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An analysis of causal relationship between economic growth and financial development for Turkey: A MODWT—Granger causality test[1]

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Abstract: This study aims to investigate the relationship between financial development and economic growth in different time horizons for Turkey. In this study an ensemble of wavelet analysis and Granger causality test were used. PSC was used to represent financial development and GDP was used to represent growth. The annual data used are for the period 1961–2018. The result obtained for a one year period shows that the demand-following hypothesis is valid for Turkey. Financial development is the Granger cause of growth and positively affects growth. The financial sector should be supported for growth in the short term. While there is no causal relationship for the 2–4 year period, bidirectional causality relationships were determined for the periods of 4–8 years, 8–16 years and 16–32 years. Because variables are a Granger cause of each other and affect each other in a positive direction supporting the financial sector is a preferable policy when the purpose is to achieve growth in the long run.

Keywords: financial development, economic growth, Granger causality, wavelet transform.

JEL codes: O16, O47, A12, C22.

Introduction

The purpose of this study is to investigate the relationship between financial development and economic growth in different time horizons for Turkey. According to economic theory, the time horizon is important when examining the relationship between financial development and economic growth since the relationship between variables can change in the different time horizons (Karlsson, Månsson, & Hacker, 2021, p. 2324). Lindh (2000), Gaytan and

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Rancière (2003), Loayza and Rancière (2006), Cheng, Ho, and Hou (2014) determined that the relationship between financial development and economic growth differs in the long-term and short-term. Relationships can also differ in different time horizons similar to how it differs in the short- and long-term. Classical time series analysis methods allow the examination of the relationship between series only in the short and long term. In this study an ensemble of wavelet analysis and Granger causality test were used. Wavelet analysis allows the series to be decomposed into different time components without loss of information. It also allows the series to be transformed to be stationary without loss of information as opposed to methods such as differencing. The series used in this study were decomposed into time components by wavelet analysis and the causality relationship was investigated for different time horizons using the Granger causality test. With the help of the wavelet transformation this distinction can be put forward for different time horizons and thus the policies to be implemented in order to achieve the targeted purpose in different time horizons can be determined. As far as is known this study is the first one to use these two methods together in order to analyze the relationship between financial development and economic growth for Turkey.

The "one-size for all" argument leads to misleading results in investigating the relationship between economic growth and financial development. The causality relationship cannot be investigated adequately by cross-sectional analysis (Arestis & Demetriades, 1997, p. 785). In panel data analysis the results are difficult to interpret as the results may differ between countries and aggregation leads to misleading interpretations due to heterogeneity. For example in the study conducted by Ghirmay (2004) for thirteen sub-Saharan African countries, different results were obtained for different countries. On the other hand, although economic growth is a more specific concept the same is not true for financial development. The point of view for financial development and country-specific political, legal, and economic characteristics are effective in determining the proxy variable to be used. Different proxy variables may need to be used for different countries. In this respect the results obtained from cross-country or panel data models may be misleading. These issues imply the appropriateness of time series analysis for a single country. Turkey as a developing country is one of the countries that can be taken as a case study in addressing the issue. Turkey is an interesting case study in this subject as there have been many important reforms in the financial sector and economy in the period under review. Although this study was conducted only for Turkey the handling of the issue, the analysis methods and the results obtained can be used for other countries with similar characteristics.

Development plans in Turkey started to form in 1960 with the establishment of the State Planning Organization. The main characteristic of these plans is protectionism. In the 1970s as in many countries significant socioeconomic and political crises were exposed and ramifications of these crisis were tried

to be overcome by applying structural adjustment strategies and stability programmes. Turkey's economy entered into a rapid transformation process after the January 24, 1980 decisions. Starting with this transformation Turkey's economy has adopted an industrialization policy for exports based on the free market mechanism instead of the imported substitution industrialization policy. In the early 1980s, significant changes were initiated in the financial sector with international expansion and liberalization policies. Some of these changes were the enactment of the Capital Markets Law and the establishment of ISE. In addition many financial arrangements have been implemented (e.g. the launch of open market transactions). In line with this approach goods and services markets have been liberalized and a free interest policy was adopted. The liberalization process of capital movements was completed in the late 1980s. In the 1990s, political instability caused the preference of policies based on short-term capital inflows away from the real economy. To overcome these problems a stabilization programme was implemented in 1999. This programme provided some positive results in early 2000. However, in 2000 there was a major economic crisis stemming from the financial system especially in the banking sector. This banking sector crisis turned into a currency crisis in 2001 and the main reason for this was the increase in the current account deficit. After the 2001 economic crisis the free exchange rate regime was introduced and many regulations were made in the banking system and capital markets. After this the share of foreigners in the banking sector and stock markets increased considerably. After 2001 many reforms were implemented especially in the banking system. These arrangements had a positive impact on growth and increased the soundness of the banking sector. As of this year the banking sector has preserved its solid structure even though rapid money inflows and outflows have been observed in the capital markets. Another negative effect on the Turkish economy and growth was the reflections of the financial crisis that emerged in the USA in 2007. On considering these financial crises and instabilities and their effects on Turkish economy the relationship between economic growth and financial development is investigated for the periods mentioned above.

Economic growth is an important concept that is frequently emphasized in economic theory. Growth can be simply expressed as an increase in a country's economic size compared to the previous year. It is not possible to make a single definition for financial development because financial development can be evaluated according to different criteria. While obtaining financial development indicators the credit system, liquidity management and risk management features of the financial system should be taken into consideration (Lynch, 1996, p. 6).

Growth can be associated with different factors in the literature. One factor that is addressed in the context of factors affecting growth is financial development. According to the classical economic view the source of economic growth is an increase in investment and production capacity. Therefore it

can be said that capital accumulation affects growth. Additionally specialization in production promotes growth by providing a competitive advantage. In Ricardo's theory of economics the source of growth is land, labour, and capital. The Harrod (1947) and Domar (1959) models are based on the Keynesian view argue that investment has functions to increase income and production. According to traditional growth theories, financial intermediation does not affect growth and according to the contemporary view financial intermediation affects growth positively due to its functions such as regulating savings and ensuring risk spread (Bozoklu & Yılancı, 2013, p. 163). Neoclassical and endogenous growth models also include the financial system in growth models (Chung, Sun, & Vo, 2019, p. 442).

