yönetim ve ekonomi araştırmaları dergisi
journal of management and economics research

Cilt/Volume: 20 Sayı/Issue: 4 Aralık/December 2022 ss. /pp. 24-41
M. S. Gorus http://dx.doi.org/10.11611/yead.1161268

RE-EXAMINATION OF THE SUPPLY LEADING HYPOTHESIS FOR TURKEY: A DISAGGREGATED ANALYSIS

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ABSTRACT

In this investigation, the causal link between financial development and economic activity is explored to determine whether the supply leading hypothesis (SLH) or the demand following hypothesis (DFH) is valid for the Turkish economy. For this aim, the study employs the Fourier Toda-Yamamoto causality test of Nazlioglu, Gormus, and Soytas (2016) by utilizing annual data covering 1980-2020. To proxy financial development, the Financial Development Index (FDi) of IMF and its eight sub-indices are chosen. The findings of this work show that the FDi Granger causes per capita income in Turkey. Therefore, one can say that the SLH holds for the Turkish economy at the aggregate level. The disaggregated level of data differs across sub-indices. The empirical findings of the paper provide significant policy implications for the economic agents.

Keywords: *Causality, Economic Growth, Financial Development, Fourier Terms, Turkey.*

JEL classification: *C22, G10, G20, O40.*

1. INTRODUCTION

The past forty years have seen increasingly rapid developments in the field of financial development, and this term has become a central issue for both developed and emerging economies. So, economic growth and financial development are the fundamental concepts that rise the welfare of the countries. Indeed, the close relationship between these two terms has been studied by researchers for a long time. Among these scholars, Schumpeter (1911) stated that the quality of the financial system is a very significant determinant of economic advancement. He claimed that financial development triggers economic growth through two main channels: making capital accumulation and funding innovative ideas (Lenka and Sharma, 2020). Contrarily, Robinson (1952) asserted that higher economic growth leads to a well-developed financial system (Mohieldin, Hussein, and Rostom, 2019).

After that, Patrick (1966) reviewed the relationship between financial development and economic growth, and he proposed two main hypotheses to the literature: the *supply leading hypothesis* (SLH) and the *demand following hypothesis* (DFH). First, the SLH argues that developments in the financial system lead to advance 'growth-inducing' modern sectors rather than 'non-growth' traditional sectors. Second, the DFH claims that economic growth is followed by the financial system. This means

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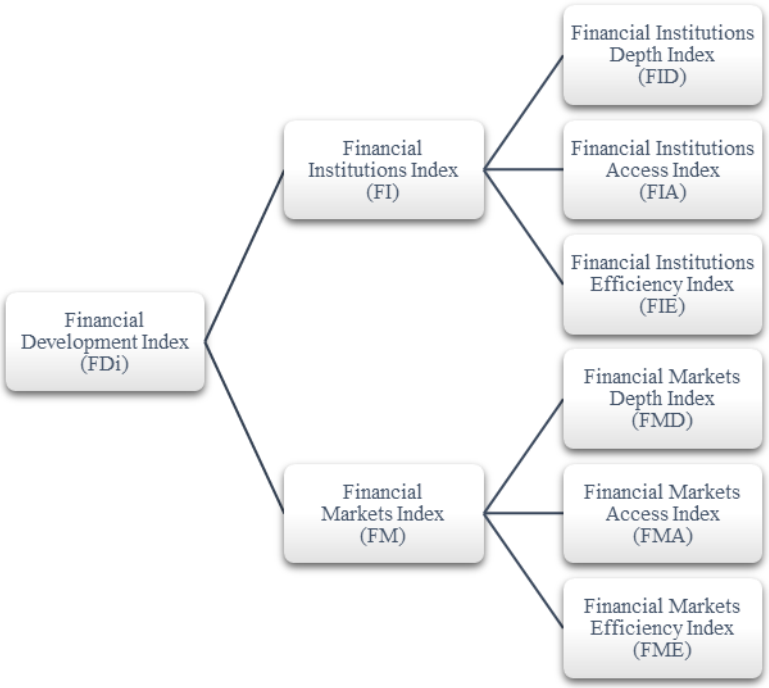
Makale Geçmişi/Article History
Başvuru Tarihi / Date of Application : 12 Ağustos/ August 2022
Düzeltme Tarihi / Revision Date : 20 Ekim / October 2022
Kabul Tarihi / Acceptance Date : 3 Aralık / December 2022
Araştırma Makalesi/Research Article

that high economic growth creates new demand for financial services. Thus, financial development increases thanks to economic development (Patrick, 1966; Menyah, Nazlioglu, and Wolde-Rufael, 2014).

