Chapter 14

The Finance-Growth Nexus for Turkey Over the Period 1960-2020: A Markov-Switching Regime Shift Model

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Abstract

This paper addresses the finance-growth relationship employing Markov-switching regime shift model for Turkey over the period 1960-2020. Growth rate of real GDP is employed as a measure of economic growth while the change in ratio of broad money to GDP and the change in the ratio of domestic credits to GDP are used as two indicators of financial development. Findings show that a positive change in the ratio of broad money to GDP reduces the economic growth rate both before and after the global crisis. On the other hand, a positive change in the ratio of domestic credits to GDP increases the rate of economic growth in both of these two periods. Moreover, an increase in the ratio of broad money to GDP reduces the economic growth rate less before the global crisis than after the global crisis. Similarly, an increase in the ratio of domestic credits to GDP increases the economic growth rate more before the global crisis than after the global crisis. As a general assessment, it is seen that the positive effect of finance on the Turkish economy has weakened after the global crisis. In addition, it is considered that an increase in the money supply more than the economic growth rate can decrease the potential growth rate of the country.

1.INTRODUCTION

The finance-growth link has been extensively researched for over a century. One of the most prominent is Schumpeter's (1911) study, which emphasized

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that the financial system provides sufficient financial resources for entrepreneurs. Gurley and Shaw (1955) stated that financial system provides capital accumulation for economic development. However, until 1970's there could not be detected sufficient empirical evidence about finance-growth relationship. In the following period, studies of Goldsmith (1969), Mckinnon (1973), Shaw (1973) and Fry (1978) played an important role in the development of the literature.

In the following years, when international capital flows increased and financial access became easier, the literature on the finance-growth relationship developed considerably. However, despite the existence of a well-developed literature, empirical results differ according to the country or group of countries studied, time period and econometric method. Some studies yield the results supporting 'the demand following hypothesis'(Robinson, 1952; Friedman ve Schwartz (1963), Goldsmith (1969); Jung (1986)) while the other ones support 'the supply-leading hypothesis' (Schumpeter, 1934 and Patrick, 1966). The demand following hypothesis states that economic growth causes financial development while the supply-leading hypothesis proposes that financial development stimulates economic growth. The third group of studies support 'the feedback effect',which states that financial development and economic growth feed each other, is also present in the literature (Kar and Pentecost, 2000; Al-Yousif, 2002; Calderon and Liu, 2003; Ang, 2008; Kar et al., 2010).

As for the literature on Turkey, similar to the world's literature, there does not exist a consensus on the direction of the relationship according to the different studies, as a result of the different findings. The diversity of the findings stems from the fact that the methodology and/or time period differ from each other in the different studies. Some studies support 'the demand following' hypothesis (Yılmaz and Kaya, 2006; Öztürk, 2008; Keskin and Karşıyakalı, 2010; Özcan and Arı, 2011; Altıntaş and Ayrıçay, 2010) while the other ones support 'the supply-leading hypothesis' (Atamtürk, 2004; Aslan and Küçükaksoy, 2006; Acaravcı et al, 2007; Mercan and Peker, 2013; Aydın et al, 2014).On the other hand, some the results of some studies are in line with 'the feedback effect' (Akkay,2010; Demirhan et.al, 2011). Moreover, there are also some studies that fall outside of these three categories.

While there are a lot of studies for finance-growth nexus on Turkey, none of them in the prominent literature investigate the influences of finance on growth under the different regimes. However, the economic growth can react to financial development indicators in the different periods or different

regimes. For example; while the financial development leads to economic growth in one regime, it can decrease economic growth rate in the other regime. Moreover, the impact of a financial development indicator such as the ratio of domestic credits to GDP can increase economic growth rate in the first regime more than the second regime. Due to this fact, this study aims to contribute to the literature on Turkey by examining the impact of financial development indicators on economic growth over the period 1960-2020 under the different regimes.

The remainder of this study is as follows: Section 2 conducts an extensive review of selected literature on the world and Turkey, respectively. Most of the selected studies in the world literature are selected from the most cited and/or the most respected scientific journals. As for literature on Turkey, literature selection is made from to the most cited and/or known and newest studies. Section 3 makes ecometric application through Markov-Switching regime shift models. Section 4 makes a conclusion.

2.LITERATURE REVIEW

Table 1: Literature Review

Panel A: Selected World Literature			
AUTHOR(S)	**PERIOD AND COUNTRY**	**METHOD**	**RESULTS**
Levine (1991)	1860-1963	Endogenous growth model	Growth is fastened by stock markets through being enabled to trade ownership of firms without being interrupted the productive processes happening within firms and facilitating agents to diversify portfolios. Moreover, growth is influenced by tax policy directly by being changed investment incentives and indirectly by being changed the incentives underlying financial contracts.
Demetriades and Hussein (1996)	16 countries	Johansen and Engle-Granger cointegration; Granger causality	There exists a little evidence for the opinion that finance is a leading factor in the economic development process. Moreover, financial development is systematically caused by economic growth in quite a few countries. The existence of bidirectional nexus is affirmed by the most of the evidence.
Rajan and Zingales (1998)	1980-1990 44 Developed and Developing Countries	Regresyon analysis	Financial development leads to a decrease in external financing costs to companies. In addition, for a large group of countries in the 1980s, industrial sectors, which require relatively more external financing, progressed faster in countries with financial markets.

Levine and Zervos (1998)	1976-1993 47 countries	Pooled cross-section time series regression	The enhacement of the stock market and banks positively affects the capital accumulation and productivity increase, therefore, it positively affects economic growth in the long term
Arestis, Demetriades and Luintel (2001)	1968-1998 France, Germany, Japan, UK, USA	VAR – Johansen cointegration	It is determined that economic growthis supported by both banks and stock markets. Moreover, the impact of banks on economic growth is more effective on economic growth than that of stock markets. In addition, studies using cross-country growth regressions may have excessively determined the contribution of stock markets to economic growth than it was in reality.
Al-Yousif (2002)	1970-1999 30 Developing countries	Johansen cointegration and Granger causality	The two-way causality is confirmed by the empirical findings. There are some findings confirming the other views expressed in the literature (supply driven, demand-followed, and non-correlated), but these findings are not as strong as bidirectional causality. In addition, the empirical conclusions of this article are that the relationship between financial development and economic growth is not common. Since the implementations are idiosyncratic and the impacts depend, between other factors, on the effectiveness of the institutions carrying out those policies.
Calderon and Liu (2003)	1970-1994 109 Developing and industrial countries	Geweke decomposition, Granger causality	Financial development generally causes economic growth. The finance-growth nexus is often bidirectional. Moreover, the contribution of financial deepening to causality for developing countries is higher than that in industrialized countries.
Abu-Bader and Abu Qarn (2008)	1960-2001 Egypt	Johansen cointegration and VECM Granger causality	In addition, financial development has a positive effect on economic growth by directing savings to investment resources and increasing investment efficiency.
Lee and Chang (2009)	1970-2002 37 countries	Panel cointegration and panel error-correction models	The strong long-term relationship between FDI, financial development and economic growth is affirmed by the analysis. Financial development is determined to have a larger effect on economic growth than does FDI. Overall, the findings show that the potential gains related to FDI will increase when coupled with financial development in an increasingly global economy.
Hassan, Sanchez and Yu (2009)	1980-2007 168 Countries	Panel regression	The positive relationship was detected for the finance-growth nexus in developing countries. In addition, a bidirectional causal relationship between finance and growth was found for most regions and a unidirectional causality from growth to finance for the least developed regions. In addition, other variables belonging to the real sector such as trade and government expenditures have an important role in economic growth.