In the literature there are different views on the sign and direction of the relationship between financial development and growth. Some of these views mention that the direction of the relationship is from growth to financial development. On the other hand some of them argue that the direction of the relationship is from financial development to growth, bidirectional relationship and no relationship. These views are expressed as the supply-leading hypothesis, the demand-followed hypothesis, the bidirectional interaction hypothesis and the absence of a relationship hypothesis respectively (Apergis, Filippidis, & Economidou, 2007, p. 180). The rest of the study is organized as follows: literature review, methodology, data, and empirical findings and conclusion.

1. Literature review

In fact it is not right to make a definitive generalization for the relationship between financial development and economic growth since economic policies are country-specific and their success depends on the success of the institutions that implement those policies (Demetriades & Hussein, 1996, p. 406–407). However, it would be appropriate to mention the opinions put forward in this regard.

According to Goldsmith (1969), McKinnon (1973) and Shaw (1973), an increase in the efficiency of financial instruments increases growth. The financial system encourages economic growth as it ensures the efficient use of resources in the long run. The endogenous growth model predicts that financial development affects economic growth through the savings rate, the rate of savings transferred to investment and the social marginal efficiency of investment (Murinde, 2012, p. 16). In economic theory savings and investment are among the important sources of growth. Savings and investment concepts are directly related to financial development and saving is an important factor affecting growth. Because the efficient use of the savings and the funding of the investments to be made are carried out through the financial markets. Financial markets put together savings that cannot be converted into investments alone allowing them to be used in investment. In addition to this it also increases the

return on investment and therefore growth with the help of functions such as risk reduction and information provision. Among the reasons for the emergence of financial markets and institutions are the necessity of reducing information and transaction costs that prevent savings from being collected directly and turned into investments (Demirguc-Kunt, 2006, p. 1). Financial development also affects economic growth through debt flows (Ben-Salha & Zmami, 2020, p. 45). Nevertheless, the effects of financial development have been neglected in many studies on economic growth.

On the other hand, the increase in income generated by growth leads to an increase in savings. According to Robinson (1952), the increase in demand for financial services resulting from economic growth is the main driving force behind the development of the financial sector. In the absence of economic growth demand for financial instruments declines and financial development stops or declines. The reason that developing countries have less developed financial sectors is the lack of demand for financial services (Karlsson et al., 2021, p. 2325). As a result of growth the demand for financial instruments increases and the financial system grows to meet this demand (Djalilov & Piesse, 2011, p. 5). Increasing savings lead to the emergence of different investment instruments and the use of different investment instruments. The existence of effective financial systems provides more efficient financial opportunities. Therefore, growth increases financial development. In addition, since the majority of the total cost of financial services is the fixed cost the increase in demand for financial services also decreases the cost and an increase in demand with growth leads to an additional increase in demand for financial services (Yıldırım & Çeştepe, 2016, p. 15).

The relationship between financial development and economic growth may differ according to the economic conditions of the country. The ability of financial institutions to perform their functions is possible by allowing politicians to establish financial institutions correctly and to perform their transactions as far as possible from external interventions. Before sustainable modern industrial growth begins growth can affect financial development. As the real growth process progresses the impact of growth on financial development gradually decreases and financial development can affect growth (Patrick, 1966, p. 177–185). In this case a bidirectional relationship arises. This is called a threshold effect: when the economy grows to develop financial markets and financial markets open. Growth causes the formation of financial markets and the formation of financial markets increases the growth rate of an economy (Greenwood & Smith, 1997, p. 145). This leads to a bidirectional relationship between growth and financial development.

Although opinions that promote the positive relationship are more dominant there are contradictory opinions about the direction of the relationship between economic growth and financial development. Stern (1989) claims that financial development has no effect on growth. According to Lucas (1988), the

financial sector has negative effects on economic growth. According to Darrat (1999), although there is no relationship between growth and financial development, placing more emphasis on financial markets leads to the ignoring of other more important policy options in increasing economic growth such as increasing productivity, promoting investment and promoting exports.

Demetriades and Luintel (1996) investigated the effects of banking sector controls on the financial system and growth for India. In the study a bidirectional relationship between financial deepening and growth has been determined that is, policies that affect financial deepening also affect growth and vice-versa. Iqbal, Khan, Khan and Al-Aali (2021) found that financial development has a positive effect on economic growth and the positive effect is more significant for low-income economies. On the other hand economic growth increases financial development with its accelerator effect and this relationship is more evident in developed economies.

Cheng and others (2014) in their study on developed and developing countries determined that the long and short-term relationship between financial development and economic growth differs according to the development levels of the countries. Banking development and stock market development may have different short- and long-term effects on economic growth according to different stages of the country's economic development. Arestis, Demetriades and Luintel (2001) in their studies in which they discussed the countries separately found that the financial system contributed significantly to growth of France, Germany, and Japan. For the United Kingdom and the United States the relationship is statistically weak and from growth to financial development, if any. Karlsson and others (2021) found that the relationship between financial development and economic growth varies according to the income group and time horizons of the countries in their recent study which divided the countries into different sub-country groups according to their income levels and investigated the relationship at different time horizons with the help of wavelet decomposition.

Nazlioglu, Ege and Bayrakdaroglu (2009) found that financial development affects economic growth negatively and that there is unidirectional causality from economic growth to financial development for Turkey. Pan and Mishra (2018) found that there is a negative directional relationship between financial development and economic growth in the long run and no relationship in the short run for China. They also found a unidirectional causal relationship from the financial market to growth. Olaniyi (2021) found that financial development and institutional quality have a strong negative impact on economic growth for countries in southern Africa. However, the institutional framework reduces the negative impact of financial development.

Djalilov and Piesse (2011) found that the financial sector is an effective determinant of growth for transition economies. However, the effect is more pronounced for Central and Eastern European countries where the transition to

a market economy is more advanced than for Central Asian countries. According to the cross-sectional model, Zhang, Wang and Wang (2012) determined a strong positive relationship between financial development and growth. Except for the estimates made by the system GMM method for household savings the dynamic panel data model estimation results also confirm the positive directional relationship. Ak, Kirca and Altintaş (2016) determined a time-varying causal relationship between financial development and economic growth for Turkey. The causal relationship identified is unidirectional from financial development to economic growth. In their study for SAARC countries Sehrawat and Giri (2016) determined that there is a cointegration relationship between financial development and economic growth, financial development supports economic growth and financial development is the Granger cause of economic growth.

