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Impact of Financial Integration on Economic Development: A Dynamic Panel Quantile Regression Analysis

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Abstract This paper investigated the impact of financial integration on economic development using the dynamic panel quantile estimator on a sample of 95 countries from 2004-2019. The results showed that the impact of financial integration on economic development varied across income levels. This study found that financial integration impacted economic development negatively in middle and high-income countries. However, financial integration did not significantly affect economic development in low-income countries.

Keywords: Financial Integration, Economic Development, Dynamic Panel Quantile Regression, Income Quantiles

JEL Classifications: F36, F63, O11, F62, C18

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I. Introduction

Financial integration is how financial markets in different countries become more closely integrated. The process is believed to positively impact improving the allocative efficiency of capital and facilitating capital movements among countries. Financial integration is considered one of the solutions to addressing financial capital inadequacy, a major factor undermining economic development in several countries. Policymakers focus on foreign capital flows to augment the domestic financial capital deficit, increasing financial integration (Al-Nasser &

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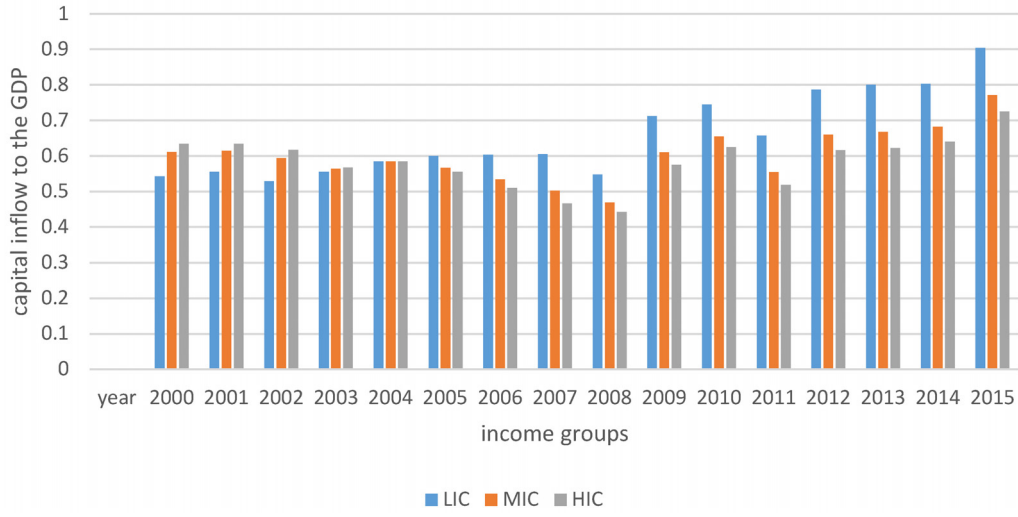
Hajilee, 2016; Aziakpono et al., 2014). Between 2000-2015, the ratio of capital flow to the GDP in 95 selected countries increased substantially and remained above 50 per cent for most of the examined years (Lane & Milesi-Ferretti, 2017). Capital inflows to these countries have risen by more than 245 per cent during this period (Lane & Milesi-Ferretti, 2017), which stressed the importance of financial integration among countries. From the economic perspective, financial integration allows the pooling of financial capital and risk from surplus spending units across countries and fills the gap between actual and needed financial capital to boost investment and productivity. Some countries have a capital surplus and search for viable investment opportunities, while others have a financial capital deficit and need foreign investment to support their economies. Therefore, financial integration enables both players to realise their goals in a win-win situation (Friedrich et al., 2013).

Financial integration has made economies more dependent on developments abroad. It has increased trade intensity and cross-border assets and liabilities. The strength and transmission channels of external shocks and macroeconomic policies have also changed. The impact of external shocks has become stronger with increased openness. The increase in financial integration raises challenges for the domestic and international policy as policy choices affect other economies more strongly in a more interconnected world. The importance of financial integration to the global economy cannot be overemphasised. Figure 1 shows the growth of cross-border capital flows relative to the GDP amongst 95 selected countries. The capital flows to the GDP ratio had consistently remained above 50 per cent of the GDP (except for 2007 and 2008, due to the global financial crisis). The ratio of capital flows to the GDP for high, middle, and low-income countries in 2000 was 63 per cent, 61 per cent, and 54 per cent, respectively. By 2015, the ratio had increased to 72 per cent, 77 per cent, and 90 per cent (Lane and Milesi-Ferretti, 2017).

Despite the increase in international capital flows, the impact of financial integration on economic development has been ambiguous. Some studies have found that financial integration could lead to economic development (Obstfeld, 2009), financial sector development and stability (Chakraborty et al., 2016), and improvements in institutional quality (Muye & Muye, 2017). However, other studies have argued differently where financial integration has promoted financial sector volatility that could undermine economic development (Biekpe & Motelle, 2013; Gourinchas & Jeanne, 2013). Financial integration could also amplify the negative spillover shocks of financial crises to other countries and regions (Calvo & Reinhart, 1996; Forbes & Rigobon, 2002). Hence, the disagreement among scholars on the impact of financial integration has necessitated further studies in this area.