This study set out to shine new light on the above-mentioned debates through a re-examination of the causal linkage between the financial development and economic activity for Turkey over the period 1980-2020. There are two main contributions of this investigation to the empirical literature on the Turkish economy: a) methodology used, and b) financial development measure utilized. First, in the empirical literature, these hypotheses have been tested through traditional Granger Causality (GC) analyses mostly. On the one hand, if financial development Granger causes economic growth, we can say that the SLH is valid. On the other hand, if the reverse causation is valid, one can call it the DFH. The studies that employ the traditional GC tests mostly ignore the structural breaks totally or only consider the sharp breaks in their analyses. Thus, previous papers' results might be biased or misleading. For this reason, this paper employs the Fourier Toda–Yamamoto (hereafter, FTY) causality test introduced by Nazlioglu et al. (2016) which considers gradual and smooth structural breaks in the causality analysis. There are some superiorities of this methodology over conventional causality tests. This recently developed method considers structural shifts by incorporating the Fourier approximation in the causality analysis. According to Enders and Jones (2016), if the breaks are ignored in the analyses, causality results can be biased. Moreover, there is no need to test the stationarity properties of the series and the cointegration relationship between variables; the employed methodology is robust to these issues (Nazlioglu et al., 2016). Second, in the literature, there are a bunch of financial indicators is used to proxy financial development such as private sector credits, domestic credits, stock market capitalization, liquid liabilities, FDI inflows, narrow money over income, and quasi-money over income, so on. These metrics, however, do not consider the complicated and multifaceted nature of financial development, properly (Svirydzenka, 2016). Therefore, Sahay et al. (2015) introduced a comprehensive measure for financial development, *the Financial Development Index of IMF* (hereafter, FDi). This paper utilizes this new dataset and its sub-indices (see Figure 1) to proxy financial development. To our knowledge, there is not any study that investigates the causal link between the disaggregated level of the FDi and the economic growth of Turkey. In short, it is hoped that the empirical findings of this investigation should make an important contribution to the field of financial economics.

In detail, the aggregate index of IMF consists of two main financial development indexes and their six sub-indices in Figure 1:

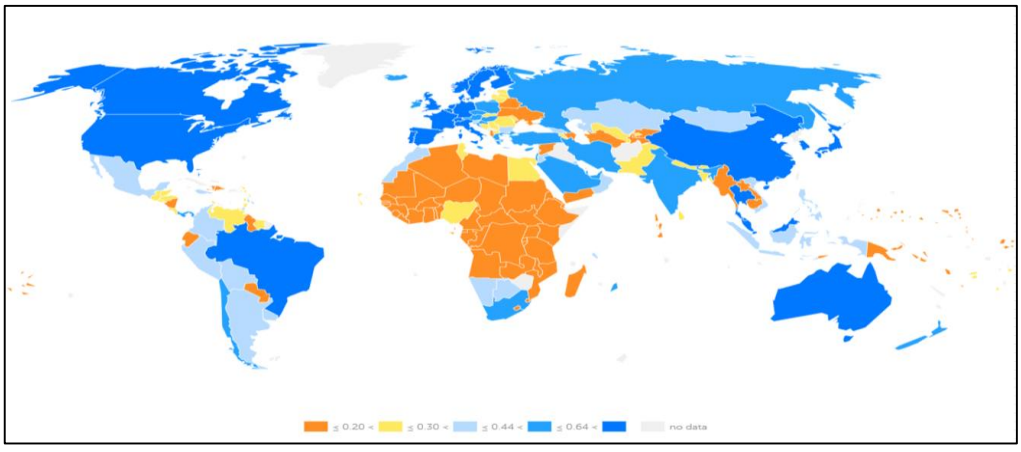
Figure 1. Unbundling the FDi of IMF



Note: The figure is constructed by the author.

An overview of the FDi of IMF for 2020 is exhibited in Figure 2. It is seen that financial development is very high in Western Europe, North America, and some parts of the Asia Pacific region (such as China, Malaysia, Thailand, Japan, South Korea, and Australia) compared to the other areas in the world. In detail, the highest index value is observed in Switzerland (0.948), while Japan (0.925) and Australia (0.908) place in the second and third ranks. On the other side, the Central African Republic (0.039), the Democratic Republic of the Congo (0.045), and the Republic of South Sudan (0.049) have the lowest financial development worldwide.

Figure 2. An overview of the FDi of IMF, 2020



Source: IMF (2022), Financial Development Index Database, https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b&sId=1485894037365, (02.08.2022).

