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Research Article

Investigating the Relationship between Economic Growth and Loans by the Provinces of Turkey: Empirical Evidence from Panel Causality Analysis

Türkiye'de İllere Göre Ekonomik Büyüme ve Krediler Arasındaki İlişkinin İncelenmesi: Panel Nedensellik Analizinden Ampirik Kanıtlar

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Abstract

Supply-leading and demand-following hypotheses are crucial to explain the relationship between economic growth and loans. Based on these two theoretical approaches, the aim of the study explores the causality relationships between economic growth and loans on a provincial basis in Turkey in the period of 2007-2019. Differing from the majority of previous studies, in this study, loans are represented by the change in total loans, the change in commercial and industrial loans, the change in consumer loans, the change in construction loans, and the change in agricultural loans. The relationships between the variables are examined using the panel Granger causality test proposed by Dumitrescu and Hurlin (2012). As a result of the analysis, it is determined that there is a unilateral causal relationship from the change in total loans and the change in commercial and industrial loans to economic growth, and from economic growth to the change in consumer loans and the change in agricultural loans. On the other hand, any causal relationship between the change in construction loans and economic growth has not been found.

Key Words: *Economic Growth, Loans, Bank, Supply-leading Hypotheses, Demand-following Hypotheses*

JEL Classification Codes: *E51, O47, R11, Q41, L74, Q14, P46*

Öz

Ekonomik büyüme ve krediler arasındaki ilişkiyi açıklayabilmek için arz yönlü ve talep takipli hipotezler oldukça önemlidir. Bu iki teorik yaklaşımdan hareketle bu çalışmanın amacı 2007-2019 döneminde Türkiye'de il bazında ekonomik büyüme ile krediler arasındaki nedensellik ilişkilerini araştırmaktır. Önceki çalışmaların çoğundan farklı olarak bu çalışmada krediler toplam kredilerdeki değişme, ticari ve endüstri kredilerindeki değişme, tüketici kredilerindeki değişme, inşaat kredilerindeki değişme ve tarımsal kredilerdeki değişme ile temsil edilmektedir. Değişkenler arasındaki ilişkiler Dumitrescu ve Hurlin (2012) tarafından önerilen panel Granger nedensellik testi kullanılarak incelenmektedir. Analiz sonucunda, toplam kredilerdeki değişme ile ticari ve endüstri kredilerindeki değişmeden ekonomik büyümeye, ekonomik büyümeden ise tüketici kredilerindeki değişme ve tarımsal kredilerdeki değişmeye tek taraflı nedensellik ilişkisi olduğu belirlenmiştir. Diğer yandan inşaat kredilerindeki değişme ile ekonomik büyüme arasında herhangi bir nedensellik ilişkisi bulunamamıştır.

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1. Introduction

Economic growth, which is the most important way to increase the welfare of countries and thus individuals, has a key role in the development of national economies. Due to its role, many factors that affect and are affected by economic growth are closely examined by researchers. Labor and capital are the most crucial ones among these factors. In addition to social and economic variables such as macroeconomic structure, regional differences, ethnic and religious characteristics, environmental factors, openness, research and development, and human capital, the banking sector is also takes its place among the important determinants of economic growth.

Thanks to the increase in globalization, international trade, financial and technological developments, the relations of institutions and individuals with banks have increased. In this process, the relationships between financial development and economic growth have been investigated for many years utilizing various financial indicators. In a significant part of these studies, there is a positive relationship between economic growth and financial development (Valickova, Havranek and Horvath, 2015; Çakar et al., 2018; Guru and Yadav, 2019; Kılıç, Gürbüz and Ayrıçay, 2019; Ho and Saadaoui, 2022). After determining that the relationship between economic growth and financial development is positive, the important issue is to determine the direction of causality between financial development and economic growth. In this sense, a consensus on the causality aspect of the relationship between financial development and economic growth could not be reached in the literature. Dynamics such as the level of development of the countries, socio-economic structure, and entrepreneurship perceptions play an active role in the difference in the results obtained.

Supply-side and demand-following hypotheses are of great importance in explaining the relationship between economic growth and financial development (Schumpeter, 1911; Patrick, 1966; Hicks, 1969). While the supply-side hypothesis states that financial development increases economic growth (Hicks, 1969; Miller, 1998), the demand-following hypothesis states that there is an effect from economic growth to financial development (Gurley and Shaw, 1967; Goldsmith, 1969). Banks support investors, exporters, and entrepreneurs by transferring funds from those with surplus funds to those in need. In other words, economic resources are channeled to more productive sectors through banks, contributing to economic growth (Patrick, 1966). In this case, the supply-side hypothesis is valid.

