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THE NEXUS OF FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH ACROSS DEVELOPING ECONOMIES

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Abstract

The relationship between financial development and economic growth has been discussed in the literature, but there is no consensus on it. This study aims to examine the relationship between financial development and economic growth in terms of developing countries. The data of 19 developing countries were analyzed individually in an attempt to reveal which of the views explaining the relationship between financial development and economic growth is predominantly valid. In the analysis, the bounds test developed by Pesaran et al. (2001) was used to determine the cointegration relationship, and the Toda Yamamoto causality test (1995) was used to determine the causality relationship. As a result, causality was determined from economic growth to financial development in four countries and from financial development to economic growth in four countries. In 11 countries, no causality was found. The results support the view that no approach is valid for every country.

Keywords: *Financial development, economic growth, developing countries, Bounds test, Toda Yamamoto causality test*

JEL classification: *O11, O16, O57*

1. Introduction

The relationship between financial development and economic growth is one of the topics that has been frequently discussed in the economics literature recently. The financial markets of countries and the development of these markets are very important in terms of countries' growth performance. The relationship between financial development and economic growth is one of the most widely discussed aspects in the literature. The debate regarding whether economic growth leads to financial development or economic growth leads to finance is very old. The literature on the relationship between financial development and economic growth is quite extensive, but there is no consensus on this issue. The findings of empirical studies are contradictory and varied in both the long and short term.

This study aims to reveal the causal relationships between financial development and economic growth by obtaining empirical evidence from

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developing country data. In this study, country data were evaluated one by one, and whether there was a generalizable relationship for all developing countries was investigated. In this respect, the study differs from other studies that are generally conducted using panel models. As the result of the study, it was determined that the relationship between financial development and economic growth does not occur in the same way in every developing country. Findings supporting different hypotheses have been reached for different countries.

The rest of this paper is organized as follows. In the Literature Survey, studies on the relationship between financial development and economic growth are explained within the framework of theoretical views on this subject. The Data section describes the dataset used in the study. The Empirical Evidence section introduces the model used for cointegration and causality tests in the study. The Empirical Evidence section reports the empirical results. The paper ends with the Concluding Remarks section.

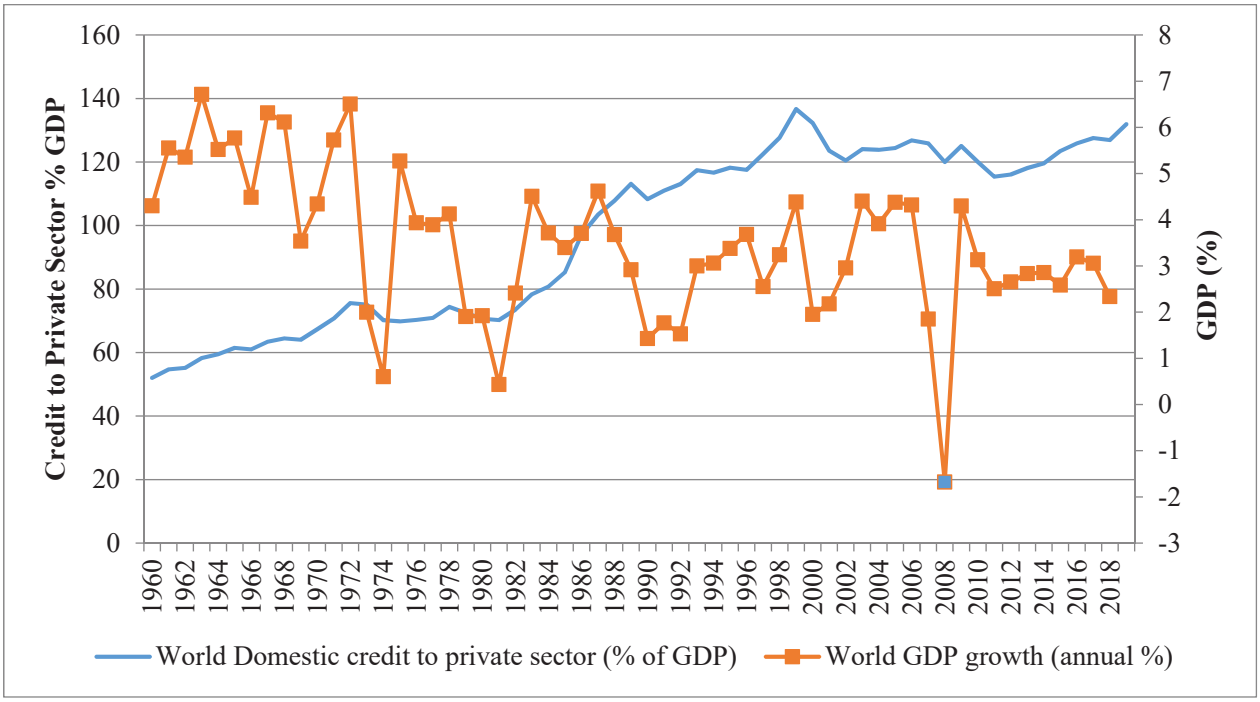
2. Literature

Graph 1 shows the movement of financial development and economic growth in the world for fifty years. It may be seen that while the variables often act together, in some periods they act independently.

The causality relationship between financial development and economic growth is explained within the framework of different approaches based on different theoretical mechanisms. According to the direction of the causality relationship, these approaches are labeled supply-leading, feedback, and neutrality hypotheses.

Existing research on the relationship between financial development and economic growth in the literature has yielded different results. The first study on the subject was carried out by Schumpeter (1912) who stated that the banking system is a very important factor for economic growth because of its role in allocating savings, promoting innovation, and financing productive investments. He also stated that a financial system with a well-functioning lending

Graph 1. Financial Development and Economic Growth in the World (1960 – 2019)*



*Drawn by the author with World Bank data

process will support R&D and innovation activities and accelerate economic growth. He claimed that the proper functioning of the financial system accelerates the level of technological innovations by providing financial opportunities. Financial development interacts with the concept of productivity, which leads to growth in real GDP per capita and an increase in capital accumulation.