Ozturk (2008) found that there is no cointegration relationship between financial development and economic growth for Turkey. Soytaş and Küçükkaya (2011) obtained the financial development index by using the basic six factors used to represent financial development and determined that there was no causal relationship between financial development and growth.

In the literature many studies have investigated the relationship between financial development and economic growth on the basis of Turkey and emerging economies. These studies differ in terms of the variables used, the methods used and the results obtained. The literature review shows that the results obtained differ according to the variables used, the analysis methods use, and for the country or country group which the analysis covered.

Djalilov and Piesse (2011), Zhang and others (2012), Cheng and others (2014), Sehrawat and Giri (2016), Raghutla and Chittedi (2021), Olaniyi (2021), Karlsson and others (2021), Iqbal and others (2021) used panel data; Demetriades and Luintel (1996), Arestis and others (2001), Ozturk (2008), Nazlioglu and others (2009), Ak and others (2016), Pan and Mishra (2018) used time series data.

In most of the studies the relationship between variables was examined by causality analysis. Ozturk (2008), Sehrawat and Giri (2016) used Granger causality tests. Demetriades and Luintel (1996), Raghutla and Chittedi (2021), Cheng and others (2014), Sehrawat and Giri (2016) used the cointegration and error correction model. Pan and Mishra (2018) used the ARDL model and Toda-Yamamoto causality tests. Raghutla and Chittedi (2021) used Dumitrescu and Hurlin tests. Iqbal and others (2021) used the PVAR model, Ak and others (2016) used the time-varying causality test. Nazlioglu and others (2009) used Dolado and Lutkepohl causality and the bounds test. Arestis and others (2001) used VAR model. Zhang and others (2012), Olaniyi (2021) used cross-sectional and dynamic panel data regressions, Djalilov and Piesse (2011) used seemingly unrelated regression (SUR) model in their studies. There are also studies in the literature that use wavelet decomposition and Granger causality test together such as Karlsson and others (2021).

The findings obtained differ according to the variables used. In these studies monetary market indicators, indicators of the banking sector, and indicators of stock markets were used to represent the financial size. Real GDP *per capita* (Demetriades & Luintel, 1996; Karlsson et al., 2021; Olaniyi, 2021; Sehrawat & Giri, 2016), the annual growth rate of real *per capita* GDP (Zhang et al., 2012), the change in the real GDP (Djalilov & Piesse, 2011; Ozturk, 2008), real GDP (Ak et al., 2016; Arestis et al., 2001; Cheng et al., 2014; Iqbal et al., 2021; Nazlioglu et al., 2009; Raghutla & Chittedi, 2021), and industrial production (Pan & Mishra, 2018) variables are used as a growth indicator.

The ratio of private sector credit to GDP (Ak et al., 2016; Nazlioglu et al., 2009; Olaniyi, 2021; Ozturk, 2008), the ratio of M1, M2 or M3 money supply to GDP (Cheng et al., 2014; Karlsson et al., 2021; Nazlioglu et al., 2009; Raghutla & Chittedi, 2021; Sehrawat & Giri, 2016), the ratio of domestic credit to GDP (Arestis et al., 2001; Nazlioglu et al., 2009; Olaniyi, 2021; Raghutla & Chittedi, 2021), ratio of private sector credit provided by banks or financial sector to GDP (Djalilov & Piesse, 2011), the share of private sector credit in domestic credit (Nazlioglu et al., 2009), the ratio of domestic credit to private sector to GDP (Sehrawat & Giri, 2016), the ratio of bank deposit liabilities to nominal GDP (Demetriades & Luintel, 1996; Nazlioglu et al., 2009), ratio of total deposits in the financial system to GDP (Zhang et al., 2012), market capitalization of shares (Pan & Mishra, 2018), the ratio of market capitalization of listed companies to GDP (Sehrawat & Giri, 2016), the ratio of stock market value to GDP (Arestis et al., 2001), the ratio of total loans in the financial system to GDP (Zhang et al., 2012), the ratio of total household savings deposited in the financial system to GDP (Zhang et al., 2012), the share of fixed asset investment financed by domestic loans relative to that financed by state budgetary appropriation (Zhang et al., 2012) the ratio of corporate deposits to total deposits in the financial system (Zhang et al., 2012), and financial development index (Iqbal et al., 2021) developed by Svirydzenka (2016) variables used as an indicator of financial development.

2. Methodology

In this study an ensemble of wavelet analysis and Granger causality test were used. The reason for using time series data instead of using cross-country cross-section data or panel data is that time series analyses provide a deeper intuitive understanding in this context as shown in previous studies (e.g., Arestis & Demetriades, 1997, p. 790; Arestis et al., 2001). Time series analysis methods allow the examination of the relationship between series only in the short and long term. Wavelet analysis allows the series to be decomposed into different time components without loss of information. The series used here were decomposed into time horizons components by wavelet analysis and the causal-

ity relationship was investigated for different time periods with the Granger causality test.

2.1. Wavelet transformation

In a dynamic system it is very difficult to make analyzes using the past values of the data because observations are open to external shocks and can be affected by unexpected factors. In particular economic and financial data contain such features. The fact that statistical methods do not give good results for economic and financial data in the long run but relatively good results in the short run can be attributed to these features (Ramsey, 1999, p. 2593). Financial data is generally a non-stationary, significantly complex and, can be followed simultaneously by both random and discrete non-random processes (Addison, 2017, p. 355). Due to such features financial and economic data need to be adjusted for analysis. One of the methods which can be used while adjusting is the wavelet transformation. With wavelet transform the series can be decomposed into high frequency components using wavelet functions. An important convenience that the wavelet transformation naturally has is that it precisely locates breaks in time regime shifts and isolates shocks in dynamic systems. Moreover its ability to cope with non-stationary processes of financial and economic time series is very important (Ramsey, 1999, p. 2594). In this way the series is cleaned of external shocks and becomes smoother. Thus the effectiveness of statistical methods can be increased. Wavelet transform can be used for business cycles analysis and filtering in economic analysis (Crowley, 2007, p. 256).

