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Borsa İstanbul Review

Borsa İstanbul Review 22-4 (2022) 688–698

http://www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Full Length Article

Does financial development matter for economic growth in the emerging markets?☆

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Received 20 June 2021; revised 28 October 2021; accepted 28 October 2021

Available online 3 November 2021

Abstract

Despite an increasing focus on the nexus between finance and growth, little is known about the growth effect of financial development in emerging markets. Financial development is generally considered a multifaceted phenomenon. Unlike previous studies, which use a static panel model or focus on a single country, this paper uses the advanced dynamic common correlated estimator (DCCE) and a panel Granger-causality test. We use panel data on 22 emerging markets over the period 1980–2020. Our empirical findings confirm that static panel data model in previous studies can have misleading conclusions on the relationship between financial development and economic growth. Instead, our findings confirm that financial development has a positive effect on economic growth, and their relationship is linear. We also find solid bidirectional Granger causality between financial development and economic growth in all proxies for financial development.

Keywords: Causality; DCCE; Dynamic panel data; Economic growth; Emerging markets; Financial development

1. Introduction

The financial sector plays an increasing role in economic growth and development in the global economy. The financial operations of firms appear to rely on financial institutions. Firms in developing countries usually require capital from bank finance, whereas their counterparts in developed countries often obtain financial resources on financial markets (Ang, 2008a). Since the 1990s, various empirical studies have investigated the relationship between economic growth and financial development, following the seminal work of King and Levine (1993). However, the finance-growth theory was developed back in the 1950s.

Schumpeter (1911), one of the first scholars, examined the critical role of credit markets in economic growth and development. Schumpeter considers banks a key player in facilitating and intermediating savings, leading to capital accumulation, and supporting economic growth. Various scholars have supported the argument (Gurley and Shaw, 1955; Goldsmith, 1969 and Hicks, 1969). Notably, the significant contribution of financial development to economic growth was highlighted in studies by McKinnon (1973) and Shaw (1973). However, Schumpeter's argument has been challenged by many scholars. Robinson (1979) presents a different view on the finance-growth nexus, claiming that, in response to economic growth, evolution in financial sectors is essential. Banks and the financial markets respond to economic growth. They are not "inputs" to economic growth. Recently, the endogenous

☆ This research is funded by Vietnam National Foundation for Science and Technology Development under grant number 502.02-2019.321.

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Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

https://doi.org/10.1016/j.bir.2021.10.004

financial development and growth model has been discussed. This model has attracted significant attention from scholars. The essence of the model considers that, on the one hand, increasing growth will require more financial products/services. On the other hand, the growth in financial institutions will facilitate capital accumulation, leading to higher economic growth.

Various empirical studies have examined the relationship between financial development and economic growth at the cross-country or country level. Using the system generalized method of moments (SGMM), Ibrahim and Alagidede (2018) present the growth effect of financial development in 29 sub-Saharan African countries in 1980–2014. Similarly, Asteriou and Spanos (2019) find similar results in 26 European countries over the period 1990–2016. In contrast, using GMM, Cheng, Chien, and Lee (2020) conclude that financial development has a detrimental effect on economic growth in 72 countries over the period 2000–2015. At the country level, Abu-Bader and Abu-Qarn (2008) confirm bidirectional causality between financial development and growth in Egypt from 1960 to 2001. Uddin, Sjö, and Shahbaz (2013) confirm the positive effect of financial development on growth in Kenya, in the long run, using the autoregressive distributed lags (ARDL) approach. This finding is consistent with that of Samargandi, Fidrmuc, and Ghosh (2014) in Saudi Arabia. In another paper, Wolde-Rufael (2009) conclude that bidirectional causality exists between growth and financial development in Kenya. Hao, Wang, and Lee (2018) find unidirectional causality from economic growth to financial development in China.

Previous empirical studies have some shortcomings. First, previous empirical studies have mainly used panel data, which might offer more information than cross-sectional or time-series data. We believe that the static model, which is used in previous analyses, does not capture the dynamic nature of data, especially in economic growth (Samargandi, Fidrmuc, & Ghosh, 2015). Second, a few papers—such as Botev, Égert, and Jawadi (2019) and Lee and Chang (2009)—have used a dynamic model. However, their empirical findings from an estimation approach (GMM, DOLS) might not be robust because of the presence of cross-sectional dependence and slope homogeneity (Dong et al., 2018; Kar, Nazlioğlu, & Ağ;ir, 2011).

