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Borsa İstanbul Review

Borsa İstanbul Review 23-2 (2023) 402–411
http://www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Full Length Article

International financial integration: Too much?

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Received 7 March 2022; revised 12 November 2022; accepted 12 November 2022
Available online 21 November 2022

Abstract

According to theory, financial openness (FO) increases growth. The literature often conditions the growth effect of FO on favorable collateral environment. However, this can conceal the actual growth benefits of FO. This paper contributes to the literature by investigating the unconditional growth effect of FO, measured as *de facto* international financial integration (IFI). We maintain that the level of IFI might affect the structure of this relationship. We examine this important issue in advanced and emerging market and developing economies over the 1990–2019 period using conditional and unconditional growth regressions. Panel fixed effects threshold and dynamic panel threshold estimations suggest that the IFI-growth relation is conditional on data-driven estimated threshold level of IFI. Accordingly, IFI encourages (impedes) growth in less (more) financially integrated economies. The results show that it is not impossible to finance growth with IFI, but it might be risky, especially beyond a certain threshold level of IFI.

JEL classification: F30; F41; F43; F63; O16

Keywords: Advanced economies; Emerging market and developing economies; Growth; International financial integration; Panel threshold model

1. Introduction

Does international financial integration (IFI), a *de facto* measure of financial openness, spur growth? According to conventional theory, the direct and indirect impacts of financial openness lead to growth by providing an efficient allocation of capital, encouraging risk sharing, promoting financial development, better governance, and macroeconomic policies (Kose et al., 2010; Obstfeld, 1998; Schmukler, 2004). However, Schmukler (2004) and Obstfeld (2009) remark that financial openness can cause some problems, including the spread of "financial fear" through contagion and an increase in vulnerability to external shocks such as sudden stops. Policy makers assume that the benefits overweigh the costs, and higher financial integration can spur growth, as noted by Coeurdacier et al. (2020).

The literature mainly posits some threshold domestic structural conditions for reaping the growth benefits of financial integration. For instance, Broner and Ventura (2016), Chen and Quang (2014), Furceri et al. (2019), Kose et al. (2010), Nicolò and Juvenal (2014), Yolcu Karadam and Öcal (2022) and Wei (2006) condition the growth-inducing impact of financial integration on having a favorable "collateral" environment, including governance, financial development, trade openness, and macroeconomic policies. Rodrik and Subramanian (2009) note that the conditional correlation between financial integration and domestic structural conditions "fails to detect" the actual growth benefits of financial integration. In this context, they suggest that the unconditional benefits of financial integration are more important than the conditional ones. The unconditional growth impact of financial integration, however, may be conditional on the level of financial integration.

This study maintains that the sensitivity of growth to financial integration can change, depending on the financial integration degrees of economies. In this vein, we investigate

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Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

https://doi.org/10.1016/j.bir.2022.11.005

the growth–financial integration relation within the context of an endogenous threshold approach in order to detect whether the financial integration threshold changes the structure of this relation. We first consider whether the financial integration level matters for the association among financial integration and growth with an unconditional growth regression. To investigate this issue, we employ the panel fixed effects threshold estimation technique by Hansen (1999). Following this benchmark model, we extend our analysis by incorporating the conventional growth drivers such as trade openness, human capital, financial development, and governance. In that step, we examine whether financial integration provides a data-driven estimated threshold for the sensitivity of growth to financial integration with a conditional growth equation. We study this important topic by utilizing the dynamic panel threshold estimation technique by Kremer et al. (2013).

Our paper contributes to the literature by examining whether the financial integration level matters for the financial integration-growth relation based on the data-driven estimated thresholding approach. To our knowledge, this empirical paper is the first to investigate the IFI-growth relation by subjecting it to data-driven IFI threshold levels. In this novel empirical context, we employ both panel fixed effects threshold and dynamic panel threshold estimation methods with a sample of 25 advanced and 58 emerging market and developing economies over the annual data of the 1990–2019 period.

We find that financial integration provides a data-driven estimated threshold for the sensitivity of growth to financial integration in both unconditional and conditional growth regressions. Our findings indicate that financial integration encourages growth in less financially integrated economies. On the other hand, financial integration dampens growth in more financially integrated economies. Like Arcand et al. (2015), this paper finds that growth can be reduced when international financialization (international financial integration) surpasses a certain threshold, that is, “too much” IFI occurs.

The rest of this article is organized as follows. Section 2 provides a brief literature review. The data are introduced in Section 3. The empirical method is explained and results are reported in Section 4. Finally, we evaluate and synthesize our main findings in concluding remarks in Section 5.

2. A brief literature review

The conventional theory maintains that increases in welfare through the creation of efficient risk sharing are among the most important benefits of IFI. The empirical literature finds that risk sharing develops in economies that exceed a certain threshold level of financial integration (Kose et al., 2003), more so in industrialized than emerging market economies (Kose et al., 2009), and that it is valid for remittances and aid flows (Islamaj & Kose, 2022). Hoxha et al. (2013) find that welfare benefits from financial integration are much higher when foreign capital is not perfect substitute for domestic capital. Tang and Yao (2022) report that higher financial integration reduces welfare during crises.