Hermes and Lensink (2010)	1970-1995 67 countries	Panel regression	Since most Latin American and Asian countries have developed financial systems, financial development in these countries has a favourable impact on economic growth by positively affecting foreign direct investment. On the other hand, it has been observed that foreign direct investments do not have a positive contribution to economic growth due to the weak financial system in sub-Saharan African countries.
Beck, Degryse ve Kneer (2014)	1980-2007 77 countries	Panel OLS regression	Financial intermediation increases growth and reduces the lon-grun volatility. The expansion of financial sectors along other dimensions is found to have ineffective in the long-run on real sector outcomes. A large financial sector in shorter time horizons stimulates growth in the developed countries countries at the expense of higher volatility. Economy is stabilized through financial intermediation, especially in low-income countries.
Bittencourt (2012)	1980-2007 Argentina, Brazil, Bolivia and Peru	Several ranel regression estimates (POLS,FE,RE, FE-IV)	Finance positively affects economic activity, innovation and economic growth. The existence of low inflation rates, central bank independence and fiscal responsibility laws have been determined as necessary prerequisites for financial development and therefore sustainable growth and welfare in the region.
Hsueh, Hu ve Tu (2013)	1980-2007 Philliphines Malaysia, Indonesia, Korea, India, Singapore, Thailand, Taiwan, China and Japan	Bootstrap panel Granger causality analysis	The supply-leading hypothesis is supported by the findings that financial development indicators lead to economic growth in some of ten Asian countries.
Uddin, Sjö and Shahbaz (2013)	1971-2011 Kenya	ARDL bounds test and cointegration test with structural breaks by Gregory and Hansen (1996)	Financial sector has apositive long-term effect in the long-term. Moreover, cointegration is detected among the series in the presence of a structural break occured in 1992.
Adeniyi, Oyinlola, Omisakin ve Egwaikhide (2015)	1960-2010 Nigeria	ARDL	Although financial development will negatively affect growth at first, employment-creating growth can be achieved by making policy reforms that aim at broader structural and sustainable development.
Ductor and Grechyna (2015)	1970-2010 101 countries	Panel OLS and GMM	The finance-growth relationship is detected as nonlinear. Moreover, if the balanced growth of finance and real sectors is ensured, the positive effect of finance on growth will emerge. In addition, too rapid financial development may adversely affect economic growth.

Hao, Wang and Lee (2020)	1995-2014 29 Provinces of China	Granger Causality Test	Capital accumulation and energy have a positive effect on economic growth, while financial development has a negative effect on economic growth.
Bist (2018)	1995-2014 16 selected low-income countries	Panel Cointegration, DOLS and FMOLS analysis	It is concluded that financial development has a positive and significant effect on economic growth.
Abeka, Andoh, Gatsi and Kawor (2020)	1996-2017 44 Sub-Saharan African countries	Panel system GMM	It has been found that the degree of financial development of Sub-Saharan African countries is not sufficiently effective on economic growth. In addition, it has been determined that the development in the telecommunications infrastructure of Sub-Saharan African countries magnifies the impact of financial development on their economic growth.
Rahman, Khan ve Charfeddine (2020)	1980-2017 Pakistan	Markov Switching	As a result of the analysis, it has been determined that financial development encourages economic growth. Trade openness and government expenditures, which are control variables, have a positive effect on economic growth, while labor has a negative effect on economic growth.
Raghutla and Chittedi (2020)	2000-2016 BRICS Countries	Panel cointegration, FMOLS and causality	Money supply, exchange rate and inflation have a positive effect on economic growth. In addition, the real sector and financial development have a significant impact on supporting economic growth.
Li and Wei (2021)	1987-2017 30 Chinese provinces	Panel Smooth Transtion Regression (PSTR) model	The existence of a non-linear relationship between carbon emissions, financial development, openness, innovation and economic growth has emerged. It also reduces the stimulus effects of carbon emissions, financial development and innovation on economic growth.
Cheng, Chien and Lee (2021)	2000-2015 72 Countries	Panel dynamic GMM	Financial development is determined to have a consistently negative impact on economic growth. The negative effects of financial development can be reduced through the interaction effects of information and communication technologies and finance.
Song, Chang and Gong (2021)	2002-2016 142 Countries	Panel cointegration, FMOLS and causality.	Increasing economic growth can help stimulate financial development for developing countries. Prevention of corruption has adverse effects on financial development in developing countries.
Mtar and Belazreg (2021)	2001-2016 27 OECD Countries	Panel VAR Model	There is a unidirectional causality running from economic growth to financial development. The study reveals that if financial systems are regulated more and the quality of financing increases, economic development will be positively affected. In addition, the relationship between innovation and economic growth is complex, and country-specific characteristics play a crucial role in promoting innovation and productivity.

