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FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN TURKEY: AN EMPIRICAL ANALYSIS

In this study, the cointegration and causality relations are examined in Turkey between the Gross Domestic Product (GDP) and the National 30, National 50 and National 100 indices at Istanbul Stock Exchange (ISE) in order to study the relation between economic growth and financial development. In the study covering the period 2000-2010 and comprising the quarterly data, the relations between GDP and each index are separately analysed by using econometric methods. As the outcome of the Johansen cointegration test conducted, it is concluded that a long-term relation exists between the GDP and all the indices. And as the outcome of the Granger causality test applied to reveal the causality relation, it is determined that a bidirectional causality relation exists between the GDP and all the indices in the short term.

Keywords: *financial development; economic growth; cointegration; causality.*

JEL classification: *C10, E44, O16.*

Айхан Капушуцоглу

ФІНАНСОВИЙ РОЗВИТОК І ЕКОНОМІЧНЕ ЗРОСТАННЯ В ТУРЕЧЧИНІ: ЕМПІРИЧНИЙ АНАЛІЗ

У статті вивчено коінтеграцію і причинні зв'язки між ВВП та індексами National 30, National 50 і National 100 на Стамбульській біржі (Туреччина) з метою з'ясування стосунків між економічним зростанням і фінансовим розвитком. Для цього використано квартальні дані з 2000 по 2010 рр., за допомогою економетричних методів окремо проаналізовано стосунки між ВВП і кожним із індексів. За результатами проведеного тесту Йохансена на коінтеграцію зроблено висновок, що існують довгострокові залежності між ВВП і всіма індексами. За результатами тесту причинності Грейнджера визначено, що існує короткострокова двостороння причинна залежність між ВВП і всіма індексами.

Ключові слова: *фінансовий розвиток; економічне зростання; коінтеграція; причинність.*

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ФИНАНСОВОЕ РАЗВИТИЕ И ЭКОНОМИЧЕСКИЙ РОСТ В ТУРЦИИ: ЭМПИРИЧЕСКИЙ АНАЛИЗ

В статье изучены коинтеграция и причинные связи между ВВП и индексами National 30, National 50 и National 100 на Стамбульской бирже (Турция) с целью изучения отношений между экономическим ростом и финансовым развитием. Для этого использованы квартальные данные с 2000 по 2010 гг., с помощью эконометрических методов отдельно проанализированы отношения между ВВП и каждым из индексов. По результатам проведенного теста Йохансена на коинтеграцию сделан вывод, что существуют долгосрочные зависимости между ВВП и всеми индексами. По результатам теста причинности Грейнджера определено, что существует краткосрочная двусторонняя причинная зависимость между ВВП и всеми индексами.

Ключевые слова: *финансовое развитие; экономический рост; коинтеграция; причинность.*

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1. Introduction. The research on the relationship between financial development and economic growth has a long history; yet, there is still no consensus as to whether there is any relationship or what its direction is, if any. The theoretical basis for the relationship between financial development and economic growth was laid by Schumpeter's (1912) studies. He argued that financial institutions make up a very important part of the economy by making use of and financing innovative entrepreneurial activities. Berthelemy and Varoudakis (1996), on the other hand, claim that finance does not only follow economic activities and the strong bond between financial development level and long-term economic growth rate does not only reflect current shocks that affect both financial development and economic performance. There is a statistically significant and economically substantial empirical relationship between initial financial development level and long-term economic growth, capital accumulation, and productivity growth. Furthermore, even when other conditions for sustainable economic development are met in a country, insufficient financial development may sometimes lead to a poverty trap, constituting a major obstacle to growth.

For Robinson (1952), financial development follows economic growth and thus, one should look elsewhere for the sources of power leading to economic growth. Levine et al. (2000) maintain that as financial intermediaries have considerable economic influence on growth, greater importance will be attached to legal, regulatory and political reforms to promote financial development.