In addition to encouraging risk sharing, financial openness may also promote the development of financial markets (Mishkin, 2009) by reducing information asymmetry, moral hazard, and adverse selection (Schmukler, 2004). Gaies et al. (2019) note that financial integration may stimulate financial stability as well. Tytell and Wei (2004) find that financial globalization encourages better macroeconomic policies, such as prioritizing low inflation targets.

However, de la Torre et al. (2002) state that developing economies can experience negative side effects of financial integration if they have an “unblessed trinity”: fear of floating, weak currency, and a poor institutional environment. Agénor (2003) remarks that emerging market and developing economies can access financial markets only in good times, but are exposed to sudden stops in bad times, leading them to fall into crises. Lane (2013) notes that the presence of better macroeconomic policies and institutions in financially integrated economies gives them a buffer against adverse shocks such as crises. Although financial integration can raise the probability of a crisis (Inekwe & Valenzuela, 2020), Devereux and Yu (2020) suggest that the severity of crises is much lower in financially integrated economies. Inekwe and Valenzuela (2020) report that capital controls reduce the incidence of banking crises in financially integrated countries.

Rejeb and Boughrara (2015) find that openness to financial flows magnifies not only the spread of volatility but also the risk of contagion. Gong and Kim (2018) and Zouri (2020) suggest that financial linkage is one of the most significant drivers of business-cycle synchronization. According to Goetz and Gozzi (2022), this appears to be the case for industrialized countries that are contingent on external finance. Benigno et al. (2020, p. 915) report that IFI leads to a global financial resource curse. Their theoretical model results show that capital movement from developing to advanced economies such as the US lead to higher demand for nontradable goods, reduce investment in tradable goods that act as the engine of growth, and lower global productivity growth. Agénor and da Silva (2022) state that IFI causes macroeconomic policy challenges not only in emerging market and developing economies but also in advanced economies. They point out the necessity of international coordination in macroprudential policies to sustain financial stability and mitigate systemic risk. In addition to providing financial stability, the use of macroprudential policies can also diminish capital flight, as suggested by Aizenman (2019).

Martin and Rey (2002) report that the elimination of capital account restrictions causes higher asset prices, more investment, and income in emerging market economies. Levine (2001) notes that financial openness enhances stock market liquidity and financial market efficiency and thus leads to higher productivity and growth. Bonfiglioli (2008) provides empirical support to Levine (2001). Ibrahim (2020), moreover, finds that financial integration encourages productivity in less financially integrated African economies. Neto and Veiga (2013) suggest that participation in financial globalization through foreign direct investment (FDI) linkages rather than debt flows results in better growth.

Table 1
Variable definitions and data sources.

Variable	Definition	Data Source
RGDPpc	GDP per capita (in constant local currency)	World Development Indicators, World Bank
IFI	International financial integration (IFI) is measured as the sum of gross stocks of financial assets and liabilities over GDP	External Wealth of Nations Database, Lane and Milesi-Ferretti (2018)
HC	Human capital index (HC) is constructed based on years of schooling and returns to education	Penn World Table Database, Feenstra et al. (2015)
TRADE	Trade openness (TRADE) is the sum of exports and imports of goods and services as a percentage of GDP	World Development Indicators, World Bank
FD	Financial development index (FD) is measured based on the size and liquidity of financial institutions and markets	Financial Development Index Database, IMF
GOV	Governance (GOV) is the first principal component of standardized values for the six governance variables (control of corruption, voice and accountability, government effectiveness, political stability and no violence, rule of law, and regulatory quality)	Worldwide Governance Indicators, World Bank

Other studies, including Edison et al. (2002), Prasad et al. (2007) and Schularick and Steger (2010), do not find a strong association among IFI and economic growth. By leading to appreciation in real exchange rates and reducing profitable investment opportunities, financial globalization prevents higher long-run growth in developing economies, according to Rodrik and Subramanian (2009). Bortz and Kaltenbrunner (2018) note that international financialization causes premature deindustrialization by encouraging the development of less productive sectors, such as construction, finance, and real estate. The results of a meta-regression analysis by Heimberger (2021) suggest that financial globalization does not lead to growth. Bergin et al. (2022) find that financial deglobalization—capital controls along with reserve accumulation—leads to higher total factor productivity and income growth. Haufler and Wooton (2021) note that reductions in transaction and information costs are necessary conditions for reaping the beneficial effects of IFI. Coeurdacier et al. (2020) find that the impacts of financial integration on growth can change, depending on the size of the economies, risk, and capital stock levels. Stiglitz (2003) reports that globalized economies need to well-structured policies to manage potential risks and adverse effects on growth. Abraham and Schmukler (2018) maintain that the overall impact of financial globalization depends on the stabilizing effect between the incidence of financial crises and higher growth.

