(0.0004)		
KOF finance *de facto*						0.0005	
						(0.0004)	
KOF finance *de jure*							0.0013
							(0.001)
Constant	0.649	-1.068*	2.448	-3.7431**	0.2196	1.2085**	-6.2806
	(0.394)	(0.567)	(2.272)	(1.501)	(0.435)	(0.6018)	(3.937)
CD statistic	-0.14	0.11	-1.35	1.79	0.91	-0.02	1.93
	(0.8906)	(0.9087)	(0.1774)	(0.0727)	(0.3647)	(0.9861)	(0.0533)
Number of observations	794	794	645	704	818	793	704
Number of countries	24	24	21	22	24	24	22

Note: ***, ** and *: statistically significant at 1%, 5% and 10%, respectively. Standard errors in parentheses. Source: own elaboration.

Table 10. DCCE-MG estimation results - developing countries

Variable	Developing countries						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP	0.4711***	0.3198***	0.4689***	0.4758***	0.4986***	0.4900***	0.348
	(0.055)	(0.056)	(0.054)	(0.064)	(0.055)	(0.057)	(0.221)
Investment	0.1062***	0.1176***	0.1153***	0.1243***	0.1104***	0.1134***	0.097
	(0.014)	(0.019)	(0.014)	(0.017)	(0.015)	(0.016)	(0.069)
Public expenditure	0.1472***	0.1219***	0.1036***	0.1190***	0.1198***	0.1206***	0.2951*
	(0.038)	(0.043)	(0.026)	(0.037)	(0.030)	(0.032)	(0.169)
Inflation	0.0002	0.0002	-0.0005	0.0001	0.00008	-0.00003	-0.0013**
	(0.0003)	(0.0008)	(0.0003)	(0.0006)	(0.0006)	(0.0005)	(0.0007)
Trade openness	-	-	-	-	-	-	-
LMF open	0.0111						
	(0.011)						
LMF EQ		0.0179*					
		(0.010)					
UNC FDI			-0.0017				
			(0.012)				
KAOPEN				-0.0037			
				(0.003)			
KOF finance					0.0008*		
					(0.0004)		
KOF finance *de facto*						0.0006	
						(0.0003)	
KOF finance *de jure*							0.0012
							(0.0008)
Constant	-0.1240	-0.4511	0.2434	-0.3881	0.160	0.4381	0.4243
	(0.571)	(0.946)	(1.277)	(0.510)	(0.512)	(0.581)	(1.935)
CD statistic	0.82	1.55	-0.44	1.37	1.43	1.61	-1.27
	(0.4117)	(0.1206)	(0.6615)	(0.1708)	(0.1540)	(0.1064)	(0.2024)
Number of observations	767	699	669	767	790	790	672
Number of countries	23	22	21	23	23	23	21

Note: ***, ** and *: statistically significant at 1%, 5% and 10%, respectively. Standard errors in parentheses. Source: own elaboration.

In the context of developing economies a lack of correlation is observed between trade openness and inflation with economic growth. However, a 10% level of significance is noted for inflation in Model 7.

The two principal mechanisms by which developing countries may foster economic growth are total portfolio equity and foreign direct investments. The portfolio equity investment demonstrates a positive relationship with growth when inflation is considered, which contradicts the findings of Kuzucu (2018) and Bencharles and Kokumo-Oyakhire (2022), who report a non-significant relationship. This result is sustained for KOF finance hybrid measure: a higher financial globalisation degree stimulates the growth.

Alternatively, the FDI variable has been found to correlate positively with the dependent variable solely in instances where trade openness has been incorporated within the regression model.

Conversely, *de jure* indicators demonstrate a lack of statistical significance in all regressions, a phenomenon that stands in contrast to the observations made in the developed country group.

In summary, the findings suggest that financial openness stimulates growth, primarily through *de facto* openness, as de jure measures do not show statistically significant effects. Moreover, the process of financial globalisation appears to confer benefits upon these countries.