In Turkey, financial development started to increase at the beginning of the 1980s and accelerated in the 1990s. These developments can be attributed to the evolution of financial services in Turkey from the 1980s to the 1990s; for instance, Istanbul Stock Exchange Market was opened, Banking Regulation And Supervision Agency was founded, and internet banking services started. In 1981, the FDi value of the Turkish economy was 0.116, while it reached 0.539 in 2020. Among all the countries, Turkey has the 31st highest index value. Her financial development is very close to the advanced markets' average (0.628) even though her economy is still developing. However, according to the disaggregated data, the FID (0.218) and the FMA (0.306) values are very low compared to the other sub-indices.

The remaining part of this investigation consists of five main sections. Section 2 summarizes the empirical literature, while Section 3 introduces the dataset and the methods employed. Section 4 and Section 5 present and discuss the empirical results of this study respectively, while the last section finalizes the paper.

2. LITERATURE SURVEY

In the empirical literature, a considerable number of academic papers have been published on the link between financial indicators and economic activity. Many studies have predominantly concentrated on the causal relationship between the aforementioned variables. To our knowledge, preliminary work on this issue was undertaken by Jung (1986) through the standard GC analysis. The author utilized the currency ratio and monetization variables to proxy financial development. The empirical results of the work demonstrated that financial development Granger causes economic growth for less developed countries. In the last decade, there has been an increasing amount of literature on the financial development-economic growth nexus (see Table 1). The practitioners employed modified versions of the GC test throughout history; however, to date, there is no consensus about this issue. A common view amongst the researchers was that the direction of the causality between financial development and economic growth is very sensitive to the method utilized and the sample selected (Soytaş and Küçükkaya, 2011).

Table 1. Selected Literature on The World Economies

Authors	Countries	Period	Methodology	Results
Jung (1986)	56 countries	Varies	GC test	FD → Y mostly for less developed countries
Demetriades and Hussein (1996)	16 developing countries	Varies	GC test	No consensus
Luintel and Khan (1999)	10 developing countries	Varies	GC test	FD ↔ Y
Kar, Nazlıoğlu, and Ağır (2011)	15 MENA	1980-2007	Kónya's (2006) panel GC test	No consensus
Öztürk, Kılıç Darıcı, and Kesikoğlu (2011)	9 emerging countries	1992-2009	Holtz-Eakin et al.'s (1988) panel GC test	Y → FD

Authors	Countries	Period	Methodology	Results
Ağayev (2012)	20 transition economies	1995-2009	Holtz-Eakin et al.'s (1988) panel GC test	FD → Y
Hye and Islam (2013)	Bangladesh	1975-2009	VECM GC test	FD → Y
Menyah et al. (2014)	21 African countries	1965-2018	Kónya's (2006) panel GC test	FD and TO → Y only for four countries
Murthy, Patra, and Samantaraya (2014)	Egypt	1970-2011	VECM GC test	FD ↔ Y
Sağlam and Erataş Sönmez (2017)	9 transition economies	2001-2014	DH panel GC test	FD → Y
Guptha and Rao (2018)	BRICS	1996-2016	TY GC test	FD → Y except for South Africa
Ağazade and Karakaya (2019)	34 OECD	2001-2016	DH panel GC test	FD ↔ Y
Ak and İnal (2019)	15 emerging economies	2002-2016	Kónya's (2006) panel GC test	FD → Y only for Colombia, Malaysia, the Philippines, Russia, and Turkey
Erataş-Sönmez and Sağlam (2019)	7 emerging countries	1980-2016	DH panel GC test	FD → Y
Ferreira (2021)	46 countries	1990-2017	DH panel GC test	FD ↔ Y mostly
Gövdeli, Özkan, and Dilmaç (2021)	BRICS-Turkey	1991-2017	DH panel GC test	Y → Financial Access, Y ↔ Financial Depth, Y ↔ Financial Efficiency
Ibrahim and Acquah (2021)	45 African countries	1980-2016	DH panel GC test	FD ↔ Y
Mike and Alper (2021)	Fragile 5	1980-2017	TY GC test	FD → Y only for Indonesia and South Africa

Note: FD and Y denote financial development and economic activity, respectively. Besides, → and ↔ represent one-way and two-way causality between variables, in order. VECM denotes the Vector Error Correction Model.