The bulk of the literature often conditions the effect of IFI on growth to the presence of better domestic structural conditions. In this context, Broner and Ventura (2016), Chen and Quang (2014), Furceri et al. (2019), Kose et al. (2010), Nicolò and Juvenal (2014), Yolcu Karadam and Öcal (2022) and Wei (2006) hold that financial integration encourages growth in economies that have financially developed, more open, and better macroeconomic fundamentals. However, the conditional correlation between financial integration and structural domestic conditions "fails to detect" the actual growth benefits of financial integration, as suggested by Rodrik and Subramanian (2009). In this context, they maintain that the unconditional gains of financial integration are more important than the conditional ones.

This study analyzes the association among financial integration and growth by constructing conditional and unconditional growth regressions. Furthermore, this paper assumes that this relationship may be conditional on an endogenously estimated threshold level of financial integration and may be different in economies that are less financially integrated than others. To study the potential thresholding effect of financial integration, we use data-driven estimated threshold procedures such as a panel fixed effects threshold and a dynamic panel threshold.

3. The data

This article analyzes the effect of IFI on growth in a sample of 25 advanced (AE) and 58 emerging market and developing economies (EMDE) with annual data for the period 1990–2019. The sample is determined mainly by data availability.[1]

Inspired by Rodrik and Subramanian (2009), we focus on whether the level of IFI matters in the effect of financial integration on growth with and without incorporating conventional growth determinants. Table 1 reports the descriptions and data sources of the variables. In this study, RGDPpc is the natural logarithm of per capita real gross domestic product (GDP), and the data are from the World Bank's World Development Indicators. International financial openness is measured as either the *de facto* IFI (the summation of gross stocks of financial assets and liabilities over GDP), suggested by Lane and Milesi-

[1] The sample of EMDE comprises Algeria, Argentina, Bangladesh, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Gambia, Ghana, Guatemala, Haiti, Honduras, India, Indonesia, Israel, Jamaica, Jordan, Kenya, Korea, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Morocco, Nepal, Niger, Nigeria, Pakistan, Paraguay, Peru, the Philippines, Rwanda, Senegal, Sierra Leone, South Africa, Sri Lanka, Thailand, Togo, Tunisia, Turkiye, and Uruguay.The sample of AE includes Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

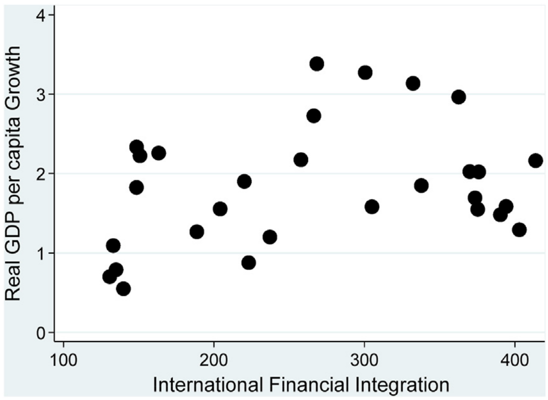

Fig. 1. International financial integration and growth.

Ferretti (2007, 2018), or the *de jure* financial openness index proposed by Chinn and Ito (2008). According to Kose et al. (2009), the *de facto* measure is preferred because it represents the financial integration degrees of economies in practice. Edison et al. (2002) note that IFI is a better measure because it does not fluctuate much with respect to short-run variations in the political and policy environment. Therefore, our measure of financial openness is IFI.

We first investigate the relationship between IFI and growth by constructing an unconditional growth regression and utilizing the panel threshold estimation technique by Hansen (1999). Following this useful benchmark model, we extend our framework of analysis through the incorporation of conventional growth determinants. We consider human capital (HC), trade openness (TRADE), financial development (FD), and governance (GOV) as conventional growth determinants, as suggested in the theory and literature. The HC index is measured as not only returns to education but also the number of years of schooling, and the data come from Penn World Table database (Feenstra et al., 2015). FD is a financial development index based on the magnitude and liquidness of financial markets. The FD index is amongst zero and one, and greater values denote better financial development. The data for FD come from the IMF financial development index database (Svirydzenka, 2016). TRADE is trade openness, calculated as the summation of goods and services exports and imports over GDP, and the data come from the World Bank's World Development Indicators. The data for institutional quality and governance come from the World Bank's Worldwide Governance Indicators (WGI). WGI provides data for voice and accountability, political stability and violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Our measurement of governance (GOV) is the first principal component of standardized values for the six aspects of governance variables, and higher values represent higher institutional quality.[2]

Fig. 1 shows the scatter plot of income per capita growth and IFI for our sample of economies in the period 1990–2019.

[2] The principal component analysis reduces the dimensions of the data by retaining the variations and linear combinations of the variables.

Table 2
Descriptive statistics.