Banto and Monsia (2021)	1999-2016 76 Countries	Panel GMM	Microfinance institutions and banks increase investments and consumption, thereby improving economic growth.
Alhassan, Adamu and Safiyanu (2021)	1980-2017 44 Asian countries	Panel GMM	Financial development triggers economic growth in Asia. While the development of financial institutions has a bigger effect on the growth of upper-middle and high-income countries than the development of financial markets, the situation is opposite in the low- and the lower-middle-income countries.
Panel B: Selected Literature on Turkey			
AUTHOR(S)	**PERIOD**	**METHOD**	**RESULTS**
Atamtürk (2004)	1975-2003	Granger causality test	While economic growth increased through capital inflows in Turkey in the analyzed period, this led to economic instability and an unsustainable economic structure. For this reason, contrary to this situation, economic growth should be achieved through the real sector.
Ardıç and Damar (2006)	1996-2001	Panel GMM	A negative relationship is found between financial development and economic growth. This result is evaluated as the main function of the banking sector at that time was to provide financing to the treasury instead of adequately financing the real sector to contribute to growth.
Aslan and Küçükaksoy (2006)	1970-2004	Granger causality test	The existence of a supply-leading relationship is confirmed.
Yılmaz and Kaya (2006)	1986-2004	Johansen cointegration, Granger causality	Any cointegration relationship could not be determined. However, Granger causality from financial development indicators to GDP is detected.
Acaravcı, Öztürk and Kakilli Acaravcı (2007)	1986Q1-2006Q4	Johansen cointegration, Granger causality	There does not exist a long-run cointegration relationship. There exists one-way causality running from financial development to economic growth.
Halicioğlu (2007)	1968-2005	ARDL bounds test, VECM Causality	There exists a cointegration relationship between financila development indicators and economic growth. Moreover, one-way causality running from financial development to economic growth is determinded.
Kar, Peker and Kaplan (2008)	1963-2005	Johansen cointegration	It has been seen that trade liberalization and financial development both have a positive effect on economic growth.
Öztürk (2008)	1975-2004	Johansen cointegration and Granger causality	There exists no cointegration but one-way causality from economic growth to financial development.
Yücel (2009)	1989-2007	Johansen cointegration and Granger causality	The effect of trade openness on growth is positive, while the effect of financial development on economic growth is negative. In addition, there exists a significant relationship between trade openness, financial development and economic growth.

Altıntaş and Ayrıçay (2010)	1987-2007 Quarterly period	ARDL	Financial development is determined to be more effective than real interest rate to raise real GDP. It is also concluded that developing countries like Turkey, feasibility of financial funds has a crucial importance to increase real income.
Keskin and Karşıyakalı (2010)	1987Q1-2007Q3 Quarterly period	Engle-Granger cointegration and error-corection model	Unidirectional causality from economic growth to financial development both in the long and short-run is determined.
Soytaş and Küçükkaya (2010)	1991Q3-2005Q4 Quarterly period	Granger causality test, impulse-response analysis	A comprehensive financial development index using principal component analysis is establihed by the authors. Any long-run causality in either direction can not be determined when the possible effects of inflation and monetary and fiscal policies on monetary aggregates and the economic growth rate is taken under the control. Generalized impulse response analysis supports the same results.
İnce (2011)	1980-2010	Johansen cointegration and Granger causality	There exists a strong relationship between financial development and economic growth in the short run, and this relationship disappears in the long run. In addition, a unidirectional relationship from financial development to economic growth is determined.
Karahan ve Yılgör (2011)	1980-2010	Granger causality	As a result of the findings, it was seen that there is a bidirectional relationship between financial deepening and economic growth. Financial deepening will positively affect economic growth, as well as financial deepening will develop as a result of economic growth.
Özcan and Arı (2011)	1998Q1-2009Q4	Granger causality	There exists one-way causality from growth to finacial development.
Özturk and Karagöz (2012)	1971-2009	ARDL bounds test	It has been determined that inflation has a negative effect on economic growth, while loans to the private sector have a positive effect on economic growth.
Mercan and Peker (2013)	1992:1-2010:6 Monthly data	ARDL Bounds test	Financial development positively affects economic growth. However, the magnitude of the effect of the finacial development on economic growth ise sensitive to the indicator that is used. Moreover, there exists one-way causality running from financial development to economi growth in the short-run.
Aydın, Ak and Altıntaş (2014)	1988-2012	Toda-Yamamoto Granger Causality	There is one-way Toda and Yamamoto (1995) Granger causality running from the ratio of credits issued to private sector and market capitalization ratio to real GDP; there also exists a bidirectional causality between real GDP and M2 / GDP.

Akpolat (2016)	1998Q1-2014:3 Quarterly period	Maki (2012) cointegration test, FMOLS	There exists a cointegration between BIST index and real GDP with four structural breaks. Moreover, there is positive contribution of BIST on real GDP.
Avcı (2017)	2003Q1-2016Q1 Quarterly period	Granger Causality test	In accordance with the supply leading hypothesis, a one-way causality relationship has been determined from the development of the stock market to economic growth. The causality relationship in terms of the growth of the banking sector and the development of the borrowing market supports the demand-following hypothesis.
Pata and Ağca (2018)	1982-2016	ARDL Bouns test, Granger and Hacker-Hatemi J bootstrap causality	ARDL bounds test shows th evidence that the increase in financial development positively affects economic growth both in the short and long run. The results of both causality tests show that there is a unidirectional causality running from financial development to economic growth in the short run.
Eyüboğlu and Akan (2020)	1980-2016	RALS-EG Cointegration test, Granger causality test	There exists a cointegration relationship between financial development indicators and economic growth as a result of the RALS-EG cointegration test. Granger causality test affirms that financial development Granger causes economic growth.
Bilman (2020)	2005Q4-2020Q1 Quarterly period	Standard Granger and fourier Granger causality tests	Findings from standard and nonlinear (fourier) Granger causality estimation methods reveal that there is no causality relationship in any direction between Islamic banking and economic growth. While the standard Granger test cannot detect any causal relationship between financial development and economic growth; the nonlinear (fourier) Granger causality test points to economic growth as the "Granger cause" of financial development.
Eroğlu and Yeter (2021)	1991-2019	Toda and Yamamoto (1995) Granger causality test	The one-way causality running from financial development to economic growth is determined.
Taşseven and Yılmaz (2022)	2005Q1-2020Q2 Quarterly period	Johansen cointegration, VECM causality, impulse-response, variance decomposition analyses	There is a long-term cointegration relationship between economic growth, BIST 100 index, inflation, exports, imports, credit volume and monetary aggregate M2 . According to Granger causality tests, there is a one-way causality relationship from economic growth to BIST 100 stock market index, which is an indicator of capital markets, and monetary aggregate M2. In this case, bank credit volume is not seen as the cause of economic growth. The impulse-response analysis shows that the economic growth has a reaction to a standard deviation shock in the BIST 100 stock market index after one period.

Tablo 1 shows a broad literature on world and Turkey, respectively. Panel A shows the selected world literature. While the most of the studies of Panel A consists of panel data studies, a few studies consist of analyzes involving several countries. Only the studies of Abu-Bader and Abu-Qarn(2008), Uddin et.al (2013), Adeniyi et.al (2015) and Rahman et.al (2020) are country-specific studies that are about Egypt, Kenya, Nigeria and Pakistan, respectively. It is seen that panel OLS, panel cointegration, DOLS, FMOLS, GMM, panel causality methods come to the fore in an important part of panel data analyses. In some studies where time series methods covering more than one country are used, it is seen that Johansen cointegration, Granger causality and OLS methods are preferred more.