Similarly, research into financial development and economic growth has a long history in the Turkish economy. These studies, to our knowledge, started with Kar and Pentecost (2000) and are still ongoing. The summary of the selected studies on the Turkish economy is presented in Table 2. It is seen that, on the one hand, Ünalmış (2002), Aslan and Küçükaksoy (2006), Işık and Bilgin (2016), Pata and Ağca (2018), Eyüboğlu and Akan (2020), Eroğlu and Yeter (2021), and Fendoğlu's (2021) studies supported the SLH. On the other hand, Kar and Pentecost (2000), Kandır et al. (2007), Keskin and Karşıyakalı (2010), Ozcan and Ari (2011), Kar et al. (2014), Ak et al. (2016), Tunalı and Onuk (2017), and Atay's (2020) findings confirmed the DFH. The differences between the empirical results for the Turkish economy can be attributed to the methodology employed and the proxy selected for financial development.

Table 2. Selected Literature on The Turkish Economy

Authors	Period	Methodology	Results
Kar and Pentecost (2000)	1963-1995	VECM GC test	Y → FD mostly
Ünalmış (2002)	1970-2001	VECM GC test	FD → Y in the short-run FD ↔ Y in the long-run
Ergeç (2004)	1988-2001	GC test	FD → Y in the long-run
Aslan and Korap (2006)	1987-2004	GC test	No consensus
Aslan and Küçükaksoy (2006)	1970-2004	GC test	FD → Y
Kandır, İskenderoğlu, and Önal (2007)	1988-2004	VECM GC test	Y → FD
Keskin and Karşıyakalı (2010)	1987-2007	VECM GC test	Y → FD
Ozcan and Ari (2011)	1998-2009	GC test	Y → FD
Soytaş and Küçükkaya (2011)	1991-2005	TY GC test	No causality
Kar, Nazlıoğlu, and Ağır (2014)	1989-2007	TY GC test, Diks-Panchenko Nonlinear GC test	Y → FD
Ak, Altıntaş, and Şimşek (2016)	1989-2011	TY GC test	Y → FD
Çeştepe and Yıldırım (2016)	1986-2015	TY GC test	FD ↔ Y
Işık and Bilgin (2016)	2003-2015	Hacker-Hatemi-J bootstrap GC test	CREDITS → Y
Türkoğlu (2016)	1960-2013	GC test	FD ↔ Y
Tunalı and Onuk (2017)	2003-2015	GC test	Y → FD
Pata and Ağca (2018)	1982-2016	Hacker-Hatemi-J bootstrap GC test	FD → Y
Atgür (2019)	2004-2017	TY GC test	No causality
Atay (2020)	1961-2015	GC test	Y → FD
Eyüboğlu and Akan (2020)	1980-2016	GC test	FD → Y
Eroğlu and Yeter (2021)	1991-2019	TY GC test	FD → Y
Fendoğlu (2021)	1960-2017	FTY GC test	FD → Y

Note: FD and Y denote financial development and economic activity, respectively. Besides, → and ↔ represent one-way and two-way causality between variables, in order. VECM refers to the Vector Error Correction Model.

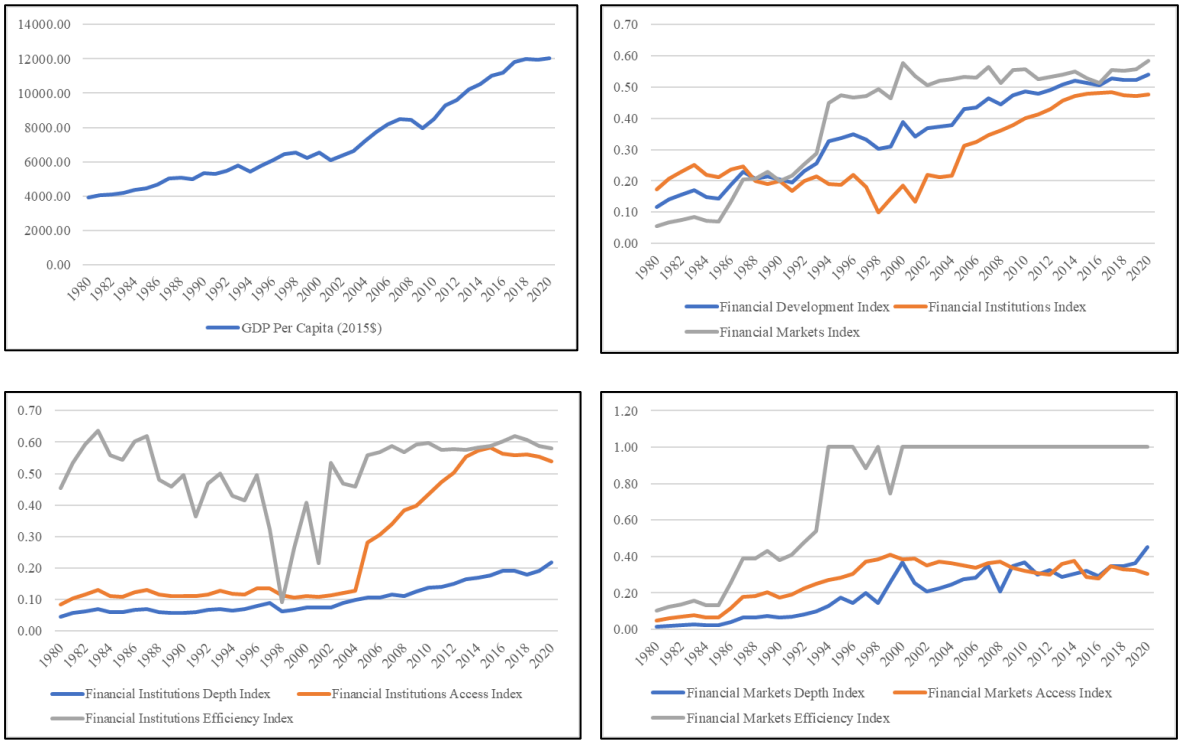
As seen, the majority of the studies employed the standard Granger causality, the VECM GC, the Toda-Yamamoto (TY) GC, and the Dumitrescu-Hurlin (DH) GC tests. The empirical findings of these studies may be misleading because they did not consider the structural breaks in the causality analysis. Among them, only Fendoğlu (2021) took into account the gradual structural breaks in her analysis. Her empirical results showed that there is a one-way causality from finance to economic growth in Turkey.