Table 11. DCCE-MG estimation results - developed countries

Variable	**Developed countries**						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP	0.3328***	0.3080***	0.3157***	0.3957***	0.3592***	0.2430***	0.3534***
	(0.042)	(0.055)	(0.062)	(0.051)	(0.075)	(0.066)	(0.069)
Investment	0.1746***	0.1959***	0.1810***	0.1708***	0.1860***	0.1700***	0.1573***
	(0.019)	(0.018)	(0.024)	(0.017)	(0.028)	(0.028)	(0.027)
Public expenditure	0.1292***	0.1252**	0.1712***	0.1377***	0.0314	0.1580***	0.1459**
	(0.044)	(0.060)	(0.024)	(0.039)	(0.064)	(0.054)	(0.065)
Inflation	-	-	-	-	-	-	-
Trade openness	0.0009**	0.0007**	0.0010**	0.0015***	0.0009**	0.003	0.0010***
	(0.0003)	(0.0003)	(0.0004)	(0.0002)	(0.0004)	(0.0004)	(0.0003)
LMF open	-0.0188*						
	(0.009)						
LMF EQ		-0.0070					
		(0.008)					
UNC FDI			0.0051				
			(0.009)				
KAOPEN				0.0026*			
				(0.0015)			
KOF finance					0.0001		
					(0.0007)		
KOF finance *de facto*						0.0012	
						(0.001)	
KOF finance *de jure*							-0.0003
							(0.0003)
Constant	1.0034	0.6551	0.4086	0.2987	0.8941	0.1998	0.3362
	(1.016)	(1.568)	(2.087)	(0.520)	(0.902)	(1.597)	(0.820)
CD statistic	-2.22	0.62	0.73	0.16	1.51	-1.72	-0.03
	(0.0265)	(0.5376)	(0.4679)	(0.8734)	(0.1303)	(0.0846)	(0.9794)
Number of observations	726	704	679	726	726	726	
Number of countries	22	22	21	22	22	22	

Note: ***, ** and *: statistically significant at 1%, 5% and 10%, respectively. Standard errors in parentheses. Source: own elaboration.

Table 12. DCCE-MG estimation results - developed countries

Variable	Developed countries						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP	0.3468***	0.2966***	0.3631***	0.4061***	0.2693***	0.3964***	0.3404***
	(0.043)	(0.053)	(0.074)	(0.050)	(0.072)	(0.042)	(0.063)
Investment	0.1788***	0.1833***	0.1464***	0.1612***	0.1802***	0.1689***	0.1701***
	(0.020)	(0.022)	(0.026)	(0.017)	(0.022)	(0.019)	(0.020)
Public expenditure	0.0593	-0.0094	0.0975**	0.0959**	0.0570	0.049*	0.0662
	(0.040)	(0.042)	(0.045)	(0.042)	(0.048)	(0.029)	(0.053)
Inflation	0.0003	0.0007	-0.0002	-0.0002	-0.0005	-0.0005	-0.0004
	(0.0009)	(0.0009)	(0.001)	(0.0008)	(0.0008)	(0.0005)	(0.001)
Trade openness	-	-	-	-	-	-	-
LMF open	-0.0158						
	(0.011)						
LMF EQ		-0.0076					
		(0.009)					
UNC FDI			0.0087				
			(0.006)				
KAOPEN				0.0014			
				(0.0011)			
KOF finance					0.0011*		
					(0.0006)		
KOF finance *de facto*						0.00001	
						(0.0003)	
KOF finance *de jure*							0.00005
							(0.0004)
Constant	1.2592	0.5146	-1.1769	0.1480	0.4489	0.2126	0.1863
	(1.040)	(1.8068)	(1.9383)	(0.397)	(1.0473)	(1.317)	(0.610)
CD statistic	-1.14	-0.16	-0.52	-0.19	-0.54	-1.17	1.44
	(0.2548)	(0.8728)	(0.6030)	(0.8472)	(0.5883)	(0.2420)	(0.1493)
Number of observations	726	704	679	726	726	770	726
Number of countries	22	22	21	22	22	22	22

Note: ***, ** and *: statistically significant at 1%, 5% and 10%, respectively. Standard errors in parentheses. Source: own elaboration.

In developed economies, the institutional aspects of financial openness have become important in order to stimulate economic growth since the coefficient of the Chinn-Ito index is positive and statistically significant. This is a plausible proposition, given that developed countries have stronger institutions and greater influence over international financial matters.

A different pattern is observed for financial integration LMF indicator, which suggests a negative relationship between financial openness and growth. However, this correlation attains statistical significance only when trade openness is incorporated into the analysis.

In table 12, when inflation is incorporated as a control variable and without the trade-to-GDP ratio, it is evident that only the KOF financial index reports a positive correlation with growth. This finding indicates that greater financial globalisation (*de jure* and *de facto*) stimulates the growth of real GDP per capita.