Greenwood and Jovanovic (1990) investigated the role of financial intermediaries in information and risk-taking. These authors' model involves two kinds of production technologies: a safe, low-yield technology and a risky, high-yield technology. Risky technology brings about two problems: aggregate and project-specific shock. Financial intermediaries can eliminate project-specific shocks simply by managing their portfolios and can identify an aggregate shock by noting simultaneously-occurring problems with multiple projects. Thus, financial intermediaries allocate their resources to the projects yielding the highest returns, while individuals without financial agents fail to choose appropriate technology to realize a potential shock and as savers build more trust in the ability of financial intermediaries, they tend to lend a greater part of their savings to them. By using the overlapping generations model, Bencivenga and Smith (1991) argued that an intermediation industry permits an economy to reduce the fraction of its savings held in the form of unproductive liquid assets, and to prevent misallocations of invested capital due to liquidity needs and thus, economic growth is triggered by capital accumulation.

Gregorio and Guidotti (1996) used the rate of bank credits loaned to private sector as an indicator of financial development to examine the relationship between financial development and long-term economic growth. The indicator they used was better when compared to the measures such as real interest rates or monetary aggregates because it more accurately represented the real volume of the funds channeled to the private sector. Therefore, the ratio of the bank loans granted to private sector to GDP is more closely associated with investment and economic growth (King and Levine, 1993).

Levine et al. (2000) examined the relationship between financial sector and economic growth; whether financial development as an exogenous component influ-

ences economic growth; and whether the differences in the level of financial development are explained by cross-country differences in legal and accounting systems. By employing various techniques and instrumental variables, the researchers concluded that the exogenous component of financial intermediary development is positively correlated with economic growth.

Romer (1986), Lucas (1988) and Rebelo (1991) examined two channels through which financial functions may affect economic growth. The first, which is capital accumulation, employs growth models that use either capital externalities or investment goods. The functions performed by financial systems influence steady-state growth through their effects on the capital information in these models. The second channel is technologic innovations, in which financial systems influence capital accumulation either by changing savings rate or reallocating savings among different technologies that generate capital.

Levine (2000), Romer (1990), Grossman and Helpman (1991) and Aghion and Howitt (1992) argue that technologic innovation focuses on the invention of novel production processes and goods. The functions performed by financial systems influence steady-state growth by changing the pace of technologic innovation. In the cases involving certain information and transaction costs, financial institutions come forward to facilitate protection against trading and risks (personal and liquidity risks). The correlation between liquidity and economic development results from high-return projects that require long-term commitment of currently unavailable capital because savers are reluctant to put their savings away for long periods.

Diamond and Dybvig (1983) modeled the emergence of financial markets as a response to liquidity risk and investigated how economic growth is influenced by these financial markets. In their liquidity model, some of the savers experience shocks after they choose between two types of investments, which include an illiquid, high-return project and a liquid, low-return project. Those suffering from such shocks want access to their savings before the illiquid project is concluded. The model assumes that it is prohibitively costly to verify whether another person has experienced a shock, and this information cost assumption rules out state-contingent insurance contracts and creates an incentive for the emergence of financial markets. Under these conditions, banks can offer liquid deposits to savers and offer a portfolio composed of liquid, low-return investments and illiquid, high-return investments to satisfy demands on deposits. By providing demand deposits and choosing an appropriate mixture of liquid and illiquid investments, banks provide savers with insurance against liquidity risk, while simultaneously facilitating long-run investments in high-return projects (Jacklin, 1987).

Levine (1991) claims that market participants do not verify whether other agents received shocks or not; they simply trade in stock exchanges. Thus, with liquid stock markets, equity holders can easily sell their shares, while firms have permanent access to the capital invested by initial shareholders. By facilitating trade, stock markets reduce liquidity risk and thus, illiquid projects enjoy sufficiently large externalities, leading to greater stock market liquidity faster steady-state growth.

