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An Empirical Evidence on the Causality between Sectoral Economic Growth and Financial Development in Turkey

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ABSTRACT

In this study, the causal relationships of financial development indicators and trade openness with total economic growth, economic growth of manufacturing industry and construction sectors, are investigated in the 2003Q1 - 2018Q3 period. As a result of Johansen cointegration analysis with three seperate models, it is determined that there is a long-term relationship between the variables, valid for all models. According to the results of the Granger causality test, the direction of the relationship between financial development and economic growth changes according to the financial development indicator. Accordingly, a mutual causal relationship of the total economic growth and the manufacturing industry economic growth with the private sector loans, which is indicator of quantitative financial development, is identified. As the economic growth in the construction sector leads to financial development, it is determined that the demand-following view is dominant.

Türkiye'de Sektörel Ekonomik Büyüme ile Finansal Gelişme Arasındaki Nedensellik Üzerine Ampirik Bir Uygulama

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ÖZ

Bu çalışmada 2003Ç1-2018Ç3 döneminde finansal kalkınma göstergeleri ve ticari açıklık ile ekonomik büyüme arasındaki nedensellik ilişkisi, hem toplam ekonomik büyüme hem de imalat sanayi ve inşaat sektörlerinin ekonomik büyümesi açısından araştırılmıştır. Üç ayrı modelle yapılan Johansen eşbütünleşme analizi sonucunda, tüm modeller için geçerli olmak üzere, değişkenler arasında uzun dönem ilişki olduğu belirlenmiştir. Granger nedensellik testi tahmin sonuçlarına göre, finansal gelişme ile ekonomik büyüme arasındaki ilişkinin tespitinde, finansal gelişme göstergesinin belirleyici olduğu sonucuna ulaşılmıştır. Buna göre, miktar ölçütlü finasal kalkınma göstergesi olan özel sektör kredileri ile toplam ekonomik büyüme ve imalat sanayi ekonomik büyümesi arasında karşılıklı bir nedensellik ilişkisi belirlenmiştir. İnşaat sektöründe ise ekonomik büyüme finansal kalkınmaya neden olduğu için talep takipli görüşün baskın olduğu tespit edilmiştir.

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1. Introduction

Globalization is a process in which goods and services, production factors, technological accumulation and financial resources are freely circulated among countries and the factors, goods, services and financial markets are increasingly integrated (Şenses, 2004, p. 13). In order to measure the integration of countries economically into the world, trade openness and financial openness indicators are taken into consideration. Trade and financial openness are defined as the removal of national restrictions on the free movement of goods, services, labor, and capital between countries, (Yapraklı, 2007).

Trade liberalization is to soften the protection walls for both imports and exports and to bring foreign investment and competition to the economy (Rruka, 2004, p. 8). Trade openness, as a result of trade liberalization, refers to the policies implemented by countries in their trade relations with the outside world. Indicators of trade openness can be classified into three criteria(Wacziarg, 2001, p. 402). The first is the output criteria, which represents the amount of trade or the components of the trade. Second, there are policy indicators, which reflect the attitude of the country's institutions towards other countries, for example, tariff rates, non-tariff barriers. Finally, the deviation criteria are deviations between the amount of trade realized and the estimated free trade amounts.

Even though the history of trade liberalization movements is old, financial liberalization, which is its complement, gained momentum in the 1980s. Increasing trade relations, developments in the information communication sector, technological innovations allowed capital to move freely. Increasing the number of financial instruments accelerated financial liberalization movements by offering the opportunity to diversify risk for investors (Eichengreen & Mussa, 1998, p. 17). Thereby, financial liberalization is the result of regulations in money and capital markets (Onur, 2005) and in the broadest sense is the removal of controls on international capital movements.

