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The Relationship Between Financial Development, Inflation and Economic Growth: The Case of MINT Countries

Asst. Prof. Dr. Mustafa TORUSDAG

Van Yüzüncü Yıl University, Faculty of Economics and Administrative Sciences, Department of Economics, Orcid Id: 0000-0002-8839-0562.

ABSTRACT: Along with the integration of money and capital markets, macroeconomic variables such as growth and inflation, which are among the indicators of macroeconomic stability, are also among the determinants of financial development in developed and developing countries. The relationship between financial development and growth is mostly explained by the process of transferring savings to investments in the literature. In endogenous growth theories, financial development is taken as an indicator of growth.

In this study, the relationship between financial development, inflation and economic growth was examined with the Kónya (2006) panel causality test for MINT countries in the 2010-2020 period. According to the causality analysis, it was concluded that there is a bidirectional causality relationship between the credit given to the private sector, which is accepted as an indicator of financial development, and growth. In line with the causality analysis findings, it was concluded that Arthur Lewis (1955)'s 'supply leading hypothesis' which states that financial development causes growth as well as Joan Robinson (1952) and Goldsmith's (1969) 'demand-followed hypothesis' which states the causality relationship from growth to financial development, are valid in MINT countries.

1. INTRODUCTION

Among the main objectives of the economic policy, besides ensuring price stability and growth, thus economic stability, there are also fair income distribution, efficiency in resource distribution, and ensuring balance in the balance of payments. For this reason, the relationship between inflation and growth variables comes to the fore first.

In macroeconomic theory, in line with the views of Mundell and Tobin in the 1960s and 1970s, it is stated that inflation will have positive effects on growth. Also referred to as the Keynes-Kaldor effect in the literature, it is that redistribution of income to those with a high propensity to save will increase growth by causing an increase in savings. Depending on the decrease in financial returns in inflationary periods, investments are directed from the financial sector to the real sector and it is also expressed as the Tobin effect, where capital accumulation will increase (Karabulut, 2019: 172).

It is argued that inflation, which is defined as the increase in the general level of prices, will cause an increase in capital accumulation and an increase in capital accumulation will cause an increase in growth. Later, in theory, this view has changed, inflation will increase the uncertainties about the future due to the rise in prices, and the capital owners do not want to incur losses. While it is desired to increase total demand with Keynesian policies, it affects growth negatively by causing an increase in inflation (Altunoz, 2013: 176, 177).

The relationship between inflation and economic growth is examined in three different groups in the literature (Yaprakli, 2010: 288-290): Some of the studies that concluded that there is a positive relationship between inflation and economic growth in the first group studies are Karras (1993), Black, Dowd and Keith (2001), Mallik and Chowdhury (2001), Rapach (2003), Benhabib and Spiegel (2006). In the second group of studies, Fischer (1983), Kormendi and Mequire (1985), Grier and Tullock (1989), Grimes (1991), Smyth (1992), De Gregorio (1993), Alexander (1997), Motley (1998), Judson et al. Orphanides (1999), Kim and Willet (2000), Gylfason and Herbertsson (2001), Caporin and Maria (2002), Roe (2003), Barber and Artan (2004), Apergis (2005), Artan (2006) and Hodge (2006)'s studies show that there is a negative relationship between inflation and economic growth. Among the third group studies, Fischer (1993), Bullard and Keating (1995), Ericsson, Irons and Tyron (2001), Bhatia (1960), Johnson (1967), Faria and Carneiro (2001), Chowdhury (2002),

Hineline (2004) and Vaona (2006), it was concluded that there is no significant relationship between inflation and economic growth.

In the studies of Boyd, Levine and Smith (2001), Cuadro, Gallego and Herrero (2003), Haslag and Koo (1999), Zoli (2007), in which the relationship between financial development and inflation are examined, it is seen that an increase in inflation causes negative effects on financial development. Dehasa, Druck and Plekhanov (2007) and Bittencourt (2008) concluded that a decrease in inflation causes an increase in the amount of credit utilization and therefore has a positive effect on financial development (Turkmen and Agir, 2020: 579).