A wavelet is a small wave that starts at a finite point of time and disappears at a future finite point of time (Crowley, 2007, p. 208). Because they are not continuous like wave functions they are called wavelets which mean small waves. There are different shapes of wavelets named Haar, Mexican Hat, Coiflet, Daublets, etc.

There are discrete and continuous versions of the wavelet transformation. While assuming that the signal is continuous in the continuous version of the wavelet transformation, the discrete version of the wavelet transformation is assumed to consist of observations obtained at equal intervals at certain points of time (Crowley, 2007, p. 213). Therefore it is necessary to use discrete wavelet transformation for the financial and economic data. It is more advantageous to use Maximal Overlap Discrete Wavelet Transform (MODWT) instead of discrete wavelet transform in economic data (Crowley, 2007, p. 256). MODWT has similar features to DWT but is not as sensitive as DWT (Percival & Walden, 2000, p. 162).

MODWT can be expressed briefly as follows:

For x, a vector containing N observations, MODWT coefficients vector is calculated with the following equation (Crowley, 2007, p. 265–266):

$$\tilde{w} = \tilde{W}x \tag{1}$$

In this expression $\tilde{W}$, $(J + 1)N \cdot N$ dimensional matrix of determining MODWT; $\tilde{w}$, $(J + 1)$N dimensional wavelet coefficients obtained as a result of the transformation. Similar to DWT, $\tilde{W}$ matrix for the MODWT can be written as follows:

$$\tilde{W}' = \left[\tilde{W}_1 \tilde{W}_2 \ldots \tilde{W}_J \tilde{V}_J\right] \tag{2}$$

N dimensional $\tilde{W}_J$ and $\tilde{V}_J$ elements respectively:

$$\tilde{W}_{j,t} \equiv \sum_{l=1}^{L_j-1} \tilde{h}_{j,l} X_{t-l \bmod N} \tag{3}$$

$$\tilde{V}_{j,t} \equiv \sum_{l=1}^{L_j-1} \tilde{g}_{j,l} X_{t-l \bmod N}\ t = 0, 1, \ldots \tag{4}$$

In this expression $L_j = (2^j - 1)(L - 1) + 1$ and mod operator ensures the borders are finite size (Risse, 2019, p. 603). $\tilde{W}_J$, $N \cdot N$ dimensional filter component matrix at each scale level. Each scale level in the matrix can be written explicitly. For the first scale:

$$\tilde{W}_1' = \left[\tilde{h}_1^1 \tilde{h}_1^2 \ldots \tilde{h}_1^{N-2} \tilde{h}_1^{N-1} \tilde{h}_1^N\right] \tag{5}$$

In this expression, $\tilde{h}_j^k$ represents rescaled the j. scale filter coefficient. h_j, k integer right shifted DWT filter coefficient is calculated by the equation:

$$\tilde{h}_j = \frac{h_j}{2^j} \tag{6}$$

The multiresolution analysis includes wavelet transform at each level as follows (Risse, 2019, p. 605):

$$x_t = x\left(\tilde{D}_1\right) + \ldots + x\left(\tilde{D}_j\right)_t + x\left(\tilde{S}_j\right)_t \tag{7}$$

$\tilde{D}_j$ is the wavelet detail coefficient that undertakes variations in the level j. for x and $\tilde{S}_j$ is the last wavelet smooth coefficient. Low level decompositions filter higher frequency fluctuations, filtering becomes smoother as j increases (Risse, 2019, p. 605).

Time scales for annual data can be interpreted as shown in Table 1.

Table 1. Frequency interpretations for scale levels of wavelet transformation

Scale crystals	Frequency decomposition
d1	2–4
d2	4–8
d3	8–16
d4	16–32
d5	32–64
d6	64–128
d7	128–256
…	…

Source: (Crowley, 2007).

2.2. Granger causality test

The Granger causality test is a method frequently used in economic and financial research. The simple causal model with two variables for zero mean and stationary variables such as X_t ve Y_t is as follows (Granger, 1969, p. 431):

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \epsilon_t \tag{8}$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t \tag{9}$$

According to Granger's causality definition if b_j (for $j = 1, 2, \ldots, m$) are statistically different from zero in the above equations, Y_t is the Granger cause of X_t. If c_j (for $j = 1, 2, \ldots, m$) are statistically different from zero, X_t is called the Granger cause of Y_t. What is meant by Granger causality here and in the following is not consistent with a conventional concept of causality. "X_t is the Granger cause of Y_t" means that X_t contains useful information that is not available in the other set of variables, in the prediction of Y_t.

2.3. Johansen cointegration test

According to the Johansen method, the cointegration test is carried out according to the following vector autoregression (VAR) model:

$$Y_t = \mu + \lambda_1 Y_{t-1} + \lambda_1 Y_{t-2} + \ldots + \lambda_k Y_{t-k} + e_t \tag{10}$$

VAR equation can be written in the form of vector error correction model (VECM) as follows:

$$\Delta Y_t = \Pi Y_{t-k} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + e_t \tag{11}$$

$Y_t, g \cdot 1$ dimensional I(1) variables vector consisting of g variables, Π and Γ_i are given with equations $\Pi = \sum_{i=1}^{k} \lambda_i$ and $\Gamma_i = \sum_{j=1}^{i} \beta_j - I_g$. If the rank of Π is equal to 0, the system is not cointegrated. If the rank of Π is different from zero, all variables in Y_t are stationary and cointegrated, there is a long-term relationship between the variables (Brooks, 2008, p. 350–351).

3. Data and empirical results

3.1. Data

In the study to represent Turkey's growth, economic size of Turkey's economy 2010 constant gross domestic product (GDP—US $) variable is used. The ratio of credit to the private sector to GDP (PSC) was used to represent financial development.