Figure 1. The ratio of capital flows to the GDP was based on income levels



Notes. LIC, MIC, and HIC denote low-income countries, middle-income countries, and high-income countries, respectively. LIC= 12 countries, MIC= 44 countries, HIC= 39 countries. The summation of ratios for all countries in each group yearly was divided by the number of countries to calculate the annual mean of the ratio of capital flows to the GDP.

(Source) Lane and Milesi-Ferretti, 2017.

According to Ibrahim et al. (2016), Saafi et al. (2016) and Silberbergen & Koniger (2016), the impact of financial integration on economic development may not be uniform, especially in a heterogeneous sample. The relationship between financial integration and economic development could depend on a country's income level. Based on a dynamic cross-sectional quantile regression model, Ibrahim et al. (2016) showed that the impact of financial integration was asymmetrical and varied across countries based on their income levels. The limitation of this study was that cross-sectional studies are snapshots and may not be suitable to examine cause-and-effect relationships (Levin, 2006; Solem, 2015). To accurately capture the relationship between financial integration and economic development, information across individuals and over a longer period may be required in examining causes and effects. Furthermore, Hsiao (2007) questioned the merits of panel models over time series and cross-sectional studies.

The present study examined the relationship between financial integration and economic development in different levels of economic development moderation. The results showed that financial integration asymmetry impacted economic development using the dynamic panel quantile regression method on 95 countries from 2004 to 2019. Financial integration has negatively impacted economic development in middle and high-income countries. In contrast, in low-income countries, the impact was insignificant. While previous studies have been conducted on the relationship between financial integration and economic development, scholars have been divided

on the impact of financial integration on economic development. This lack of consensus among researchers has led to the need for a further re-examination of the nexus between financial integration and economic development. The present study has provided insight into the impact of financial integration on economic development among a heterogeneous panel sample of developed and developing nations.

The remainder of this paper is organised as follows: Section 2 discusses the literature review. In contrast, Section 3 describes the methodology used in the study. Meanwhile, Section 4 presents the study's results, and Section 5 concludes the paper's findings.

II. Literature Review

The borrowing to finance capital accumulation theory emphasises the role of financial integration in economic development. Countries with insufficient capital resources may be unable to realise their economic development goals. According to Kose et al. (2003), financial integration could enhance economic development through direct and indirect channels. The direct channels involve; the augmentation of domestic savings, reduction in the cost of capital through the better global allocation of risk, transfer of technological and managerial know-how and stimulation of domestic financial sector development. While the economic development impact of financial integration through indirect channels involves; promoting specialisation, commitment to better economic policies and an anticipation that the country will practice more friendly policies toward foreign investment in the future.

Meanwhile, Chakraborty et al. (2016) identified three channels through which financial integration may affect development. The first was through risk sharing/hedging (investment channel), which can; mitigate losses, diversify opportunities, or amplify the transmission of spillover shocks. The second was the financial institution channel, where financial integration may promote economic growth by; increasing competition, reducing the cost of borrowing and increasing access to small businesses, amongst other benefits. The third was the trade channel, where financial integration may affect the exchange rate. Such exchange rate fluctuations will impact exports and imports and may promote economic development, increase welfare, or undermine such.

Despite the theoretical argument in favour of financial integration, existing studies have shown mixed empirical evidence on the impact of financial integration on economic development. Some studies have reported that financial integration has positively impacted economic development through the allocative efficiency of capital (Aizenman et al., 2013; Chakraborty et al., 2016; De Nicolo & Juvenal, 2014). These studies argued that financial integration had enabled financial resources for growth to be readily available to augment capital deficits. Resources have flown from

capital-surplus countries to capital-deficit countries searching for viable investment opportunities, thus, promoting economic growth. In contrast, other studies have argued that financial integration has indirectly impacted economic development. Such indirect impacts have been through; improvements in the financial sector development, institutions, the public sector, technological transfers, and political integration (Chen & Quang, 2014; Freidrich et al., 2013; Kumar, 2015; Lee & Shin, 2012;). The positive impact of financial integration has been believed to be conditional on a country's level of economic development (Ibrahim et al., 2016).

Contrarily, other studies have argued that financial integration has not significantly impacted or undermined economic development (Ahmed & Mmolainyane, 2014; Calliatore et al., 2016, Edison et al., 2002; Mmolainyane & Ahmed, 2015; Van-Ewilk & Arnold, 2015). They have argued that financial integration has affected capital accounts and shocked the exchange rate. It may have caused instability in the financial sector, especially in small and underdeveloped countries. Some studies have also found that financial integration has been associated with global or regional financial crises and has undermined economic development by transmitting financial shocks from one country to another (Neaime, 2016; Paramati et al., 2016; Pyun & An, 2016).

Several studies have argued that the impact of financial integration may be asymmetric to certain conditional variables. In particular, Ibrahim et al. (2016) found that the effect of financial integration depended on the level of development. Income and economic development levels influenced the propensity to consume imported goods. Ibrahim et al. (2016) adopted the quantile regression method in a cross-sectional setting. The difference was in the limitation of cross-sectional studies relative to panel studies. It was argued that cross-sectional studies were snapshot studies and, therefore, unsuitable for investigating cause-and-effect relationships. Lag information was required to ascertain causes and effects.