The conventional relationship between financial development and economic growth appears underexamined over the past two decades. For example, Edward (1999) and Harwood, Litan, and Pomerleano (1999) discuss the different effects of the financial crisis in emerging countries, especially Southeast Asian countries. The effect of the financial crisis from 1993 to 1997 in the Southeast Asian countries is shown by their current account deficits. Malaysia was the most affected country in the region, with a current account deficits of −4.9 percent of the gross domestic product (GDP) in 1997, whereas Singapore had a surplus in its current account, equaling 15.4 percent of GDP in the same year. Since then, the growth effect of financial development in emerging markets has been neglected. Empirical studies have focused on the effects of financial development on macroeconomic stability (Kim & Wu, 2008), the environmental impacts (Cetin & Bakirtas, 2020; Durusu-Ciftci, Soytas, & Nazlioglu, 2020; Sadorsky, 2010), the social contributions (Nguyen, Vu, Vo, & Ha, 2019), and many other topics. Krishnan (2011) discusses the role of financial development in India, an emerging market. However, few studies have investigated the finance-growth nexus in emerging countries.

Based on these considerations, this paper revisits the finance-growth nexus in emerging markets using advanced quantitative techniques and recent data. The paper makes four contributions to the existing literature. First, in revisiting the finance-growth nexus, we use a dynamic model, the dynamic common correlated estimator (DCCE). The DCCE model, which allows both cross-sectional dependence and slope heterogeneity, provides reliable estimates. Second, to capture the potential nonlinear relationship between financial development and economic growth, we consider both linear and quadratic models. Third, our study uses panel data on 22 emerging markets worldwide over the period 1980–2020. We believe that the finance-growth nexus has been underexamined in emerging markets, which are considered increasingly influential players in the global economy. Fourth, we employ various proxies for financial development, including the broad-based financial development index developed by the International Monetary Funds (IMF) (Svirydzenka, 2016) to investigate the finance-growth nexus in emerging markets and to enhance the robustness of the empirical findings.

The structure of this paper is as follows. Following this introduction, Section 2 discusses and synthesizes a review of the relevant literature. Section 3 presents the models adopted in this paper and the data. The estimation techniques are discussed in Section 4. Empirical findings are presented in Section 5, followed by the conclusions in Section 6.

2. The relationship between financial development and economic growth

The finance-growth nexus has been widely discussed in the economic development literature. Since the seminal paper by King and Levine (1993) was published, various empirical studies have examined the relationship between financial development and growth. However, empirical findings on this relationship are mixed. The differences in findings can be explained in part by the differences in the samples of countries, the research periods, and the quantitative techniques employed.

Tran, Walle, and Herwartz (2020) collect a firm-level dataset of more than 40,000 Vietnamese firms to investigate the impact of local financial development on firm growth, which is conditional on corruption. Their empirical findings confirm the growth impact of financial development. Using the GMM technique and various proxies for financial development, Nguyen, Brown, and Skully (2019) argue that the stock markets and bond markets support economic growth in middle-income countries. Their findings also show a positive effect of the bond market on economic growth in high-income countries. Ang (2008b) investigates the link between financial

Table 1
Definitions of the variables.

Variable	Definition	Proxy	Source
G	Economic growth	GDP per capita (constant 2010 US$)	WDI
GOV	Government Expenditure	The ratio between final government consumption expenditure and GDP	WDI
INF	A measurement of the overall level of prices in the economy	Percentage change in the cost to the average consumer of acquiring a basket of goods and services	IMF
HC	Human capital	Gross enrollment ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of secondary education	WDI
T	Trade openness	Sum of exports and imports of goods and services measured as a share of GDP	WDI
FD	Financial development	New broad-based index of financial development and other proxies	IMF

development and economic growth in Malaysia for the period 1960–2003. The results confirm a positive long-run impact of financial development on economic growth. Finally, Yang (2019) also confirms financial development's significant contributions to economic growth in middle-income and high-income countries. However, the positive effect of financial development on growth has been challenged by various scholars. Robinson (1979) argues that financial progress is mostly driven by economic growth, instead of being an input to economic growth. Lucas (1988) considers that financial sectors' critical role in economic growth is a stylized fact. Using assumptions of information symmetry and no transaction costs, Modigliani and Miller (1958) argue that the development of real sectors is irrelevant to financial sectors. Morck and Nakamura (1999) even argue that the banking sector has a negative effect on economic growth.

Recently, the endogenous financial development and growth model has been widely examined. This model assumes that a higher level of economic growth demands financial products/services, leading to increased access to financial markets, which support economic growth. Various empirical studies have been conducted using the endogenous financial development and growth model. For example, Shahbaz, Khan, and Tahir (2013) investigate the dynamic links between growth, energy consumption, financial development, and trade using a multivariate framework analysis. Their findings confirm a long-run relationship between these variables using ARDL bounds testing. Their findings also confirm bidirectional causality between financial development and economic growth. Furthermore, using the Toda and Yamamoto test, Wolde-Rufael (2009) finds bidirectional Granger causality between growth and the financial sector. Finally, Pradhan, Arvin, Nair, Bennett, and Hall (2018) show bidirectional causality between growth and financial development for a sample of 35 countries over the period 1961–2015.