	ΔRGDPpc	IFI	FD	GOV	TRADE	HC
	Full Sample					
Mean	1.751	268.031	0.369	0.513	72.402	2.387
Median	1.928	125.706	0.293	0.428	59.580	2.412
S.D.	3.838	460.148	0.258	0.263	52.918	0.729
C.V.	2.192	1.717	0.700	0.512	0.731	0.305
	Advanced Economies					
Mean	1.555	623.703	0.680	0.850	96.454	3.150
Median	1.642	364.543	0.686	0.873	69.673	3.198
S.D.	2.583	717.871	0.146	0.099	0.807	0.390
C.V.	1.661	1.151	0.215	0.116	0.837	0.124
	Emerging Market and Developing Economies					
Mean	1.835	114.724	0.235	0.370	62.043	2.052
Median	2.113	103.874	0.176	0.365	55.989	2.009
S.D.	4.264	54.949	0.163	0.160	0.291	0.574
C.V.	2.323	0.479	0.693	0.433	0.468	0.280

Notes: S.D. and C.V. are, respectively, the standard deviation and coefficient of variation (standard deviation over the mean) for the corresponding variable.

These variables have a nonlinear relationship. Growth in income per capita and IFI are positively associated, up to a certain threshold level of IFI (around 280). After this threshold level, the relationship between these variables is reversed.

Table 2 reports the descriptive statistics for our variables during the period 1990–2019. The mean growth in real GDP per capita (ΔRGDPpc) is 1.8, 1.6, and 1.8 for the full sample, AE, and EMDE, respectively. Although in both subsamples, the means are quite similar, the variation is considerably higher in EMDE. The mean IFI is 268 in the full sample, 624 in AE, and 115 in EMDE.[3] The mean and variation in financial integration is considerably much higher in AE than in EMDE. The mean conventional growth determinants, including trade openness, financial development, governance and human capital are much higher in AE.

4. Empirical methodology and estimation results

To examine the unconditional effect of financial integration on growth, we consider:

$$\Delta RGDPpc_{it} = \alpha_i + \alpha_1 IFI_{i,t-1} + u1_{it} \quad (1)$$

In Equation (1), i is the country, and t is the time, ΔRGDPpc is the real GDP per capita growth rate, and IFI is international financial integration, as suggested by Lane and Milesi-Ferretti (2007, 2018). IFI is the summation of gross stocks of financial assets and liabilities in GDP. Considering the potential endogeneity, we use lagged IFI in Equation (1).

Equation (1) retains that the sensitivity of growth to financial integration is invariant to the financial integration levels of

[3] Kose et al. (2009) notes that some benefits of financial openness accrue only after the countries achieve a certain threshold level of financial integration. Considering that the mean and median of IFI are much higher in AE than EMDE, we can plausibly suggest that AE are better able to manage IFI to reap the benefits of growth. This implies that the IFI-growth relation might not be the same in AE as in EMDE. To consider this important issue, we investigate the IFI-growth relation in AE as well as EMDE.

Table 3
Panel fixed effects threshold estimation results.

	Full Sample	Advanced Economies	Emerging Market and Developing Economies
Threshold IFI	151.03	273.68	153.52
F_B [.]	7.55 [0.00]	12.77 [0.07]	13.92 [0.05]
NT_{TH}	955	461	321
$IFI_{i,t-1}$ ($IFI_{i,t-1} \leq \lambda$)	0.466** (0.246)	0.400** (0.133)	1.674*** (0.623)
$IFI_{i,t-1}$ ($IFI_{i,t-1} > \lambda$)	−0.059** (0.024)	−0.054** (0.022)	0.711 (0.452)
Constant	0.016*** (0.002)	0.016*** (0.002)	0.003 (0.006)
Statistics	N = 83 NT = 2490	N = 25 NT = 750	N = 58 NT = 1740
	R^2 = 0.0054	R^2 = 0.0365	R^2 = 0.0098
	F = 6.46 [0.00]	F = 15.2 [0.00]	F = 5.25 [0.00]

Notes: F_B is the bootstrapped F-test based on 1000 replications to test the statistical insignificance of the threshold level and [.] is the *p*-value of the test. N and NT are, respectively, the number of countries and the effective number of observations. NT_{TH} reports the number of observations above the estimated threshold level. Standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

the economies. However, there is no reason a priori to expect that the IFI-growth relation is the same in less and more financially integrated economies. In this context, the level of IFI might matter in explaining the relationship between IFI and growth. All these may require the estimation of Equation (1) by employing nonlinear panel data estimation procedures, such as a panel fixed effects threshold and a dynamic panel threshold[4] and treating the financial integration level as a threshold. In Sections 4.1 and 4.2, respectively, we report the estimation results of the procedures by Hansen (1999) and Kremer et al. (2013).

4.1. Panel fixed effects threshold estimation results

To examine whether the degree of IFI matters in the sensitivity of growth to IFI, we consider the following unconditional growth regression:

$$\Delta RGDPpc_{it} = \alpha_i + \alpha_1 IFI_{i,t-1}(IFI_{i,t-1} \leq \lambda) + \alpha_2 IFI_{i,t-1}(IFI_{i,t-1} > \lambda) + u2_{it} \tag{2}$$

In Equation (2), λ is an endogenously determined threshold for IFI. The data-driven estimated threshold splits the observations into low and high regimes. For example, if IFI ≤ λ, then α_1 shows the IFI-growth relationship in the low regime including less financially integrated economies. Otherwise, α_2 represents the IFI-growth relationship in the high regime with more financially integrated observations. The low and high regimes are segregated by having different slope parameters.