It can be said that the concepts of trade openness and financial openness are reflected in the national market as financial development. It is expected that economic and financial indicators in the national market will ultimately affect economic growth. The relationship between financial development and economic growth has been the subject of interest for many researchers and different results have emerged. The theoretical and empirical literature can be summarized in four headings as the demand-following, supply-leading, studies indicating that there is mutual interaction and is not a relationship. Demand-following and supply-leading hypotheses are developed by Patrick (1966). While the economic growth in demand-following hypothesis causes financial development, the development of the financial system in the supply-leading hypothesis is accepted as the cause of economic growth. According to the mutual interaction approach put forward by Arthur Lewis (1955), economic growth leads to financial development by increasing demand for financial services, and financial development provides economic growth by transferring the resources needed by the real sector (Kirkpatrick & Green, 2002, p. 207; Türedi & Berber, 2010, p. 302). Lucas (1988) argues that financial growth does not affect economic growth as the source of economic growth depends on physical and human capital.

Determining the variables that can measure the level of financial development is more complex than the indicators of trade openness, because the aspect of the causal relationship between financial development and growth can vary according to the indicators. In order to achieve correct results, the most comprehensive indicators to reflect the economic conditions and the situation of the country concerned should be identified. Lynch (1996) recommends the use of monetary aggregates, loans-related sizes, capital markets-related indicators, structural indicators, change indicators as indicators of financial development.

In this study, unlike the studies in the literature, both total GDP and GDP of manufacturing industry and construction sectors are analyzed. In this way, it is thought that economic growth will contribute to sectoral restructuring and sustainable economic growth by identifying sectors that are motor/driving forces of economic growth. Accordingly, the main dynamics affecting the GDP of manufacturing industry and construction sectors, and total GDP are investigated on the basis of integration with the world.

In this study, the causal relationship between sectoral economic growth and trade openness and the determined financial development indicators are investigated. The financial development indicators are

determined according to quantitative, structural and change criteria as suggested by Lynch (1996). As the quantitative criterions the stock exchange trading volume / GDP, private sector loans to represent the intermediation activities of the banking sector / GDP; as the structural criterion the M2 money supply definition / GDP; and as the change criteria the difference between loan interest rate and deposit interest rate are taken. When the literature is examined, no study that examines economic growth with these variables on a sectoral basis has been found. Another contribution of this study to the literature is the period of 2003Q1- 2018Q3. This period is characteristic in the world economy in terms of both the 2008 global crisis and the impact of policies implemented after the crisis on the markets. The aim of this study is to determine the basic dynamics of economic growth of manufacturing industry, and construction sectors, and total economic growth in order to ensure sustainable economic growth. Also, it is to contribute to the creation of policies appropriate to the sectors that need to be supported.

The study was conducted amidst few limitations. First, only the banking system, capital markets, broad monetary definition, and change indicators were used as financial development indicators. Second, the services and the agricultural sectors were excluded from the analysis, to determine the relationship between manufacturing industry and construction sectors with financial development. In the study, it is found that there is a mutual causal relationship between the total GDP and private sectors loans. The results are evaluated on a sectoral basis as follows. There is dominant the supply-leading vision in manufacturing industry sector; that is, financial development is interpreted as causing economic growth. There is dominant the demand-side vision in construction sector, because economic growth is the cause of financial development.

The rest of the paper is organised as follows. Section 2 reviews the related literature. Section 3 presents the data used and empirical applications. Section 4 concludes, providing some policy implications.

2. Literature review

Amount of studies have been carried out to investigate the relationship between economic growth and trade openness and financial development, which are two main sources of liberalization. The studies investigating the causal relationship are given below.

Some of these studies arguing that economic growth causes financial development are as follows: In the study of Awojobi (2013), the relationship between domestic output, trade openness and financial development are investigated using the Granger causality test in Greece for the period 1960-2009. According to the results, there is relationship between financial development and economic growth. Also, economic growth is an accelerator for trade openness, and there is one-directional causality from the trade sector to financial development. Saaed and Hussain (2015) examined the causal relationship between financial development, trade openness and economic growth in Kuwait for the period 1977-2012 with Granger causality tests. The results show that there is one-directional causality between economic growth and financial development and between trade openness and economic growth. Also, while economic growth is the Granger cause of financial development, trade openness is the Granger cause of economic growth.