As for literature on Turkey shown in panel B, it is seen that standard and advanced versions of cointegration and Granger causality tests, and ARDL are heavily used in most of the literature. The studies of Ardıç and Damar (2006) and Akpolat (2016) differ in terms of the methods they use which are panel GMM and FMOLS, respectively.

As mentioned in the previous section, although there are many studies on Turkey examining the finance-growth relationship, there does not exist any study that takes into account the economic regime shifts among the studies within our knowledge. This study differs from the others in terms of the methodology adopted.

3. ECONOMETRIC METHODOLOGY AND DATA

This study aims to investigate the impact of financial development on economic growth within the Markov-Switching modelling approach over the period 1960-2020. We use the natural logarithm of reel GDP according to 2015 constant prices in US dollars. As for financial development indicators, we use the ratio of broad money to GDP (BM) and the ratio of domestic credits to GDP (DOCRE). The data were obtained from Worldbank database.

The prerequisite for using Markov-Switching model is that the variables of interest must be stationary. For this reason, we apply unit root tests regarding the possible structural breaks since we analyse a long-time period. Secondly, we make the correlation and graphical analysis to support the results of Markov-Switching model. Thirdly, we establish a Markov-Switching model to determine how the financial development indicators that we use behave under the different regimes.

3.1. Unit Root Test

Eviews package software suggests various kinds of modified ADF unit root tests allowing for structural breaks. The two versions of the breakpoint unit root test are developed: The first one is *innovational outlier* test, the second one is *additional outlier* test. The innovational outlier test supposes that break occurs gradually while the additional outlier test proposes that break occurs immediately. The null hypothesis of the unit root test suggests that series contain unit root while alternative hypothesis suggests the absence of unit root or stationarity.

The innovational and the additional outlier tests divide into the four basic models. For non- trending data, the first model (O) accepts a one-time change in level. For trending data, there exists a model (A) with a change in level, a model with a change in level and trend (B), and a model with a change in trend (C). In this study, we adopt the innovational outlier test and apply the first two models (O and A) to investigate the unit root characteristics of the series.

The O model can be expressed as follows:

$$y_t = y_{t-1} + \beta + \psi(L)(\theta D_t(T_b) + \gamma DU_t(T_b) + \varepsilon_t \quad (1)$$

where y_t denotes the variable of interest, $D_t(T_b)$ is a one-time break dummy variable taking the value of 1 only on the break date and 0 otherwise. $DU_t(T_b)$ represents intercept break variable that takes the value 0 for all dates prior to the break, and 1 thereafter. $\psi(L)$ symbolizes a lag polynomial which denotes the the dynamics of the stationary and invertible ARMA error process.

The A model is as follows:

$$y_t = y_{t-1} + \beta t + \psi(L)(\theta DU_t(T_b) + \gamma D_t(T_b) + \varepsilon_t \quad (2)$$

where *t* denotes trend in the data.

Table 1: Breakpoint Unit Root Test Results

	Intercept				Intercept & Trend			
Variables	**Level**	**Break**	**1st Diff.**	**Break**	**Level**	**Break**	**1st Diff.**	**Break**
LRGDP	-2.12	2002	-8.14***	2009	-3.29	2009	-8.21***	2009
BM	-1.94	2004	-10.33***	2019	-4.18	2007	-10.28***	2019
DOCRE	-2.74	2009	-6.71***	2002	-3.04	2009	-6.74***	2002

- Optimal lag length is determined according to the Schwarz information criterion. Maximum lag length is determined as 10.

*- The critical values for the model with intercept is -4.95, -4.44, -4.19 at 1%, 5% and 10% significance levels, respectively while the critical values for the model with intercept & trend is -5.35, -4.86, -4.61 at 1%, 5% and 10% significance levels, respectively. *** refers to statistically significance at 1 % significance level.*

- Breakpoint selection is done according to Dicker-Fuller minimum t-statistic.

Table 1 represents breakpoint unit root test results. It is clearly seen that the test statistics of the unit root tests for the first differenced series are statistically significant at 1% significance level. In other words, all the series are stationary at first difference (I(1)) according to both intercept and intercept & trend models. Therefore, we will use the differenced series for Markov-Switching model in the next step. As for the break dates, it is observed that 5 of the break dates are determined as 2009 which coincides the year that the global financial crisis seriously affected Turkish economy. The three of the break dates are determined as 2002 which is the year after the 2001 economic crisis occurred in Turkey that had severe impacts on Turkish economy. The two structural break dates are set as 2019 that coincides with the political tension between Turkey and the United States. As an overall assessment, it can be considered that the determined break dates are compatible with the economic history of Turkey.

The variables of interest are determined as stationary in their first differences. Therefore, the following preliminary analyzes and the Markov-Switching model will be conducted based on the differenced data.

3.2. Preliminary Analysis: Correlation and Graphical Analysis

Table 2: Correlation Matrix

	ΔLRGDP	**ΔBM**	**ΔDOCRE**
ΔLRGDP	1.000		
ΔBM	-0.421	1.000	
ΔDOCRE	0.364	0.380	1.000

Table 2 shows the correlation matrix of the differenced data that we will use in the Markov-Switching model. As is known, the multicollinearity is an important issue to be handled in an econometric analysis if there exists. Otherwise, the analysis outcomes can be misguiding if the problem is not resolved. It is seen that the correlation coefficient between the dependent variables which are ΔBM and ΔDOCRE is about 0.38 which can be evaluated as a low ratio for us to be in doubt about the existence of multicollinearity. As for the ΔLRGDP which corresponds to the growth rate of the real GDP (since log-difference is approximately growth rate), it has a negative correlation coefficient between ΔBM which is about -0.42 and a positive correlation coefficient between ΔDOCRE which is about 0.36. The negative correlation between the growth rate and ΔBM is an outstanding finding suggesting that monetary growth can reduce the growth rate of real GDP. The positive correlation between the growth rate and ΔDOCRE can be considered as a sign that an increase in credit ratio may cause an increase in the real GDP growth rate. However, we should make further analysis to be sure about the direction of the relationships.