The demand-following hypothesis by Robinson (1952) stated that the causality relationship is from economic growth to financial development. In this hypothesis, it is suggested that economic growth and the resulting increase in income level creates a demand pressure that supports the development of financial institutions, assets, and services. The development of the financial system depends on the increasing demand for the services offered by financial intermediaries. The demand for financial services belongs to the real sector. As the real sector grows, its demand for financial services grows. In other words, as economic growth increases, the financial sector develops. Also, there is a relationship between the size of financial services and their cost. As financial services increase, their costs decrease. This is because a significant portion of the total cost of financial services consists of fixed costs. The fact that the increase in the number of financial service sales may lower the average cost is a factor that increases competition between companies. Since the demand for financial services will remain constant during periods of non-economic growth, the cost of financial services does not change. However, growth and demand increases bring down the prices of financial services and provide an additional increase for the demand for financial services. The findings of Goldsmith (1969), Jung (1986), Kar and Pentecost (2000), Thangavelu, Jiunn and James (2004), Ang and Mc Kibbin (2007), Akinlo and Akinlo (2009), Kandır, İskenderoğlu and Önal (2007), Zang and Kim (2007), Odhiambo (2010), Hassan, Sanchez and Yu (2011), Kar, Nazlıoğlu and Ağır (2011), Athanasios and Antonios (2012), Adeyeye et al. (2015) supported the demand-following hypothesis.

Patrick (1966) revealed that there may be two relationship models in opposition to each other between financial development and economic growth. The first relationship is called the demand-following hypothesis and describes a movement from economic growth to financial development. Accordingly, economic growth offers new opportunities for entrepreneurs. Entrepreneurs need outsourcing to take advantage of opportunities and increase their demand for financial services. According to Patrick (1966), this relationship can be observed in countries in which financial systems have not developed or are not sufficiently developed. As financial systems develop, the direction of the relationship can change.

The second relationship is called the supply-leading hypothesis. With the establishment of modern financial systems, the financial sector could become the engine of growth. Modern financial systems work effectively and shift resources from traditional sectors to modern sectors. Incorrect investment decisions are minimized by providing effective surveillance, supervision, and support services in active financial markets. Financial investments are directed towards more productive areas, and productivity increase is achieved. The level of development of the financial system may differ according to the individual country. Developed countries generally have more efficient financial markets. Ownership and contractual rights are well defined, and banks and other financial institutions are working and audited by the rule of law. Therefore, a causality relationship from financial development to economic growth is more likely to occur in developed countries. In countries where the financial market has just begun to form, a relationship from growth to financial development seems more reasonable. Both hypotheses may be valid for countries at intermediate levels in terms of economic and financial development. In other words, two opposing relationships can be observed between financial development and economic growth in some countries. Based on Schumpeter's (1912) view, Patrick's (1966) supply-leading hypothesis argues that, in a financially developed economy, resources are transferred to more productive sectors, which increases economic growth. In this hypothesis, the functions of financial markets and intermediaries based on an increase in efficiency in capital accumulation and resource allocation are contemplated. McKinnon (1973), Shaw (1973), Gupta (1984), King and Levine (1993), Levine and Zervos (1998), Rousseau and Watchel (1998), Rousseau (1999), Levine, Loayza and Beck (2000), Xu (2000), Arestis, Demetriades and Luintel (2001), Graff (2002), Calderon and Liu (2003), Ghirmay (2004), Christopoulos and Tsionas (2004), Rioja and Valev (2004), Beck and Levine (2004), Caporale, Howells and Soliman (2005), Shan (2005), Abu Bader and Abu-Qarn (2008), Enisan and Olufisayo (2009), Akinlo and Egbetunde (2010), Cooray (2010), Osuala et al. (2013), Herwartz and Walle (2014), Seven and Yetkiner (2016), Durusu-Çiftci, İspir and Yetkiner (2017), Bayar et al. (2018), Bekele and Degu (2021) found results that support the supply-leading hypothesis. A recent study by Wen et al. (2021) investigates the effect of financial development on different economic growth indicators

with the data of 120 countries for the period 1997 to 2017. The results contradict the traditional supply-lending hypothesis and reveal a negative impact of financial development on economic growth.

According to the feedback hypothesis, there is a bidirectional causality relationship between financial development and economic growth. Supporters of the bidirectional causality hypothesis emphasize the theory that a well-functioning and stable financial system is critical for economic growth. According to this approach, while supply-led growth occurs in the early stages of economic development, financial instruments and services also diversify. Thus, savings become actionable, capital accumulation is achieved, investments are triggered, and financial development arises from economic growth in the following period. Patrick (1966), Demetriades and Hussein (1996), Luintel and Kahn (1999), Ünalmış (2002), Al-Yousif (2002), Shan and Morris (2002), Dritsakis and Adamopoulos (2004), Shan and Jianhong (2006), Shahbaz et al. (2008), Wolde-Rufael (2009), Demirhan, Aydemir and İnkaya (2011), Cheng (2012), Araç and Özcan (2014), Marques, Fuinhas and Marques (2013), Swamy and Dharani (2018), Ho, Pham and Nguyen (2021) support the bidirectional causality between financial development and economic growth.