In Ersoy's (2011) study of Turkey for the period 1980-2008, the causal relationship to financial development and to economic growth from financial openness is not found. But there is one-directional causal relationship to financial openness from financial development in the long-term. In the study of Özel (2012), Turkey's economy is examined with the VAR model in the quarter period 1991 - 2010. According to results of this study financial openness is determined as the Granger cause of both GDP and trade openness. Kar et al. (2014) are stated that mutual causality between economic growth and trade openness. Also, they indicated that the economic development ist he cause of the financial development. Variables of the study are trade openness (total trade to the GDP), financial development, domestic credit to income, private sector credit to income, and the market capitalization ratio, GDP series. In the study of Öztürk (2008), using the VAR framework and Granger test, the causality between financial development and economic growth for the period 1975-2005 in Turkey is investigated. The results show that there is not a long-run causal relationship between variables. But, there is a one-directional causality running to financial development from economic growth.

Çınar and Nulambeh (2017) stated that one-directional causality towards trade openness from GDP, inflation and exports, to per capita income from inflation and direct foreign investment, imports are found in Turkey's economy for the period 1974-2015. In study of Cihangir and Öztürk (2018), the relationship between trade openness, designated financial development indicators (financial openness, private sector domestic credit volume/GDP and exchange trading volume/GDP) and sectoral (total GDPs of all sectors, construction sector, manufacturing sector, services sector) economic growth are investigated using Johansen-Juselius Cointegration Test and VECM over the period 2002Q1 - 2017Q4 for Turkey's economy. According to the results, there is a long-term relationship between the variables but there is no short-term relationship.

The studies arguing that financial development causes economic growth are as follows: Yapraklı (2007) investigate causal relationship between trade openness, financial openness and economic growth for the quarter period 1990-2006 in Turkey's economy. As a result of the study, one-directional causality relation from trade openness to financial openness is determined. Türedi and Berber (2010) proved a mutual causal relationship between trade openness and economic growth, and one-directional causal relationship from financial development to economic growth in Turkish economy over the period 1970 - 2007 using VAR and causality test. Also, there is a relationship between the variables in the long term. Demir et al. (2017) examine the causality between trading openness, financial openness, and economic growth with Granger casualty test and VAR analysis for the period 1991Q4 - 2016Q3 in Turkey. Variables of the study are trade openness, financial openness, economic growth, exchange rate, direct foreign investment, interest rate and BİST 100 index. The results show that there is one-directional causal relationship from the financial market data to economic growth and from the direct foreign investment to financial openness. Trade and financial openness positively influence economic growth.

Jung (1986) examined the causal relationship between financial development and economic growth using the Granger causality test in 56 countries for the period of 1950-1980. It is determined that the causality relation is from financial development to economic growth in underdeveloped countries and from economic growth to financial development in developed countries.

Studies suggesting a mutual relationship between financial development and economic growth as follows: Pradhan et al. (2015) are investigated that the causal relationship between financial depth, trade openness and economic growth data during 1994-2011 in India. According to this study, economic growth is positively affected from trade openness and there is a mutual causal relationship between financial depth and economic growth.

In the study of Yücel (2009), the causal relationship between financial development, trade openness and economic growth in Turkey for the period 1989M1-2007M11 is investigated. The results of Granger causality test are indicated that there are mutual causality relations between financial development and economic growth and between trade openness and economic growth. Yıldırım and Çevik (2017) detected a causal relationship from economic growth to financial openness in the period 1993-2016 in Turkey using Granger causality test and asymmetric causality test. According to the result of the Granger causality test, there is a mutual causal relationship between economic growth and financial openness.

There are also studies suggesting that there is no relationship between liberalization policies and economic growth. Such as, Menyah et al. (2014) investigated the relationship between financial development and trade liberalization with growth in the 21 African countries using the Granger causality test for the period 1965-2008. According to the results of this study, the related variables have no significant effect on growth.

3. Data and methodology

3.1. Data Description

In this study, the causal relationship between manufacturing industry and construction sectors's GDPs and trade openness, Private Sector Domestic Loan Use / GDP, Stock Exchange Trading Volume / GDP, and M2 / GDP, and the difference between loan interest rate and deposit interest rate indicators are investigated for the period of 2003Q1 – 2018Q3.