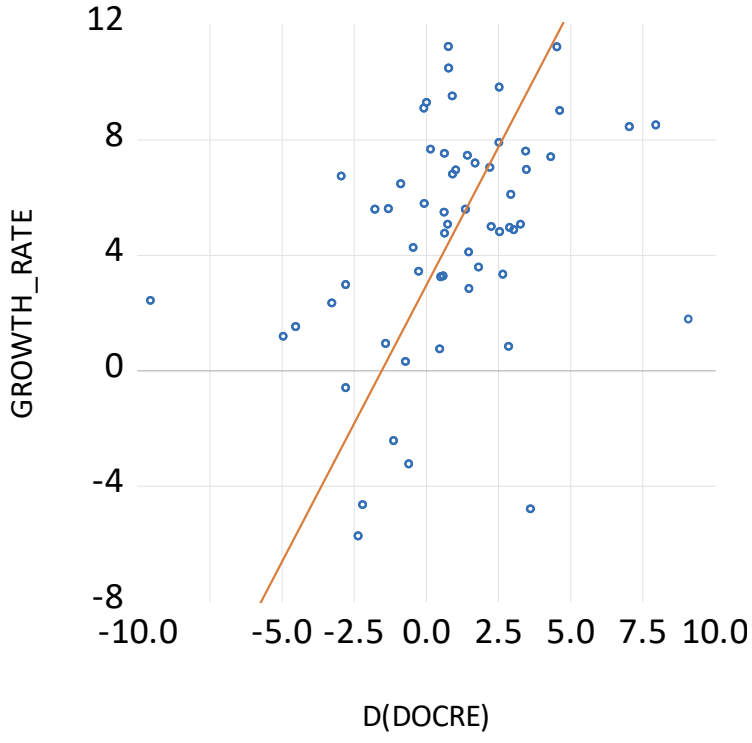


Figure 1: Growth Rate Of Real GDP(ΔLRGDP) and Change in Credit Ratio (ΔDOCRE)

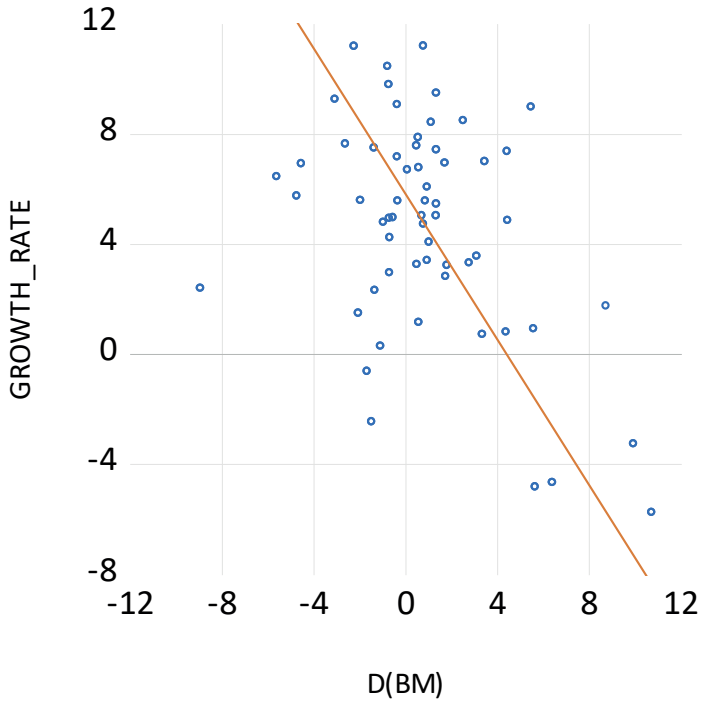


Figure 2: Growth Rate Of Real GDP(ΔLRGDP) and Change in Broad Money to GDP (ΔBM)

Figure 1 shows the growth rate of real GDP (ΔLRGDP) and the change in credit ratio (ΔDOCRE) relationship with an orthogonal regression line. It is seen that there exists a positive relationship between ΔDOCRE and ΔLRGDP.

Figure 2 indicates the growth rate of real GDP (ΔLRGDP) and the change in the ratio of broad Money to GDP (ΔBM) relationship with an orthogonal regression line. We observe that the orthogonal regression line has a downward trend showing that there can be a negative relationship between ΔBM and ΔLRGDP.

It can be concluded that both graphical analysis and correlation analysis reveal results that confirm each other: There is a positive relationship between ΔDOCRE and growth rate while the opposite is true for ΔBM and growth rate relationship.

3.3. Markov-Switching Model

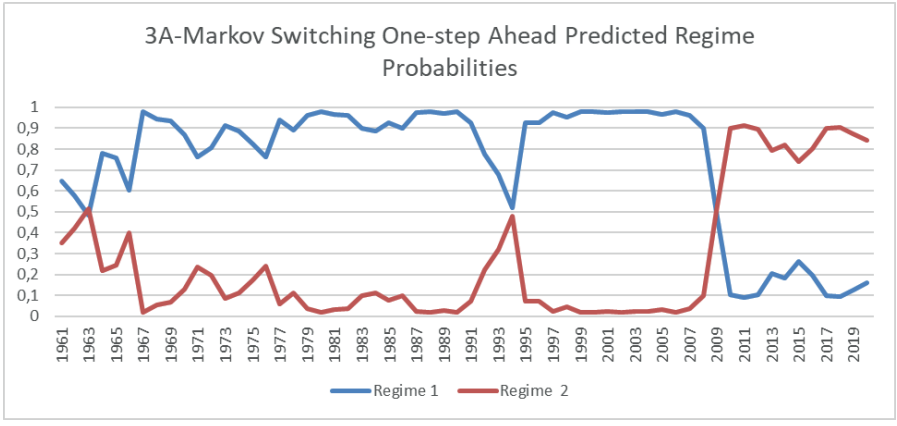
Table 3: Markov-Switching Regression Model Results

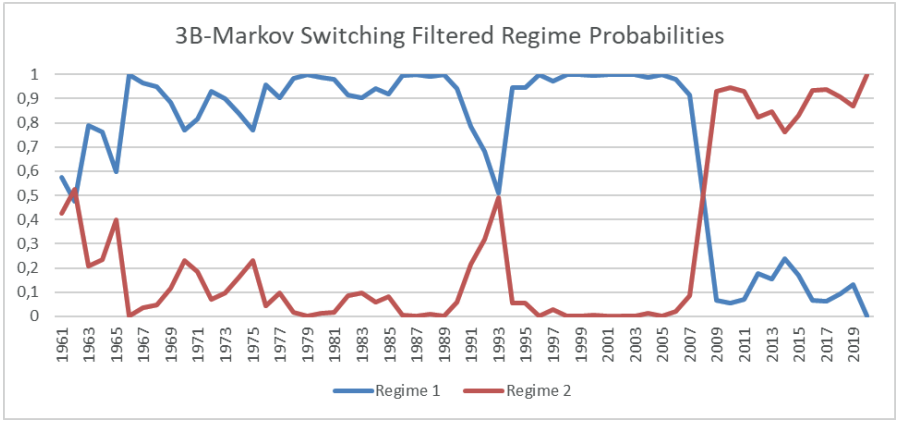
Variable	Coefficient	Std. Error	z-Statistic	Prob.
Regime 1				
ΔBM	-0.309585	0.081702	-3.789188	0.0002
ΔDOCRE	0.755649	0.113233	6.673382	0.0000
LOG(SIGMA)	0.806135	0.106566	7.564687	0.0000
Regime 2				
ΔBM	-0.922674	0.127556	-7.233475	0.0000
ΔDOCRE	0.538609	0.105988	5.081808	0.0000
LOG(SIGMA)	0.339561	0.157956	2.149720	0.0316
Common				
C	5.146382	0.316150	16.27828	0.0000
DUMMY	-6.292296	0.641877	-9.802959	0.0000
Transition Probabilities	P_{11}	P_{12}	P_{21}	P_{22}
	0.979	0.020	0.038	0.962