Other studies have also discussed the growth effect of financial development indirectly. Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) discuss the essential roles of finance in different ways. Their findings indicate that financial development plays a vital role in ensuring the important contribution of foreign direct investment (FDI) to economic growth. Kutan, Samargandi, and Sohag (2017), by contrast, examine the finance-growth nexus with a focus on the important roles of FDI and institutional quality in the Middle East and North African (MENA) countries. Findings in their paper confirm a positive contribution of financial development to economic growth in these countries. Finally, Slesman, Baharumshah, and Wohar (2015) find inconsistent effects of

Table 2
Descriptive statistics.

	Observations	Mean	Median	Min	Max
G	769	2.781	3.092	−14.350	13.636
ΔG	767	0.050	0.019	−18.701	16.671
GOV	769	13.818	12.893	5.693	27.685
ΔGOV	768	0.0239	0	−5.687	6.181
INF	769	28.552	5.818	−4.863	7481.664
ΔINF	766	−1.562	−0.158	−7072.133	4082.985
HC	769	76.235	81.872	16.992	120.651
ΔHC	767	1.046	0.577	−18.711	38.333
T	769	52.597	3.251	12.219	220.407
ΔT	768	0.697	0.451	−41.878	40.192
FD	769	0.389	0.372	0.082	0.868
ΔFD	755	0.006	0.004	−0.174	0.120

G is economic growth, GOV is government expenditure, INF is inflation, HC is human capital, and FD is financial development. Δ denotes the first difference.

Table 3
Results from Pesaran's CD test of cross-sectional dependence.

Variable	G	GOV	INF	HC	T	FD	FD^2
CD test	15.185[a]	4.795[a]	31.338[a]	62.419[a]	22.309[a]	55[a]	53.275[a]
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The null hypothesis is of cross-sectional independence. G is economic growth, GOV is government expenditure, INF is inflation, HC is human capital, and FD is financial development.
[a] Significant at the 1 percent confidence level.

Table 4
Results of the slope homogeneity test.

	Slope homogeneity test	
	Δ	Δ_{adj}
Equation (1)	10.497[a] (0.000)	12.863[a] (0.000)
Equation (2)	10.497[a] (0.000)	12.863[a] (0.000)

[a] Is statistically significant at 1%.

Table 5
Results from panel unit-root test.

Variable	Level	First Difference			Order of Integration
	Constant (1)	Constant & Trend (2)	Constant (3)	Constant & Trend (4)	
G	0.816 (0.793)	1.294 (0.902)	−15.765[a] (0.000)	−13.825[a] (0.000)	I(1)
GOV	−1.149 (0.125)	0.793 (0.786)	−8.837[a] (0.001)	−6.550[a] (0.000)	I(1)
INF	−0.899 (0.184)	0.850 (0.802)	−8.276[a] (0.000)	−6.022[a] (0.000)	I(1)
HC	1.229 (0.890)	2.543 (0.995)	−10.068[a] (0.000)	−8.285[a] (0.000)	I(1)
T	−0.464 (0.321)	1.180 (0.881)	−10.020[a] (0.000)	−8.581[a] (0.000)	I(1)
FD	−1.193 (0.166)	−0.103 (0.459)	−8.536[a] (0.000)	−7.010[a] (0.000)	I(1)
FD^2	−0.685 (0.247)	0.884 (0.812)	−7.612[a] (0.000)	−5.791[a] (0.000)	I(1)

The p-values are reported in parentheses. The Z[t-bar] is reported.
The null hypothesis assumes that all series are nonstationary. G is economic growth, GOV is government expenditure, INF is inflation, HC is human capital, and FD is financial development.
[a] Significant at the 1 percent level.

capital flows on economic growth, depending on the level of institutional quality. They conclude that institutional quality is important for the efficient use of foreign capital flows to support economic growth in middle-income countries and for avoiding the middle-income trap.

Our literature review indicates that various studies have investigated the finance-growth nexus. However, previous analyses focus mainly on the effect of financial development on economic growth in developed countries or groups of countries in the Organization for Economic Cooperation or MENA. In addition, previous studies employ static models, which may result in misleading findings and conclusions. These shortcomings provide the basis for our paper.

3. Model and data

3.1. Model

The following model is used to examine the relationship between financial development and economic growth in emerging markets (Adu, Marbuah, & Mensah, 2013; Asteriou & Spanos, 2019; Hassan, Sanchez, & Yu, 2011; Nguyen, Vo, Ho, & Vo, 2021; Samargandi et al., 2015; Vo, 2021; Vo, Tran, & Nguyen, 2021):

$$G_{it} = \alpha_i + \beta_1 G_{it-1} + \beta_2 GOV_{it} + \beta_3 INF_{it} + \beta_4 HC_{it} + \beta_3 T_{it} + \beta_4 FD_{it} + \varepsilon_{it} \quad (1)$$

where G denotes economic growth, GOV represents government expenditure, INF is inflation, HC denotes human capital, FD denotes financial development, and ε is an error term.