Further, most macroeconomic relationships are dynamic, where lag or previous information is required to predict the relationship among macroeconomic variables. This situation is one of the shortcomings of cross-sectional studies. In the present study, the limitation was addressed by using the dynamic panel quantile regression approach.

III. Methodology

The present study adopted the model from Ibrahim et al. (2016) and specified the dynamic panel model as follows,

$$ly_{it} = \beta_{0it} + \beta_1 ly_{it-1} + \beta_2 lfi_{it} + \beta_3 inf_{it} + \beta_4 lgov_{it} + \beta_5 lhc_{it} + \epsilon_{it} \quad (1)$$

where *ly* is the log of the real GDP per capita used as a proxy for economic development. Meanwhile, ly_{it-1} represents the log of initial real GDP per capita, *lf* denotes the log of financial integration measures, *inf* is the inflation rate, *lgov* represents the log of government expenditures, *lhc* is the log of human capital, and ε is the error term. $\beta_0 - \beta_5$ are the parameter coefficients.

Economic development was represented by the real GDP per capita, as used in the studies by Ibrahim et al. (2016) and Cheng and Quang (2014). The present study used three proxies to denote financial integration. The first proxy was the ratio of capital inflow and outflow to the GDP (*fi1*). Edison et al. (2002) argued that capturing capital inflows and outflows was imperative when measuring the degree of financial integration. This proxy was used in Lane and Melessi-Ferreti's (2007) and Vo and Daly's (2007) studies. The second measure of financial integration was the total capital inflow (*fi2*), as Ahmed and Mmolainyane (2014) used. The third proxy for financial integration was the capital account openness index (*kao*) by Chinn and Ito (2006), as adopted by Ahmed (2016) and Saafi et al. (2016). Government expenditure (*gov*) was represented by real government final consumption expenditure, as adopted by Ahmed and Mmolainyane (2014). According to the Keynesian aggregate demand theory, government expenditure positively affects the equilibrium income level and economic development. Inflation (*inf*) was denoted by the consumer price index, as used by Chen and Quang (2014). The Phillips Curve points to the inverse relationship between unemployment and inflation and, therefore, the relationship between inflation and economic development. In other words, a moderate inflation rate is necessary for economic development, as this may be associated with a lower unemployment rate. Human capital development (*hc*) was represented by the gross percentage of secondary school enrolment, as used by Ahmed (2016). The Harrod-Domar growth model emphasised human capital development's importance and immeasurable role in economic growth and development.

Table 1 summarises the variables used in the regression model and their expected signs.

This study used annual data from 2004 to 2019 in a sample of 95 countries selected based on data availability. The sampled countries are shown in Table 2. The classification of countries by income followed the World Bank's (2019) classification. Countries with incomplete data were removed from the sample. All data for this study were collected from Chinn and Ito (2017), Lane and Melessi-Ferreti (2017), and the *World Bank Development* Indicators database. The estimation was conducted using dynamic panel models. This model was used when there was a concern that unobserved heterogeneity existed across the cross-sectional units, which could have affected the time-series data. By adding the lagged dependent variable as an additional explanatory variable, dynamic panel models can help to control for the unobserved heterogeneity and produce more robust and accurate estimates than static panel models.

Table 1. *Summary of Variables*

Variables	Description	Measurement	Source	Expected Sign
y (economic development)	Real GDP per capita (constant 2010)	US Dollar	WDI	
fi1 (financial integration 1)	Ratio of capital inflows and outflows to the GDP	Ratio	Lane and Milesi-Ferretti	Ambiguous
fi2 (financial integration 2)	Total capital inflow	US Dollars (Million)	Lane and Milesi-Ferretti	Ambiguous
kao (financial integration 3)	Capital account openness index.		Chinn and Ito	Ambiguous
inf (inflation)	Consumer Price Index	Annual percentage	WDI	Ambiguous
gov (government spending)	General government final consumption expenditure (constant 2010)	US Dollar	WDI	Ambiguous
hc (human capital)	Secondary school enrolment	Percentage of gross enrolment	WDI	Positive

Table 2. *Sample Countries Used in the Study*

High-Income (40 countries)	Middle-Income (44 countries)	Low-Income (11 countries)
Austria, Bahrain, Belgium, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hong Kong, Hungary, Ireland, Israel, Italy, Japan, Korea Republic, Kuwait, Latvia, Lithuania, Netherlands, New Zealand, Norway, Oman, Panama, Poland, Portugal, Qatar, Romania, Slovakia, Slovenia. Spain, Sweden, Switzerland, United Kingdom, United States of America, Uruguay	Albania, Algeria, Argentina, Bangladesh, Bolivia, Brazil, Bulgaria, Cameroon, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, El-Salvador, Ghana, Guatemala, India, Indonesia, Iran, Jordan, Jamaica, Kyrgyz Republic, Lao DPR, Macedonia, Mauritania, Mauritius, Mexico, Moldova, Morocco, Nepal. Nicaragua, Nigeria, Pakistan, Paraguay, Peru, Russian Federation, Serbia, South Africa, Thailand, Tajikistan, Tunisia, Turkey, Ukraine, Venezuela	Burkina Faso, Burundi, Chad, Malawi, Mali, Mozambique, Niger, Senegal, Sudan, Togo, Yemen

Source: World Bank, 2019.