According to the last approach, called the neutrality hypothesis, the claim is that there is no relationship between financial development and economic growth. Lucas (1988) argues that financial development cannot be a fundamental determinant of long-term economic growth and that the role of financial development in economic growth is exaggerated in the literature. Similarly, there are claims that there can be no causal relationship between financial development and economic growth in the long run. Policies for the deepening of financial markets will prevent scarce resources from being wasted by pulling them from productive areas. In other words, it is not possible to transfer the resources that can be used in real sectors to financial sectors to increase economic growth. According to this theory, the findings in the literature that financial development supports economic growth are not sufficient. These conclusions are still premature, and the findings will change when they mature in the long term. There is no long-term relationship between the two variables. The findings of Lucas (1988), Naceur and Ghazouani (2007), De Gregorio and Guidotti (1995), Bencivenga and Smith (1991), Ram (1999), Dawson (2003), Boyreau- Debray (2003), Andersen and Tarp (2003), Akinlo (2004), Rousseau and Vuthipadadporn (2005) and Nyasha and Odhiambo (2018) support this hypothesis.

In recent years, there have been studies in the literature with results different from the theoretical views described above. Ibrahim and Alagidede (2020) show the existence of a long-run asymmetric relationship between financial development and economic growth with the data from Ghana. They stated that a positive shock to financial development hinders economic growth to a large extent, but the long-term effect is insignificant. However, financial development does not affect economic growth, regardless of the source of the shock in the short term. Guru & Yadav (2019) examined different financial development indicators in BRICS countries. They suggest that different indicators of economic development are complementary to each other in stimulating economic growth. Asteriou and Spanos (2019) examined the relationship between financial development and economic growth using the data of 26 European Union countries over the period 1990 to 2016. The results show that before the 2008 crisis, financial development promoted economic growth while after the crisis, it hindered economic activity. Zardoub and Abed (2019) examined the interaction between different indicators of financial flows and economic growth on a panel of 33 developing countries divided into two groups, lower-middle-income countries, and upper-middle-income countries. In the short run, the effect of FDI and remittances on economic growth was found to be significant and negative but not significant in the long run. Official development assistance was found to be insignificant, both in the short and long term.

The summary of selected recent literature is shown in Table 1 where it may be seen that there is no consensus in the literature on the relationship between financial development and economic growth. However, particularly in studies on developing countries, most of the empirical literature has found a positive relationship between these two variables. The main finding in the literature is that the relationship between these two variables does not occur in the same way in all countries. The relationship between financial development and economic growth varies according to time and the internal and external dynamics of the country. At the same time, the model and data set used may also affect the result.

Table 1. Summary of Selected Recent Literature

Author/s	Period / Sample	Proxy of Financial Dev.	Proxy of Econ. Gr.	Methodology	Findings
Fetai (2018)	1998-2015 / 20 European countries	The ratio of (market capitalization plus domestic credit to private sector, liquid liabilities) to GDP	Real GDP per capita	Panel OLS,	A positive relationship between Fin Dev. and Econ. Gr.
Le and Tran-nam (2018)	1961-2011 / 14 Asia Pacific countries	Credit issued to the private sector by banks	Real GDP per capita	Panel cointegration, Granger causality	Unidirectional causality between financial modernization to economic development
Combes and Kinda (2019)	1980-2012 / 63 Low and middle-income countries	Financial flows (FDI)	GDP growth	GMM	Financial flows affect economic growth both directly and indirectly.
Botec et al. (2019)	1995-2012 / 88 countries	Stock market capitalization, domestic credit to the private sector, bank branches	The ratio of physical capital investment to GDP	GMM threshold, DOLS threshold	The positive effect of bank credit on growth is larger in deeper stock markets.
Perera and Paudel (2019)	1955-2005 / Sri Lanka	The ratio of (narrow money, broad money, total deposit, private sector credit, total credit) to the nominal per capita GDP, private sector credit to total domestic credit	Real GDP per capita	Johansen cointegration, Granger causality tests	No relationship
Ismail et al. (2019)	1990-2013 / Malaysia	The ratio of (private credit, financial system deposits, liquid liabilities) to GDP, lending-deposit spread	Real GDP	Johansen cointegration, Granger causality tests	Bidirectional causality from Econ Gr. to Fin. Dev.
Osei and Kim (2020)	1987-2016 / 62 middle-and high-income countries	FDI, domestic credit to the private sector, liquid liabilities	Real GDP per capita	Dynamic panel threshold	Credit expansion leads to financial fragility, and the financial crisis may weaken the growth activities.
Redmond and Nasir (2020)	1993-2016 / 30 Countries	The ratio of liquid liabilities, market capitalization to GDP	GDP per capita	FMOLS, DOLS	International trade and financial development have significant negative impacts on economic development.
Yakubu et al. (2021)	1977-2018 / Egypt	Domestic credit provided by banks to GDP	GDP per capita	Bounds test, ARDL-ECM	Bidirectional causality from Fin. Dev. to Econ Gr.
Song et al. (2021)	2002- 2016 / 142countries	Broad money	GDP per capita	Panel FMOLS	Econ Gr has a positive effect on Fin Dev.
Ekanayake and Thaver (2021)	1980-2018 / 138 developing countries	The ratio of domestic credit to the private sector, broad money, or liquid liabilities, domestic credit to the private sector, gross domestic savings to GDP	The growth rate of real GDP per capita	Panel LS, panel FMOLS, Granger causality	Ekanayake and Thaver (2021): bidirectional causalities in Europe, Central Asia, and South Asia; no causality in Africa, Middle East, and East Asia

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3. Data

The relationship between financial development and economic growth is investigated by examining the data of 19 developing countries. Although there is a theory about the developing countries that are in the literature, there is no clarity. The data set selected in the study was created using nine different developing country lists. 19 developing countries were chosen from the developing countries which are listed in at least seven out of nine developing market lists (IMF, BRICS/Next Eleven, FTSE, MSCI, S&P, EM Bond Index, Dow Jones, Russell, and Columbia University EMGP). These countries are Brazil, Chile, China, Colombia, Egypt, Hungary, India, Indonesia, Malaysia, Mexico, Morocco, Peru, the Philippines, Poland, Russia, South Africa, Thailand, Turkey, and the United Arab Emirates.