By assuming that the size of a financial system is positively correlated with the provision and quality of financial services, Goldsmith (1969) used the value of financial intermediary assets divided by GNP to gauge financial development; however, his

results had certain shortcomings. First, the study did not control other factors influencing economic growth. Secondly, it did not examine whether financial development is associated with productivity growth and capital accumulation. And thirdly, close correlation between the size of a financial system and economic growth did not clearly show the direction of causality.

This study aims to examine the presence and direction of long-run causality relationships between financial development and economic growth by using the National 30, National 50, and National 100 indices at the Istanbul Stock Exchange (ISE). Accordingly, the second section of the study discusses the results reported in the relevant literature, while the third section presents the dataset used for analysis and the econometric methods employed. The fourth section discusses the results obtained in the analyses and the last section evaluates the results.

2. Literature Review. A great deal of empirical research has been conducted on the causality relationship between financial development and economic growth, and various results have been obtained. Some studies concluded that a developed financial sector accelerates economic growth, while other studies underlined that finance sector develops as the economy grows. On the other hand, studies on certain countries failed to identify a significant relationship between the financial sector and economic growth.

In the study involving the total of 56 countries — 19 developed and 37 developing ones, Jung (1986) investigated the causality relationship between financial development and economic growth. The researcher used the ratio of money supply to GDP as the indicator of financial development and applied Granger causality test. Causality relationship was detected from economic growth to financial development in developed countries and from financial development to economic growth in less developed ones.

Demetriades and Hussien (1996) examined the causality relationship between financial development and economic growth in 16 countries between 1969 and 1990. By using Johansen cointegration and Engle-Granger tests, they found that economic growth is the main determinant of financial development. In another study, Hayo (1999) examined the causality relationship between financial development and economic growth in 14 EU countries, Canada, USA and Japan. Covering the period between 1960 and 1990 and using the variables of consumer price index, interest rate and GDP, the research detected no causality between the variables.

Ben M'Rad (2000) investigated the causality relationship between financial development and economic growth, as well as the direction of this relationship. Taking the period between 1980 and 1998 and 6 Mediterranean countries, he employed Granger causality test and VAR model. The study found a unidirectional causality relationship from economic growth to financial development in Lebanon and Turkey and a unidirectional causality relationship from financial development to economic growth in Jordan, Algeria, Tunisia, and Egypt.

In their research, Kar and Pentecost (2000) investigated the causality relationship between financial development and economic growth in Turkey between 1923 and 1995. Using Granger causality test and the vector error correction model, the researchers found that the direction of causality relationship between the variables varied with the selected measure; in other words, a unidirectional causality relation-

ship from financial development to economic growth was found when the money/return ratio was used, while the direction of the causality relationship was from economic growth to financial development when the rates pertaining to private and public sector credits and bank deposits were employed.

Macri and Sinha (2001) investigated the causality relationship between financial development and economic growth in 8 Asian countries for the period between 1950 and 1997. They detected a bidirectional causality relationship between the variables in India and Malaysia, a unidirectional causality relationship from economic growth to financial development in Pakistan and Philippines and a unidirectional causality relationship from financial development to economic growth in Japan, Thailand and Korea. In another study, Al Yousif (2002) examined the causality relationship between financial development and economic growth in 30 developing countries applying Granger causality test and concluded that there was a bidirectional causality relationship between the variables.

Calderon and Liu (2003) investigated in their research the causality relationship between financial development and economic growth for the total of 109 (developing and developed) countries for the period from 1960 to 1994. The results of their study revealed a bidirectional causality relationship between financial development and economic growth, implying an interaction between the two variables. In the study on the relationship between financial development and economic growth in 72 countries between 1978 and 2000, Demetriades and Law (2004) concluded that financial development had a significant effect on economic growth.

Boulila and Trabelsi (2004) examined the causality relationship between financial development and economic growth in the North Africa and the Middle East for different periods ranging from 1960 to 2002 by applying Granger causality and cointegration tests. The researchers showed that there was mostly a unidirectional causality relationship from economic growth to financial development; in other words, economic growth is a determinant of financial development.