The variables used in the analysis and the sources of these variables are below. The values of GDP are based onthe Chain Linked Volume method. The data of foreign trade transactions are taken from TURKSTAT database and the other data is from Central Bank of Republic of Turkey (CBRT) electronic data delivery system (EDDS).

- Trade Openness [((Import + Export) / GDP)*100] is calculated by this formula. For the foreign trade data the aggregate values of TURKSTAT's broad categories of economic categories (BEC) are taken as the series generated by the Chain Linked Volume method for GDP.
- Stock exchange trading volume / GDP representing the capital markets in order to determine the impact of the development of the financial sector,
- The use of private sector domestic credit / GDP representing the investments financed by the banking sector (Lynch, 1996; Baltagi et al., 2008)
- As the structural indicator of financial development, M2 / GDP (Lynch, 1996, Demetriades and Hussein, 1996)
- As the exchange cost indicator of financial development, the difference between loan interest rate and deposit interest rate (Lynch, 1996).

The models established for the three dependent variables are as follows:

Model 1: GDP_{Total} = f(credits, spread, m2, trade)
Model 2: $GDP_{Manufacturing}$ = f(credits, spread, m2, trade)
Model 3: $GDP_{Construction}$ = f(credits, spread, m2, trade)

3.2. Empirical evidence

Stability analysis of variables is performed by using augmented Dickey-Fuller (ADF) and Philips-Perron (PP) Unit Root tests. Phillips-Perron (1988) Test provides strong results in unit root test results in terms of error correlation and serial variance because this test does not require a changing variance assumption and uses nonparametric correction in the case of autocorrelation.

All variables are seasonally adjusted by Moving Average Methods, and then natural logarithms of the GDP variables aere taken. Table 1 shows the unit root test results for the variables. The results show that the levels of the variables are not stationary and the PP test shows that the first differences are stationary. These series integrate to the same degree and are I(1).

Table 1. Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) Unit Root Tests

Variables	**ADF Unit Root Test**				**PP Unit Root Test**			
	Level	Prob.	First Difference	Prob.	Level	Prob.	First Difference	Prob.
$LGDPSA_{TOTAL}$	4.18754	1.0000	-8.27859	0.0000*	4.46609	1.0000	-8.27859	0.0000*
$LGDPSA_{MANU.}$	2.23391	0.9934	-10.0029	0.0000*	9.03345	1.0000	-10.9178	0.0000*
$LGDPSA_{CONS.}$	2.01241	0.9887	-4.16882	0.0016*	2.97668	0.9991	-11.6573	0.0000*
CREDITSA	3.72218	0.9999	-2.69026	0.2444	9.30654	1.0000	-5.42549	0.0002*
SPREADSA	0.32119	0.7753	-5.26773	0.0003*	-0.00841	0.6761	-5.19370	0.0004*
M2SA	6.23019	1.0000	-4.73280	0.0016*	6.05413	1.0000	-4.74683	0.0016*
TRADESA	0.05710	0.6973	-8.74732	0.0000*	0.33677	0.7795	-9.31796	0.0000*

*, **, *** respectively %1, %5, and %10 are indicate the significance levels.
Not: Both unit root tests have constant terms in the first difference values.

The variables must be stationary for the Granger causality test to be applied. Accordingly, if the mean and variance of a series are constant over time and the covariance of the series does not change over time, the series is stationary. In a model set up with non-stationary series, the causal relationship may not be correctly identified. The exception to this is that the series move together in the long run, that is, there is a cointegration relationship between the series. While the Vector Autoregressive Model (VAR) is used to determine the causal relationship between variables that are non-stationary and do not have a cointegration relationship, it is appropriated to use the Vector Error Correction Model (VECM) for the causal relationship between variables that are non-stationary but have a cointegration relationship (Yavuz, 2005).

In order to investigate the cointegration relationship, the optimal lag length should be determined. According to LR (Log Likelihood), FPE (Akaike Information Criterion), SIC (Schwarz Information Criterion) and HQ (Hannan-Quinn Information Criterion) criteria, which are taken into consideration in calculating optimal lag length in VAR Model. The lag length determined for these Models is given respectively 2, 1, and 2 (see. Appendix 1).