Domestic credit to the private sector (GDP %) was taken as the representative of financial development. Real GDP growth was chosen as the proxy of economic growth. Two variables were denoted, FIN and GR. All data was obtained from the World Bank Open Database. The data covers the period 1961-2019 for Brazil, 1961-2019 for Chile, 1977-2019 for China, 1961-2019 for Colombia, 1961-2019 for Egypt, 1992-2019 for Hungary, 1961-2019 for India, 1980-2019 for Indonesia, 1961-2019 for Malaysia, 1961-2019 for Mexico, 1961-2019 for Peru, 1961-2019 for the Philippines, 1991-2019 for Poland, 2001-2019 for Russia, 1965-2019 for South Africa, 1961-2019 for Thailand, 1961-2019 for Turkey, and 1976-2019 for the United Arab Emirates.

Table 2 presents the descriptive statistics of the variables. This paper uses the separate panel data of 19 developing countries between 19 and 59 years. The average domestic credit to the private sector (GDP %) represents between 20.55% in Mexico and 99.52% in South Africa while the average real GDP growth represents between 2.45% in South Africa and 9.45% in China. The results show that the countries have a heterogeneous structure in terms of growth and finance and development. For this reason, the gathering of countries under a single panel leads to different results. Due to the unique conditions of each country, the panels of the countries will be analyzed separately.

4. Methodology

4.1. Unit Root Tests

A time series is stationary if its mean and variance do not change over time and if its covariance between two periods depends only on the distance between the two periods, not on the period for which the covariance is calculated. Granger and Newbold (1974) showed that the spurious regression problem can be encountered when working with a non-stationary time series. Empirical studies have revealed that series are not stationary most of the time. In such a case, the result obtained by the regression analysis does not reflect the correct relationship. Regression analyses with a non-stationary time series can only reflect the correct relationship if there is a cointegration relationship between these series. Therefore, to avoid the problem of spurious regression between the series, first, the stationarity levels of the series should be determined. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to determine the stationarity level of the series. The null hypothesis of ADF and PP tests shows the existence of the unit root, and the rejection indicates that the series is stationary. Table 3 shows the stationary test results of the financial development and economic growth series of 19 countries. For the series that give inconsistent results with each other, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992) test was applied for control purposes, and the stationary of the series was determined with the KPSS test.

4.2. The Bounds Test Approach to Cointegration.

Empirical studies have revealed that the vast majority of macroeconomic time series are non-stationary. Since the problem of spurious regression is encountered among those series containing unit roots, various methods have been proposed to find a solution to this problem. One of them is to take the differences of the series and apply them to regression. However, in this case, information that is important for the long-term balance is lost. Because the first differences of the variables are used, the possible long-term relationship between these variables disappears. This was the starting point of the cointegration analysis.

In the approach developed by Engle and Granger (1987), time series that are not stationary at the level and whose first difference is stationary can be modeled with level states, thus preventing long-term loss of information. However, this approach is invalid if there is more than one cointegrating vector. With the approach developed by Johansen (1988), the number of cointegrated vectors between the variables can be determined based on the VAR model in which all variables are accepted as endogenous. Therefore, a more accurate test can be performed without limiting the test to the expectation of a single cointegrating vector. However, for the cointegration tests performed

Table 2. Descriptive Statistics

	N	Mean	Max	Min	Std. Dev.	Skew.	Kurt.	J-B
Brazil FIN	59	25.19	70.85	12.73	16.35	1.84	4.95	42.02
Brazil GR	59	4.76	11.21	-5.96	3.92	-0.84	3.47	7.33
Chile FIN	59	53.74	116.65	6.06	35.16	0.15	1.81	3.62
Chile GR	59	4.082	11.23	-12.91	4.54	-1.60	6.79	59.58
China FIN	43	98.90	161.13	49.74	31.94	0.17	-0.79	1.43
China GR	43	9.45	15.13	3.90	2.67	0.18	2.65	0.44
Colombia FIN	59	31.48	52.26	19.00	9.05	0.79	2.58	6.25
Colombia GR	59	4.10	8.46	-4.20	2.11	-0.90	5.52	23.29
Egypt FIN	59	28.03	54.93	10.27	13.08	0.72	2.47	5.78
Egypt GR	59	5.20	13.27	-1.60	2.73	0.61	3.84	5.43
Hungary FIN	28	38.20	60.67	21.36	12.49	0.48	2.06	2.04
Hungary GR	28	2.17	5.09	-6.69	2.76	-1.48	5.15	15.21
India FIN	59	26.86	52.38	8.51	14.23	0.56	2.12	5.00
India GR	59	5.25	9.62	-5.23	2.94	-1.25	4.88	23.90
Indonesia FIN	40	32.41	60.84	9.68	13.69	0.41	2.10	2.45
Indonesia GR	40	5.15	9.88	-13.12	3.44	-3.90	21.57	659.96
Malaysia FIN	59	79.26	158.50	11.18	45.43	-0.18	1.67	4.55
Malaysia GR	59	6.35	11.70	-7.35	3.32	-1.58	7.03	63.55
Mexico FIN	59	22.56	35.32	11.20	7.04	0.14	1.85	3.38
Mexico GR	59	3.90	11.90	-6.29	3.54	-0.52	3.84	4.34
Morocco FIN	53	39.17	95.50	12.98	27.92	0.90	2.36	7.30
Morocco GR	53	4.65	12.37	-5.40	3.71	-0.14	3.09	0.21
Peru FIN	59	20.55	44.01	9.24	9.02	1.33	3.92	19.30
Peru GR	59	3.67	12.30	-12.31	4.72	-1.36	5.60	34.31
Philippines FIN	59	29.48	66.33	14.85	11.36	1.29	4.94	25.38
Philippines GR	59	4.35	8.92	-7.32	2.95	-2.17	9.34	142.78
Poland FIN	29	33.54	54.48	12.89	15.18	0.19	1.34	3.36
Poland GR	29	3.76	7.03	-7.01	2.65	-2.37	10.87	98.77
Russia FIN	19	41.98	77.65	16.83	17.71	0.46	2.65	0.73
Russia GR	19	3.42	8.49	-7.79	4.05	-1.15	4.34	5.38
South Africa FIN	55	99.52	160.12	53.96	36.02	0.24	1.40	6.23
South Africa GR	55	2.74	7.19	-2.13	2.29	-0.28	2.37	1.60
Thailand FIN	59	76.64	166.50	10.98	48.82	0.15	1.64	4.66
Thailand GR	59	5.99	13.28	-7.63	3.60	-0.94	5.54	24.27
Turkey FIN	59	25.18	70.85	12.72	16.35	1.84	4.94	42.02
Turkey GR	59	4.75	11.21	-5.96	3.91	-0.83	3.47	7.32
U. Arab Emr FIN	44	40.27	87.60	13.79	21.71	0.86	2.46	5.88
U. Arab Emr GR	44	4.86	23.87	-14.95	7.56	0.42	3.59	2.92