Examinations of the growth effect of financial development have yielded mixed findings. Various scholars believe that the impact of financial development on economic growth is monotonic. However, others find an inverted U-shaped relationship between growth and financial development (Samargandi et al., 2015). In particular, Samargandi et al. argue that the development of the financial sector supports economic growth up to a certain threshold. We examine this recently emerged hypothesis on the relationship between financial development and economic growth as follows:

Table 6
Results of the cointegration test.

	Equation 1	Equation 2
Pedroni		
Modified Phillips-Perron t	−3.495[b] (0.00)	−1.740[a] (0.04)
Phillips-Perron t	−13.549[b] (0.00)	−12.403[b] (0.00)
Augmented Dickey-Fuller t	−13.598[b] (0.00)	−12.826[b] (0.00)
Kao		
Modified Dickey-Fuller t	−30.793[b] (0.00)	−30.393[b] (0.00)
Dickey-Fuller t	−23.567[b] (0.00)	−23.158[b] (0.00)
Augmented Dickey-Fuller t	−15.172[b] (0.00)	−15.170[b] (0.00)
Unadjusted modified Dickey-Fuller t	−43.076[b] (0.00)	−42.538[b] (0.00)
Unadjusted Dickey-Fuller t	−24.583[b] (0.00)	−24.179[b] (0.00)
Westerlund		
Variance Ratio	−3.1675[b] (0.00)	−3.1792[b] (0.00)

[a] Significant at the 5 percent level.
[b] Significant at the 1 percent level.

Table 7
The effect of financial development on economic growth using the DCCE method.

	Equation (1)	Equation (2)
G^{-1}	0.019 (0.715)	−0.027 (0.578)
GOV	−0.796[a] (0.083)	−0.871[a] (0.091)
INF	−0.149[c] (0.002)	−0.111[b] (0.023)
HC	−0.034 (0.427)	−0.027 (0.515)
T	0.062 (0.103)	0.061 (0.167)
FD	2.467[a] (0.097)	46.379[a] (0.071)
FD^2	–	35.100 (0.411)
Number of observations	747	747
R^2 (Mean group)	0.62	0.62

[a] Significant at the 10 percent level.
[b] Significant at the 5 percent level.
[c] Significant at the 1 percent level. G is economic growth, GOV is government expenditure, INF is inflation, HC is human capital, and FD is financial development.

$$G_{it} = \alpha_i + \beta_1 G_{it-1} + \beta_2 GOV_{it} + \beta_3 INF_{it} + \beta_4 HC_{it} + \beta_3 T_{it} + \beta_4 FD_{it} + \beta_5 FD_{it}^2 + \varepsilon_{it} \quad (2)$$

We expect that β_4 is statistically significant, and β_5 is negative and statistically significant, supporting the hypothesis.

3.2. Data

The data for the period 1980–2020 are collected from the World Development Indicators (WDI), from the World Bank and the IMF. Our dataset consists of 22 emerging markets: Brazil, Chile, China, Colombia, Czechia, Egypt, Greece, Hungary, India, Indonesia, Korea, Mexico, Malaysia, Pakistan, Peru, the Philippines, Poland, Qatar, Russia, South Africa, Thailand, and Turkey. Details on the variables are in Table 1. Descriptive statistics are in Table 2.

The descriptive statistics of the variables are shown in Table 2. The highest and lowest levels are achieved at 13.636 percent and −14.350 percent for economic growth in the sample countries. The highest mean value of financial development is 0.389, and it has a minimum of 0.082, a maximum value of 0.868, and a median value of 0.372.

Table 8
Empirical results on causality using the Dumitrescu and Hurlin test.