There are many small and medium-sized companies in Turkey that are not listed on the stock exchange. These firms are financed by bank, not the stock markets. In Turkey, SMEs accounted for 99.8% of the total number of enterprises, 72% of employment, 49.2% of personnel costs, 49.4% of turnover, 41.3% of value added with factor cost and 42.7% of production value in 2020 (Turkstat, 2021). Also 84% of the asset size of financial institutions in Turkey belongs to banks (The Banks Association of Turkey, 2021, p. 16). Financial systems can be divided into two as those dominated by banks and those dominated by the capital market (Ang & McKibbin, 2007, p. 219). Unlike industrialized countries most of the financial developments in developing countries occur in the banking system (Ghirmay, 2004, p. 421). Because the banking sector in financial markets is more dominant in Turkey it is more appropriate to prefer indicators related to banking system/sector (Güneş, 2013, p. 79). Since PSC does not include credit issued by the central bank and credit to public institutions it is an indicator of the level at which financial intermediaries transfer savings to investors (Herwartz & Walle, 2014, p. 419). PSC is more successful in measuring financial development than other financial development measures used in the literature (Levine, Loayza, & Beck, 2000, p. 38). In this respect, this variable is a good indicator for developing countries. The money supply is frequently used in the literature to represent financial development. But the weakness of using the money supply as an indicator of financial development is that the money supply is more a measure of monetary transaction volume than the financial system. PSC is the most important banking development indicator as it represents the opportunities of new firms to pro-

vide bank financing (Baltagi, Demetriades, & Law, 2009, p. 289). While using PSC as an indicator of financial development is advantageous in terms of accurately measuring the role of financial intermediaries in directing funds to the private sector, it is disadvantageous in terms of reflecting only the banking sector (Khan & Senhadji, 2000, p. 5).

The data used are annual data for the period 1961–2018 and were obtained from the World Bank's database. In the present study GDP and PSC series decomposed, d_1, d_2, d_3, d_4, 4 scale crystals. d_1, d_2, d_3, d_4 represent 2–4 years period, 4–8 years period, 8–16 years period and 16–32 years period respectively. Wavelet Symlets 6 (sym6) was used in the study.

3.2. Empirical results

Correlation coefficients between the GDP and PSC variables are presented in Table 2.

Table 2. Correlation coefficients between the GDP and PSC

1 Year	2–4 Years	4–8 Years	8–16 Years	16–32 Years
0.882	0.959	0.954	0.950	0.972
0.000	0.000	0.000	0.000	0.000

Source: Own calculations.

The null hypothesis of the insignificance of the correlation coefficient is rejected at 5% significance level for all periods. Correlation coefficients are positive and significant for all periods. There is a strong correlation between variables. The lowest relationship was obtained for 1-year period. The relationship between the variables decreased from 2–4 years periods to 8–16 years periods; reached its highest level for a period of 16–32 years period.

Before performing time series analysis for GDP and PSC variables stationarity levels were investigated with ADF, PP and, KPSS tests and the results presented in Tables 3 and 4. According to the results obtained from the stationarity test for GDP, 1-year period (original) series are the first difference (I (1)) stationary and series for all other periods are stationary at the level (I (0)). Although the original series of GDP are non-stationary the series obtained as a result of wavelet transform are stationary. According to the results obtained from the stationarity test for PSC, 1-year period (original) series are the first difference (I (1)) stationary and series for all other periods are stationary at the level (I (0)). Although the original series of PSC is non-stationary the series obtained by wavelet transform are stationary. These results show that the non-stationary problem which is frequently encountered in financial and economic time series can be eliminated with the help of wavelet transform.

Table 3. Stationarity test result for GDP

		ADF		PP		KPSS
		t-Statistic	*p*–value	*t*-Statistic	*p*–value	*t*-Statistic
1 year	Constant	5.498	1.000	8.705	1.000	0.875
	Constant +Trend	1.785	1.000	3.385	1.000	0.250
	None	9.400	1.000	14.213	1.000	–
1 year (First Difference)	Constant	–4.929	0.000	–5.018*	0.000	0.836
	Constant +Trend	–6.612	0.000	–6.612*	0.000	0.164*
	None	–1.776	0.072	–3.355*	0.001	–
2–4 Years	Constant	–7.718*	0.000	–43.099*	0.000	0.500*
	Constant +Trend	–7.577*	0.000	–42.596*	0.000	0.500
	None	–7.831*	0.000	–43.61*	0.000	–
4–8 Years	Constant	–5.752*	0.000	–4.687*	0.000	0.284*
	Constant +Trend	–5.687*	0.000	–4.563*	0.003	0.283
	None	–5.828*	0.000	–4.812*	0.000	–
8–16 Years	Constant	–4.53*	0.001	–6.818*	0.000	0.030*
	Constant +Trend	–4.482*	0.004	–6.843*	0.000	0.029*
	None	–4.177*	0.000	–6.823*	0.000	–
16–32 Years	Constant	–2.895***	0.053	–11.343*	0.000	0.074*
	Constant +Trend	–7.043*	0.000	–9.171*	0.000	0.068*
	None	–6.835*	0.000	–11.89*	0.000	–

Notes: *, ** and *** show stationarity at 1%, 5% and 10% significance levels, respectively.

Source: Own calculations.

Table 4. Stationarity test result for PSC

		ADF		PP		KPSS
		t-Statistic	*p*–value	*t*-Statistic	*p*–value	*t*-Statistic
1 year	Constant	0.555	0.987	1.306	0.998	0.556**
	Constant +Trend	–0.599	0.975	–0.104	0.994	0.184**
	None	1.535	0.968	2.502	0.997	
1 year (First Difference)	Constant	–4.791*	0.000	–4.791*	0.000	0.410*
	Constant +Trend	–5.169*	0.001	–5.169*	0.001	0.135*
	None	–4.520*	0.000	–4.520*	0.000	
2–4 Years	Constant	–14.281*	0.000	–188.129*	0.000	0.008*
	Constant +Trend	–14.05*	0.000	–184.777*	0.000	0.008*
	None	–14.451*	0.000	–190.726*	0.000	
4–8 Years	Constant	–4.161*	0.002	–4.438*	0.001	0.380*
	Constant +Trend	–4.119**	0.011	–4.314*	0.006	0.027*
	None	–4.203**	0.000	–4.553*	0.000	
8–16 Years	Constant	–4.812**	0.000	–4.82*	0.000	0.031*
	Constant +Trend	–4.764**	0.002	–4.786*	0.002	0.031*
	None	–4.863**	0.000	–3.062*	0.003	
16–32 Years	Constant	–3.141***	0.029	–13.804*	0.000	0.090*
	Constant +Trend	–3.709***	0.031	–12.413*	0.000	0.066*
	None	–3.931**	0.000	–13.829*	0.000	

Notes: *, ** and *** show stationarity at 1%, 5% and 10% significance levels, respectively.