* Calculated by author

by Engle and Granger (1987), Johansen (1988), and Johansen and Juselius (1990), all series should be non-stationary at the level and become stationary when the difference is taken at the same level. If one or more of the series is stationary in level, that is I(0), the cointegration relationship cannot be investigated with these tests.

According to Pesaran et al. (2001), the bounds test approach eliminates this problem. According to this approach, regardless of whether the series is I(0) or I(1), the existence of a cointegration relationship between the series can be investigated. In addition, the bounds test approach gives healthy results with data containing a low number of observations. For this, an unrestricted error correction model (UECM) is first created. The error correction model of this study was established as follows:

$$\Delta GR_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1_i} \Delta GR_{t-i} + \sum_{i=0}^{m} \alpha_{2i} \Delta FIN_{t-i}$$

$$+\alpha_3 GR_{t-1} + \alpha_4 FIN_{t-1} + \mu_t \quad (1)$$

Where GR is the log of the growth ratio and FIN is the log of credit to the private sector. m stands for the optimal lag length, and Δ is the change operator. In this study, the optimum lag length (m) model selection criterion was determined by the results of the Akaike Information Criterion (AIC) and autocorrelation test.

4.3. Toda Yamamoto Approach to Causality

The causality relationship between the series began to be tested with the causality test developed by Granger (1969). Since the concept of stationarity was not important in the periods when this causality test was used, all series were modeled at the level. The studies of Sims et al (1990) and Park and Phillips (1989) showed that the Granger causality test does not fit any of the non-stationary series and asymptotically standard distributions. Toda and Yamamoto (1995) developed the Granger causality test for a non-stationary but cointegrated series and proposed a new method. According to this method, in the first step, the new VAR model is created by adding the lag as much as the integration degrees of the series to the VAR model. Then, the null hypothesis is created by placing a zero constraint on the parameters that do not add any lag. The Wald statistics are calculated from the restricted and unrestricted VAR models created according to the null hypothesis. This obtained Wald statistic conforms to the standard $\chi 2$ distribution. Thus, the Granger causality definition can be tested for a non-stationary but cointegrated series. In this way, a model emerges that minimizes the risks arising from the incorrect determination of the integration degree of the series.

In this study, the cointegration test developed by Pesaran et al. (2001), which does not require the series to be stationary in the same order, was applied to determine the cointegration relationship. The causality relationship between the variables was demonstrated by the causality analysis developed by Toda Yamamoto (1995) in which the causality relationship between the series could be investigated without the condition of cointegration.

5. Empirical evidence

5.1. Stationary Test

Before the cointegration and causality test, the unit root test was applied to determine the stationarity level of the data. Augmented Dickey-Fuller (ADF), Phillips and Perron (PP) (1988) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests were used for each of the variables to determine the unit root. In both tests, the Akaike information criterion was used to determine the lag times. The results of these tests are presented in Table 3.

In the results of ADF, Phillips-Perron, and KPSS unit root tests in Table 3, it may be seen that the independent variables are I(0) or I(1). This indicates that the precondition for examining the long-term relationship between the variables with the Pesaran bounds test has been fulfilled. In addition, the maximum degree of cointegration for each country was found to be I(1). Therefore, 1 will be added to the number of lags calculated for each country when applying the Toda Yamamoto causality test.