Hypothesis	Z-bar	Z-bar tilde	Conclusion
GOV → G	5.4270[b] (0.00)	3.7497[b] (0.00)	Bidirectional causality
G → GOV	6.6838[b] (0.00)	4.7413[b] (0.00)	between government expenditure and economic growth
INF → G	5.1906[b] (0.00)	3.5632[b] (0.00)	Bidirectional causality
G → INF	26.8895[b] (0.00)	20.6823[b] (0.00)	between inflation and economic growth
HC → G	14.2500[b] (0.00)	10.7105[b] (0.00)	Bidirectional causality
G → HC	3.3535[b] (0.00)	2.1138[b] (0.03)	between human capital and economic growth
T → G	12.8447[b] (0.00)	9.6018[b] (0.00)	Bidirectional causality
G → T	3.8270[b] (0.00)	2.4874[b] (0.01)	between trade and economic growth
FD → G	5.1781[b] (0.00)	3.5533[b] (0.00)	Bidirectional causality
G → FD	2.2933[a] (0.02)	1.8948[b] (0.05)	between financial development and economic growth
INF → GOV	10.6565[b] (0.00)	7.8754[b] (0.00)	Bidirectional causality
GOV → INF	3.6161[b] (0.00)	2.3210[b] (0.02)	between inflation and government expenditure
HC → GOV	4.4210[b] (0.00)	2.9560[b] (0.00)	Bidirectional causality
GOV → HC	4.5603[b] (0.00)	3.0659[b] (0.00)	between human capital and government expenditure
T → GOV	14.5619[b] (0.00)	10.9566[b] (0.00)	Bidirectional causality
GOV→ T	7.897[b] (0.00)	5.6988[b] (0.00)	between trade and government expenditure
FD → GOV	5.4537[b] (0.00)	3.7708[b] (0.00)	Bidirectional causality
GOV → FD	2.3164[a] (0.02)	1.9156[b] (0.05)	between financial development and government expenditure
HC → INF	8.3699[b] (0.00)	6.0714[b] (0.00)	Bidirectional causality
INF → HC	2.9344[b] (0.00)	1.7832[b] (0.07)	between human capital and inflation
T → INF	8.8119[b] (0.00)	6.4202[b] (0.00)	Bidirectional causality
INF → T	7.5198[b] (0.00)	5.4008[b] (0.00)	between trade and inflation
FD → INF	5.8632[b] (0.00)	4.0938[b] (0.00)	Bidirectional causality
INF → FD	3.7069[b] (0.00)	3.1714[b] (0.00)	between financial development and inflation
T → HC	9.4802[b] (0.00)	6.9474[b] (0.00)	Bidirectional causality
HC → T	4.5320[b] (0.00)	3.0436[b] (0.00)	between trade and human capital
FD → HC	13.8305[b] (0.00)	10.3796[b] (0.00)	Bidirectional causality
HC → FD	6.2435[b] (0.00)	5.4621[b] (0.00)	between financial development and human capital
FD → T	7.5931[b] (0.00)	5.4586[b] (0.00)	Bidirectional causality
T → FD	2.9495[b] (0.00)	2.4874[a] (0.01)	between financial development and trade

A → B denotes unidirectional Granger causality running from A to B.
G is economic growth, GOV is government expenditure, INF is inflation, HC is human capital, and FD is financial development.
[a] Significant at the 5 percent level.
[b] Significant at the 1 percent level.

4. Empirical findings

Panel data, especially panel data across countries, often have various issues, such as cross-sectional dependence and slope homogeneity. The problem of cross-sectional dependence might be the result of increasing economic integration. For example, variations in economic growth among country members of free trade agreements appear to be correlated. As such, the economic volatility in a particular member country can affect other countries. Slope heterogeneity exists because of country-specific characteristics. Estimation techniques that ignore these issues have inconsistent estimates and, as a result, misleading conclusions. During our estimation process, we conduct a cross-sectional dependence test and a slope homogeneity test. Next, we use a second-generation panel unit-root test and a panel cointegration test, which allow cross-sectional dependence. We use the DCCE technique is because this advanced method takes cross-sectional dependence and slope heterogeneity into consideration. Finally, we perform a panel test of Granger causality using the Dumitrescu and Hurlin (2012) method to identify the directions of causality (details on these tests are in the Supplementary Material, available online). The next section presents and discusses the empirical findings from various tests.

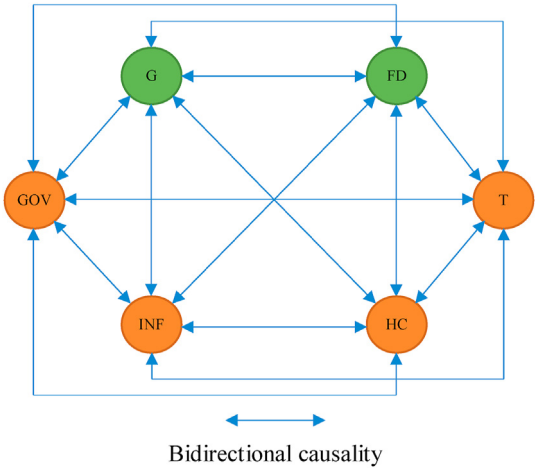

Fig. 1. Causality relationship flows.