Source: Own calculations.

Since the original series are non-stationary whether there is a long-term relationship for these series was investigated with the Johansen Cointegration Test and the results presented in Table 5.

Table 5. Johansen cointegration test results

Hypothesis	Eigenvalues		Trace statistics	
	t-Statistic	*p*–value	*t*-Statistic	*p*–value
None *	0.234	0.024	17.555	0.039
At least one	0.045	0.107	2.595	0.107

Notes: * shows that the null hypothesis was rejected at a 5% significance level.
In cointegration test, the lag length was determined as 1 according to the information criteria. The results of the information criteria are presented in Appendix Table 1.

Source: Own calculations.

The null hypothesis that there is no cointegration vector was rejected at 5% significance level. The null hypothesis that there is at least one cointegration vector could not be rejected at 5% significance level and it was decided that there is a cointegration relationship between the series.

Since the series obtained as a result of wavelet transform are stationary the regression model in which the dependent variable is GDP was estimated and the results presented in Table 6.

Table 6. Regression results for different time horizons

	2–4 Year	4–8 Year	8–16 Year	16–32 Year
Coefficient	0.959*	0.954*	0.950*	0.972*
p-value	0.000	0.000	0.000	0.000

Notes: *, shows significance at 1% significance level.

Source: Own calculations.

The regression model was estimated to determine the sign of the relationship between the variables. In the models estimated the dependent variable is GDP, and the independent variable is PSC. For all models the coefficient for the variable of PSC is significant at 1% significance level. The regression model shows that the signs of the relationship between the variables are positive.

Granger causality test results are presented in Table 7. These results show that there is a unidirectional relationship for 1-year period. PSC is Granger cause of GDP for 1-year period (original series). This result shows that for the period reviewed the demand-follow hypothesis of Robinson (1952) is valid in short term for Turkey. The Granger causality relationship for the 2–4 years

period could not be determined. For 4–8, 8–16, and 16–32 years periods bidirectional Granger causality relationships were determined. These results show that the bidirectional relationship hypothesis which is also expressed by Patrick (1966) and Greenwood and Smith (1997) is valid in the long term for Turkey. In line with the findings of Karlsson and others (2021), Lindh (2000), Gaytan and Rancière (2003), Loayza and Rancière (2006) and Cheng and others (2014) it has been determined that the relationship between economic growth and financial development has differed in different time horizons. These findings show that economic development can be achieved through financial development and vice-versa in the long run. If the focus is on achieving economic growth in the long run tools to increase financial development can be used for this purpose. In the short run (2–4 years) the effect of financial development policies on economic growth may not be seen but in the long run (4–8, 8–16, and 16–32 years) it will be seen.

Table 7. Granger causality test results of GDP and PSC for different time horizons

	Null Hypothesis	*t*-Statistic	Deep of Freedom	*p*-value
1 Year	PSC, Granger Cause of GDP	6.465	1	0.011*
	GDP, Granger Cause of PSC	0.476	1	0.490
2–4 Years	PSC, Granger Cause of GDP	2.458	4	0.652
	GDP, Granger Cause of PSC	4.301	4	0.367
4–8 Years	PSC, Granger Cause of GDP	13.750	4	0.008*
	GDP, Granger Cause of PSC	12.393	4	0.015**
8–16 Years	PSC, Granger Cause of GDP	23.645	4	0.000*
	GDP, Granger Cause of PSC	21.081	4	0.000*
16–32 Years	PSC, Granger Cause of GDP	76.801	4	0.000*
	GDP, Granger Cause of PSC	96.387	4	0.000*

Notes: * and ** indicate causal relationship at 1% and 5% significance levels, respectively. Lag lengths are determined according to information criteria. The results of the information criteria are presented in Appendix Table A2–A5.

Source: Own calculations.

Conclusions

This study aims to investigate the relationship between financial development and economic growth in different time horizons for Turkey in which an ensemble of wavelet analysis and Granger causality test were used. While classical time series analysis methods allow the examination of the relationship between series only in the short and long term distinction; wavelet analysis allows the series to be decomposed into different time components without loss of information. It also allowed the series to be made stationary without loss of information as opposed to methods such as differencing. The series used in this study were decomposed into time components by wavelet analysis and the causality relationship was investigated for different time periods with the Granger causality test.

To represent Turkey's growth and the size of Turkey's economy, 2010 constant gross domestic product (GDP—US $) variable was used. The ratio of credit to the private sector to GDP (PSC) was used to represent financial development. The data are annual data for the period 1961–2018. The results obtained from the stationarity tests for the series obtained as a result of decomposition show that the non-stationary problem which is frequently encountered in financial and economic time series can be eliminated with the help of wavelet transform. Correlation and regression analysis results show that there are strong positive correlations between the variables for the periods analyzed. The results obtained from the causality tests differ according to the periods reviewed. The finding obtained for the 1-year period shows that there is a unidirectional Granger causality from PSC to GDP. The result obtained for one year period shows demand-following hypothesis is valid for Turkey. When evaluated together with regression and correlation analysis, it can be said that financial development is Granger cause of growth and positively affects growth. The financial sector should be supported for growth in the short term. There is no causal relationship for the 2–4 year period. In this period the effects of financial instruments on economic growth will not emerge. For the periods of 4–8, 8–16, and 16–32 years bidirectional Granger causality relationships were determined. When evaluated together with regression and correlation analysis it can be said that variables are Granger cause of each other and affect each other in a positive direction. These findings show that economic development can be achieved through financial development and vice-versa in the long run. If the focus is on achieving economic growth in the long run tools to increase financial development can be used for this purpose.