Table 3. Unit Root Test Results

Countries	Variables	ADF Test		PP Test		KPSS Test	
		Without trend	With trend	Without trend	With trend	Without trend	With trend
Brazil	FIN	0.554	0.598	1.306	-0.103	3.210	3.452
	ΔFIN	-4.791*	-5.168*	-4.729*	-5.187*	0.261*	0.108*
	GR	-7.457*	-7.518*	-7.518*	-7.457*	1.474	1.247
	ΔGR	-5.042*	-5.112*	-24.927*	-24.444*	0.194*	0.121**
Chile	FIN	-0.751	-3.176***	-0.220	-2.291	0.974	1.247
	ΔFIN	-3.292**	-3.284***	-6.644*	-6.663*	0.214*	0.094*
	GR	-5.659*	-5.623*	-5.644*	-5.606*	0.247*	0.091*
	ΔGR	-6.055*	-5.985*	-13.364*	-13.211*	0.197*	0.004*
China	FIN	0.068	-3.696**	0.272	-2.638	0.850	0.94
	ΔFIN	-5.476*	-5.450*	-5.930*	-5.969*	0.211*	0.09*
	GR	-2.869***	-2.978	-2.890***	-2.774	0.489***	0.541
	ΔGR	-5.691*	-5.696*	-9.375*	-9.302*	0.184*	0.148**
Colombia	FIN	-0.403	-1.547***	-0.403	-1.681	0.97	0.374
	ΔFIN	-6.265*	-6.264*	-6.263*	-6.263*	0.21*	0.129**
	GR	-4.424*	-4.690*	-4.424*	-4.690*	0.124*	0.097*
	ΔGR	-9.905*	-9.812*	-13.786*	-13.613*	0.004*	0.024*
Egypt	FIN	-1.580	-1.425	-1.408	-1.260	1.024	0.974
	ΔFIN	-3.251**	-3.305***	-6.321*	-6.340*	0.441**	0.174**
	GR	-3.607*	-4.094**	-4.515*	-4.651*	0.334*	0.081*
	ΔGR	-6.457*	-6.428*	-19.336*	-19.384*	0.087*	0.014*
Hungary	FIN	-1.457	-2.472	-1.942	-1.018	1.014	0.374
	ΔFIN	-4.854*	-5.952*	-4.240*	-3.410**	0.271*	0.138**
	GR	-3.185**	-4.726*	-3.412**	-3.074**	0.364**	0.141**
	ΔGR	-7.178*	-7.964*	-6.472*	-6.401*	0.142*	0.024*
India	FIN	-1.453	-1.450	-1.941	-1.614	0.974	0.671
	ΔFIN	-4.104*	-5.412*	-4.014*	-4.014*	0.194*	0.094*
	GR	-0.725	-3.647	-0.854	-2.841	0.841	0.574
	ΔGR	-6.014*	-5.248*	-6.247*	-7.541*	0.274*	0.064*
Indonesia	FIN	-2.147	-2.145	-2.475	-2.415	1.874	0.974
	ΔFIN	-7.345*	-7.942*	-7.950*	-8.024*	0.210*	0.108*
	GR	0.174	-4.541*	0.145	-2.148	0.974	0.097*
	ΔGR	-4.015*	-4.935*	-6.841*	-6.665*	0.274*	0.004*
Malaysia	FIN	-3.005	-2.247	0.841	-3.954**	1.241	0.874
	ΔFIN	-6.541*	-2.952	-6.541*	-7.014*	0.297*	0.127**
	GR	-1.247	-1.247	0.904	-1.242	1.047	1.073
	ΔGR	-6.951*	-6.014*	-6.146*	-5.994*	0.324*	0.075*
Mexico	FIN	-1.841	-2.219	-1.453	-2.048	1.997	0.417
	ΔFIN	-6.017*	-6.641*	-6.441*	-6.641*	0.301*	0.108*
	GR	-0.307	-3.017	-0.219	-2.314	0.791	0.674
	ΔGR	-6.410*	-6.279*	-6.421*	-6.041*	0.174*	0.085*
Morocco	FIN	-2.145	0.104	-2.065	-0.147	1.068	0.579
	ΔFIN	-5.540*	-5.412*	-5.410*	-5.964*	0.331*	0.062*
	GR	-0.145	-2.314	-0.014	-1.548	0.974*	0.841
	ΔGR	-5.941*	-5.941*	-5.019*	-5.885*	0.274*	0.054*
Peru	FIN	0.014	-1.441	0.154	-1.412	0.884	0.882
	ΔFIN	-5.741*	-5.884*	-5.401*	-5.568*	0.254*	0.034*
	GR	-0.412	-3.664	-0.270	-3.023	0.923	0.944
	ΔGR	-6.451*	-6.541*	-6.641*	-6.477*	0.143*	0.083*

Table 3. ***Continued***

Countries	Variables	ADF Test		PP Test		KPSS Test	
		Without trend	With trend	Without trend	With trend	Without trend	With trend
Philippines	FIN	0.542	-1.154	3.005	-0.994	1.073	0.674
	ΔFIN	-0.974	-5.941*	-4.741*	-5.854*	0.309*	0.070*
	GR	1.041	-1.944	0.999	-1.012	0.935	1.143
	ΔGR	-5.149*	-5.443*	-3.884*	3.940**	0.269*	0.107*
Poland	FIN	1.020	-2.471	-0.992	-2.124	1.153	0.928
	ΔFIN	-6.045*	-6.621*	-7.541*	-7.944*	0.208*	0.106*
	GR	-0.541	-2.441	-1.981	-1.741	0.932	0.331
	ΔGR	-5.941*	-5.707*	-6.057*	-5.748*	0.319*	0.021*
Russia	FIN	1.014	-1.004	3.014	-0.142	1.142	0.702
	ΔFIN	-6.854*	-6.884*	-6.997*	-7.854*	0.187*	0.112*
	GR	0.014	-2.811	0.128	-2.174	0.834	1.195
	ΔGR	-6.996*	-6.938*	-6.741*	-6.452*	0.239*	0.047*
South Africa	FIN	-2.142	-2.224	0.887	-3.854**	1.378	0.142**
	ΔFIN	-6.412*	-2.475	-6.223*	-7.441*	0.279*	0.024*
	GR	-1.411	-1.357	0.849	-1.250	1.427	0.874
	ΔGR	-6.492*	-6.664*	-6.412*	-6.664*	0.152*	0.061*
Thailand	FIN	-2.008	-2.314	-1.474	-2.041	1.742	0.843
	ΔFIN	-5.994*	-6.651*	-6.410*	-6.274*	0.278*	0.048*
	GR	-0.195	-3.019	-0.004	-2.349	0.877	0.622
	ΔGR	-6.647*	-6.234*	-5.854*	-6.094*	0.115*	0.104*
Turkey	FIN	-2.614	-0.086	-2.334	-0.641	1.047	0.328
	ΔFIN	-5.354*	-5.950*	-5.007*	-5.992*	0.305*	0.035*
	GR	0.041	-2.240	-0.444	-1.629	0.943	0.298
	ΔGR	-5.680*	-5.853*	-5.943*	-5.772*	0.275*	0.111*
U. Arab Emr.	FIN	0.166	-1.299	0.233	-1.251	1.274	0.923
	ΔFIN	-5.645*	-5.675*	-5.445*	-5.114*	0.324*	0.108*
	GR	-0.885	-2.914	-0.340	-2.854	0.952	0.609
	ΔGR	-6.944*	-7.245*	-6.543*	-6.003*	0.125*	0.083*