Arthur Lewis (1955) deals with the relationship between financial development and growth with the "supply leading hypothesis". According to the hypothesis, financial development as a result of economic growth in financial markets is defined as having a stimulating role in real economic growth. Joan Robinson (1952), on the other hand, states that with the “demand-following hypothesis” founded by Goldsmith (1969), financial development follows economic growth and that the developments in the real dimension of the economy will cause financial development (Altunoz, 2013: 184; Tuncay and Oruc, 2021: 2115).

The relationship between financial development and economic growth is explained by four different approaches. According to the supply-side approach, financial development causes growth. An advanced financial system causes a rapid increase in capital accumulation. Increasing capital accumulation provides positive contributions to the growth process by increasing technological development. In the demand-side approach, on the other hand, financial development causes economic growth, provided that real growth occurs through real economic activities. According to the third hypothesis, it is claimed that there is a bidirectional causality relationship between financial development and economic growth, which also expresses that real and financial sectors encourage each other's development. The fourth approach is the hypothesis led by Lucas (1988) and Stern (1989), which states that there is no causal relationship between financial development and economic growth, that is, the two variables are independent from each other (Al-Yousif, 2002: 132; Hayaloglu, 2015: 132).
When the studies in the literature are examined, Schumpeter (1911), Gurley and Shaw (1960), Goldsmith (1969), McKinnon (1973), Shaw (1973), King and Levine (1993), Beck et al. (2000), Arestis et al. (2001), Falahaty and Hook (2003), Caporale et al. (2005), McCaig and Stengos (2005), Artan (2007), Ang (2008) concluded that financial development has a positive effect on growth. Achy, (2004), Chang (2002), Acaravci et al. (2009), on the other hand, concluded that financial development does not have an important role in the economic growth process for the period examined in the studies and for the countries and country groups discussed. In the studies of Müslümov and Aras (2002), Christopoulos and Tsionas (2004), Thangavelu and James (2004), Chang and Caudill (2005), and Islam and Shah (2012), it was found that financial development causes economic growth. In the studies of Liang and Teng (2006), Ang and McKibbin (2007), and Odhiambo (2008), it was stated that economic growth causes financial development. Al-Yousif (2002), Calderon and Liu (2003), Pradhan et al. (2013), Dritsakis and Adamopoulos (2004), Shan and Jianhong (2006) found that there is a bidirectional causality relationship between financial development and economic growth (Hayaloglu, 2015: 132).

The relationship between economic growth and financial development by Schumpeter (1911) is explained by the role of the banking system, which is financial institutions, on economic growth. It is argued that financial institutions have an encouraging role in the growth and technological innovation and development process. Patrick (1966), on the other hand, argues that there is a bidirectional causality relationship between financial development and economic growth (Tuncay and Oruc, 2021: 2114, 2115).

Although the product variety of financial markets is among the financial development indicators, monetary aggregates as quantity criteria, indicators related to credit and variables related to the capital market are among the indicators used to measure the development of the financial sector. Money supply definitions, domestic credit volume data and stock market indicators are also accepted as quantity criteria (Kar and Agir, 2005). In endogenous growth theories, financial development is an indicator of economic growth (Turkmen and Agir, 2020: 578).

2. DATASET AND METHODOLOGY

In this study, it is aimed to examine the relationship between financial development, inflation and economic growth for MINT countries - Mexico, Indonesia, Nigeria and Turkey - for the 2010-2020 period. In the study, econometric analyzes were made using economic growth, financial development and inflation indicators. The annual % change in consumer prices, % annual change in economic growth and domestic credit given to the private sector (percentage of GDP) are taken as the inflation variable. Econometric analyzes of the study were performed using the Gauss 10.0 econometric program.

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The data used in the study were taken from the "data.worldbank.org" databases. In the study, the analysis of the variables in the study was performed with the Breusch-Pagan (1980) $CDLM_1$ and Pesaran (2004) $CDLM_2$ horizontal cross section dependency tests and the Kónya (2006) panel causality test.