In their study, Akmal et al. (2005) examined the causality relationship between financial development and economic growth for 10 Asian countries in the period between 1971 and 2000. They used gross domestic product per capita as an indicator of economic growth and applied Johansen cointegration test, revealing a cointegration relationship between the variables and a unidirectional causality relation running from gross domestic product to financial development. In another study covering the period from 1960 to 2004, Abu-Baber and Abu-Qarn (2006) investigated the causality relationship between financial development and economic growth in North African and 5 Middle East countries. By using Granger causality test and the vector error correction model, they detected no causality relationship between the variables.

Apergis et al. (2007) focused on the period between 1975 and 2000 and 15 OECD countries to investigate the causality relationship between financial development and economic growth. As a result, they demonstrated the presence of a long-term and bidirectional causality relationship between the variables. In their study, Hassan, Sanchez and Yu (2011) examined the causality relationship between financial development and economic growth for the period from 1980 and 2007 in 168 countries. At the end of their study, they detected a bidirectional causality relationship for the

majority of the countries in their sample and a unidirectional causality relationship running from economic growth to financial development in two low-income countries.

3. Empirical Data and Methodology. The dataset used in this study consists of quarterly data for the period between 2000 and 2010 pertaining to gross domestic product (GDP) and National 30, National 50, and National 100 indices at Istanbul Stock Exchange. The closing values for relevant periods were used for the indices. The gross domestic product data were obtained from Turkish Statistical Institute (http://www.turkstat.gov.tr), while the data on the indices and exchange rates were obtained from the electronic data distribution system of the Central Bank of Turkey (CBT) and Istanbul Stock Exchange (ISE) (http://evds.tcmb.gov.tr). First the natural logarithms and then the first-order differences were taken for the GDP data used as the economic growth variable. The data about the index variables were included into the analysis after taking their natural logarithms. Eviews 5.1 software pack was used for the econometric analyses of the data.

Stationary analysis was performed for the data concerning the variables used in the study. Among the parametric tests, the most commonly used is the augmented Dickey-Fuller (ADF-1979) test, which considers possible structural breaks and trends in time series. By using the cointegration test developed by Johansen (1988) and Johansen and Juselius (1990), the presence of a long-run relationship was investigated between the time series. Finally, the direction of the intervariable relationship was investigated through Granger (1969) causality analysis.

4. Empirical Results.

4.1. Unit Root Test Results. Unit root test was carried out to examine the stationarity of the data. The first step involved investigating the level I(0) stationarity of the variables. For this purpose, ADF test was performed for 2 different models including with constant and with constant-with trend. The lag numbers used in ADF unit root test are the lag length determined by Schwarz information criteria (SIC).

Table 1. **Unit Root Test Results**

Variables	ADF (Level)		ADF (First Difference)	
	Constant	Constant and Trend	Constant	Constant and Trend
GDP	-0.934 (0.764) [6]	-3.179 (0.105) [4]	-4.106*** (0,003) [5]	-3.921** (0.022) [5]
ISE 30	-0.614 (0.855) [0]	-2.536 (0.309) [1]	-6.376*** (0.000) [0]	-6.352*** (0.000) [0]
ISE 50	-0.608 (0.857) [0]	-2.523 (0.315) [1]	-6.408*** (0.000) [0]	-6.386*** (0.000) [0]
ISE 100	-0.607 (0.857) [0]	-2.525 (0.314) [1]	-6.453*** (0.000) [0]	-6.433*** (0.000) [0]

,* represent the statistical significance levels of 5% and 1% respectively.
( ) MacKinnon (1996) one-sided p values. [ ] Lag length.

Table 1 presents the results of the unit root tests performed for the variables at their levels. From Table 1, it is clear that all the variables were non-stationary and had

unit roots both in the ADF test and for 2 different models (with constant and with constant-with trend). If all the variables are not found to be stationary as a result of unit root tests performed for the levels of all variables, they are made stationary by taking their differences. Thus, in order to make the variables stationary, ADF unit root test was repeated by taking the first difference of the variables I(1), the results of which are presented in Table 1.