Table 2. Results of Johansen's Cointegration Test

LGDPSA$_{TOTAL}$							
H0	λ_{trace}	*%5 Critical Value*	Prob.	H0	λ_{max}	*%5 Critical Value*	Prob.
r = 0	*73.01681*	*69.81889*	0.0272*	r = 0	*29.72722*	*33.87687*	0.1446
r ≤ 1	-	-	-	r ≤ 1	-	-	-
LGDPSA$_{MANUFACTURING}$							
H0	λ_{trace}	*%5 Critical Value*	Prob.	H0	λ_{max}	*%5 Critical Value*	Prob.
r = 0	*87.81591*	*69.81889*	0.0010 *	r = 0	*32.36360*	*33.87687*	0.0749
r ≤ 1	*55.45231*	*47.85613*	0.0082 *	r ≤ 1	*30.07458*	*27.58434*	0.0234 *
LGDPSA$_{CONSTRUCTION}$							
H0	λ_{trace}	*%5 Critical Value*	Prob.	H0	λ_{max}	*%5 Critical Value*	Prob.
r = 0	*76.73404*	*69.81889*	0.0126 *	r = 0	*31.85212*	*33.87687*	0.0855
r ≤ 1	*44.88192*	*47.85613*	0.0926	r ≤ 1	-	-	-
* Statistical significance at the 5% level.							

The basic hypothesis (H0) that there is no long-term equilibrium relationship between variables at 5% significance level for all models is rejected. Therefore, according to the Johansen Cointegration test, there is a long-term equilibrium relationship between the variables since there is at least one cointegrated relationship in the models (Table 2).

If there is a cointegration relationship between the variables, the short-term relationship should also be investigated. The vector error correction model is used to determine the short term relationship among the variables. Accordingly, if the error correction coefficient is negative and statistically significant, there is a short term relationship between the variables. There was no correlation between variables in the short-time for all three models based on the estimation results of the vector error correction model (See. Appendix 2).

Granger causality test is very sensitive to the choice of lag length (Gujarati, 2004, p. 703). In this study, the optimal lag length test is performed for each model and the optimal lag length is determined as respectively 2, 1, and 2 for all three models (See. Appendix 1). Table 3 shows the results of the Granger causality test estimation.

Table 3. The Results of Granger Causality Test via VECM

$LGDPSA_{TOTAL}$			
Aspect of Relationship	DF	Prob.	Prob.
$\Delta\, CREDITSA \leftrightarrow \Delta\, LGDPSA_{TOTAL}$	2	0.0017 *	0.0501 **
$\Delta\, M2SA \rightarrow \Delta\, LGDPSA_{TOTAL}$	2	0.0251 **	
$LGDPSA_{MANUFACTURING}$			
Aspect of Relationship	DF	Prob.	Prob.
$CREDITSA \leftrightarrow LGDPSA_{MANUFACTURING}$	1	0.0055 *	0.0637 ***
$LGDPSA_{MANUFACTURING} \rightarrow SPREADSA$	1	0.0082 *	
$LGDPSA_{CONSTRUCTING}$			
Aspect of Relationship	DF		
$LGDPSA_{CONSTRUCTING} \rightarrow M2SA$	2	0.0175 **	

DF: Degree of Freedom
*, **, *** respectvely %1, %5, and %10 are indicate the significance levels.

According to results of the Granger causality test, a mutual causal relationship is found between the private sector loans and the total GDP. This result shows that private sector loans, which are the quantitative measure of financial development variable, trigger the economic growth. Furthermore, the definition of M2 money supply is determined to be the Granger cause of total GDP. Accordingly, it can be said that supply is the primary relationship since M2 is the cause of economic growth, which is a structural financial development indicator in terms of total GDP.

When the growth dynamics of the manufacturing industry sector is analyzed, different interpretations can be made according to the financial development variable. The relationship between private sector loans, the quantitative measure of financial development variable and manufacturing industry growth is mutual. However, the criterion of change in the manufacturing industry GDP is the Granger cause of the spread which is the financial development variable. In other words, in terms of the criterian of change in the manufacturing industry sector, there is the demand-following relationship since economic growth causes financial development.