Moreover, the findings of this subsample demonstrate that trade openness exerts a beneficial effect on the augmentation of GDP per capita. This is evidenced by the establishment of a positive and statistically significant relationship in all specifications.

5 Final Remarks

The present study has examined the relationship between financial openness and economic growth. This has been achieved by distinguishing between *de jure*, *de facto*, and hybrid measures of openness and by explicitly comparing developed and developing economies. The analysis employed the DCCE estimator, a methodological framework that has been demonstrated to offer enhanced reliability in comparison with conventional panel approaches. This is due to the DCCE's capacity to address CD, slope heterogeneity and endogeneity.

The econometric results demonstrate that the effects of financial openness are heterogeneous and strongly dependent on how openness is measured. Among the *de facto* indicators, both UNC FDI (foreign direct investment inflows) and LMF EQ (portfolio equity inflows) are positively associated with growth. These results are consistent with the hypothesis that such flows are more likely to enhance productivity through capital deepening, technology transfer, and improved resource allocation, especially when supported by adequate regulation. By contrast, the LMF OPEN (aggregate financial flows relative to GDP) variable exhibits a negative relationship with growth, indicating that extensive and non-specialized integration may expose economies—particularly developing ones—to volatility, sudden stops, and external shocks that undermine long-run growth. Furthermore, the KOF Finance *de facto* index also provides evidence to suggest that actual financial integration is a pertinent factor, though the direction of its effect is not uniform across samples.

The results for *de jure* indicators, namely KAOPEN and the KOF Finance *de jure* index, indicate no statistically significant effects on growth. This finding indicates that the eliminations of legal restrictions on capital account transactions, when considered in isolation, is insufficient to engender growth benefits in the absence of conducive institutional and financial frameworks. For its part, the hybrid indicator, measured by the KOF Financial Globalisation Index, demonstrate a positive and significant association with growth in the overall sample. This finding suggests that measures combining both institutional/legal openness and actual cross-border financial flows capture more effectively the conditions under which financial integration supports economic development. The discrepancy between the results for *de facto* aggregates (negative in the case of LMF OPEN) and the hybrid index (positive) emphasizes the importance of differentiating between varying dimensions of openness when evaluating its growth effects.

The heterogeneity observed across income groups is also noteworthy. Developed economies appear better positioned to harness the benefits of financial openness, as they typically combine liberalized capital accounts with strong institutions, deep financial markets, and stable macroeconomic environments. In contrast, no statistically significant effects were found for developing countries. This imbalance underscores the pivotal role that sequencing and institutional readiness play in shaping the outcomes of liberalization.

By documenting these differentiated effects, the study provides both empirical and methodological contributions to the debate. Empirically, it has been demonstrated that not all forms of financial openness are equal in their growth implications, and that the nature and quality of capital flows are as important as their volume. Methodologically, the application of the DCCE estimator serves to enhance the reliability of these conclusions, as it allows for heterogeneous responses across countries and controls for CD that may bias results in traditional panel estimations.

A comprehensive review of the extant literature reveals a persistent absence of consensus regarding the question of whether financial openness promotes economic growth. Previous studies frequently relied on a single indicator of openness or econometric models that were unable to adequately account for unobserved heterogeneity and cross-country interdependence. The present study contributes to the existing body of knowledge in this field by applying a methodology explicitly designed to address the econometric challenges identified and by jointly analysing *de jure*, *de facto*, and hybrid measures. The results of the study serve to reinforce the prevailing view that the growth effects of openness are contingent not only on the degree of integration, but also on the institutional and developmental context in which they occur.

From a policy perspective, the evidence suggests that liberalization strategies should move beyond a simple focus on deregulation. The results of the study highlight the importance of attracting stable and productivity-enhancing capital inflows —particularly foreign direct investment— while carefully managing volatile flows that may undermine macroeconomic stability. In the context of developing economies, in particular, the sequencing of liberalization and the strengthening of regulatory and institutional frameworks appear crucial for translating openness into sustainable growth.

Nevertheless, certain limitations must be acknowledged. The measurement of financial openness remains imperfect, and results are sensitive to the indicators employed. Furthermore, the analysis does not explicitly incorporate institutional and policy dimensions that may interact with openness in shaping growth outcomes.