The examination of the results of the ADF unit root test performed by taking the first difference of the series shows that although none of the variables was stationary at their levels I(0), they were made stationary by taking their first differences I(1). Since all the variables are integrated in the first order I(1), it was concluded that there might be a cointegration relationship between the variables. Therefore, as these 4 variables are integrated in the same order, we can continue with investigating the existence of a long-run relationship (cointegration) among them.

4.2. Johansen Cointegration Test Results. Johansen cointegration test was carried out to investigate the presence of a long-term relationship between the variables of GDP, ISE 30, ISE 50 and ISE 100 in the analyses, and the results are given in Tables 2 and 3. The lag number to be considered in the cointegration test was computed to be 4 (four) in line with Akaike and Schwarz information criterions (AIC and SIC), and included in the model.

Table 2. **Johansen Cointegration Test Results-Trace Statistics**

	H_0	H_n	Eigen value	Trace Statistics	%1 Critical Value	%5 Critical Value	%10 Critical Value
GDP-ISE 30 [4]	r=0	r>0	0.361	18.023** (0.020)	19.937	15.494	13.428
	r ≤ 1	r>1	0.078	2.785* (0.095)	6.634	3.841	2.705
GDP-ISE 50 [4]	r=0	r>0	0.357	17.894** (0.021)	19.937	15.494	13.428
	r ≤ 1	r>1	0.080	2.847* (0.091)	6.634	3.841	2.705
GDP-ISE 100 [4]	r=0	r>0	0.353	17.585** (0.023)	19.937	15.494	13.428
	r ≤ 1	r>1	0.078	2.779* (0.095)	6.634	3.841	2.705

*,** represent the statistical significance levels of %10 and %5 respectively.
( ) MacKinnon-Haug-Michelis (1999) p-values.

An examination of the results on the variables with regard to trace statistics revealed the following: the Johansen trace statistics values (18.023 - 2.785) between the variables of GDP and ISE 30 was higher than the critical values (15.494 - 13.428) at the statistical significance levels of 5% and 10% with two cointegration vectors; the Johansen trace statistics values (17.894 - 2.847) between the variables of GDP and ISE 50 was higher than the critical values (15.494 - 13.428) at the statistical significance levels of 5% and 10% with two cointegration vectors; the Johansen trace statistics values (17.585 - 2.779) between the variables of GDP and ISE 100 was higher than the critical values (15.494 - 13.428) at the statistical significance levels of 5% and 10% with two cointegration vectors. Therefore, the null hypothesis indicating the absence of a cointegration relationship can be rejected.

Table 3. **Johansen Cointegration Test Results — Maximum Eigen value Statistics**

	H_0	H_n	Eigen value	Maximum Eigenvalue Statistics	%1 Critical Value	%5 Critical Value	%10 Critical Value
GDP-ISE 30 [4]	r=0	r=1	0.361	15.237** (0.035)	18.520	14.264	12.296
	r ≤ 1	r=2	0.078	2.785* (0.095)	6.634	3.841	2.705
GDP-ISE 50 [4]	r=0	r=1	0.357	15.046** (0.037)	18.520	14.264	12.296
	r ≤ 1	r=2	0.080	2.847* (0.091)	6.634	3.841	2.705
GDP-ISE 100 [4]	r=0	r=1	0.353	14.806** (0.041)	18.520	14.264	12.296
	r ≤ 1	r=2	0.078	2.779* (0.095)	6.634	3.841	2.705

*,** represent the statistical significance levels of %10 and %5 respectively.
( ) MacKinnon-Haug-Michelis (1999) p-values.