The present study re-specified the model to a dynamic panel quantile form as proposed by Koenker and Bassett (1978) to examine the impact of financial integration on economic development, as follows:

$$ly_{qit} = \beta_{0qit} + \beta_1 ly_{qit-1} + \beta_2 lfi_{qit} + \beta_3 inf_{qit} + \beta_4 lgov_{qit} + \beta_5 lhc_{qit} + \epsilon_{qit} \quad (2)$$

where y, $ly_{it-1}fi$, inf, gov, hc, and ϵ are as defined above. Quantile regression modelled the relationship between the explanatory variables on the conditional quantile of the dependent variable. The quantile regression was justified because parameter estimates vary across a

heterogeneous sample. The strengths of the quantile regression method include; its flexibility and policy application even in a heterogeneous and non-normal sample (Chernozherkov & Hansen, 2005), richer data characterisation (Andini & Andini, 2014), and robustness to the problem of outliers (Ibrahim et al., 2016). To estimate the quantile model, Koenker and Bassett (1978) assigned asymmetric penalties for the quantiles and optimised the above equation of the *least absolute deviation* as follows:

$$\min \sum_{i=y_i \geq \alpha_q+\beta_q x_s}^{n} q\left|yi-(\alpha+\beta i Xs)\right| + \sum_{i=y_i<\alpha_q+\beta q x_s}^{n}(1-q)\left|yi-(\alpha+\beta Xs)\right|;$$

$$\textit{where,} \begin{cases} q\epsilon_{qi\ if\ \epsilon_{qi}} \geq 0 & under\ prediction \\ (1-q)\epsilon_{qi\ if\ \epsilon_{qi}} < 0 & over\ prediction \end{cases}$$

A quantile regression is expected to fulfil two conditions: (1) quantile parameter coefficients must be significant, and (2) quantile parameter estimates should be statistically different from the mean estimate. In the present study, the quantile regression was conducted using the 25th, 50th and 75th percentile divisions. The 25th division represented low-income countries. The 50th division represented middle-income countries, while the 75th quantile division represented high-income countries.

In addition to the dynamic panel quantile regression, the present study also utilised the dynamic panel generalized method of moments (GMM) estimator proposed by Arellano and Bond (1991) and further refined by Blundell and Bond (1998) to examine the hypothesis of the asymmetrical economic development impact of financial integration. Only a short explanation has been provided here because the estimator has been used extensively in the existing literature. Due to the need to account for simultaneity bias and country-specific impacts, this estimator was chosen. Consider the baseline Equation (2) to illustrate its use concerning the present study's dataset. To remove the country-specific effect and correct for simultaneity bias, Arellano and Bond (1991) proposed converting Equation (2) into a first difference and using the lag levels of the regressors as instruments. However, several recent papers have demonstrated that if the explanatory variables were persistent, this modelling approach might result in incorrect inferences (Arellano and Bover 1995). Arellano and Bover (1995) and Blundell and Bond (1998) suggested a system GMM estimator that combines the level and difference formulae to resolve this issue. Then, the regressors' lagged differences may be used as extra instruments for a level equation. They provided examples to demonstrate how this modelling approach could lessen the errors and imprecision associated with the difference estimator.

The one- and two-step estimators are two types of GMM estimators. Using optimal weighting vectors makes the two-step estimator theoretically more effective than the one-step estimator. It should be noted that, when applied to a sample with a small cross-section dimension, as

in the current research, it may result in; biased standard errors, biased estimated parameters (Windmeijer, 2005), and a weaker overidentification test (Bowsher 2002). Roodman (2009) demonstrated how the proliferation of instruments was the root of such issues. He then proposed a novel idea to make the auxiliary variable matrix less dimensional. The two-step system GMM estimator was used in this study's analysis of the relationship between financial integration and economic development. The instrumental variable matrix's complexity was reduced following Roodman (2009). The Sargan test of over-identifying constraints and a serial correlation test in the disturbances are two specification tests that determine the consistency of the GMM estimator (Arellano and Bond 1991). It would be assumed that the instruments are reliable and the model was properly described if the Sargan test fails to reject the null hypothesis. When performing the serial correlation test, one should not deny the absence of second-order serial correlation (AR2). However, one should reject the null of the absence of first-order serial correlation (AR1).

IV. Results and Analysis

Tables 3 and 4 present the descriptive statistics and correlation matrix for the variables used in the model. Table 3 shows that the sample was strongly balanced. However, evidence suggests that the sample may have consisted of heterogeneous individuals or, at best, extreme values. This result was clear from the relatively large standard deviations and the widely dispersed minimum and maximum values. In most cases, the mean value significantly differed from the minimum and maximum values. For instance, the mean of the real GDP per capita value was $15,666, while the minimum and maximum values were $219 and $91,617, respectively. The wide variation was evident in the size of the standard deviation of 19,082. The mean value of the capital account openness index was 0.781, which denoted an open scenario. However, the minimum value of the index (-1.9) showed a financially repressed country, and the maximum value of the index (2.37) indicated an extremely financially open country. This result showed evidence of heterogeneity in the sample.