The first step in Hansen (1999) technique consists of the removal of country fixed effects by demeaning the sample. Then, the observations are put in ascending order with respect to the thresholding variable. After cutting the lowest and biggest 5 percent of the sample, we explore for the threshold by considering each IFI as a potential nominee. For each nominee, we use panel least squares technique and choose the threshold that provides the smallest residuals sum of squared.

Under $\alpha_1 = \alpha_2$ in Equation (2), there is no significant thresholding impact of IFI, and we obtain Equation (1). The rejection of the null hypothesis implies the existence of a significant threshold effect of IFI. After the statistically significant threshold is identified, the parameters are estimated utilizing a panel fixed effects technique.

Table 3 presents the panel fixed effects threshold estimation results. The bootstrapped F-test (F_B) results suggest that IFI has a significant threshold impact on the financial integration-growth relationship. The threshold value of IFI is 151 for the full sample, 274 for AE, and 154 for EMDE.[5] The threshold level is much higher in the sample of AE. This might not be surprising because they are more financially integrated than EMDE. Considering NT_{TH}, almost 40 percent, 60 percent, and 20 percent of the observations, respectively, are in the high regime, for the full sample, AE and EMDE. According to Table 3, financial integration and growth have a positive association in the low regime for all equations. As compared to AE, the estimated coefficient for IFI is much higher for EMDE. This might indicate that access to additional finance can accelerate growth at a much higher rate for the latter sample. However, financial integration is negatively related to growth in the high regimes of AE and the full sample. This empirical finding suggests that the IFI-growth relation changes, depending on the financial integration degrees of the economies. A rise in IFI leads to growth in less financially integrated observations. But the effect of financial integration is contractionary in more financially open economies. Our panel fixed effects threshold estimation findings indicate that IFI tends to increase growth up to a particular threshold level, beyond which growth diminishes with IFI.

4.2. Dynamic panel threshold estimation results

This section investigates the threshold impact of IFI in explaining the association between IFI and growth by

[4] A brief description of these estimation procedures is in the Appendix.

[5] According to the descriptive statistics reported in Table 2, these threshold values are slightly lower than the median for the full sample and AE, but slightly higher than the median for EMDE.

Table 4
Dynamic panel threshold estimation results.

	Full Sample	Advanced Economies	Emerging Market and Developing Economies
Threshold IFI	144.85	270.31	140.64
Bootstrap *p*-value for linearity test	0.00	0.00	0.02
NT_{TH}	1038	480	429
$IFI_{i,t}$ ($IFI_{i,t} \leq \lambda$)	0.589** (0.273)	0.202* (0.133)	0.475** (0.279)
$IFI_{i,t}$ ($IFI_{i,t} > \lambda$)	−0.064** (0.027)	−0.050* (0.028)	−0.054* (0.034)
ln $(RGDPpc)_{i,t-1}$	0.950*** (0.007)	0.898*** (0.013)	0.948*** (0.009)
HC_{it}	0.031*** (0.008)	0.037*** (0.008)	0.035*** (0.010)
GOV_{it}	0.012*** (0.002)	0.019*** (0.003)	0.011*** (0.002)
$TRADE_{it}$	0.036*** (0.006)	0.035*** (0.005)	0.035*** (0.009)
FD_{it}	0.056** (0.020)	−0.007 (0.016)	0.143*** (0.030)
Constant	0.316*** (0.049)	0.889*** (0.116)	0.294*** (0.053)
NT	1909	575	1334
N	83	25	58

Notes: NT_{TH} reports the number of observations above the estimated threshold level. N and NT are, respectively, the number of countries and the effective number of observations. Standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

constructing a conditional growth regression. We consider financial development, governance, human capital, and trade openness as the conventional growth determinants. To this end, we estimate the following conditional growth regression:

$$ln(RGDPpc)_{i,t} = \mu_i + \alpha_1 ln(RGDPpc)_{i,t-} + \alpha_2 IFI_{i,t}(IFI_{i,t} \leq \lambda) + \alpha_3 IFI_{i,t}(IFI_{i,t} > \lambda) + \alpha_4 HC_{it} + \alpha_5 GOV_{it} + \alpha_6 FD_{it} + \alpha_7 TRADE_{it} + u3_{it} \quad (3)$$

Equation (3) is consistent with the conventional growth literature, augmented by IFI. In this equation, HC is a human capital index, GOV is the first principal component of the six characteristics of governance variables, FD is the financial development index, and TRADE is trade openness. To investigate whether the differences in income per capita are temporary, we also incorporate the lagged income per capita into Equation (3). We estimate this equation by utilizing the Kremer et al. (2013) technique, which considers endogeneity.