An examination of the results on the variables with regard to maximum Eigen value statistics revealed the following: the Johansen maximum Eigen statistic values (18.023 - 2.785) between the variables of GDP and ISE 30 was higher than the critical values (14.264 - 2.705) at the statistical significance levels of 5% and %10 with 2 cointegration vectors (cointegration relationship); the Johansen maximum Eigen value statistic values (15.046 - 2.847) between the variables of GDP and ISE 50 was higher than the critical values (14.264 - 2.705) at the statistical significance levels of 5% and 10% with 2 cointegration vectors (cointegration relationship); and the Johansen maximum Eigen value statistic values (14.806 - 2.779) between the variables of GDP and ISE 100 was higher than the critical values (14.264 - 2.705) at the statistical significance levels of 5% and 10% with 2 cointegration vectors (cointegration relationship). Therefore, the null hypothesis indicating the absence of a cointegration relationship can be rejected. The examination of the obtained results in the light of both trace and maximum Eigen value statistic values demonstrates that there is a long-term relationship (cointegration) between the variable pairs of GDP - ISE 30, GDP - ISE 50 and GDP - ISE 100.

4.3. Granger Causality Test Results. After identifying the presence of a long-term relationship (cointegration relationship) between the variables, Granger causality test based on the VECM model was performed to reveal whether there was any causality relationship between them, and the results are presented in Table 4.

Table 4. **Granger causality test results**

Variables	Hypothesis (H_0 and H_n)	df	Chi-Square	Prob.
GDP - ISE 30	ISE 30 does not Granger-cause GDP.	4	22.147***	0.0002
	GDP does not Granger-cause ISE 30.	4	13.245**	0.0101
GDP - ISE 50	ISE 50 does not Granger-cause GDP.	4	23.116***	0.0001
	GDP does not Granger-cause ISE 50.	4	13.215**	0.0103
GDP - ISE 100	ISE 100 does not Granger-cause GDP.	4	23.111***	0.0001
	GDP does not Granger-cause ISE 100.	4	13.044**	0.0111

, * represent the statistical significance levels of 5% and %1 respectively.

Table 4 shows that the variables of ISE 30 (22.147, p=0.0002), ISE 50 (23.116, p=0.0001), ISE 100 (23.111, p=0.0111) Granger-caused at a statistical significance

level of 1% of GDP, and a bidirectional causality relationship was found to run from ISE 30, ISE 50 and ISE 100 to GDP. The variables of GDP (13.245, p=0.0101; 13.215, p=0.0103; 13.044, p=0.0111) Granger-caused at the statistical significance level of 5% of ISE 30, ISE 50 and ISE 100, and a bidirectional causality relationship was found to run from GDP to ISE 30, ISE 50 and ISE 100.

5. Conclusion. The present study examined the long-term causality relationship between economic growth and financial development for the period from 2000 and 2010 by performing cointegration and causality analyses. Gross domestic product (GDP) was taken as the economic growth variable, while ISE National 30, National 50, and National 100 indices were used as the financial development measure. The Johansen cointegration test performed revealed a long-term relationship between economic developments and index returns. From this result, it could be concluded that positive or negative developments in growth rate affect index returns in the long run. The results supporting the existence of a long-term relationship confirm the results obtained by Al Tamimi et al. (2002), and Apergis et al. (2007). Granger causality test was performed to demonstrate the causality relationship between the variables, revealing a short-run and bidirectional causality relationship between the economic growth (GDP) variable and the financial development variables (ISE 30, ISE 50, ISE 100). To put it differently, possible short-term changes in both main variables can be taken as an important indicator to explain the changes in the other variable. The results showing a bidirectional relationship confirm the results (bidirectional causality) obtained by Kar and Pentecost (2000), Macri and Sinha (2001), Al Yousif (2002), Calderon and Liu (2003), Apergis et al. (2007), and Hassan, Sanchez and Yu (2011). In the light of these results, it could be argued that financial development may be a policy variable to induce economic growth, while economic growth may serve as a policy variable to support the development of the financial system within the economic structure. A well performing financial system is necessary for the process of economic growth but is inadequate to ensure sustained economic growth in developing countries like Turkey.

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Стаття надійшла до редакції 17.05.2012.