Boyd, Levine and Smith (2001) showed that inflation negatively affects financial development. Although Turkey achieved a relative decrease in inflation with successful policies in the early 2000s inflation rates in Turkey generally are above the developed economies. Recently inflation rates have increased even more. The development of financial markets can be achieved through policies

that will keep inflation low and stable. In Turkey the three largest banks by asset size are public banks and the total asset size of public banks constitutes 45% of the asset size of all banks. In addition the total assets of domestic banks constitute 78% of the total assets of all banks (The Banks Association of Turkey, 2021, p. 271–272). It is seen that the banks in Turkey are public banks and domestic banks. Government ownership of banks leads to lower financial development due to factors such as low productivity growth (La Porta, Lopez-de-Silanes, & Shleifer, 2002, p. 290). Resource efficiency and thus financial development can be achieved by implementing policies that will further increase the size of private banks in financial markets. By increasing competition foreign banks can improve the efficiency of the banking system and thus improve the national banking system (Claessens, Demirgüç-Kunt, & Huizinga, 2001, p. 908). The entry of foreign banks can be ensured by implementing policies that reinforce the atmosphere of stability and trust. Also the development of the financial system can be achieved through policies that encourage the entry of foreign banks into the country. The financial development to be achieved in this way will encourage economic growth. In short, policies that provide low inflation and encourage private and foreign banking can be adopted to increase financial development. In the short run (2–4 years) the effect of financial development policies on economic growth may not be seen but in the long run (4–8, 8–16, and 16–32 years) it will be seen.

Conflicting results have been obtained in the literature on the relationship between financial development and economic growth. A plausible reason for the confusion is the difference in the level of development of the countries under consideration. However, the variables used to represent financial development also lead to contradictory results. Considering this problem in the future, using different methods to derive the financial development index from more than one indicator for the financial system is suggested. Or instead of investigating the relationship between financial development and economic growth in general it is suggested to investigate the relationship between growth and sub-headings such as the development of the banking system or the development of stock markets.

Appendix

Table A1. Information criteria for lag lengths for 1-year period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–1442.083	NA	4.53E+21	55.542	55.617	55.570
1	–1433.303	16.546*	3.77E+21*	55.358*	55.583*	55.444*
2	–1430.956	4.244	4.02E+21	55.421	55.797	55.565
3	–1428.464	4.313	4.27E+21	55.479	56.005	55.681
4	–1427.235	2.032	4.77E+21	55.586	56.261	55.845

Notes: * shows the optimal lag length.

Source: Own calculations.

Table A2. Information criteria for lag lengths for 2–4 years period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–1489.851	NA	3.40E+21	55.254	55.327	55.282
1	–1475.369	27.355	2.31E+21	54.866	55.087	54.951
2	–1452.536	41.437	1.15E+21	54.168	54.536	54.310
3	–1433.118	33.802	6.50E+20	53.597	54.113	53.796
4	–1415.223	29.825*	3.90E+20*	53.082*	53.745*	53.338*

Notes: * shows the optimal lag length.

Source: Own calculations.

Table A3. Information criteria for lag lengths for 4–8 years period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–1516.906	NA	9.26E+21	56.256	56.329	56.284
1	–1499.640	32.615	5.67E+21	55.764	55.985	55.850
2	–1439.950	108.326	7.21E+20	53.702	54.070	53.844
3	–1426.431	23.533	5.08E+20	53.349	53.865	53.548
4	–1393.524	54.845*	1.75E+20*	52.279*	52.942*	52.534*

Notes: * shows the optimal lag length.

Source: Own calculations.

Table A4. Information criteria for lag lengths for 8–16 years period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–1561.398	NA	4.81E+22	57.904	57.977	57.932
1	–1462.015	187.724	1.41E+21	54.371	54.592	54.456
2	–1334.293	231.791	1.44E+19	49.789	50.157	49.931
3	–1292.765	72.290	3.59E+18	48.399	48.914	48.598
4	–1269.233	39.219*	1.75E+18*	47.675*	48.338*	47.931*

Notes: * shows the optimal lag length.

Source: Own calculations.

Table A5. Information criteria for lag lengths for 16–32 years period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–1585.082	NA	1.16E+23	58.781	58.854	58.809
1	–1444.669	265.225	7.40E+20	53.728	53.949	53.814
2	–1168.313	501.534	3.08E+16	43.641	44.010	43.783
3	–1092.164	132.555	2.13E+15	40.969	41.485	41.168
4	–1065.192	44.953*	9.14E+14*	40.118*	40.781*	40.374*

Notes: * shows the optimal lag length.

Source: Own calculations.

References

Addison, P. S. (2017). *The illustrated wavelet transform handbook: Introductory theory and applications in Science, engineering, medicine and finance*. Boca Raton: CRC Press.

Ak, M. Z., Kirca, M., & Altintaş, N. (2016). The impacts of financial development on growth: A time-varying causality analysis for Turkey. *Zbornik Radova Ekonomskog Fakultet Au Rijeci*, *34*(2), 529–554.

Ang, J. B., & McKibbin, W. J. (2007). Financial liberalization, financial sector development and growth: Evidence from Malaysia. *Journal of Development Economics*, *84*(1), 215–233.

Apergis, N., Filippidis, N., & Economidou, C. (2007). Financial deepening and economic growth linkages: A panel data analysis. *Review of World Economics*, *143*(1), 179–198.

Arestis, Ph., & Demetriades, P. (1997). Financial development and economic growth: Assessing the evidence. *The Economic Journal*, *107*(442), 783–799.

Arestis, Ph., 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.

Baltagi, B. H., Demetriades, P. O., & Law, S. H. (2009). Financial development and openness: Evidence from panel data. *Journal of Development Economics*, *89*(2), 285–296.

Ben-Salha, O., & Zmami, M. (2020). The impact of private capital flows on economic growth in the MENA region. *Economics and Business Review*, *6*(3), 45–67.

Bozoklu, Ş., & Yılancı, V. (2013). Finansal gelişme ve iktisadi büyüme arasındaki nedensellik ilişkisi: Gelişmekte olan ekonomiler için analiz. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi*, *28*, 161–187.

Brooks, Ch. (2008). *Introductory econometrics for finance* (2nd ed.). Cambridge: Cambridge University Press.

Boyd, J. H., Levine, R., & Smith, B. D. (2001). The impact of inflation on financial sector performance. *Journal of Monetary Economics*, *47*(2), 221–248.