Future research could address these limitations by incorporating institutional quality, financial regulation, and macroeconomic policy frameworks more explicitly into the analysis, by exploring potential non-linearities across different stages of development, and by examining the interaction of financial openness with other forms of globalisation, such as trade and political integration. Such extensions would not only enhance understanding of the heterogeneous effects of financial openness. Furthermore, it would also provide clearer guidance for policymakers aiming to design liberalization strategies that maximize benefits while minimizing risks.

6 Appendix

Table A.1. Result of the slopes homogeneity test by Pesaran and Yamagata (2008)

	(1)	(1)'	(2)	(2)'	(3)	(3)'	(5)	(5)'
Total sample								
Δ statistic	12.561	17.518	17.764	16.629	18.244	19.859	20.035	20.183
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\tilde{\Delta}$ statistic	14.549	20.118	20.388	19.097	21.080	22.141	22.994	23.178
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Developing countries								
Δ statistic	9.866	8.281	9.637	7.203	12.964	10.576	10.996	-
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	-
$\tilde{\Delta}$ statistic	11.406	9.563	11.141	8.318	14.519	11.836	12.713	-
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	-
Developed countries								
Δ statistic	16.709	14.548	12.696	11.938	12.422	10.932	15.035	15.219
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\tilde{\Delta}$ statistic	19.083	16.615	14.500	13.634	13.795	12.141	16.698	16.902
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Source own elaboration. Note: p-values are reported in parentheses. Models denoted by a prime (') include inflation as a control variable.

Table A.2. Second generation unit root CADF test

Variable	Total sample				Developing countries				Developed countries			
	In level		In first difference		In level		In first difference		In level		In first difference	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
Economic growth	0.709	-3.432	-11.968	-13.110	-0.335	-1.758	-10.605	-12.100	-0.685	-1.163	-8.776	-10.444
	(0.761)	(0.000)	(0.000)	(0.000)	(0.369)	(0.039)	(0.000)	(0.000)	(0.257)	(0.122)	(0.000)	(0.000)
Initial GDP	1.358	-3.204	-11.126	-12.323	-0.221	-1.596	-9.718	-11.368	-0.539	-1.104	-8.427	-10.109
	(0.913)	(0.001)	(0.000)	(0.000)	(0.413)	(0.055)	(0.000)	(0.000)	(0.209)	(0.135)	(0.000)	(0.000)
Investment	-2.277	-6.293	-14.965	-17.657	-3.037	-3.952	-9.891	-11.833	-0.686	-0.917	-11.920	-13.409
	(0.011)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.200)	(0.180)	(0.000)	(0.000)
Public expenditure	-0.462	-1.924	-10.201	-11.900	-0.495	-1.650	-9.138	-10.669	1.330	0.690	-7.743	-8.969
	(0.322)	(0.027)	(0.000)	(0.000)	(0.310)	(0.049)	(0.000)	(0.000)	(0.000)	(0.755)	(0.000)	(0.000)
Inflation	-4.760	-11.307	-20.777	-21.319	-6.020	-8.905	-18.751	-20.134	-7.126	-10.349	-10.856	-11.959
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade openness	3.383	0.965	-16.457	-18.282	1.797	0.791	-12.693	-14.112	3.271	-0.153	-11.982	-13.850
	(1.000)	(0.833)	(0.000)	(0.000)	(0.964)	(0.786)	(0.000)	(0.000)	(0.999)	(0.439)	(0.000)	(0.000)
LMF open	0.607	-3.783	-11.657	-14.649	0.478	-0.382	-11.368	-13.213	-0.232	-1.532	-7.344	-9.348
	(0.728)	(0.000)	(0.000)	(0.000)	(0.684)	(0.551)	(0.000)	(0.000)	(0.408)	(0.063)	(0.000)	(0.000)
LMF EQ	0.110	-2.565	-10.838	-14.210	0.593	-0.898	-7.967	-10.341	0.350	-1.912	-8.555	-10.737
	(0.544)	(0.005)	(0.000)	(0.000)	(0.723)	(0.185)	(0.000)	(0.000)	(0.157)	(0.028)	(0.000)	(0.000)
UNC FDI	1.013	-1.898	-12.872	-14.000	0.081	-1.966	-9.024	-10.266	0.888	-1.484	-9.396	-10.321
	(0.844)	(0.209)	(0.000)	(0.000)	(0.532)	(0.025)	(0.000)	(0.000)	(0.813)	(0.069)	(0.000)	(0.000)
KAOPEN	-1.162	-3.169	-11.026	-13.751	1.423	-0.427	-3.705	-6.486	-1.057	-1.218	-4.349	-6.196
	(0.123)	(0.001)	(0.000)	(0.000)	(0.925)	(0.335)	(0.000)	(0.000)	(0.145)	(0.112)	(0.000)	(0.000)
KOF finance	-1.014	-4.008	-15.267	-17.850	0.010	-2.043	-11.871	-13.724	-0.207	-2.178	-7.029	-11.571
	(0.155)	(0.000)	(0.000)	(0.000)	(0.504)	(0.021)	(0.000)	(0.000)	(0.418)	(0.090)	(0.000)	(0.000)
KOF finance *de facto*	1.035	-2.408	-9.343	-10.936	1.346	-0.728	-9.191	-10.839	1.158	-1.339	-8.737	-9.772
	(0.850)	(0.008)	(0.000)	(0.000)	(0.911)	(0.489)	(0.000)	(0.000)	(0.877)	(0.090)	(0.000)	(0.000)
KOF finance *de jure*	-1.059	-2.569	-15.399	-18.325	-18.962	-6.138	-8.694	-1.387	-1.536	-12.699	-14.363	0.000
	(0.145)	(0.005)	(0.000)	(0.000)	(0.029)	(0.018)	(0.033)	(0.062)	(0.002)	(0.000)	(0.000)	(0.000)