2. 1. Econometric Analysis and Findings

The cross-sectional dependence is explained by the assumption that all units are affected by a possible shock to the units that make up the panel, and that the other countries that make up the panel are affected by a possible macroeconomic shock to any of the countries. Due to the increase in globalization, international trade level and financial integration between countries, it can be said that the economic shock of the global financial crisis in 2008 will affect other countries differently. For this purpose, the findings obtained from the econometric analyzes made without considering the cross-sectional dependency give consistent results. It is necessary to test the cross-sectional dependence between the series before making the analysis (Mercan, 2014: 235; Menyah et al., 2014: 389; Kocbulut and Altıntas, 2016: 152).

Breusch-Pagan (1980) $CDLM_1$ and Pesaran (2004) $CDLM_2$ cross-section dependency tests are among the methods used to apply cross-section dependence in panel data analysis. Hypotheses of the test (Govdeli, 2018: 382):

H_0: There is no cross-section dependency,

H_1: There is a cross-section dependency.

As stated in the test statistics developed by Pesaran (2004), the findings obtained from the Breusch-Pagan (1980)) $CDLM_1$ expressed in equation 1 and Pesaran (2004) $CDLM_2$ cross-section dependency tests in equation 3 (Pesaran et al., 2008) If the probability values are less than 0.05, the H_0 hypothesis is rejected at the 5% significance level. Therefore, it is decided that there is a cross-section dependency between the units that make up the panel (Govdeli, 2018: 382):

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{P}_{ij}^2 \quad (1)$$

$\hat{P}_{ij}$: It expresses the estimates of cross-section correlations between residual values.

$$\hat{P}_{ij} = \hat{P}_{ji} = \frac{\sum_{t=1}^{T}\hat{v}_{it}\hat{v}_{jt}}{\left(\sum_{t=1}^{T}\hat{v}_{it}\right)^{1/2}\left(\sum_{t=1}^{T}\hat{v}_{jt}\right)^{1/2}} \quad (2)$$

Based on the H_0 hypothesis, the cross-section dependency is decided. In the H_0 hypothesis, N is constant and goes to $T\rightarrow\infty$. Statistics have N(N-1)/2 degrees of freedom and a chi-square asymptotic distribution. In the $CDLM_1$ test, T>N gives more reliable results when the time dimension is larger than the cross-section dimension (Pesaran, 2004; Guloglu and Ivrendi, 2010: 384). Again, Pesaran (2004) $CDLM_2$ statistic shows standard normal distribution in case of $T\rightarrow\infty$ and $N\rightarrow\infty$ under H_0 hypothesis. $CDLM_2$ cross-section dependency test also gives better and more reliable results than T>N when the time dimension is larger than the cross-section dimension (Govdeli, 2018: 382).

Table 1. Cross Section Dependency Test Results

Tests	Test Statistics	Probabilty Value (p)
Cd Lm1 (Breusch,Pagan 1980)	59.124	0.000*
cd LM2 (Pesaran 2004 CDlm)	15.336	0.000*

Note: ** denotes cross-sectional dependence at 5% and 1% significance levels.

In table 1, the analysis findings of the $CDLM_1$ and $CDLM_2$ cross-section dependence tests are given. In line with the analysis findings obtained, the null hypothesis is rejected at the 5% significance level for both tests and the alternative hypothesis is accepted. In this case, it can be said that there is a cross-section dependency in the panel. This finding tells us that the financial shock, inflationary shock, economic stagnation and crisis-induced growth shock that may come to any MINT country will also affect the other MINT country.

In order to test the homogeneity of the variables, Pesaran (2008) developed the Swamy (1970) test to determine the homogeneity or heterogeneity of the slope coefficients. Equation 3 is used for testing large samples and the test statistics expressed in equation 4 for testing small samples are used (Ilgaz Yıldırım and Sahin, 2018: 77, 78):

H_0: $\beta_i = \beta$, Slope coefficients are homogeneous.