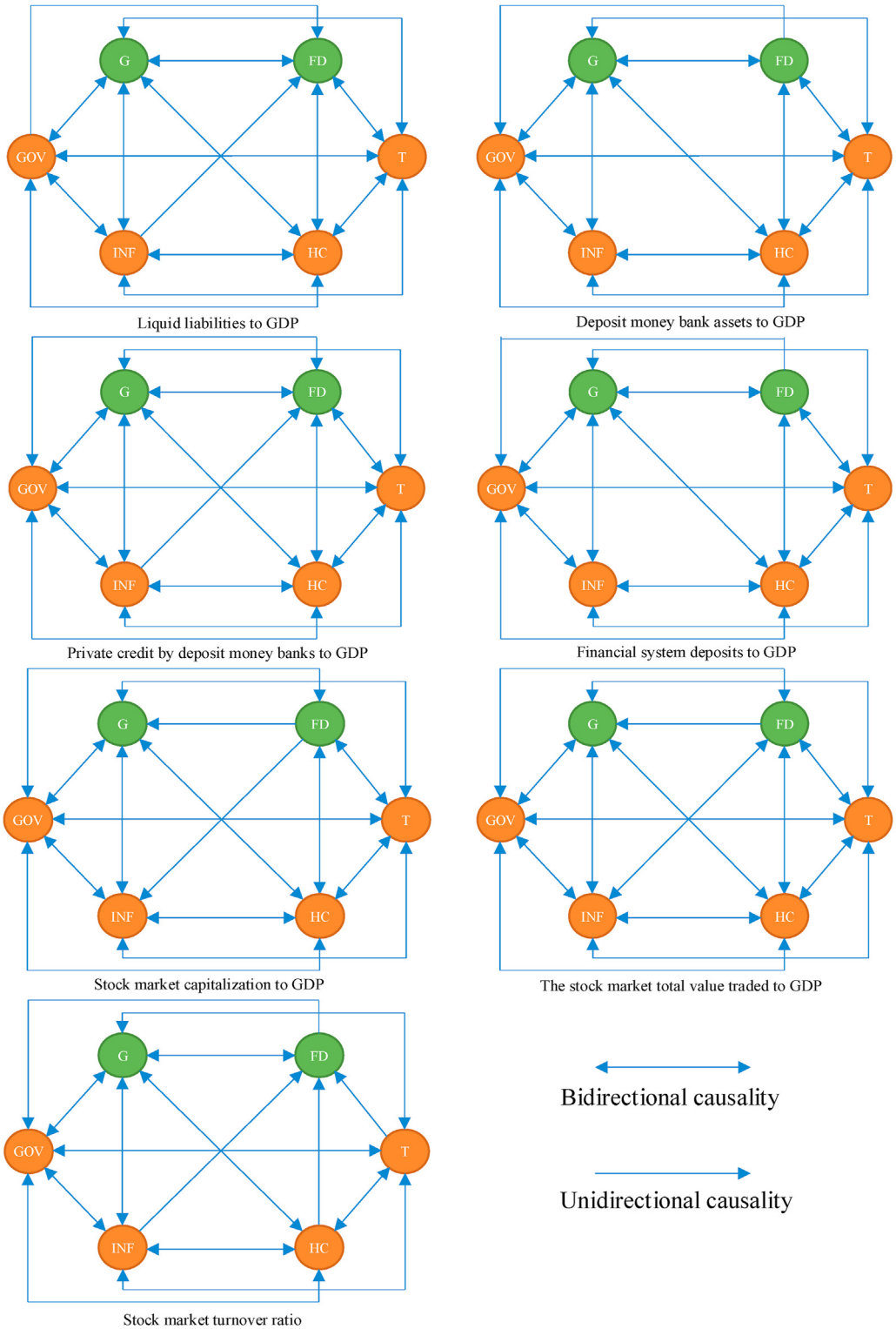

Fig. 2. The causality relationship flows for each of the seven proxies for financial development.

4.1. Empirical findings from the cross-sectional dependence test

The empirical results, shown in Table 3, indicate that the null hypothesis of cross-sectional independence is rejected at the 1 percent significance level. This finding confirms that the residuals are autocorrelated. As such, we consider that the estimations allowing for cross-sectional dependence are appropriate in this study.

4.2. Empirical findings from the slope homogeneity test

In this section, we conduct the slope homogeneity test. The empirical results, shown in Table 4, suggest that the null hypothesis of slope homogeneity is rejected by the Δ and Δ_{adj} statistics, implying the presence of slope heterogeneity. As such, the methods used in this paper should consider cross-sectional dependence and slope homogeneity.

4.3. Empirical findings from the panel unit-root test

Next, we conduct the unit-root tests proposed by Pesaran (2007) to examine the stationarity and determine the integration order of the variables used in this paper. The empirical results reported in Table 5 reveal that all the variables have a unit root at level. However, all variables used in our analysis become stationary when the first differences are considered. Overall, our results suggest that the variables employed are integrated at I(1). A long-run equilibrium relationship between the variables may be present.

4.4. Empirical findings from the cointegration test

Following the empirical result that all the employed variables are integrated at I(1), this study employs various panel cointegration tests developed by Kao (1999), Pedroni (1999, 2004), and Westerlund (2005) to examine the existence of a long-run equilibrium relationship between the variables. The empirical results, presented in Table 6, confirm that the null hypothesis of no cointegration is rejected at the 1 percent significance level. Thus, all panels are cointegrated, or a long-run equilibrium relationship exists between variables. Additionally, a long-run equilibrium relationship indicates Granger causality should be considered in this study.

4.5. Empirical results using the dynamic common correlated estimator (DCCE)

In this section, we present the estimates using the Dynamic Common Correlated Estimator (DCCE) method. Compared to other long-run estimators, the DCCE is appropriate for dynamic panel data. The DCCE method allows both cross-sectional dependence and slope heterogeneity. The empirical results are presented in Table 7, indicating that the coefficient of financial development is statistically significant for Eqs. (1) and (2). However, the squared term of financial development is not. As such, these results confirm a linear relationship between financial development and economic growth in 22 emerging markets in our sample in 1980–2020.