Cheng, S. Y., Ho, C. C., & Hou, H. (2014). The finance-growth relationship and the level of country development. *Journal of Financial Services Research*, *45*(1), 117–140.

Chung, P. T., Sun, S., & Vo, D. T. H. (2019). How does financial development interact with economic growth in five ASEAN countries?. *The Singapore Economic Review*, *64*(3), 441–460.

Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. (2001). How does foreign entry affect domestic banking markets?. *Journal of Banking & Finance*, *25*(5), 891–911.

Crowley, P. M. (2007). A guide to wavelets for economists. *Journal of Economic Surveys*, *21*(2), 207–267.

Darrat, A. F. (1999). Are financial deepening and economic growth causally related? Another look at the evidence. *International Economic Journal*, *13*(3), 19–35.

Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics*, *51*(2), 387–411.

Demetriades, P. O., & Luintel, K. B. (1996). Financial development, economic growth and banking sector controls: Evidence from India. *The Economic Journal*, *106*(435), 359–374.

Demirguc-Kunt, A. (2006). *Finance and economic development: Policy choices for developing countries*. The World Bank.

Djalilov, K., & Piesse, J. (2011). Financial development and growth in transition countries: A study of Central Asia. *Emerging Markets Finance and Trade*, *47*(6), 4–23.

Gaytan, A., & Rancière, R. (2003). *Banks, liquidity crises and economic growth*. Barcelona: Universitat Pompeu Fabra.

Ghirmay, T. (2004). Financial development and economic growth in sub-Saharan African countries: Evidence from time series analysis. *African Development Review*, *16*(3) 415–432.

Goldsmith, R. W. (1969). *Financial structure and development*. New Haven, CT: Yale University Press.

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, *37*(3), 424–438.

Greenwood, J., & Smith, B. D. (1997). Financial markets in development, and the development of financial markets. *Journal of Economic Dynamics and Control*, *21*(1), 145–181.

Güneş, S. (2013). Finansal gelişmişlik ve büyüme arasındaki nedensellik testi: Türkiye Örneği. *Doğuş Üniversitesi Dergisi*, *1*(14), 73–85.

Herwartz, H., & Walle, Y. M. (2014). Determinants of the link between financial and economic development: Evidence from a Functional coefficient model. *Economic Modelling*, *37*, 417–427.

Iqbal, S., Khan, A. Q., Khan, M. Y., & Al-Aali, L. (2021). The dynamics of financial development, government quality, and economic growth in different groups of economies. *Sustainability*, *13*(14).

Karlsson, H. K., Månsson, K., & Hacker, S. (2021). Revisiting the nexus of the financial development and economic development: New international evidence using a wavelet approach. *Empirical Economics*, *60*(5), 2323–2350.

Khan, M. S., & Senhadji, S. A. (2000). *Financial development and economic growth: An overview.* (IMF Working Paper No. WP/00/209).

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). Government ownership of banks. *The Journal of Finance*, *57*(1), 265–301.

Levine, R., Loayza, N., & Beck, Th. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, *46*(1), 31–77.

Lindh, Th. (2000). Short-run costs of financial market development in industrialized economies. *Eastern Economic Journal*, *26*(2), 221–239.

Loayza, N. V., & Rancière, R. (2006). Financial development, financial fragility, and growth. *Journal of Money, Credit and Banking*, *38*(4), 1051–1076.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42.

Lynch, D. (1996). Measuring financial sector development: A study of selected Asia-Pacific countries. *The Developing Economies*, *34*(1), 1–27.

McKinnon, R. I. (1973). *Money and capital in economic development*. Washington, DC: Brookings Institution.

Murinde, V. (2012). Financial development and economic growth: Global and African evidence. *Journal of African Economies*, *21*(Suppl. 1), 10–56.

Nazlioglu, S., Ege, I., & Bayrakdaroglu, A. (2009). Financial development and economic growth: Cointegration and causality analysis for Turkey. *Banking and Finance Letters*, *1*(2), 59–66.

Olaniyi, C. O. (2021). On the transmission mechanisms in the finance—growth nexus in Southern African countries: Does institution matter?. *Economic Change and Restructuring*, *55*, 153-191.

Ozturk, I. (2008). Financial development and economic growth: Evidence from Turkey. *Applied Econometrics and International Development, 8*(1), 85–98.

Pan, L., & Mishra, V. (2018). Stock market development and economic growth: Empirical evidence from China. *Economic Modelling*, *68*, 661–673.

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

Percival, D. B., & Walden, E. T. (2000). *Wavelet methods for time series analysis* (4th ed). Cambridge: Cambridge University Press.

Raghutla, Ch., & Chittedi, K. R. (2021). Financial development, real sector and economic growth: Evidence from emerging market economies. *International Journal of Finance & Economics*, *26*(4), 6156–6167.

Ramsey, J. B. (1999). The contribution of wavelets to the analysis of economic and financial data. *Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences*, *357*(1760), 2593–2606.

Risse, M. (2019). Combining wavelet decomposition with machine learning to forecast gold returns. *International Journal of Forecasting*, *35*(2), 601–615.

Robinson, J. (1952). *The rate of interest and other essays*. London: Macmillan.

Sehrawat, M., & Giri, A. K. (2016). The impact of financial development on economic growth. International *Journal of Emerging Markets*, *11*(4), 569–583.

Shaw, E. S. (1973). *Financial deepening in economic development*. New York: Oxford University Press.

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

Stern, N. (1989). The economics of development: A survey. *The Economic Journal*, *99*(397), 597–685.

Svirydzenka, K. (2016). *Introducing a new broad-based index of financial development*. Washington, DC: International Monetary Fund.

The Banks Association of Turkey. (2021). *Banks in Turkey*. Istanbul.

Turkstat. (2021). *Small and medium sized enterprises statistics*. Ankara.

Yıldırım, E., & Çeştepe, H. (2016). Türkiye'de finansal gelişme ve ekonomik büyüme ilişkisi. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, *12*, 12–26.

Zhang, J., Wang, L., & Wang, S. (2012). Financial development and economic growth: Recent evidence from China. *Journal of Comparative Economics*, *40*(3), 393–412.