H_1: $\beta \neq \beta_j$ the slope coefficients are not homogeneous.

$$\hat{\Delta} = \sqrt{N}\left(\frac{N^{-1}\hat{S}-k}{\sqrt{2k}}\right) \quad (3)$$

$$\widetilde{\Delta_{adj}} = \sqrt{N}\left(\frac{N^{-1}\hat{S}-k}{\sqrt{2k}}\right) \approx N(0,1) \quad (4)$$

N is the number of cross-sections, S is the Swamy test statistic, and k is the number of explanatory variables. Among these equations, error terms show free distribution when $(N, T) \dashrightarrow \infty$, $\sqrt{N}/T \dashrightarrow \infty$ under the H_0 hypothesis (Pesaran, Yamagata, 2008: 52-57; Kocbulut and Altintas, 2016: 159).

Table 2. Homogeneity Test Result

	Test Statistics	**Probability Value (p)**
$\tilde{\Delta}$	61.651**	0.000
$\tilde{\Delta}_{adj}$	16.065**	0.000

Note: ** denotes cross-sectional dependence at 5% and 1% significance levels.

In table 2, the delta-tilde and delta-tilde-adj test statistics values are rejected as the null hypothesis of "the slope coefficients are homogeneous" and the slope parameters vary between cross-sections and therefore are heterogeneous. Since cross-sectional units are determined as heterogeneous units affected by each other, the use of Kónya (2006) panel causality analysis, which gives effective results under the assumption of cross-sectional dependence and heterogeneity, is preferred in this study.

Kónya (2006) causality test is a SUR causality test based on the Wald test about the direction of causality, which allows to examine the countries separately based on the apparently unrelated regression estimation and is tested with critical values. It gives more effective findings under the assumption of cross-section dependence and heterogeneity. Kónya (2006) panel causality test has many advantages. With this test, it is not assumed that the panel is homogeneous, it is possible to conduct a separate Granger causality test for each country that makes up the panel. Again, in this approach, since the bootstrap critical value is obtained separately for each country, it does not require cointegration and unit root test. In addition, with the Kónya (2006) panel causality analysis, it can be determined that there is no one-way, two-way or causality relationship for each country that makes up the panel (Ilgaz Yildirim and Sahin, 2018: 78). Kónya bootstrap panel causality test, panel causality test is estimated with the following equations (Kónya, 2006: 981):

$$
\begin{aligned}
y_{i,t} &= \propto_{1,1} + \sum_{i=1}^{ly1} \beta_{1,1,i}\, y_{1,t-i} + \sum_{i=1}^{lx1} \gamma_{1,1,i}\, \chi_{k,1,t-1} + \mathcal{E}_{1,1,t} \\
y_{2,t} &= \propto_{1,2} + \sum_{i=1}^{ly1} \beta_{1,2,i}\, y_{2,t-i} + \sum_{i=1}^{lx1} \gamma_{1,2,i}\, \chi_{k,2,t-1} + \mathcal{E}_{1,2,t} \qquad (13) \\
y_{N,t} &= \propto_{1,N} + \sum_{i=1}^{ly1} \beta_{1,N,i}\, y_{N,t-i} + \sum_{i=1}^{lx1} \gamma_{1,N,i}\, \chi_{k,N,t-i} + \mathcal{E}_{1,N,t}
\end{aligned}
$$

ve

$$
\begin{aligned}
\varkappa_{k,1,t} &= \propto_{2,1} + \sum_{i=1}^{ly2} \beta_{2,1,i}\, y_{1,t-i} + \sum_{i=1}^{lx2} \gamma_{2,1,i}\, \chi_{k,1,t-1} + \varepsilon_{2,1,t} \\
\varkappa_{k,2,t} &= \propto_{2,2} + \sum_{i=1}^{ly2} \beta_{2,2,i}\, y_{2,t-i} + \sum_{i=1}^{lx2} \gamma_{2,2,i}\, \chi_{k,2,t-1} + \varepsilon_{2,2,t} \qquad (14) \\
\varkappa_{k,N,t} &= \propto_{2,N} + \sum_{i=1}^{ly2} \beta_{2,N,i}\, y_{N,t-i} + \sum_{i=1}^{lx2} \gamma_{2,N,i}\, \chi_{k,N,t-i} + \varepsilon_{2,N,t}
\end{aligned}
$$