4.6. Empirical findings from the Granger-causality tests

In this section, we perform the Dumitrescu and Hurlin (2012) panel Granger-causality test to identify the directions of causality between variables. We use this test because our empirical results discussed in Section 5.5 confirm a long-run equilibrium relationship between the variables. The findings in Table 8 indicate bidirectional causality for each pair of variables. For convenience, Figs. 1 and 2 summarize the results on causality.

Table 9
Descriptive statistics for various proxies for financial development.

	Observations	Mean	Median	Min	Max
LLGDP	898	50.126	41.920	6.125	197.996
ΔLLGDP	896	1.151	0.767	−27.292	38.427
DBAGPP	888	53.480	44.766	2.018	174.534
ΔDBAGPP	885	1.393	0.898	−26.604	44.646
PCRDBGDP	888	41.786	30.738	2.627	163.210
ΔPCRDBGDP	885	1.035	0.734	−25.519	22.095
FDGDP	888	41.704	35.494	6.026	128.839
ΔFDGDP	885	1.046	0.693	−26.974	39.160
STMKTCAPGDP	664	50.569	33.072	0.0124	328.360
ΔSTMKTCAPGDP	645	0.521	0.451	−73.193	97.465
STVALTRADEDGDP	706	22.808	10.087	0.071	249.173
ΔSTVALTRADEDGDP	687	0.917	0.067	−104.487	136.942
STTURNOVER	660	62.809	37.019	0.350	556.912
ΔSTTURNOVER	641	−0.621	0	−530.806	317.765

LLGDP is the ratio of liquid liabilities to GDP. DBAGPP is the ratio of deposit money bank assets to GDP. PCRDBGDP is the ratio of private credit by deposit money banks to GDP. FDGDP is the ratio of financial system deposits to GDP. STMKTCAPGDP denotes stock is the ratio of capitalization to GDP. STVALTRADEDGDP is the ratio of stock market total value traded to GDP. STTURNOVER is the stock market turnover ratio. Δ denotes first differences.

Table 10
Results of the robustness checks using seven alternative proxies for financial development.

	Liquid liabilities to GDP		Deposit money bank assets to GDP		Private credit by deposit money banks to GDP		Financial system deposits to GDP		Stock market capitalization to GDP		Stock market total value traded to GDP		Stock market turnover ratio	
	Eq (1)	Eq (2)	Eq (1)	Eq (2)	Eq (1)	Eq (2)	Eq (1)	Eq (2)	Eq (1)	Eq (2)	Eq (1)	Eq (2)	Eq (1)	Eq (2)
G^{-1}	−0.005	−0.039	−0.035	−0.085	−0.042	−0.091[a]	−0.017	−0.030	−0.109[b]	−0.159[b]	0.005	−0.051	−0.026	0.004
	(0.913)	(0.524)	(0.564)	(0.151)	(0.453)	(0.068)	(0.776)	(0.622)	(0.045)	(0.034)	(0.933)	(0.304)	(0.643)	(0.937)
GOV	−0.482[b]	−0.618[b]	−0.324	−0.258	−0.241	−0.317	−0.816[a]	−1.214	−0.640[a]	−0.511	−0.455	−0.660[b]	−0.334	−0.683
	(0.027)	(0.018)	(0.208)	(0.294)	(0.316)	(0.198)	(0.076)	(0.105)	(0.051)	(0.354)	(0.154)	(0.014)	(0.586)	(0.029)
INF	−0.149[c]	−0.161[b]	−0.184[c]	−0.168[c]	−0.177[c]	−0.154[b]	−0.081[b]	−0.077	−0.122[a]	−0.074	−0.059	−0.143[c]	−0.407[b]	−0.235[c]
	(0.002)	(0.012)	(0.002)	(0.008)	(0.002)	(0.015)	(0.027)	(0.238)	(0.069)	(0.351)	(0.576)	(0.004)	(0.028)	(0.002)
HC	−0.043	−0.060	−0.078	−0.063	−0.060[b]	−0.048	−0.024	−0.023	−0.038	−0.047	0.136	−0.013	−0.023	−0.019
	(0.282)	(0.216)	(0.104)	(0.230)	(0.080)	(0.288)	(0.562)	(0.682)	(0.378)	(0.366)	(0.398)	(0.765)	(0.529)	(0.621)
T	0.051	0.071[b]	0.063[a]	0.086[b]	0.051	0.048	−0.016	−0.015	−0.080	−0.182	−0.093	0.039	0.052	0.082[a]
	(0.107)	(0.026)	(0.062)	(0.013)	(0.122)	(0.152)	(0.763)	(0.830)	(0.441)	(0.390)	(0.494)	(0.298)	(0.175)	(0.064)
FD	0.074	0.317	0.096[b]	0.086	0.119[c]	0.007	0.140[a]	0.420	0.041	0.032	0.090[c]	0.009	0.026	0.002
	(0.255)	(0.261)	(0.039)	(0.558)	(0.001)	(0.964)	(0.062)	(0.240)	(0.345)	(0.828)	(0.004)	(0.954)	(0.292)	(0.938)
FD^2	–	0.001	–	0.000	–	−0.001	–	0.003(0.354)	–	0.000	–	−0.004	–	0.000
		(0.527)		(0.813)		(0.560)				(0.653)		(0.767)		(0.548)
No. Obs.	876	876	866	866	866	866	866	866	642	642	684	670	638	624
R^2	0.55	0.58	0.61	0.62	0.60	0.62	0.57	0.60	0.76	0.78	0.70	0.71	0.74	0.74