Table 4 shows the pairwise correlation among the variables. The results showed that all variables were significantly correlated with the real GDP per capita. The correlation coefficients were weak, except for education (0.615) and the capital account openness index (0.587). The correlations among the explanatory variables were weak, although statistically significant. There were positive correlations between government expenditure and gross capital inflow, as well as between human capital and the capital account openness index. This outcome indicated that the multicollinearity of the regressors was not a problem in the analysis.

Table 3. *Descriptive Statistics*

Variable	Mean	Std Dev	Min	Max
rgdpc	15666.85	19082.25	219.19	91617.28
FI 1	0.60	0.16	0.34	0.97
FI 2	816717.30	2770421.00	701.37	3.16e+07
kao	0.78	1.59	-1.90	2.37
inf	5.78	8.07	-8.97	121.74
govt	9.13e+10	2.78e+11	1.08e+08	2.52e+12
hc	81.17	29.29	6.11	163.93

Note. rgdpc= real GDP per capita, FI 1 = the ratio of capital inflows and outflows to the GDP, FI 2 = gross capital inflow, inf = inflation, kao= capital account openness index, govt = government expenditure, hc = the percentage of gross secondary school enrolment.

Table 4. *Pairwise Correlation Matrix*

	rgdpc	*FI 1*	*FI 2*	*kao*	*Inf*	*Govt*	*edu*
rgdpc	1.000						
FI 1	-0.067***	1.000					
FI 2	0.407***	0.005	1.000				
kao	0.587***	-0.050**	0.256***	1.000			
inf	-0.268***	-0.080***	-0.127***	-0.274***	1.000		
govt	0.362***	-0.016	0.825***	0.214***	-0.107***	1.000	
hc	0.615***	-0.078***	0.225***	0.616***	-0.179***	0.199***	1.000

Note. rgdpc= real GDP per capita, FI 1 = the ratio of capital inflows and outflows to the GDP, FI 2 = gross capital inflow, inf = inflation, kao = capital account openness index, govt= government expenditure, hc = the percentage of gross secondary school enrolment. *** and ** denote the significance at 1% and 5%, respectively.

Tables 5, 6 and 7 present the dynamic panel quantile estimation results of the impact of financial integration on economic development using the three different measures of financial integration. Table 5 shows *the results with the log of the ratio of capital inflows and outflows to the GDP* (*F1*), Table 6 with *the log of gross capital inflow* (*F2*), and Table 7 with *the capital account openness index* (*kao*).

Table 5 shows that the impact of financial integration (*FI 1*) on economic development was asymmetrical and varied across income levels. The results suggested that financial integration had no significant impact on economic development for low-income countries (25^{th} *quantile*). However, in middle and high-income countries (50^{th} *and* 75^{th} *quantiles*), the results showed that financial integration negatively affected economic development.

When using gross capital inflow (*FI 2*) as a proxy for financial integration, the results were quite similar to the previous estimation (see Table 6). Nonetheless, in this estimation, the negative impact of financial integration on economic development was observed at all levels of income (25^{th}, 50^{th} and 75^{th} quantiles), although the coefficient of *FI 2* in the 25^{th} quantile

was relatively smaller than the coefficient for the 50th and 75th quantiles.

Table 5. *Results of the Dynamic Panel Quantile Estimations (The Log of the Ratio of Gross Capital Inflows and Outflows to the GDP Represents Financial Integration)*

	25th	50th	75th
l.rgdpc	0.9897***	0.9887***	0.9924***
	(0.0007)	(0.0003)	(0.0005)
FI 1	-0.0018	-0.0100***	-0.0045***
	(0.0011)	(0.0007)	(0.0007)
lgovt	0.0040***	0.0008***	0.0002***
	(0.0012)	(0.0001)	(0.0000)
inf	-0.0005***	-0.0000	0.0006***
	(0.0002)	(0.0000)	(0.0000)
edu	0.0001**	0.0004***	0.0002***
	(0.0001)	(0.0000)	(0.0000)
No. of group		95	

Note. l.rgdp = the log of real GDP per capita lagged one period, FI 1 = log of the ratio of capital inflows and outflows to the GDP, inf = inflation, lgovt = the log of government expenditure, edu = the percentage of gross secondary school enrolment. Values in () are standard errors. ** $p < 0.05$, *** $p < 0.01$.

Table 6. *Results of the Dynamic Panel Quantile Estimations (The Log of Gross Capital Inflow Represents Financial Integration)*

	25th	50th	75th
l.rgdpc	0.9917***	0.9866***	0.9921***
	(0.0001)	(0.0003)	(0.0010)
FI 2	-0.0006***	-0.0036***	-0.0030***
	(0.0001)	(0.0005)	(0.0006)
lgovt	0.0079***	0.0063***	0.0029
	(0.0002)	(0.0005)	(0.0018)
inf	-0.0003***	-0.0007***	0.0003
	(0.0000)	(0.0000)	(0.0003)
edu	0.0002**	0.0002***	0.0002***
	(0.0000)	(0.0000)	(0.0000)
No. of group		95	

Note. l.rgdp = the log of real GDP per capita lagged one period, FI2 = log of gross capital inflow, inf = inflation, lgovt = the log of government expenditure, edu = the percentage of gross secondary school enrolment. Values in () are standard errors. ** $p < 0.05$, *** $p < 0.01$.