In the equations, the variables y and x express the number of cross-section units (i = 1,2, ..., N), while the time dimension t (t = 1,2, ..., T) and l, mly and mlx respectively, gives lag lengths. The Wald statistics obtained to determine the causality relationship and the direction of causality are obtained by comparing the critical values for the cross-section units reached by the bootstrap causality analysis method. If the Wald statistical values are greater than the bootstrap critical value, the null hypothesis stating that there is no causality is rejected. (Sahin, 2018: 291).

Table 3. Kónya (2006) Panel Causality Test Results

Causality Direction	**Panel Fisher**	**P-val.**
Cred → Enf	7.957	0.438
Enf → Cred	7.091	0.527
Gr → Cred	5.291	0.076*
Cred → Gr	3.105	0.029**
Gr → Enf	8.270	0.408
Enf → Gr	10.516	0.231

Note: *, **, *** denote heterogeneity at 10%, 5% and 1% significance levels, respectively. Credit: Credits to the private sector, Gr: Growth, Inf: Inflation.

In table 3, the panel causality analysis findings are explained for the panel as a whole. Since there is a causal relationship from credit to the private sector to growth at only 5% significance level for MINT countries, the H_0 hypothesis, which is the hypothesis that credit to the private sector is not the cause of growth, is rejected, and it can be said that credit to the private sector are the cause of growth. In addition, since the H_0 hypothesis, which is expressed as the reason for the growth is not the credit given to the private sector, is rejected, since the one-way causality relationship from the growth to the credit given to the private sector is found at the level of 10% significance, the growth causes the credit given to the private sector. It is concluded that there is a bidirectional causality relationship between financial development and growth for MINT countries.

Table 4. Kónya (2006) Panel Causality Test Results

H_0: Credit to Private Sector are not the Cause of Inflation						H_0: Inflation is not the Cause of Credit to Private Sector				
i	Wald	Boot-pval	Critical Values			Wald	Boot-pval	Ciritical Values		
			1%	5%	10%			1%	5%	10%
1- Mexico	0.775	0.747	64.785	29.845	19.705	1.483	0.605	63.321	26.303	16.491
2- Indonesia	8.880	0.214	74.678	29.650	18.545	4.232	0.254	40.039	16.256	9.822
3- Nigeria	2.650	0.488	95.303	39.239	22.732	2.733	0.329	31.547	13.847	8.848
4-Turkey	5.738	0.240	42.138	19.186	12.430	0.778	0.572	30.029	12.861	7.915
Panel Fisher : 7.957						Panel Fisher : 7.091				
p-value : 0.438						p-value : 0.527				

Note: *, **, *** denote heterogeneity at 10%, 5% and 1% significance levels, respectively.

In line with the Kónya (2006) panel causality analysis findings expressed in table 4, H_0 hypotheses expressed as "Credits to the private sector are not the cause of inflation" and "inflation is not the cause of credit to the private sector" are H_0 respectively, since Bootstrap probability values are not higher than the critical values. H_0 hypotheses are accepted for MINT countries since the hypotheses cannot be rejected and there is no causality relationship from inflation to credit given to the private sector and from credit to the private sector to inflation.