G is economic growth. GOV is government expenditure. INF is inflation. HC is human capital. FD is financial development.
[a] Significant at the 10 percent level.
[b] Significant at the 5 percent level.
[c] Significant at the 1 percent level.

4.7. Extended analysis for a robustness check

So far, we have used the financial development index, which proxies for the level of financial development for each emerging market in the sample, as reported by the IMF. We consider this choice arbitrary. Financial development is a multifaceted phenomenon (Nguyen, Vu, et al., 2019). As such, in this section, we employ other indicators as proxies for financial development in addition to the financial development index reported by the IMF. The following seven alternative proxies for financial development are used in our extended analysis: (1) the ratio of liquid liabilities to GDP; (2) the ratio of deposit money bank assets to GDP; (3) the ratio of private credit by deposit money banks to GDP; (4) the ratio of financial system deposits to GDP; (5) the ratio of stock market capitalization to GDP; (6) the ratio of stock market total value traded to GDP; and (7) the stock market turnover ratio. For each of them, we re-estimate Eqs. (1) and (2) using the DCCE method. The summary statistics for the proxies are in Table 9. Table 10 summarizes the results of the growth effect of financial development for each of the seven proxies using Eqs. (1) and (2). Overall, the empirical findings indicate that the growth effect of financial development is linear. The empirical findings from our analysis for the sample of 22 emerging countries for the period 1980–2020 do not establish a nonlinear relationship between financial development and economic growth. Financial development is found have positive effect on economic growth in emerging markets, and this relationship is linear.

We use the Dumitrescu and Hurlin (2012) panel Granger-causality test to gain deeper insights into the direction of causality. Details on these estimates are available on request. Overall, we find bidirectional causality between financial development and economic growth regardless of the proxy for financial development.

5. Conclusion and policy implications

This paper revisits the impact of financial development on economic growth using panel data on 22 emerging markets over the period 1980–2020. Unlike previous papers, this study uses an advanced DCCE, rather than static models as in previous empirical studies. Various tests are used to detect the fundamental issues arising from panel data analysis, including cross-sectional dependence and slope heterogeneity. In addition, we use the second-generation Dumitrescu and Hurlin (2012) panel Granger-causality tests to identify the direction of causality among the variables used in our analysis.

The empirical results of this study can be summarized as follows. First, our empirical results confirm cross-sectional dependence and the slope heterogeneity in our sample. Ignoring these fundamental issues in the panel data analysis can result in misleading conclusions concerning the relationship between financial development and economic growth. As such, a dynamic method such as the DCCE should be used. Second, a long-run relationship between financial development and economic growth is found for the 22 emerging markets in our sample during the period studied. Third, financial development is found to have a linear relationship with economic growth. Thus, financial development generally has a positive effect on economic growth in emerging markets. Fourth, bidirectional causality between financial development and growth is found when the IMF's broad-based index is used to proxy for financial development. This bidirectional causality is also found in five of the seven alternative proxies for financial development in our extended analysis to enhance the robustness of the findings.

Our findings confirm that financial development and economic growth are integrated, and they cannot be separated. Findings from the bidirectional causality analysis between financial development and economic growth imply that policies supporting financial development also support economic growth in emerging markets. As a result, for emerging markets, extending financial development appears to be an effective way to support economic growth. Economic growth then further supports financial development. However, the linear and positive effect of financial development on economic growth requires a well-rounded approach by governments in emerging markets to ensure that financial development will not undermine economic growth. We also note that unidirectional causality from financial development to economic growth is found when the proxy for financial development is the ratio of stock market total value traded to GDP. This finding implies that policies supporting domestic stock markets support economic growth in emerging markets.

Our findings confirm cross-sectional dependence and slope heterogeneity in panel data analysis when the relationship between financial development and economic growth is examined. As such, dynamic estimation methods, such as the DCCE used in this paper, should be considered. Furthermore, empirical studies in the future should extend the current analysis by considering the effects in the short and long run simultaneously. In addition, the mean reversion of the degree of financial development should also be considered.

Conflict of interest

This article has no financial nor non-financial conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bir.2021.10.004.

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