Source own elaboration. Note: p-values are reported in parentheses.

Table A.3. List of countries

Developing countries	Developed countries
Argentina	Australia
Bolivia	Austria
Brazil	Belgium
Botswana	Canada
Chile	Cyprus
Cameroon	Germany
Colombia	Denmark
Costa Rica	Spain
Dominican Republic	Finland
Algeria	France
Ecuador	United Kingdom
Guatemala	Greece
Honduras	Ireland
Indonesia	Iceland
India	Israel
Morocco	Italy
Mexico	Japan
Mauritania	Korea, Rep.
Malaysia	Norway
Pakistan	New Zealand
Peru	Portugal
Paraguay	Singapore
Senegal	Sweden
Thailand	United States
South Africa	

Source: own elaboration

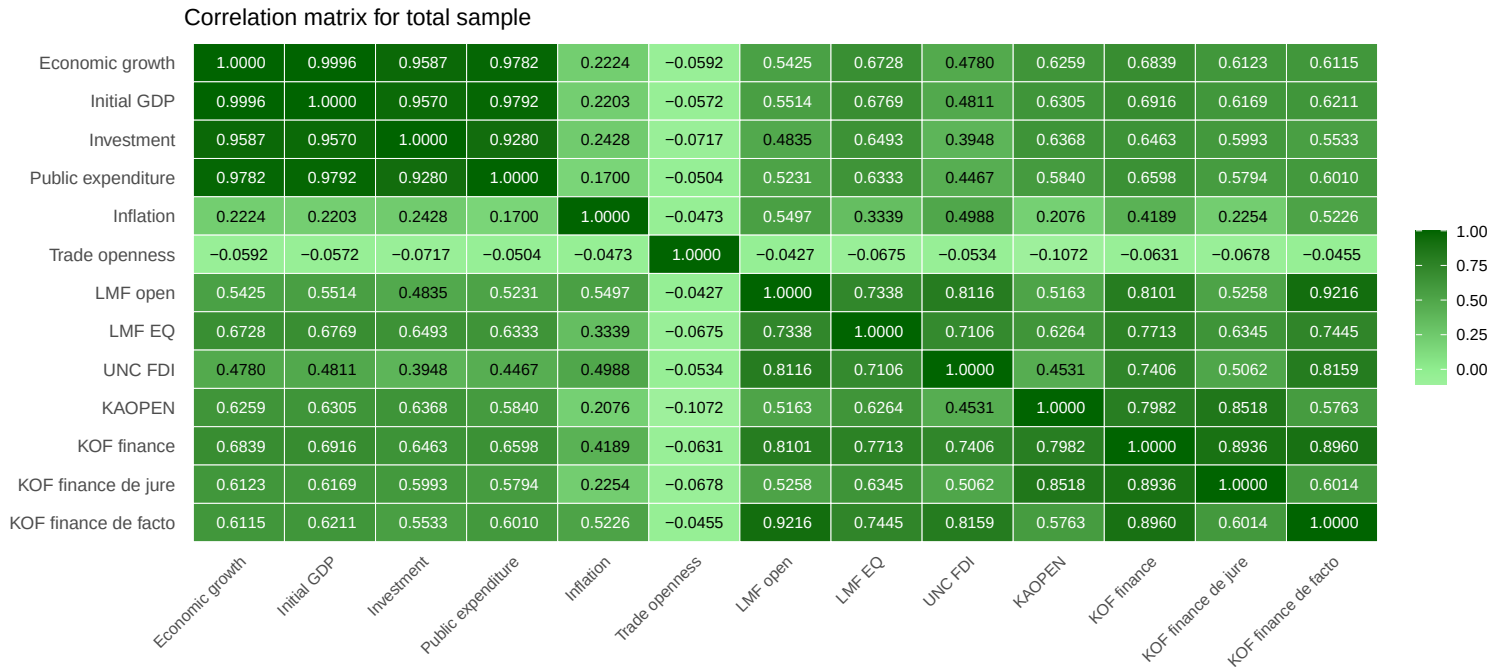

Figure 3: Matrix of correlations for the total sample

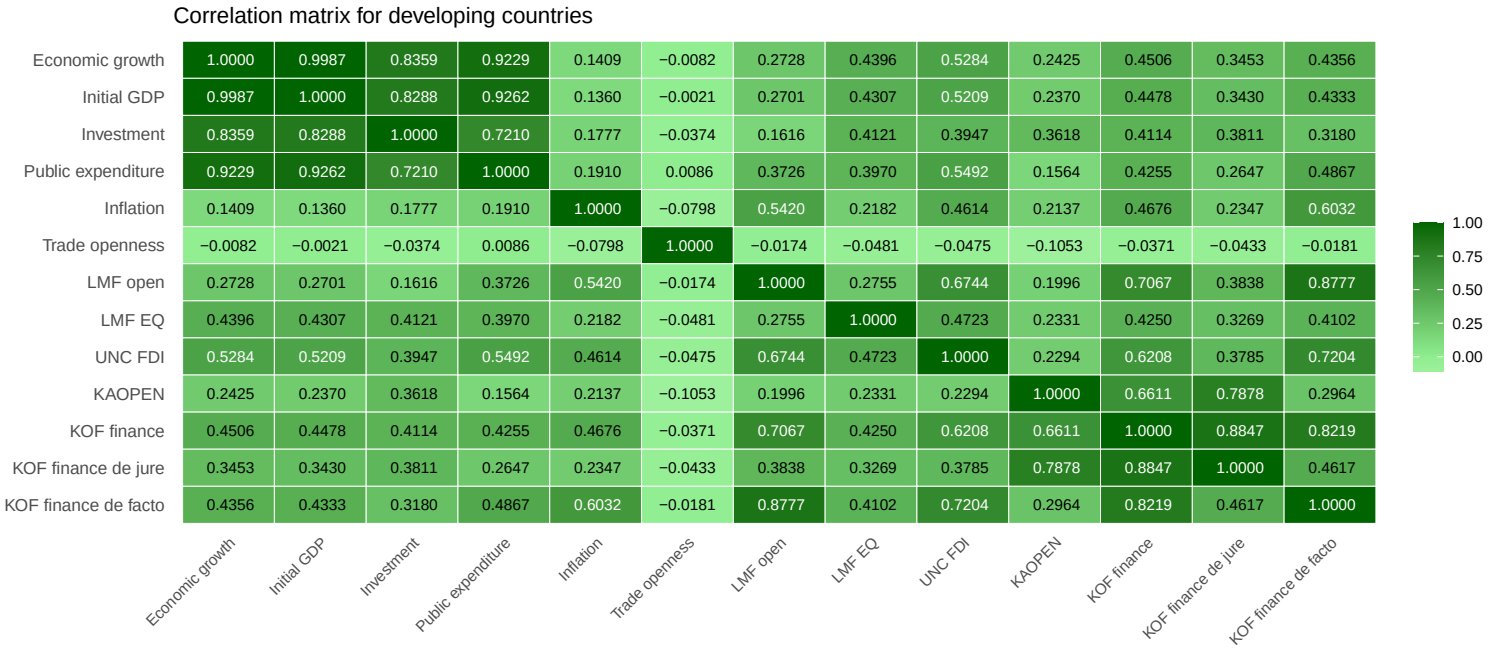

Figure 4: Matrix of correlations for developing countries

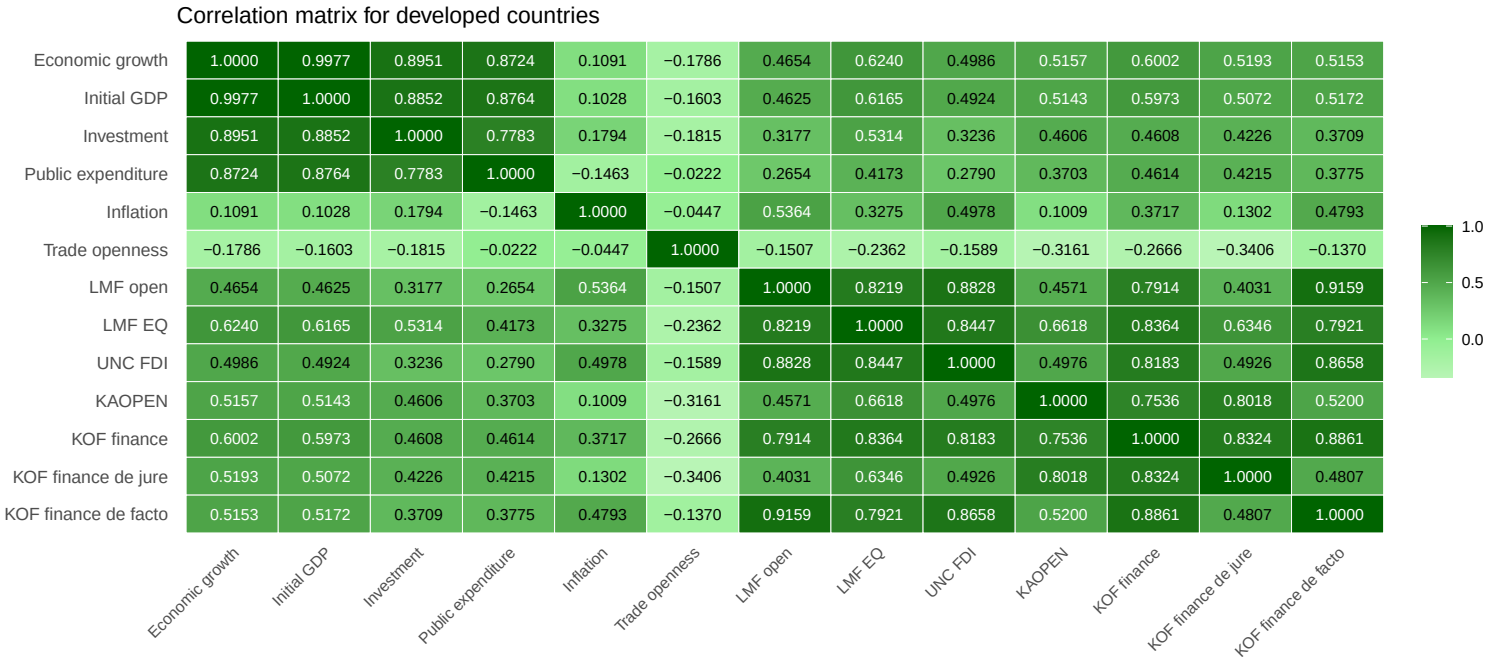

Figure 5: Matrix of correlations for developed countries