Table 5. Kónya (2006) Panel Causality Test Results

H_0: Growth is not the Cause for Credits to Private Sector						H_0: Credit to Private Sector is not the cause for Growth				
i	Wald	Boot-pval	Critical Value			Wald	Boot-pval	Critical Value		
			1%	5%	10%			1%	5%	10%
1 Mexico	3.839	8.776***	36.914	14.632	4.203	0.017	97.105**	123.071	49.995	32.571
2 Indonesia	0.552	6.577***	23.970	10.496	6.011	3.933	37.011**	81.286	31.105	18.353
3 Nigeria	1.044	12.177**	26.627	7.984	5.104	0.763	72.026**	98.585	35.779	21.740
4 Turkey	0.003	9.066***	21.335	9.096	5.602	0.227	81.372*	66.885	24.809	15.003
Panel Fisher : 5.291						Panel Fisher : 3.105				
p-value : 0.076*						p-value : 0.029**				

Note: *, **, *** denote heterogeneity at 10%, 5% and 1% significance levels, respectively.

In line with the Kónya (2006) panel causality analysis findings expressed in table 5, H_0 hypotheses expressed as "growth is not the reason for credit to the private sector" and "credits to the private sector are not the reason for growth" are H_0 since Bootstrap probability values are greater than the critical values. hypotheses are rejected. Therefore, H_0 hypothesis is rejected for MINT countries, there is a one-way causality relationship from growth to credit to the private sector and from credit to the private sector to growth.

Table 6. Kónya (2006) Panel Causality Test Results

H_0: Growth is not cause of Inflation						H_0: Inflation is not cause of Growth				
i	Wald	Boot-pval	Ciritical Value			Wald	Boot-pval	Critical Value		
			1%	5%	10%			1%	5%	10%

1- Mexico	1.498	0.457	36.779	14.753	9.073	6.293	0.308	91.756	34.024	20.414
2- Indonesia	3.232	0.262	41.114	15.801	8.917	7.995	0.142	52.675	18.976	11.041
3- Nigeria	3.756	0.239	37.779	13.998	8.412	1.295	0.546	65.362	23.573	14.062
4- Turkey	0.574	0.562	22.584	9.389	5.858	6.170	0.218	63.669	22.257	13.187
Panel Fisher : 8.270						Panel Fisher : 10.516				
p-value : 0.408						p-value : 0.213				

Note: *, **, *** denote heterogeneity at 10%, 5% and 1% significance levels, respectively.

In line with the Kónya (2006) panel causality analysis findings expressed in table 6, the H_0 hypotheses expressed as "growth is not the cause of inflation" and "inflation is not the cause of growth" are not valid for MINT countries since Bootstrap probability values are not greater than critical values and H_0 hypotheses cannot be rejected. H_0 hypotheses are accepted and there is no causality relationship from growth to inflation and from inflation to growth.

3. RESULT

Growth and inflation are among the macroeconomic indicators. Growth and inflation are also among the indicators that affect financial development. Financial system has an important role in developed and developing countries for a sustainable economic growth. Financial development is also an indicator of the development of the financial markets of the country's economies. Financial development is defined as the increase in the level of use of financial instruments used in a country and the widespread use of these instruments. The relationship between financial development and growth has been examined in a theoretical and empirical framework. Financial development or a developed financial system provides an increase in savings and the conversion of savings into investments. In endogenous growth theories, economic growth is explained in the context of the concept of financial development. The general opinion expressed in the literature is that financial development will positively affect growth in the long run.

In this study, the relationship between financial development, growth and inflation in MINT countries - Mexico, Indonesia, Nigeria and Turkey - for the 2010-2020 period was examined theoretically and empirically with Kónya (2006) panel causality analysis. In line with the analysis findings, it was concluded that there is a bidirectional causality relationship between the credit given to the private sector as an indicator of financial development and growth variables for MINT countries and the panel in general. The analysis findings of the study also coincide with the analysis findings of Al-Yousif (2002), Calderon and Liu (2003), Pradhan et al. (2013), Dritsakis and Adamopoulos (2004), and Shan and Jianhong (2006)'s studies.

In addition, Arthur Lewis (1955)'s 'supply leading hypothesis', which states that financial development causes economic growth, and Joan Robinson (1952) and Goldsmith's (1969) 'demand-follower hypothesis', which states that developments arising from economic growth lead to financial development. It can be stated that this is also valid for this study.

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