3. DATA AND METHODOLOGY

This paper utilizes annual data to investigate the causal nexus between the financial development index and the economic growth of Turkey during 1980-2020. For this aim, the current paper utilizes the FDi of IMF and its eight sub-indices, namely, FI, FM, FID, FIA, FIE, FMD, FMA, and FME (see Figure 1 for these terms in full form).

These indices range from 0.000 to 1.000, and a higher index value means higher financial development. In addition, this paper uses GDP per capita (2015 US$) (hereafter, GDPpc) to measure economic activity. The first dataset is gathered from IMF (2022), while the second one is collected from World Bank (2022).

Figure 3. Time Series Plots of The Variables



Time series plots of the variables are displayed in Figure 3. According to the figure, it is obvious that per capita income in Turkey increased significantly from 1980-2020. In this period, the per capita GDP level rose threefold; in 1980, it was around $3,940 and it reached $12,038 in 2020. Besides, it is seen that financial development in the Turkish economy advanced in the past four decades significantly. FDi increased from 0.116 to 0.539, FI rose from 0.173 to 0.476, and FM increased from 0.054 to 0.583.

To find out the correlation between variables, we carry out Pearson's correlation test. The empirical results are presented in Table 3. The table shows that there is a positive and strong relationship between financial development indicators except for the Financial Institutions Efficiency Index. The highest correlation coefficient is observed between per capita GDP and the Financial Institutions Depth

Index, while the correlation between per capita income and the Financial Development Index places the second.

Table 3. The Correlation Matrix between Variables

Variables	GPDpc	FDi	FI	FM	FID	FIA	FIE	FMD	FMA	FME
GPDpc	1.000									
FDi	0.934***	1.000								
FI	0.786***	0.651***	1.000							
FM	0.800***	0.939***	0.372**	1.000						
FID	0.959***	0.867***	0.894***	0.663***	1.000					
FIA	0.914***	0.797***	0.938***	0.566***	0.959***	1.000				
FIE	0.208	0.116	0.722***	-0.130	0.384**	0.446***	1.000			
FMD	0.873***	0.971***	0.497***	0.976***	0.765***	0.674***	-0.024	1.000		
FMA	0.719***	0.876***	0.251	0.982***	0.559***	0.458***	-0.224	0.938***	1.000	
FME	0.780***	0.929***	0.353**	0.997***	0.641***	0.546***	-0.139	0.961***	0.978***	1.000

Note: *** and ** show statistical significance at the 1% and 5%, respectively.

In this investigation, we use the FTY causality test of Nazlioglu et al. (2016). The authors incorporated the Fourier terms into the standard TY approach to the GC test. By doing this, the new test is able to detect gradual and smooth structural breaks in the causality analysis. Therefore, the empirical results become more unbiased and reliable. Also, there is no need to test the stationarity properties of the series and the cointegration relationship between variables because this methodology is robust to the above-mentioned issues like the standard TY causality test (Nazlioglu et al., 2016).