Finally, it is determined that the economic growth in the construction sector is the Granger cause for the definition of M2 money, which is the indicator of structural financial development. Since the relationship is from economic growth to financial development, it is interpreted as demand-followed relationship.

3. Conclusions and policy implication

In this study, the causal relationship between total GDP, manufacturing industry and construction sectors's GDPs and selected financial development indicators and trade openness are investigated for the period 2003Q1 – 2018Q3. Lynch (1996) classifies financial development indicators as quantity, structural, diversity and cost of exchange indicators. As the quantitative criterions the private sector loans / GDP; as the structural criterion the M2 money supply definition / GDP; and as the change criteria the spread of loan – deposit interest rate are taken. In this period, the financial development has a great effect on the fluctuating movement of economic growth. In this study, the effects of financial development are investigated both in terms of the total growth of economy and the growth of manufacturing industry and construction sectors. The purpose of such a classification is to provide sector-specific policies for the sustainable economic growth.

As a result of the models established separately for the total GDP, and GDP of manufacturing industry and construction sectors, it is determined that there is a long term cointegration relationship between the variables. Apart from the economic growth of the construction sector, the analysis results for general economic growth and the economic growth of the manufacturing industry do not give a single relationship. Accordingly, while there is a mutual relationship between the general economic

growth and the private sector loans; it is determined that there is supply-leading relationship between growth and M2 money definition. In other words financial development causes economic growth.

There is a mutual relationship between the economic growth in manufacturing industry and private sector loans. However, when the spread of loan - deposit interest rate is evaluated, it is determined that there is a demand - following relationship. As the economic growth in the construction sector causes the financial development, it is determined that there is a demand-followed relationship between the economic growth and the financial development in this sector.

The industrial sector plays an important role in ensuring sustainable economic growth, because it is more suitable than other sectors to support and increase the country's productivity, employment level and production and use of technology. The policies implemented by policy makers to develop the industrial sector will also serve as the locomotive for the economy. In this sense, according to the results of the analysis, policies that can develop this sector-specific loan alternatives or create demand can be developed. For examples, bank loans can be redirected to support the manufacturing industry, especially sectors with high technology weight and added value, instead of the construction sector that creates temporary benefits. Also, as investment incentives, the supports of the KOSGEB (Small and Medium Enterprise Development of Turkey) and tax advantages can be increased. Trainings can be organized to manage these resources and that is as important as access to financial resources. Projects that increase the industry and university cooperation can be extended in accordance with regional conditions. Ultimately, sustainable economic growth can only be achieved in this way.

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Appendix

Appendix 1: VAR Lag Order Selection Criteria

$LGDPSA_{TOTAL}$						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1040.204	NA	9.30e+08	34.84014	35.01467	34.90841
1	-686.5959	636.4950	16325.72	23.88653	24.93370*	24.29614*
2	**-660.5893**	**42.47739***	**16067.53***	**23.85298***	**25.77279**	**24.60392**
3	-643.9555	24.39619	22214.88	24.13185	26.92431	25.22414
$LGDPSA_{MANUFACTURING}$						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1057.293	NA	1.64e+09	35.40975	35.58428	35.47802
1	**-730.8740**	**587.5534***	**71427.27***	**25.36247***	**26.40964***	**25.77207***
2	-709.2533	35.31387	81364.01	25.47511	27.39492	26.22605
$LGDPSA_{CONTRUCTING}$						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1040.859	NA	3.16e+09	36.06411	36.24173	36.13329
1	-710.9471	591.5663	86183.12	25.54990	26.61565*	25.96503
2	**-674.8380**	**58.52166***	**59915.20***	**25.16683***	**27.12070**	**25.92790***
3	-657.5286	25.06876	82124.62	25.43202	28.27401	26.53903

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 2: The Results of VECM

	$LGDPSA_{TOTAL}$	$LGDPSA_{MANUFACTURING}$	$LGDPSA_{CONSTRUCTING}$
Error Correction Coefficient	0.006704	0.031287	0.051950
Prob.	0.9252	0.7237	0.4030