Table 7 shows the results when using the *capital account openness index* (*kao*) as a proxy for financial integration. The results were consistent with Table 5 (using *gross capital inflows and outflows to the GDP*). Financial integration negatively impacted economic development in middle and high-income countries (50th and 75th quantiles). However, it had no significant impact in low-income countries (25th quantile).

Table 7. *Results of the Dynamic Panel Quantile Estimations (The Log of the Capital Account Openness Index Represents Financial Integration)*

	25th	50th	75th
l.rgdpc	0.9896***	0.9891***	0.9948***
	(0.0003)	(0.0009)	(0.0003)
kao	-0.0002	-0.0024***	-0.0020***
	(0.0001)	(0.0005)	(0.0002)
lgovt	0.0057***	0.0022***	0.0018***
	(0.0003)	(0.0008)	(0.0001)
inf	-0.0003***	-0.0001	0.0008***
	(0.0000)	(0.0000)	(0.0000)
edu	0.0001**	0.0003***	0.0003***
	(0.0000)	(0.0000)	(0.0000)
No. of group		95	

Note. l.rgdp = the log of real GDP per capita lagged one period, kao = capital account openness index, inf = inflation, lgovt = the log of government expenditure, edu = the percentage of gross secondary school enrolment. Values in () are standard errors. ** $p < 0.05$, *** $p < 0.01$.

The significant impact of financial integration on economic development at the 50th and 75th quantiles was in line with the findings of Mmolainyane and Ahmed (2015) and Van-Ewilk and Arnold (2015). Financial integration could influence economic development through the exchange rate channel. Financial integration often leads to an increase in capital flows which will affect the level of the current account balance. When capital inflows exceed capital outflows, demand for the local currency may increase, leading to its appreciation. On the other hand, higher capital outflows than inflows may reduce the demand for the local currency and lead to its depreciation. Aggressive changes in the inflows and outflows of capital cause exchange rates to become more volatile. This situation would undermine trade and may adversely affect economic development. The impact depends on various factors, including; the size and openness of the economy, the regulatory environment, and the country's economic development level.

Furthermore, although financial integration may promote risk sharing and diversification, it may also transmit financial shock across countries with severe consequences on the global economy. This outcome may be detrimental to economic development. For example, the global financial crisis of 2008, with its origin in the US and later spillovers to other countries, was due to financial integration.

Although financial integration was detrimental to economic development, this does not indicate that middle and high-income countries should refrain from financial integration. The negative impact of financial integration on economic development should not hinder a country from enjoying the benefits that financial integration could provide. Rather, it only implies that countries should be more cautious about financial integration. For instance, there is a need for a country to have a macroeconomic management team to counter the adverse impact of financial

integration on exchange rate volatility and the loss of domestic monetary and macroeconomic policy autonomy. Osada and Saito (2010) stated that trade liberalisation should support financial integration. Exchange rate volatility triggered by financial integration may affect the capital account balance. Exchange rate instability may further undermine economic development. Trade liberalisation may offset the negative impact of financial integration on economic development. Chen and Quang (2014) and Kumar (2015) argued in favour of the indirect positive effect of financial integration on economic development through improvements in institutions and financial development. Therefore, to mitigate the negative effect of financial integration on economic development, examining its indirect effect on economic development vis-à-vis; trade liberalisation, institutional factors, and financial development is important.

Meanwhile, the insignificant results at the 25th quantile may imply that financial integration did not significantly impact economic development in low-income countries. There could be several reasons for this finding. First, many low-income countries have limited and underdeveloped financial market infrastructure. This environment is not conducive for financial integration to lead to expected benefits. Second, low-income countries are often linked to weak institutional frameworks that may lead to; poor regulation, corruption and a lack of transparency. All these may undermine the effectiveness of financial integration. Third, financial integration may benefit some sectors within a country more than others. This outcome could lead to unequal benefit distributions. This situation could aggravate existing inequalities and limit the potential for inclusive economic growth.

The varying impact of financial integration in this study aligned with Ibrahim et al. (2016), who argued that the impact of financial integration, although positive, was conditional on income. However, this study differed from Ibrahim et al. (2016). First, this study found that financial integration negatively impacted economic development, while Ibrahim et al. (2016) found that financial integration positively affected growth in middle-income countries. Second, this study was based on a dynamic panel quantile regression method, while Ibrahim et al. (2016) were based on a cross-sectional study. The limitation of cross-sectional studies entails that they are specific to a point in time. However, examining cause-and-effect relationships requires longer time observations across individual units. This outcome emphasises the strength of the present study over Ibrahim et al. (2016).

The results of the control variables showed that government expenditure, in general, positively impacted economic development at all income levels. However, the magnitude of the impact was greatest in low-income countries (25th quantile) and least in high-income countries (75th quantile). The asymmetrical impact of government expenditure on economic development was expected because the ratio of government expenditure to the GDP in low-income countries was relatively higher than the high-income countries. This outcome was because low-income countries rely more on government spending to stimulate their economies, as these countries'

private sector investments are small. On the contrary, economic development in high-income countries has been generally driven by the private sector's investment, which amounts to crowding out government expenditure.