Table 3 indicates Markov-Switching regression model results. In the model, we adopt the regime specific error variances. Moreover, ΔBM and ΔDOCRE are determined as switching regressors. We determine constant term and the dummy variable as non-switching regressors. We use the dummy variable to capture the effects of the contraction years of the Turkish economy. These years are 1980, 1994, 1999, 2001 and 2009. Turkish economy faced a foreign Exchange crisis in 1980 as a failure of import substitution industrialization strategy implemented in the pre-1980 period. In 1994 and 2001, Turkey lived the two financial crisis that have severe economic and social results. In 1999, an earthquake occurred in the Marmara region in which Turkey's important industrial zones are located and the economy faced a contraction. 2009 was the year when the effects of the global financial crisis were felt most deeply in Turkey. The economy contracted by 4.8% this year.

As for the results, we observe that all the coefficients of the switching and the non-switching regressors are statistically significant. The coefficient of ΔBM is about -0.31 and -0.92 in regime-1 and regime-2, respectively.

This shows that the lowering effect of change in ratio of broad money to GDP in regime-2 is 3 times higher than in regime-1. The coefficient of ΔDOCRE is about 0.76 and 0.54 in regime-1 and regime-2 meaning that the change in ratio of domestic credits to GDP increases economic growth rate in regime-1 more than in regime-2. As a general assessment, financial development indicators have a greater impact on the economic growth rate in regime-1 than in regime-2. Moreover, it is interesting that the change in ratio of broad money to GDP (ΔBM) decreases economic growth rate while the change in the ratio of domestic credits to GDP (ΔDOCRE) increases economic growth rate in both of the regimes. The coeffient of the dummy variable is about -6.29. This shows that the economic growth rate decreased by about 6% on average during the crisis years. The transition probabilities show that the probability of the economy staying in regime 1 while it is still in regime 1 ($\mathbf{P}_{11}$) and the probability of the economy staying in regime 2 while it is still in regime 2 ($\mathbf{P}_{22}$) is about 98 % and 96 % , respectively.





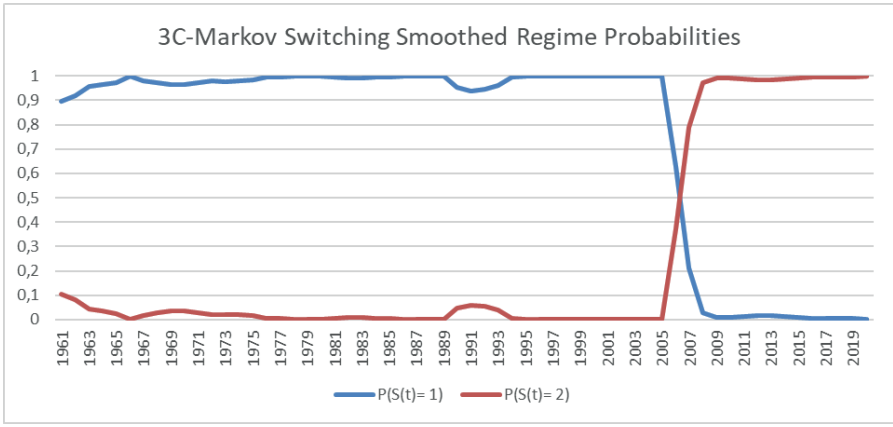


Figure 3: Markov Switching Regime Probabilities

Figure 3 illustrates the results of the three different Markov-Switching regime probabilities according to the years. The vertical axis shows the probabilities while the horizontal axis shows the years. Figure 3A and Figure 3B show Markov Switching one-step ahead predicted regime probabilites and filtered regime probabilities, respectively. It is seen that the two figures show similar results. According to Figure 3A, regime-1 largely prevails until 2009, except the years 1963 and 1994. 1963 is the first year that the first 5-year development plan and 1994 is a crisis year as mentioned above. The transition year from regime-1 to regime-2 is determined as 2009 as a result of one-step ahead regime predicted probabilities illustrated in Figure 3A. Accordingly, Figure 3B reveals that regime-1 is valid until 2008 except 1962 and 1993 for the finance-growth nexus. In other words, the transition year from regime-1 to regime-2 is determined as 2008. As for Figure 3C, which shows Markov switching smoothed regime probabilities, it is clearly seen that the regime-1 is valid until 2007 while the regime-2 is valid after this year.

The results that the transition year from regime-1 to regime-2 is determined as 2009, 2008 and 2007 as a result of these three different types of regime probabilities suggest that the impact finance on economic growth rate has changed after the global financial crisis. As mentioned above, the impact of financial variables on economic growth rate has reduced in regime-2. This means that financial development has increased the economic growth rate less after the global crisis than before.

4. CONCLUSION

This study examines the finance-growth relationship in the 1960-2020 period through the Markov-Switching model, which takes into account the regime changes in the economy. Growth rate of real GDP (ΔLRGDP) is used as an indicator of economic growth while the change in ratio of broad money to GDP (ΔBM) and the change in the ratio of domestic credits to GDP (ΔDOCRE) are used as two indicators of financial development.

The Markov-switching model divided the economy into two periods: before and after the global crisis. A positive change in the ratio of broad money to GDP reduces the economic growth rate both before and after the global crisis. On the other hand, a positive change in the ratio of domestic credits to GDP increases the rate of economic growth in both of these two periods. Another finding is that while the positive effects of both financial development indicators on the economic growth rate are greater before the global crisis, their effects are lower after the global crisis. In other words, an increase in the ratio of broad money to GDP reduces the economic growth rate less before the global crisis than after the global crisis. Similarly, an increase in the ratio of domestic credits to GDP increases the economic growth rate more before the global crisis than after the global crisis. The general conclusion to be drawn from this is that the positive effect of finance on the Turkish economy has weakened after the global crisis.

According to these findings, the growth of money supply more than real GDP (an increase in UN) decreased the economic growth rate before and after the global crisis. Accordingly, excessive monetization in the economy leads to the shift of finance to inefficient areas and the growth of the economy below its potential. This situation worsened in Turkey after the global crisis, as a result of the findings. On the other hand, the growth of loans more than real GDP (an increase in DOCRE) increased the economic growth rate in both periods. However, this effect is determined as lower after the crisis. Based on this result, it can be concluded that credits were directed to productive areas that would increase economic growth in both of these periods in Turkey.