According to Nazlioglu, Gormus and Soytas (2019), it is more reasonable to choose the FTY causality test with a single frequency rather than with cumulative frequencies when the sample size is around 50. Since this investigation includes 41 observations, the study chooses a single frequency for the empirical analysis. Thus, we present the empirical methodology of the FTY causality test with a single frequency in the following equation (Gormus, Nazlioglu and Soytas, 2018):

$$Y_t = \sigma_0 + \omega_1 Y_{t-1} + \cdots + \omega_{p+d_{max}} Y_{t-(p+d_{max})} + \varphi_1 \, sin\left(\frac{2k\pi t}{T}\right) + \varphi_2 \, cos\left(\frac{2k\pi t}{T}\right) + \epsilon_t \qquad (1)$$

here, φ_1 and φ_2 are the parameters of the trigonometric terms, while ωs are slope parameters. σ_0 is the constant term and ϵ_t refers to the white noise error terms. k is the frequency, T denotes the number of observations, and t refers to the trend. In the above equation, Y_t consists of g endogenous variables. p is lag length, while d_{max} denotes the variables' maximum integration degree.

The null hypothesis of Granger non-causality can be represented as $H_0: \omega_1 = \omega_2 = \omega_3 = \cdots = \omega_{p-1} = \omega_p = 0$. This study uses the bootstrap distribution of F-statistics to test the null hypothesis.

4. EMPIRICAL RESULTS

This study utilized the conventional ADF and PP tests to determine the stationarity properties of the variables[1]. According to Table 4, almost all series are nonstationary; it means that series are affected by the shocks significantly and their effects are permanent. In addition, d_{max} is determined as 1 for further analyses.

Table 4. Unit Root Tests Results for Constant and Trend Model

Variables	ADF	PP	Variables	ADF	PP
GDP	-1.395	-2.545	ΔGDPpc	-4.790***	-16.168***
FDi	-2.217	-2.015	ΔFDi	-3.287*	-7.896***
FI	-1.404	-1.605	ΔFI	-5.370***	-5.357***
FM	-2.010	-1.961	ΔFM	-6.320***	-14.667***
FID	-2.250	-3.557	ΔFID	-7.982***	-9.372***
FIA	-2.582	-1.512	ΔFIA	-5.375***	-5.811***
FIE	-2.750	-1.959**	ΔFIE	-5.971***	-
FMD	-2.137	-1.868	ΔFMD	-5.773***	-17.468***
FMA	-4.238	-1.409	ΔFMA	-1.131***	-7.953***
FME	-2.578**	-2.628	ΔFME	-	-6.661***

Note: ***, **, and * show statistical significance at the 1%, 5%, and 10%, respectively.

At first, this study employs the standard TY approach to the GC test proposed by Toda and Yamamoto (1995). According to the empirical findings of the method utilized (see Table 5), it is revealed that per capita income Granger causes the Financial Institutions Index and the Financial Institutions Efficiency Index in the short-run. In other words, there is a one-way causality from economic growth to FI and FIE in the Turkish economy. Moreover, from the financial development side, it is confirmed that there is unidirectional causality from the FID and the FMA to per capita income for the period 1980-2020. This means that these financial indicators can be used to predict the future values of per capita income. There is no causal nexus between the remaining variables in the short-run.

Table 5. TY Causality Test Results

Null Hypothesis	Wald Stat	Asymptotic p-value	Bootstrap p-value	p*
FDi ↛ GDPpc	0.815	0.367	0.375	1
GDPpc ↛ FDi	1.152	0.283	0.293	1
FI ↛ GDPpc	2.422	0.120	0.128	1
GDPpc ↛ FI	3.210	0.073	0.082	1

[1] Before the empirical analyses, all the series converted to their natural logarithm.

Null Hypothesis	Wald Stat	Asymptotic p-value	Bootstrap p-value	p^*
FM ↛ GDPpc	0.167	0.683	0.693	1
GDPpc ↛ FM	0.001	0.979	0.981	1
FID ↛ GDPpc	19.613	0.001	0.006	4
GDPpc ↛ FID	1.296	0.862	0.854	4
FIA ↛ GDPpc	1.450	0.228	0.238	1
GDPpc ↛ FIA	1.059	0.303	0.319	1
FIE ↛ GDPpc	2.600	0.107	0.110	1
GDPpc ↛ FIE	4.292	0.038	0.046	1
FMD ↛ GDPpc	1.673	0.196	0.205	1
GDPpc ↛ FMD	1.413	0.235	0.246	1
FMA ↛ GDPpc	8.065	0.045	0.065	3
GDPpc ↛ FMA	1.422	0.700	0.703	3
FME ↛ GDPpc	0.005	0.946	0.949	1
GDPpc ↛ FME	0.017	0.897	0.898	1

Note: d_{max} equals to 1 while p_{max} equals to 4.