The results also showed that human capital positively impacted economic development at all quantiles. This result is consistent with theoretical and empirical expectations (Xianguo & Haifeng, 2008). There is a strong emphasis on knowledge capital in promoting economic development, and the endogenous growth theory recognises the significant role of human capital development in the economic growth process. Finally, the impact of inflation was found to vary across income levels. Whilst inflation hindered economic development in low- and middle-income countries, it did not significantly impact economic development in high-income countries. This study's results corroborated the theoretical expectation of a mixed relationship between inflation and economic development, which may depend on the degree of inflation. For instance, high inflation rates (common in some low-income countries) may harm economic activities and make planning difficult for businesses. In high-income countries, inflation rates are low and support growth in economic activities.

The present study employed the system GMM estimator and compared the parameter estimates from the system GMM against the confidence intervals of the dynamic panel quantile to determine the validity of the asymmetrical impact of financial integration on economic development. Suppose the GMM estimates fell within the confidence intervals of the dynamic panel quantile estimates across all quantiles. Therefore, the quantile estimates would not be statistically different from the mean estimate (GMM), rejecting the hypothesis for an asymmetrical impact of financial integration on economic development. The results of the GMM estimation are presented in Table 8. The Sargan test results were insignificant, indicating that the overidentifying restrictions were valid. Third, AR(2) was insignificant in all cases, denoting no serial autocorrelation in the second order. The results showed that financial integration negatively affected economic development when *FI 1* was used as a measure. However, the impacts were positive when *FI 2* and *kao* were used as proxies. Different results between quantile regression and GMM estimates supported the asymmetrical impact of financial integration on economic development. Focus of GMM lies in estimating the average of the conditional distribution while giving greater importance to the moments near the average. Meanwhile quantile regression prioritizes specific quantiles and is less concerned with the overall shape of the distribution. Therefore, both estimates could yield different results if the effect of a variable is asymmetric.

Table 8. *Results of the System GMM Estimator*

	(1)	(2)	(3)
l.rgdpc	0.570***	0.504***	0.432***
	(0.056)	(0.059)	(0.062)
FI 1	-0.205***	-	-
	(0.056)		
FI 2	-	0.134***	-
		(0.014)	
kao	-	-	0.043***
			(0.016)
Inf	-0.007***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.002)
lgovt	0.249***	0.133***	0.237***
	(0.030)	(0.031)	(0.032)
edu	0.006***	0.003	0.005***
	(0.001)	(0.001)	(0.001)
AR(1)	-1.69***	-2.793	-2.959**
	[0.007]	[0.052]	[0.031]
AR(2)	-4.34	-3.269	-5.5175
	[0.081]	[0.113]	[0.104]
Sargan	63.889	68.668	66.087
	[0.134]	[0.197]	[0.153]
No of group	95	95	95

Note. lrgdpc = log of real GDP per capita lagged one year, FI 1 = log of the ratio of capital inflows and outflows to GDP, FI 2 = log of gross capital inflow, kao = capital account openness index, inf = inflation, lgovt = log of government expenditure, edu = thrpercentage of gross secondary school enrolment. Standard errors are in parentheses. ** $p < 0.05$, *** $p < 0.01$.

V. Conclusion

This study examined the impact of financial integration on economic development using annual data from 2004 to 2019 from 95 countries. Generally, the dynamic panel quantile regression method results showed that financial integration negatively impacted economic development. The study also found that financial integration has an asymmetrical impact on economic development across all income levels. The results showed that financial integration negatively impacted economic development in the low and high-income quantiles, whilst it had no significant impact in middle-income quantiles.

References

Ahmed, A. D. (2016). Integration of financial markets, financial development and growth: Is Africa different? *Journal of International Financial Markets, Institutions & Money, 42*, 43-59.

Ahmed, A. D., & Mmolainyane, K. K. (2014). Financial integration, capital market development and economic performance: Empirical evidence from Botswana. *Economic Modelling, 42*, 1-14.

Aizenman, J., Jinjarak, Y., & Park, D (2013). Capital flows and economic growth in the era of financial integration and crisis, 1990-2010. *Open Economies Review, 24*(3), 371-396.

Al Nasser, O. M., & Hajilee, M. (2016). Integration of emerging stock markets with global stock markets. *Research in International Business and Finance, 36*, 1-12.

Andini, M., & Andini, C. (2014). Finance, growth and quantile parameter heterogeneity. *Journal of Macroeconomics, 40*, 308-322.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29-51.

Aziakpono, M. J., Kleimeier, S., & Sander, H (2014). Banking market integration in the SADC countries: Evidence from interest rate analyses. *Applied Economics. 44*(29), 3857-3876.

Biekpe, N., & Motelle, S. (2013). Financial integration and the stability of the financial system in Southern African Customs Union. *Banks and Bank Systems, 8*(4), 67-78.

Bowsher, G. C. (2002). On testing overidentifying restrictions in dynamic panel data models. *Economics Letters, 77*(2), 211-220.

Calvo, S., Carmen M., & Reinhart, C., M. (1996). Capital flows to Latin America: Is there evidence of contagion effects? In Guillermo A. Calvo, Morris Goldstein, and Eduard Hochreiter (Eds.), *Private capital flows to emerging markets after the Mexican crisis.* Institute for International Economics, Washington, DC.