As for policy implications, excessive monetization can be harmful for Turkish economy since it can reduce economy's potential growth rate. For this reason, it would be appropriate to avoid an increase in money supply above the targeted economic growth rate. In addition, care should be taken to ensure that the loans extended to the private sector are used for productive areas.

REFERENCES

Abeka, M. J., Andoh, E., Gatsi, J. G., Kawor, S. (2020). Financial development and economic growth nexus in ssa economies: The moderating role of telecommunication development, *Cogen Economics & Finance,* 9(1), 1-24

Abu-bader, S. & Abu-qarn, A. (2008). Financial development and economic growth: The Egyptian experience, *Journal of Policy Modeling,* 30, 887-898

Acaravcı, A., Öztürk I., & Kakilli Acaravcı, S. (2007) *Finance-growth nexus: Evidence from Turkey*. International Research Journal of Finance and Economics 11: 30-40

Adeniyi, O., Oyinlola, A., Omisakin, O. ve Egwaikhide, F. O. (2015). Financial development and economic growth in Nigeria: Evidence from threshold modelling, *Economic Analysis and Policy,* 47, 11-21

Akkay, C. (2010). Finansal entegrasyon sürecinde finansal gelişme ekonomik büyüme arasındaki nedenselliğin Türkiye açısından dönemsel olarak araştırılması. *Sosyal Bilimler Dergisi* 2: 55-70.

Akpolat, A. G. (2016) Does Turkish stock market contribute to Turkey's long-run growth: An analysis with structural breaks. *Journal of Applied Research in Finance and Economics,* 2(3), 1-13.

Alhassan A., Adamu, M. S., Safiyanu, S. S. (2021), Finance led growth hypothesis for Asia: An Insight from new data, *Journal of the Asia Pacific Economy,* 1-20

Altıntaş, H. ve Ayrıçay, Y. (2010). Türkiye'de finansal gelişme ve ekonomik büyüme ilişkisinin sınır testi yaklaşımıyla analizi: 1987–2007.*Anadolu Üniversitesi Sosyal Bilimler Dergisi* 10, No.2: 71-98

Al-Yousif, Y. K. (2002). Financial development and economic growth: another look at the evidence from developing countries. *Review of financial economics*, *11*(2), 131-150.

Ang, James B. (2008). What are the mechanisms linking financial development and economic growth in Malaysia?. *Economic Modelling* 25, no.1: 38-53

Ardic, O. P. & Damar, H. E. (2006), Financial sector deepening and economic growth: Evidence from Turkey, *Topics in Middle Eastern and North African Economies*, 9, 1-25

Arestis, P., Demetriades, P. O. & Luintel, K. B. (2001), Financial development and economic growth: The role of stock markets, *Journal of Money, Credit and Banking*, 33(1), 16-41

Aslan, Ö., & Küçükaksoy, İ. (2006). Finansal gelişme ve ekonomik büyüme ilişkisi: Türkiye ekonomisi üzerine ekonometrik bir uygulama, *Ekonometri ve İstatistik Dergisi* 4 : 12- 28.

Atamtürk, B. (2004). Türkiye'de Finansal Gelişme ve Ekonomik Büyümenin Nedensellik Yönü Üzerine Bir İnceleme (1975-2003). *Maliye Araştırma Merkezi Konferansları* 46, 99-105.

Avcı, Ö. (2017), Examination of the relationship between financial development and economic growth: Case of Turkey, *Journal of Accounting & Finance,* 75, 171-181

Aydın, M.K., Ak, M.Z., & Altıntaş, N. (2014) Finansal Gelişmenin "Büyüme" ye Etkisi: Türkiye Özelinde Nedensellik Analizi. *Maliye Dergisi* 167: 149-162

Banto, J. M. ve Monsia, A. F. (2021), Microfinance institutions, banking, growth and transmission channel: A GMM panel data analysis from developing countries, *The Quarterly Review of Economics and Finane, 79, 126-150*

Bayar, Y., Kaya, A. & Yıldırım, M. (2014), Effects of stock market development on economic growth: Evidence from Turkey, *International Journal of Financial Research,* 5, 93-100

Beck, T., Degryse, H. & Kneer, C. (2014), Is More Finance Better? Disentangling Intermediation and Size Effects of Financial Systems, *Journual Of Financial Stability,* 10, 50-64

Bilman, M. E. (2020). Türkiye'de islami bankacılık, finansal gelişme ve ekonomik büyüme arasındaki nedensellik ilişkilerinin doğrusal ve doğrusal olmayan yöntemlerle analizi. *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi*, *19*(Temmuz 2020 (Özel Ek)), 353-369.

Bist, J. P. (2018), Financial Development and Economic Growth: Evidence from a panel of 16 african and non-african low-income countries, C*ogent Economics & Finance, 6(1), 1-17*

Bittencourt, M. (2012), Financial development and economic growth in Latin America: Is Schumpeter right, *Journual of Policy Modeling,* 34, 341-355

Calderón, C., & Lin Liu. 2003. The direction of causality between financial development and economic growth. Journal of Development Economics 72. No.1: 321-334.

Cheng, C., Chien, M. & Lee, C. (2021), ICT Diffusion, Financial Development and Economic Growth: An International Croos-Country Analysis, *Economic Modelling,* 94, 662-671

Demetriades, P. O. & Hussein, A. K. (1996), Does Financial Development Cause Economic Growth? Times- Series Evidence From 16 Countries, *Journal of Development Economics*, 51, 387-411

Demirhan, E., Aydemir, O., & Inkaya, A. (2011). The direction of causality between financial development and economic growth: evidence from Turkey. *International Journal of Management* 28. no.1: 3-19

Ductor, L. & Grechyna, D. (2015), Financial development, real sector, and economic growth, *International Review of Economic and Finance,* 37, 393-405

Eroğlu, İ., & Yeter, F. (2021). Finansal gelişme ve ekonomik büyüme ilişkisi: Türkiye için nedensellik analizi. *JOEEP: Journal of Emerging Economies and Policy*, *6*(2), 272-286.

Eyüboğlu, K., & Kadir, A. (2020). Türkiye'de finansal gelişme ve ekonomik büyüme ilişkisi: RALS-EG Eşbütünleşme Testi. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi*, *22*(4), 974-988.

Friedman, M., & Schwartz, A. (1963) A monetary history of the United States, 1867- 1960. *Princeton University Press*.

Fry, M. J. (1978). Money and capital or financial deepening in economic development?. *Journal of money, credit and banking* 10. no.4: 464-475.