However, it is frequently discussed in the literature that structural breaks can significantly affect the causal nexus between variables. According to Enders and Jones (2016), if the breaks are ignored in the analyses, causality results can be biased. Therefore, considering structural shifts in the causality analysis can provide more reliable results to policymakers. For this reason, this study also uses the FTY causality test introduced by Nazlioglu et al. (2016) which takes into account gradual and smooth shifts in the analysis.

The empirical results of the FTY causality test are presented in Table 6. The findings show that the Financial Development Index Granger causes per capita income in Turkey. Besides, it is found that there is a one-way causality from the Financial Institutions Depth Index to per capita income and from GDPpc to the Financial Institutions Efficiency Index covering 1980-2022. One can say that these findings partly supported the previous empirical results of the standard TY approach to the GC test. However, it is obvious that there are slight differences in the direction of the causations. In detail, this methodology finds new causation from FDi to GDPpc, while the existing Granger causations from GDPpc to FI and from FMA to GDPpc disappear when considering smooth structural breaks. Besides, unidirectional Granger causalities from the Financial Institutions Depth Index to per capita income and from GDPpc to the Financial Institutions Efficiency Index are the same for both empirical methodologies.

Table 6. FTY Causality Test Results

Null Hypothesis	Wald Stat	Asymptotic p-value	Bootstrap p-value	k^*	p^*
FDi ↛ GDPpc	8.127	0.043	0.070	1	3
GDPpc ↛ FDi	5.377	0.146	0.178	1	3
FI ↛ GDPpc	2.043	0.153	0.152	1	1
GDPpc ↛ FI	1.783	0.182	0.180	1	1
FM ↛ GDPpc	1.664	0.197	0.202	1	1
GDPpc ↛ FM	2.223	0.136	0.142	1	1
FID ↛ GDPpc	8.479	0.004	0.009	1	1
GDPpc ↛ FID	0.422	0.516	0.511	1	1
FIA ↛ GDPpc	0.399	0.528	0.519	1	1
GDPpc ↛ FIA	1.865	0.172	0.180	1	1
FIE ↛ GDPpc	2.192	0.139	0.142	1	1
GDPpc ↛ FIE	3.822	0.051	0.063	1	1
FMD ↛ GDPpc	2.383	0.123	0.141	1	1
GDPpc ↛ FMD	0.021	0.885	0.890	1	1
FMA ↛ GDPpc	5.149	0.161	0.196	1	3
GDPpc ↛ FMA	5.731	0.125	0.152	1	3
FME ↛ GDPpc	1.140	0.286	0.278	1	1
GDPpc ↛ FME	2.000	0.157	0.171	1	1

Note: d_{max} equals to 1 while k_{max} and d_{max} equal to 3 and 4, respectively.

To sum up, it is confirmed that the SLH is valid when the IMF's aggregate financial development index is used as a proxy for financial development. At the disaggregated level, it is found that the SLH is supported when the Financial Institutions Depth Index is utilized for the Turkish economy during 1980-2020, while the DFH is valid when the Financial Institutions Efficiency Index is employed. There is not any causal relationship between economic growth and the remaining sub-indices.

5. DISCUSSION

At an aggregated level, our results confirm the validity of the SLH in the Turkish economy. At a disaggregated level, the empirical findings of this study show that the neutrality in the causal analyses is confirmed for most of the cases. This means that there is no causal linkage between financial development indicators and economic growth mostly. The supply leading hypothesis is confirmed only when the Financial Institutions Depth Index is used as a financial development indicator. As known, private sector credits, insurance premiums, pension fund assets, and mutual fund assets are the main drivers of the Financial Institutions Depth Index; therefore, one can infer that these financial indicators

have a positive impact on the economic growth performance of Turkey. Besides, it can be stated that the FID has a predictive power to forecast the further values of income level.

Also, the demand following hypothesis is supported only when the Financial Institutions Efficiency Index is utilized as a financial development indicator. According to the IMF, return on assets, return on equity, net interest margin, non-interest income to total income, lending-deposits spread, and overhead costs to total assets are the basic drivers of the FIE. Our results show that these financial indicators are closely related to the economic growth of Turkey. So, it can be said that economic growth has a positive effect on financial institutions' efficiency significantly. Therefore, it should be focused on stable economic growth policies with low inflation and high employment.