The initial step of the Kremer et al. (2013) technique consists of the removal of fixed effects by forward orthogonal deviation transformations to avoid autocorrelation concerns. Then, we obtain a reduced-form regression for the endogenous variable by considering higher lags as instruments. By replacing the predicted values into Equation (3), we apply the Hansen (1999) procedure to determine the value of the threshold. Finally, we estimate the slope parameters by utilizing a generalized method of moments (GMM) estimation procedure.

Table 4 presents the dynamic panel threshold estimation findings. The linearity test results imply that the thresholding effect of IFI is significant. The threshold level of IFI is about 145 for the full sample, 270 for AE, and 141 for EMDE. These threshold levels are almost the same as our earlier findings reported in Table 3. The impact of IFI is growth enhancing in the low regime for all equations. However, IFI decelerates growth in the high regime. These empirical findings suggest that IFI promotes growth up to a certain threshold level of IFI, beyond which IFI impedes growth.

The estimated parameter for lagged income per capita is positively significant. This might show that differences in income per capita are temporary, and they will be phased out in the long run. Human capital (HC) and growth have a positively significant relationship, although the estimated coefficients are almost the same in AE and EMDE. Accordingly, better educated labor leads to higher growth. This empirical result is consistent with Barro (2001) and Mankiw et al. (1992), showing that human capital is one of the indispensable components of growth.

The conventional literature suggests that better governance is related to better accountability, legal infrastructure, property rights and transparency. According to the World Trade Organization (2004), a better institutional environment might also represent effectively functioning markets, less information asymmetry and risk, as well as greater political accountability. Acemoglu et al. (2005) remark that economies with better governance can promote factor accumulation, stimulate innovative activities, and provide an efficient allocation of resources. Consistent with these arguments, our results indicate that an enhancement in governance increases economic growth.[6]

Our estimation results also indicate that higher trade openness leads to growth in both subsamples. The estimated parameter for trade openness is almost the same in AE and EMDE in terms of magnitude. This result is in line with Baldwin and Lopez-Gonzalez (2015) stating that trade

[6] According to Table 2, the mean of GOV is 0.513, 0.850, and 0.370, respectively, for the full sample, AE, and EMDE. The mean of governance is much lower in EMDE than in AE. The evidence reported in Table 4 indicates that the effect of governance on growth is slightly higher (lower) in AE (EMDE). Chen and Quang (2014) and Yolcu Karadam and Öcal (2022) examine the growth impact of IFI conditional on the threshold level of structural domestic conditions, including institutional quality and governance. The findings in these studies indicate that IFI leads to higher growth in economies with better institutions. Rodrik and Subramanian (2009) remark that the conditional growth impact of IFI on the institutional quality should be interpreted with caution because it is not clear whether this is due to higher IFI or a better institutional environment.

openness is associated with higher productivity, greater labor specialization, an efficient allocation of capital, and higher growth.

The literature also maintains that financial development provides additional funds for resource-constrained firms and risk diversification and plays a leading role in investment and growth. In line with the conventional literature, our findings indicate that an improvement in financial development increases growth, except in AE. According to Table 2, the mean of financial development is much higher in AE than EMDE. Financial development appears to alleviate financial constraints for the latter and leads to higher growth. AE, by contrast, already have developed financial systems, and further increases in financial development do not have a significant growth effect.

5. Concluding remarks

This paper investigates whether the effect of IFI, *de facto* measure for financial openness, on growth is conditional on its level. According to conventional theory, the impacts of international financial openness are expansionary. However, the empirical literature does not provide persuasive evidence on the theoretical benefits of financial openness. The results of this paper strongly show that the level of financial integration matters in the IFI-growth relation.

Our empirical results, based on the Hansen (1999) and Kremer et al. (2013) procedures, suggest that IFI has a data-driven estimated threshold, which explains the association between IFI and growth. This implies that the sensitivity of growth to IFI is conditional on its level. In less financially integrated economies, the impact of IFI is expansionary. However, the effect of IFI is contractionary in more financially integrated economies. This empirical finding suggests that IFI encourages growth up to a certain threshold level of IFI, beyond which IFI diminishes growth. This also implies that less financially integrated economies can reap the theoretical gains of financial openness, but "too much" financial integration lowers growth when the level of IFI (as a percentage of GDP) exceeds almost 270 percent in AE and 140 percent in EMDE. These threshold levels are robust to different estimation procedures. Also, these threshold levels are robust to the incorporation or exclusion of conventional growth determinants.

Our results suggesting that a particular threshold level of financial integration is linked with growth are consistent with Lane (2013) and Didier et al. (2012). The results in this study are also consistent with those by Berkmen et al. (2012) and Claessens et al. (2010), which show that "too much" globalized economies, with financial and trade connections, suffered large collapses in growth during the global financial crisis. The evidence that "too much" IFI deters growth shows the crucial importance of macroeconomic policies that aimed at minimizing the side effects of financial openness.

The potential reasons of "too much" financial integration that diminishes growth may be related to the appreciation in real exchange rates and reduction in profitable investment projects as proposed by Rodrik and Subramanian (2009), premature deindustrialization as suggested by Bortz and Kaltenbrunner (2018), the global financial resource curse as indicated by Benigno et al. (2020, p. 915), and a surge in short-term capital flows such as debt and portfolio that has a deleterious effect on growth as reported by Bussiere and Fratzscher (2008).