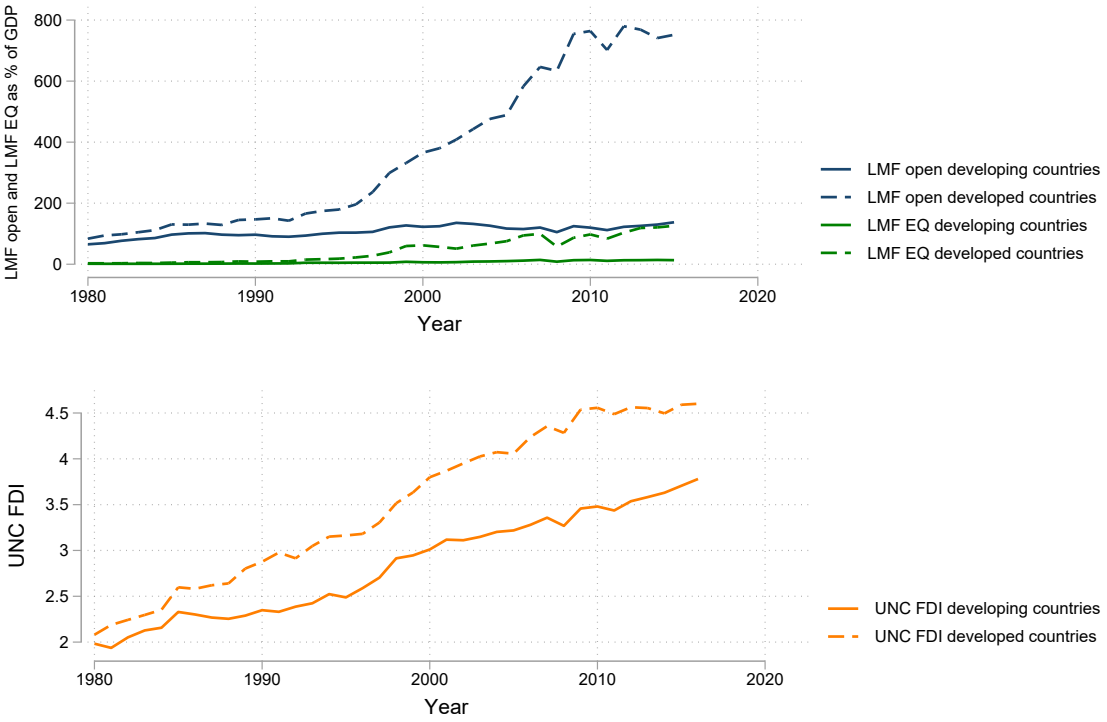

Figure 6: Evolution of LMF financial openness indicators by level of development

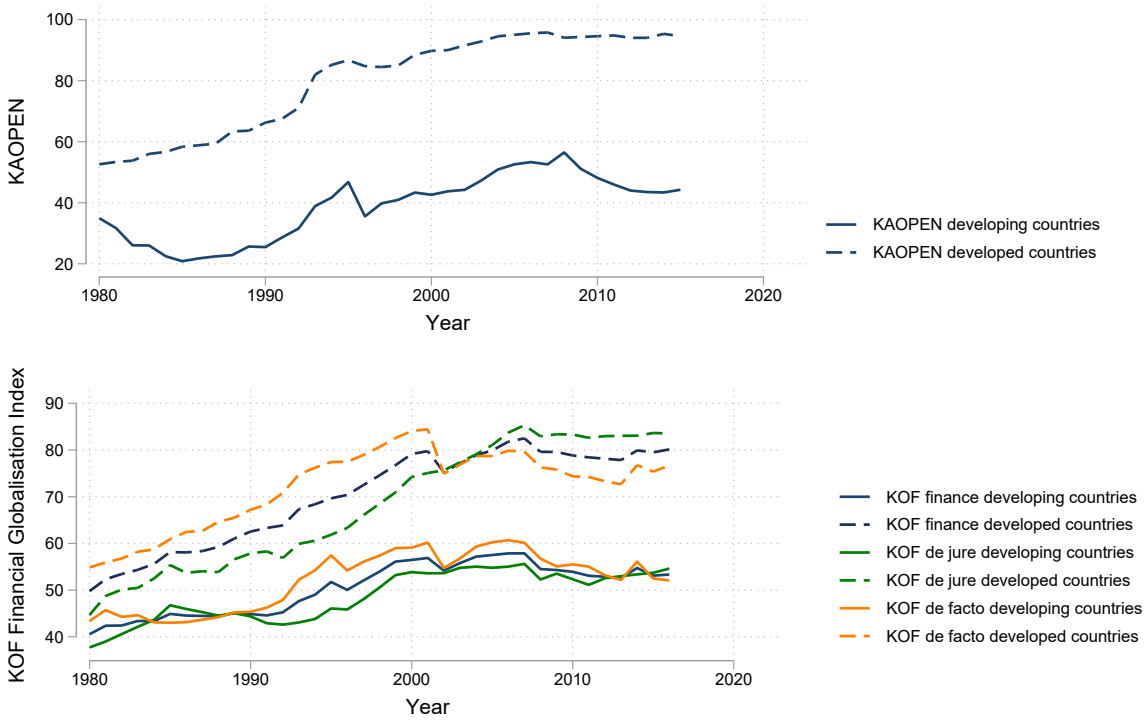

Figure 7: Evolution of the Chinn-Ito and KOF indices by level of development

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