These results seem to be consistent with other research which found that there is one-way causality running from finance to economic activity for the Turkish economy; namely, Ünalmış (2002), Aslan and Küçükaksoy (2006), Işık and Bilgin (2016), Pata and Ağca (2018), Eyüboğlu and Akan (2020), Eroğlu and Yeter (2021), and Fendoğlu (2021). Among them, only Fendoğlu (2021) employed the same methodology (the FTY causality test) as ours, and this study produced results that corroborate the findings of a great deal of her study. In addition, to our knowledge, only Eyüboğlu and Akan (2020) utilized the FDi data from the IMF. Our empirical findings confirm their results regarding the association between the financial development index and economic growth. As seen, there is not any study that uses IMF's Financial Development Index at the disaggregated level for the Turkish economy.

In the global setting, to our best knowledge, only Ferreira (2021) and Gövdeli et al. (2021) used disaggregated levels of IMF's FDi data. On the one hand, Ferreira (2021) utilized FDi and its eight sub-indices to reveal the causal nexus between financial development and economic growth for 46 countries. The author found that economic growth Granger causes the Financial Institutions Efficiency Index for Turkey that supported our findings partly. On the other hand, Gövdeli et al. (2021) tested the causal nexus between financial development and economic growth for BRICS-T (Brazil, Russia, India, China, South Africa, and Turkey) countries from 1991 to 2017. They found that economic growth Granger causes financial access, financial depth, and financial efficiency, while the last two financial indicators cause economic growth for the countries examined. Their empirical findings contradict ours.

6. CONCLUSION

This investigation set out to re-examine the causal relationship between financial development and economic growth through advanced econometric techniques for the Turkish economy covering 1980-2020. For this purpose, this study employed the FTY causality test of Nazlioglu et al. (2016). The main advantage of this test is that it can detect gradual and smooth structural breaks in the causality analysis.

The empirical findings of this work stated that there is a unidirectional causality running from the FDi to per capita income in Turkey. A similar one-way causality was also confirmed for the Financial Institutions Depth Index. Considering these two financial development indexes, we can say that the SLH was validated for Turkey from 1980 to 2020. Also, it was found that per capita income Granger causes the Financial Institutions Efficiency Index in the short-run. That finding suggested that the DFH holds regarding only the aforementioned sub-index.

According to the empirical findings of this paper, policymakers should take some important steps. Greater efforts are needed to ensure overall financial development instead of specific ones to promote economic growth. At an aggregated level, the empirical findings show that financial development provides enough financial instruments to increase economic activities. Also, it can be stated that finance flows to productive (growth-inducing) sectors rather than not nonproductive ones in the Turkish economy. Policymakers should not intervene financial sector and must stick to the current policies since changes in policies related to the financial sector may hurt economic growth. At a disaggregated level, financial institutions' depth should be developed to increase economic growth. For this purpose, private sector credits, insurance premiums, pension fund assets, and mutual fund assets can be increased by the efforts of both the public and private sectors. Besides, it is found that return on assets, return on equity, net interest margin, non-interest income to total income, lending-deposits spread, and overhead costs to total assets are affected by the economic growth performance of the country. Therefore, to increase the financial institutions' efficiency, the government should take priority to stable economic growth policies.

In this study, our results are based on the bivariate causality analysis. This paper cannot employ a multivariate causality analysis due to practical constraints. In detail, the current investigation consists of nine financial development indicators, namely, FI, FM, FID, FIA, FIE, FMD, FMA, and FME. If a multivariate analysis is conducted, the study produces too many empirical results to interpret rationally and some of the results may contradict each other. According to Nazlioglu et al. (2014), the GC tests are sensitive to the omitted variable bias; however, this study is not appropriate to carry out a multivariate analysis. Therefore, we follow the approach of Nazlioglu et al. (2016) and employ a bivariate analysis in the case of several proxies for one variable. This issue can be regarded as the main limitation of this study.

Further studies need to follow recent developments in econometrics science to employ novel methods that produce more unbiased and reliable results. Also, machine-learning algorithms can be applied to investigate the close relationship between financial development and economic growth. To examine the nonlinear relationship between these variables, for instance, the random forest method might be utilized.

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Hakem Değerlendirmesi: Dış bağımsız.

Çıkar Çatışması: Yazar çıkar çatışması bildirmemiştir.

Finansal Destek: Yazar bu çalışma için finansal destek almadığını beyan etmiştir.

Teşekkür: -

Peer-review: Externally peer-reviewed.

Conflict of Interest: The author has no conflict of interest to declare.

Grant Support: The author declared that this study has received no financial support.

Acknowledgement: -