Significant at *1%, **5%, ***10%. Calculated by author

5.2. The bounds test approach to cointegration

Creating the unrestricted error correction model (UECM) has been explained in the methodology. The model adapted to our study is as follows:

$$\Delta GR_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1_i} \Delta GR_{t-i} + \sum_{i=0}^{m} \alpha_{2i} \Delta FIN_{t-i} + \alpha_3 GR_{t-1} + \alpha_4 FIN_{t-1} + \mu_t \quad (2)$$

where, GR_t is real GDP growth and FIN_t domestic credit to the private sector (GDP%). To test the existence of cointegration, the F test is applied to the first period lags of the dependent and independent variables. For this test, the basic hypothesis is established as (H0:α4=α5=0). The calculated F statistic is compared with the lower and upper critical values in Table 4 in Pesaran et al. (2001). If the calculated F statistic is less than the Pesaran subcritical value, there is no cointegration relationship between the series. If the calculated F statistic is between the lower and upper critical value, a definite interpretation cannot be made, and other cointegration testing approaches should be applied. Finally, if the calculated F statistic is above the upper critical value, there is a cointegration relationship between the series. After determining the cointegration relationship between the series, ARDL (Autoregressive Distribution Lag) models are established to determine the long- and short-term relationships. In the UECM model, t is the trend variable, and m is the lag number. Critical values such as Akaike, Schwarz, and Hannan-Quinn are used to determine the lag number, and the lag length that provides the smallest critical value is determined as the lag length

Table 4. Tests for Cointegration using the ARDL approach

Countries	Dependent variable	F statistic without trend	F statistic with trend	Long run coefficient	Error correction term
Brazil	ΔFIN	11.045*	13.974*	1.456*	-0.650*
China	ΔGR	12.854*	14.874*	0.854*	-0.064**
India	ΔGR	8.641**	6.985**	0.773*	-0.104**
Indonesia	ΔFIN	10.544*	3.078	0.145**	-0.097**
Malaysia	ΔGR	4.474	11.974*	0.744*	-0.288*
South Africa	ΔFIN	3.664	10.740*	0.374*	-0.408*
Thailand	ΔGR	13.479*	2.475	0.319*	-0.341*

*,**,*** shows the significance levels for 1%,5% and 10%. Calculated by author

of the model. However, if the model created with the lag length where the selected critical value is the smallest includes an autocorrelation problem, then the lag length providing the second smallest critical value is taken, and if the autocorrelation problem persists, this process is continued until this problem is eliminated. Since the data set we examined in this study is annual, the maximum lag length was taken as four, and the number of lags was determined as four according to the Akaike criterion. Then, LM test was performed to investigate whether there was an autocorrelation problem in the model. According to the test results, no autocorrelation problem was found. Cointegration test results are shown in Table 4, and the diagnostic results of the countries which have long term relationships are shown in Table 5.

The lag length providing the smallest critical value at these values was determined as the lag length of the model. However, if the model created with the selected critical value contains an autocorrelation problem, the lag length providing the second smallest critical value is included in the model. If the autocorrelation problem persists, the process is continued by using the next smallest value until this problem disappears. Long-term and error correction coefficients were obtained from ARDL models for each country in the data set.

According to the results in Table 4, a long-term relationship was found between financial development and economic growth in Brazil, China, India, Indonesia, Malaysia, South Africa, and Thailand. According to the UECM model in which the economic growth is the dependent variable, cointegration is detected in China, India, Malaysia, and Thailand. And in Brazil, Indonesia, and South Africa where financial development is the dependent variable, cointegration is detected in the UECM model. In the ARDL models constructed after the UECM models, the coefficients of seven countries were found to be positive and statistically significant. The error correction term was found to be negative, between 0 and -1, and statistically significant, as expected. This variable briefly shows how much of the short-term disequilibrium will be corrected in the long term.

Table 5. Diagnostic Tests

Countries	X^2_{BG}	χ^2_{NORM}	χ^2_{WHITE}	X^2_{RAMSEY}
Brazil	0.214(0.485)	3.741(0.148)	1.356(0.354)	1.231(0.220)
China	3.145(0.147)	1.472(0.497)	0.374(0.741)	0.742(0.618)
India	1.075(0.801)	1.841(0.414)	0.712(0.573)	0.873(0.308)
Indonesia	0.595(0.624)	1.974(0.321)	1.547(0.274)	0.614(0.531)
Malaysia	2.347(0.197)	2.932(0.264)	0.401(0.679)	1.087(0.267)
South Africa	1.974(0.357)	3.935(0.124)	0.392(0.692)	0.693(0.554)
Thailand	2.094(0.175)	2.045(0.293)	1.049(0.467)	0.982(0.371)

χ^2_{BG}, χ^2_{NORM}, χ^2_{WHITE}, χ^2_{RAMSEY} are autocorrelation, normality, heteroscedasticity, and model specification error test statistics, respectively. Calculated by author

5.3. The Toda–Yamamoto approach to causality test

The VAR model with two variables, financial development (FIN) and economic growth (GR) series, was formed as follows.