Considering "too much" financial integration is related with lower growth, financing growth with domestic savings rather than external funds could lead to higher sustainable growth. To reap the theoretical growth benefits of financial integration, countries can regulate their financial system to make allocation of capital and risk more efficient. Most of the literature reports that FDI flows are the most beneficial type of capital flows because they enhance total factor productivity and the upgrading of technological capacity. Therefore, policies aimed at integration with FDI linkages can also contribute to reaping the growth benefits of financial openness.

Mishkin (2007, p. 262) notes: "The issue is thus not whether financial globalization is inherently good or bad, but whether it can be done right." Agénor (2003) and Bussiere and Fratzscher (2008) remark that policy makers can design policies that aim to minimize potential short-run pains, such as sudden stops and crises, and maximize the long-run gains of financial openness. The findings in this study suggest that it is not impossible to finance growth with IFI, but it could be risky, especially after a certain threshold level of financial integration.

Funding

No funding was received to assist with the preparation of this manuscript.

Declaration of competing interest

The author has no competing interests to declare that are relevant to the content of this article.

Acknowledgments

The author thanks the editors and anonymous referees for their valuable comments. The usual disclaimer applies.

Appendix.

A1. Panel Fixed Effects Threshold Estimation Procedure.

To analyze whether the level of IFI matters in the sensitivity of growth to IFI, we consider the following regression for unconditional growth:

$$\Delta RGDPpc_{it} = \mu_i + \alpha_1 IFI_{i,t-1} I(IFI_{i,t-1} \leq \lambda) + \alpha_2 IFI_{i,t-1} I(IFI_{i,t-1} > \lambda) + e1_{it} \tag{A1}$$

In Equation (A1), I(.) is the indicator function. Alternatively, Equation (A1) may be specified as:

$$\Delta \mathrm{RGDPpc}_{it} = \begin{cases} \mu_i + \alpha_1 IFI_{i,t-1} + e1_{it}, IFI_{i,t-1} \leq \lambda \\ \mu_i + \alpha_2 IFI_{i,t-1} + e1_{it}, IFI_{i,t-1} > \lambda \end{cases} \tag{A2}$$

We can specify the regime-dependent parameters in Equations (A1) and (A2) in compact form as follows:

$$IFI_{i,t-1}(\lambda)=\begin{pmatrix} IFI_{i,t-1}I(IFI_{i,t-1}\leq\lambda) \\ IFI_{i,t-1}I(IFI_{i,t-1}>\lambda) \end{pmatrix}$$

$$\alpha=(\alpha_1 \quad \alpha_2)'$$

So, Equations (A1) and (A2) may be characterized as:

$$\Delta RGDPpc_{it}=\mu_i+\alpha IFI_{i,t-1}(\lambda)+e1_{it} \tag{A3}$$

To identify the regime-dependent parameters, the explanatory and thresholding variables need to change over time. The independent and identical distribution (i.i.d.) assumption is maintained for the error term.

The initial step in the panel fixed effects threshold estimation technique consists of the elimination of country-specific fixed effects. The average Equation (A1) over time, t, leads to

$$\overline{\Delta RGDPpc_i}=\mu_i+\alpha\overline{IFI}_i(\lambda)+\overline{e}_i \tag{A4}$$

where $\overline{\Delta RGDPpc_i}=\frac{\sum_{t=1}^{T}\Delta RGDPpc_{it}}{T}$, $\overline{e}_i=\frac{\sum_{t=}^{T}e_{it}}{T}$

$$\overline{IFI}_i(\lambda)=\frac{\sum_{t=1}^{T}IFI_{i,t-1}(\lambda)}{T}=\begin{pmatrix} \frac{\sum_{t=1}^{T}IFI_{i,t-1}I(IFI_{i,t-1}\leq\lambda)}{T} \\ \frac{\sum_{t=1}^{T}IFI_{i,t-1}I(IFI_{i,t-1}>\lambda)}{T} \end{pmatrix}$$

The difference between Equations (A3) and (A4) is as follows:

$$\Delta RGDPpc^*_{it}=\alpha IFI^*_{i,t-1}(\lambda)+e^*_{it} \tag{A5}$$

where

$$\Delta RGDPpc^*_{it}=\Delta RGDPpc_{it}-\overline{\Delta RGDPpc_i}$$

$$IFI^*_{i,t-1}(\lambda)=IFI_{i,t-1}(\lambda)-\overline{IFI}_i(\lambda)$$

$$e^*_{it}=e_{it}-\overline{e}_i$$

When the data stacked over all countries, Equation (A5) becomes equivalent to

$$\Delta RGDPpc^*=IFI^*(\lambda)\alpha+e^* \tag{A6}$$

For any given threshold λ, the slope parameter α can be estimated by employing an ordinary least squares (OLS) estimation procedure. Thus,

$$\widehat{\alpha}(\lambda)=(IFI^*(\lambda)'IFI^*(\lambda))^{-1}IFI^*(\lambda)'\Delta RGDPpc^* \tag{A7}$$