Chakraborty, I., Hai, R., Holter, H. A., & Stepanchuk, S. (2016). The real effects of financial (dis)integration: A multi-country equilibrium analysis of Europe. *Journal of Monetary Economics, 85*, 28-45.

Chen, J., & Quang, T. (2014). The impact of international financial integration on economic growth: New evidence on threshold effects. *Economic Modelling, 42*, 475-489.

Chernozhukov, V., & Hansen, C. (2005). Notes and comments an IV model of quantile treatment effects. *Econometrica, 73*(1), 245-261.

Chinn, M. D., & Ito, H. (2006). What matters for financial development? Capital controls, institutions, and interactions. *Journal of Development Economics, 81*(1), 163-192.

De Nicolò, G., & Juvenal, L. (2014). Financial integration, globalization, and real activity. *Journal of Financial Stability, 10*, 65-75.

Edison, H. J., Levine, R., Ricci, L., & Sløk, T (2002). International financial integration and economic growth. *Journal of International Money and Finance, 21*(6), 749-776.

Forbes, K. J., & Roberto Rigobon, R. (2002). No contagion, only interdependence: Measuring stock market comovements. *The Journal of Finance, 57*(5), 2223-226.

Friedrich, C., Schnabel, I., & Zettelmeyer, J. (2013). Financial integration and growth — Why is Emerging Europe different? *Journal of International Economics, 89*(2), 522-538.

Gourinchas, P. O., & Jeanne, O. (2013). Capital flows to developing countries: The allocative puzzle. *Review of Economic Studies, 80*, 1484-1545.

Hsiao, C. (2007). Panel data analysis-advantages and challenges. *Test, 16*, 1-22.

Ibrahim, S., Mazlina, A. R., Azman-Saini, W. N. W., & Zakaria, M. F. M. (2016). Financial integration-growth nexus: A quantile regression analysis. *Journal of Economic Integration, 31*(3), 531-546.

Koenker, R., & Bassett, G. J. (1978). Regression quantiles. *Econometrica, 46*(1), 33-50.

Kose, A., Rogoff, K., Prasad, E. S., & Wei, S. J. (2003). *Effects of financial globalization on developing countries: Some empirical evidence.* Washington, DC: International Monetary Fund.

Kumar, S. (2015). Regional integration, capital mobility and financial intermediation revisited: Application of general to specific method in panel data. *Journal of International Financial Markets, Institutions & Money, 36*(C), 1-17.

Lane, P. R., & Milesi-Ferretti, G. M. (2017). *International financial integration in the aftermath of the global financial crisis* (IMF Working Paper 17/115).

Lee, J. W., & Shin, K. (2012). Welfare implications of international financial integration. *Japan and the World Economy, 24*(4), 235-245.

Levin, K. A. (2006). Study design III: Cross sectional studies. *Evidence-Based Dentistry, 7*, 24-25.

Mmolainyane, K. K., & Ahmed, A. D. (2015). The impact of financial integration in Botswana. *Journal of Policy Modeling, 37*(5), 852-874.

Muye, I. M., & Muye, I. Y. (2017). Testing for causality among globalization, institution and financial development: Further evidence from three economic blocs. *Borsa Istanbul Review; 17*(2), 117-132.

Neaime, S. (2016). Financial crises and contagion vulnerability of MENA stock markets. *Emerging Markets Review, 27*, 14-35.

Obstfeld, M. (2009). International finance and growth in developing countries: What have we learned? *Economic Review, 56*(1), 63-111.

Osada, M., & Saito, M. (2010). *Financial integration and economic growth: An empirical analysis using international panel data from 1974-2007* (Bank of Japan Working Papers Series No. 10-E-5).

Paramati, S. R., Roca, E., & Gupta, R. (2016). Economic integration and stock market dynamic linkages: evidence in the context of Australia and Asia. *Applied Economics, 48*(44), 4210-4226.

Pyun, J. H., & An, J. (2016). Capital and credit market integration and real economic contagion during the global financial crisis. *Journal of International Money and Finance, 67*, 172-193.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), 86-136

Saafi, S., Mohamed, M. B. H., & Ben Doudou, M. (2016). Causal nexus between financial integration and economic growth: Does nonlinearity matter? *Journal of Economic Integration, 31*(4), 817-854.

Silberberger, M., & Königer, J. (2016). Regulation, trade and economic growth. *Economic Systems, 40*(2), 308-322.

Solem, C. R. (2015). Limitations of a cross sectional study. *American Journal of Orthodontics and Dentofacial Orthopedics, 148*(2), 204-205.

Van Ewijk, S. E., & Arnold, I. J. M. (2015). Financial integration in the euro area: Pro-cyclical effects and economic convergence. *Economic Modelling, 44*, 335-342.

Vo, X. V., & Daly, K. J. (2007). The determinants of international financial integration. *Global Finance Journal, 18*(2), 228-250.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics, 126*(1), 25-51.

Xianguo, Y., & Haifeng, Z. (2008). Education, human capital and regional economic differentials. *Economic Research Journal, 5*, 47-57.