$$GR_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} GR_{t-i} + \sum_{j=k+1}^{d\,max} \alpha_{2j} GR_{t-j} + \sum_{i=1}^{k} \emptyset_{1i} FIN_{t-i} + \sum_{j=k+1}^{d\,max} \emptyset_{2j} FIN_{t-j} + \mu_{1t} \quad (3)$$

$$FIN_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} FIN_{t-i} + \sum_{j=k+1}^{d\,max} \beta_{2j} FIN_{t-j} + \sum_{i=1}^{k} \delta_{1i} GR_{t-i} + \sum_{j=k+1}^{d\,max} \delta_{2j} GR_{t-j} + \mu_{2t} \quad (4)$$

In the VAR model, "k" indicates the number of delays and "dmax" indicates the maximum cointegration level in the model. In this approach, the number of delays in the VAR model will be increased by the maximum cointegration level of the variables in the model. The hypothesis for equation (3) is if $\emptyset_{1i} \neq 0$ financial development can be the reason for economic growth. Similarly, the hypothesis for equation (4) is if $\delta_{1i} \neq 0$ economic growth can be the reason for financial development. The model is estimated by using seemingly unrelated regression (SUR). The results of this test are given in Table 6.

It may be seen in Table 6 that the direction of the causality relationship is from financial development to economic growth in China, India, Malaysia, and Thailand and reversed in Brazil, Indonesia, Mexico, and South Africa. No relationship can be found between the variables for Chile, Colombia, Egypt, Hungary, Morocco, Peru, the Philippines, Poland, Russia, Turkey, and the United Arab Emirates.

Studies in the literature have produced contradictory results, both in studies conducted with data from a single country and in studies conducted with panel data. In our research, the result supports the relationship between financial development and economic growth, but the relationship could not be found for every country in the sample. Le and Tran-nam (2018)

Table 6. Toda Yamamoto Test Results

Countries	D	From FIN to GR		From GR to FIN		Direction of causality
		p-value	Sum of lagged coefficients	p-value	Sum of lagged coefficients	
Brazil	3	0.112	2.745	0.024	11.345**	GR ⇒FIN
Chile	2	0.384	0.874	0.294	1.646	No
China	1	0.001	15.733*	0.135	3.647	FIN⇒GR
Colombia	2	0.984	0.008	0.648	0.510	No
Egypt	4	0.831	0.118	0.507	0.814	No
Hungary	2	0.742	0.241	0.314	1.274	No
India	1	0.003	14.772*	0.159	2.341	FIN⇒GR
Indonesia	1	0.125	2.941	0.036	10.821**	GR⇒FIN
Malaysia	1	0.009	13.042*	0.142	2.230	FIN⇒GR
Mexico	1	0.021	10.409**	0.217	2.054	GR⇒FIN
Morocco	2	0.408	0.611	0.447	0.888	No
Peru	2	0.487	0.502	0.884	0.125	No
Philippines	2	0.072	0.289	0.540	0.772	No
Poland	2	0.575	0.483	0.382	0.908	No
Russia	1	0.277	1.544	0.609	0.633	No
South Africa	2	0.197	1.820	0.008	13.948*	GR⇒FIN
Thailand	1	0.036	8.374**	0.276	1.853	FIN⇒GR
Turkey	1	0.641	0.315	0.921	0.094	No
U. Arab Emr.	2	0.043	0.584	0.334	0.947	No

*,** shows the significance levels for 1% and 5% successively. d shows the lag number. Calculated by author

found unidirectional causality between financial modernization to economic development in 14 Asia Pacific countries. In this study, this view was supported only for Thailand, while reverse causality was found for Indonesia, and no relationship was found for other countries. Although Ekanayake and Thaver (2021) reached the result of bidirectional causality for Europe, Central Asia, and South Asia countries, no bidirectional causality was found in any country analyzed in this study. As reported by Fetai (2018), the result was that, even though there is a positive relationship between financial development and economic growth, this theory was not supported by some countries. The fact that country data support very different views may be due to the internal dynamics of the countries. For this reason, as Botec et al. (2019), Zardoub and Abed (2019), and Ibrahim and Alagidede (2020) revealed, examining the variables that cause different results can make the results meaningful. Botec et al. (2019) found that the positive effect of bank credit on growth is larger in deeper stock markets.

6. Concluding remarks

In this study, the relationships between financial development and economic growth were investigated by considering 19 developing countries. To measure the long-term cointegration relationship between variables, the bounds test approach developed by Pesaran et al. (2001) was examined. The causality relationship between the variables was analyzed using the causality model developed by Toda Yamamoto (1995), which allows a causality analysis between series at different stationary levels. According to the results of the bounds test, the long-term coefficients indicating a cointegration relationship in seven countries (Brazil, China, India, Indonesia, Malaysia, South Africa, and Thailand) were found to be positive and statistically significant. According to the results of the Toda Yamamoto (1995) causality test, the direction of causality is from financial development to economic growth in four countries and the reverse in the other four. No bidirectional causality was found in any of the countries.

This result can be interpreted to mean that there is no relationship between financial development and economic growth in developing countries that is valid for every country. It can be argued that the relationship between financial development and economic growth may vary according to the domestic and regional dynamics of the country. In the countries where this relationship exists, investigating up to which threshold the relationship is effective will be the subject of future studies.

This research faced some limitations that we acknowledge here. We used data from only 19 developing economies, so it is not wise to generalize the results to all developing countries. However, we do not think that this situation creates any inconvenience, since a panel was not formed from the countries, and each country was analyzed separately with its data. Although all of the countries were selected from developing countries, choosing a more limited and homogeneous data set in terms of income level could ensure that a single view prevails in countries of a certain size.

There are many studies in the literature examining the relationship between financial development and economic growth. In the majority of these studies, data from a single country or panel data consisting of many countries were used. Trying to reach a common result by gathering the countries with different characteristics in a single panel causes different results from each other because there are findings in the literature regarding the existence of other factors affecting this relationship. These factors vary from country to country. This study contributes to the literature in terms of revealing whether a common result can be obtained from the data of different countries analyzed with the same method.

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