The residual of the regression is

$$\widehat{e}^*(\lambda)=\Delta RGDPpc^*-IFI^*(\lambda)\widehat{\alpha}(\lambda)$$

and the sum of squared residuals is

$$S_1(\lambda)=\widehat{e}^*(\lambda)'\widehat{e}^*(\lambda)=\Delta RGDPpc^{*}{}'(I-IFI^*(\lambda)'(IFI^*(\lambda)'IFI^*(\lambda))^{-1}IFI^*(\lambda)')\Delta RGDPpc^* \tag{A8}$$

Hansen (1999) proposes the estimation of the threshold λ that minimize the residuals sum of the squared. Therefore, the OLS estimator of λ is

$$\widehat{\lambda}=arg\min_{\lambda}S_1(\lambda) \tag{A9}$$

To eliminate the possibility of having too few observations in one of the regimes, the threshold is filtered by trimming 1 percent or 5 percent of the data. After the threshold is determined, the slope parameter is estimated as $\widehat{\alpha}=\widehat{\alpha}(\widehat{\lambda})$ and the error term $\widehat{e}^*=\widehat{e}^*(\widehat{\lambda})$ and residual variance are:

$$\widehat{\sigma}^2=\frac{1}{n(T-1)}\widehat{e}^{*\prime}\widehat{e}^*=\frac{1}{n(T-1)}S_1(\widehat{\lambda}) \tag{A10}$$

Following the estimation of the threshold, we determine its statistical significance. The null hypothesis for doing so can be represented as follows:

$$H0: \alpha1=\alpha2$$

The threshold, λ, is unidentified under the null hypothesis. Hansen (1999) recommends setting a bootstrap technique to replicate the asymptotic distribution of the likelihood ratio test. The test of the null hypothesis, H0, is based on:

$$F=\frac{(S_0-S(\widehat{\lambda}))}{\widehat{\sigma}^2} \tag{A11}$$

The null hypothesis for maintaining the equality of the slope parameters and the superiority of the linear model over the nonlinear counterpart is rejected if the asymptotic p-value for F1 is lower than the critical value.

A2. Dynamic Panel Threshold Estimation Procedure.

To examine the threshold growth effect of IFI in a conditional growth regression, we consider:

$$ln(RGDPpc)_{i,t}=\mu_i+\alpha_1 ln(RGDPpc)_{i,t-1}+\alpha_2 IFI_{i,t}(IFI_{i,t}\leq\lambda)+\alpha_3 IFI_{i,t}(IFI_{i,t}>\lambda)+\alpha_4 HC_{it}+\alpha_5 GOV_{it}+\alpha_6 FD_{it}+\alpha_7 TRADE_{it}+e2_{it} \tag{A12}$$

The incorporation of lagged income per capita into Equation (A12) might raise endogeneity concerns and require the selection of an estimation procedure that explicitly considers the endogeneity, such as a dynamic panel threshold. Kremer et al. (2013) introduces a dynamic panel threshold method. To explain this estimation procedure, we specify Equation (A13) as follows:

$$ln(RGDPpc)_{it}=\mu_i+\alpha_1' z_{it}I(IFI_{it}\leq\lambda)+\alpha_2' z_{it}I(IFI_{it}>\lambda)+\varepsilon_{it} \tag{A13}$$

In Equation (A13), μ_i is the fixed effects, and the error term ε_{it} is supposed to have independent and identical distribution. I(.) is the indicator function, which splits the observations into low and high regimes. In Equation (A13), z_{it} is the vector of explanatory variables, containing the endogenous and lagged dependent variables. z_{it} is decomposed into z_{1it} including exogenous variables, and z_{2it}, containing endogenous variables.

The initial stage in Kremer et al. (2013) procedure consists of the removal of fixed effects through forward orthogonal deviation. For the error term, this conversion is given by:

$$\varepsilon_{it}^{*} = \sqrt{\frac{T-t}{T-t+1}}\left[\varepsilon_{it} - \frac{1}{T-t}\left(\varepsilon_{i(t+1)} + \ldots + \varepsilon_{iT}\right)\right] \quad \text{(A14)}$$

This transformation enables the uncorrelated error terms, e.g., $Var(\varepsilon_i) = \sigma^2 I_T \Rightarrow Var(\varepsilon_i^*) = \sigma^2 I_{T-1}$.

We obtain a reduced-form regression for the endogenous variables, z_{2it}, as a function of the instrumental variables. The endogenous variables are substituted with the predicted values $\widehat{z}_{2it}$. Then, for each threshold, λ, Equation (A13) is estimated with least squares by using the predicted values of endogenous variables. For each potential threshold, the equation is estimated and the observation that gives the minimum residuals sum of squared S(λ) is selected as the threshold. Following the determination of the threshold, λ, the slope parameters can be computed with the GMM method.

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