Goldsmith, Raymond W. (1969). Financial Structure and Development. New Haven, Yale University Press

Gurley, J. G., & Shaw, E. S. (1955). Financial aspects of economic development. *The American economic review*, *45*(4), 515-538.

Halicioğlu, F. (2007), The financial development and economic growth nexus for Turkey, *Economics and Econometrics Research Institute,*

Hao, Y., Wang, L. & Lee, C. (2020), Financial development, energy consumption and China's economic growth: New evidence from provincial panel data, *International Review of Economics and Finance,* 69, 1132-1151

Hassan, K. M., Sanchez, B. ve Yu, J. (2009), Financial development and economic growth: New evidence from panel data, *The Quartry Review of Economic and Finance,* 51, 88-104

Hermes, N. ve Lensink, R. (2010) Foreing direct investment, financial development and economic growth, *The Journual of Development Studies,* 40(1), 142-163

Hsueh, S., Hu, Y. Ve Tu, C. (2013), Economic growth and financial development in asian countries: A bootstrap panel Granger causality analysis, *Economic Modelling,* 32, 294-301

Ince, M. (2011), Financial liberalization, financial development and economic growth: An empirical analysis for Turkey, *Journal of Yaşar University,* 23(6), 3782-3793

Jung, W. S. (1986). Financial development and economic growth: international evidence. Economic Development and cultural change, 34(2), 333-346.

Kar, M., Peker, O. & Kaplan, M. (2008). Trade liberalization, financial development and economic growth in the long term: The case of Turkey, *South East European Journal of Economics and Business*, 3(2), 25–38

Kar, M., & Pentecost, E. J. (2000). Financial development and economic growth in Turkey: further evidence on the causality issue. Universitäts-und Landesbibliothek Sachsen-Anhalt.

Kar, M., & Eric J.P. (2000). Financial development and economic growth in Turkey: further evidence on the causality issue. *Economic Research Paper 27*, Department of Economics, University of Loughborough University .

Kar, M., Nazlıoğlu Ş., & Agir, H. (2010). Financial Development in Economic Growth Nexus in The MENA Countries: Bootstrap Panel Granger Causality Analysis. *Economic Modeling* 28: 685- 693.

Karahan, Ö. & Yılgör, M. (2011). Financial Deepening and Economic Growth in Turkey, *Mibes Transactions,* 5(2), 19-29

Keskin, N. & Karşıyakalı, B. (2010). The Relation of Financial Development and Economic Growth: Türkey Sample , *Finance Political & Economic Comments* 47, no.548, 76.

Lee, C. C. & Chang, C. P. (2009). FDI, Financial development and economic growth: International evidence, *Journal of Applied Economics,* 12(2), 249-271

Levine, R. (1991). Stock markets, growth, and tax policy, *The Journal of Finance*, 46(4), 1445-1465

Levine, R. & Zervos, S. (1998), Stock Markets, Banks and Economic Growth, *The American Economic Review,* 88(3), 537-558

Li, G. & Wei, W. (2021). Financial Development, Openness, Innovation, Carbon Emissions and Economic Growth in China, *Energy Economics,* 97, 1-9

Mercan, M., & Peker, O. (2013). Finansal gelişmenin ekonomik büyümeye etkisi: Ekonometrik bir analiz. *Eskişehir Osmangazi Üniversitesi İktisadi ve İdari Bilimler Dergisi*, *8*(1), 93-120.

McKinnon, R. (1973). Money and Capital in Economic Development, Washington, D.C.: Brookings Institution

Mtar, K., & Belazreg, W. (2021). Causal nexus between innovation, financial development, and economic growth: The case of OECD countries. *Journal of the Knowledge Economy*, *12*, 310-341.

Ozcan, B., & Ari, A. (2011). An empirical analysis of relationship between financial development and economic growth: The Turkish case. *Business and Economics Research Journal* 2. no.1: 121 – 142

Ozturk, I. (2008). Financial development and economic growth: Evidence from Turkey, *Applied Econometrics and International Development,* 8, 85-98

Ozturk, N. ve Karagöz, K. (2012), Relationship Between Inflation and Financial Development: Evidence From Turkey, *International Journal of Alanya Faculty os Business,* 4(2), 81-87.

Pata, U.K. & Ağca, A. (2018). Finansal gelişme ve ekonomik büyüme arasindaki eşbütünleşme ve nedensellik ilişkisi: Türkiye örneği. *Osmaniye Korkut Ata Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,* 2(2), 115-128.

Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural change*, 14(2), 174-189.

Raghutla, C. & Chittedi, K. R. (2020). Financial development, real sector and economic growth: Evidence from emerging market economies, *Wiley,* 26, 6156-6167

Rahman, A., Khan, M. A. & Charfeddine, L. (2020), Financial development economic hrowth nexus in Pakistan: New evidence from the Markov switching model, *Cogent Economics & Finance,* 8 (1), 1-15

Rajan, G. R. & Zingales, L. (1998). Financial dependence and growth, *American Economic Review*, 88, 559-586.

Rehman, N. ve Hysa, E. (2021), The effect of financial development and remittances on economic growth, *Cogent Economics & Finance,* 9, 1-15

Robinson, Joan. (1952). The generalization of the general theory, the rate of interest and other essays. London, MacMillan: 67-146

Schumpeter, J.A. (1911). *Theorie der wirtschaftlichen Entwicklung, 1st edn. Duncker & Humblot, Leipzig*

Schumpeter, J.A., & Nichol, A.J. (1934). Robinson's economics of imperfect competition. *Journal of political economy*, *42*(2), 249-259.

Shaw, Edward Stone. (1973). Financial deepening in economic development. Vol. 270. New York: Oxford University Press.

Song, C., Chang, C. & Gong, Q. (2021), Economic growth, corruption and financial development: global evidence, *Economic Modelling,* 94, 822-830

Soytaş, U. & Küçükkaya, E. (2011). Economic growth and financial development in Turkey: New evidence, *Applied Economics Letters,* 18(6), 595-600

Taşseven, Ö., & Yılmaz, N. (2022). Finansal Gelişme Göstergeleri İle Ekonomik Büyüme İlişkisi: Türkiye Örneği. Doğuş Üniversitesi Dergisi, 23(1), 105-125.

Uddin, G. S., Sjö, B. & Shahbaz, M. (2013). The Causal Nexus Between Financial Development and Economic Growth in Kenya, *Economic Modelling,* 35, 701-707

Yilmaz, Ö., & Kaya, V. (2006). Finansal kalkınma ve iktisadi büyüme arasındaki nedensellik. *Iktisat Isletme ve Finans*, *21*(244), 120-131.

Yücel, F. (2009). Causal Relationships Between Financial Development, Trade Openness and Economic Growth: The Case of Turkey, *Journal of Social Sciences*, 5(1), 33-42