Economic structure and efficiency in operation cause financial markets to work more safely, quickly, and efficiently. This positive atmosphere coming from real markets encourages banks to extend credit and contributes to the development of the economy. This indicates that the demand-following hypothesis is valid. Finally, there are economic conditions in which two situations are valid. Recently, there have also been studies that support the validity of these two conditions, in other words, that there is bidirectional causality between the banking sector and economic growth (Demetriades and Hussein, 1996).. Therefore, as economies grow, globalization and international trade increase, and the services provided by financial markets become more important (Beck and Levine, 2004; Deidda and Fattouh, 2008; Demirguc Kunt et al., 2013).

As equity markets in developing countries encourage short-term profits and require sophisticated monitoring systems, these markets are seen as unlikely to promote long-term economic growth (Singh and Weisse, 1998). In other respects, banks support the sustainability of the financial system with the loan facilities they offer. The lending activities offered by banks to those who request funds continue as long as the investments continue. Thus, banks can have a longer-term and sustainable relationship with investors. As a result, banks are a stable source of financing for the long-term economic growth and industrialization of cities, regions, and countries. Bank loans are an important factor in terms of their relationship with economic growth in terms of financial markets, determining the financial factors that trigger growth and determining the effects of growth on financial markets.

In this context, for the first time in Turkey as a developing country, employing credit and growth data for 81 provinces, an answer to the question "Does economic growth affect loans or do loans affect economic growth? Or do these variables trigger each other?" is sought through the Dumitrescu and

Hurlin (2012) panel Granger causality test. In this study, total credit growth and per capita GDP data for 81 provinces of Turkey were subjected to panel Granger non-causality analysis. Moreover, total loans were also analyzed by dividing them into sub-loans such as commercial loans, consumer loans, construction loans, and agricultural loans for more detailed policy implications. The study differs from other studies in that it deals with total loans and economic growth data for 81 provinces, as well as examining the relationships between sub-loans and economic growth.

The chapters of this study are designed as follows: The first chapter includes the introduction. The second chapter consists of the literature review and hypothesis development, and gap in literature. The third chapter, which describes the data and model, is followed by the fourth chapter, which explains the methodology. The empirical results are reported in the fifth chapter. The final chapter includes the discussion and conclusion.

2. Literature Review and Hypothesis Development

After the important studies of Schumpeter (1934), Goldsmith (1969), and Shaw (1973), there has been significant debate on the relationship between the development of financial markets and economic growth. Pioneering researchers such as Robinson (1952) and Lucas (1988) suggest that the financial sector develops as a result of economic growth. On the other side, King and Levine (1993), Bekaert et al. (2005) emphasize that a good financial system supports economic growth by reducing information asymmetry and transaction costs and by increasing entrepreneurship. In this process, mixed results have emerged in the literature about whether the stock markets, which represent the financial system to a large extent, and the banking system are effective in terms of economic growth. For instance, many researchers assert that highly efficient stock markets increase market efficiency by reducing asymmetric information and costs and thus encourage economic growth (Holmstrom and Tirole, 1993; Boyd and Smith, 1998; Allen and Gale, 1999). A number of researchers (Boot and Thakor, 1997; Coval and Thakor, 2005) have conducted studies showing that banks are more effective and stronger in the long run at this point.

Ofori-Abebrese et al. (2017) investigated the causal relationship between private-sector loans and growth in Ghana and found a one-way causality relationship from private sector loans to growth. Hassan et al. (2011) examined the relationship between financial development and economic growth utilizing Granger causality tests to different country groups in 1980 and 2007. The findings showed that there was a positive relationship between financial development and economic growth in developing countries. In addition, while there was a bidirectional causality relationship between financial development and economic growth in most of the regions in the short run, it was determined that there was a one-way causality relationship from economic growth to financial development in the two poorest regions.

Kar et al. (2011) tested the causality relationship between financial development and economic growth for the period 1980–2007 in the Middle East and North African (MENA) countries employing Konya's (2006) panel Granger causality test. The findings obtained demonstrated that there were mixed results about the direction of causality between financial development and economic growth. Kahouli (2017) studied the relationships among economic growth, energy consumption and financial development in six Southern Mediterranean countries during the period of 1995-2015. According to the Granger causality test results, it was determined that the direction of the relationship and the compliance rates varied from country to country.

Pradhan et al. (2018) investigated the relationships between innovation, financial development, and economic growth in 49 European countries over the period of 1961-2014. . Numerous unidirectional or bidirectional causal relationships were confirmed in the study findings. Especially when the development of the banking sector is related to innovation and per capita GDP, there is evidence for the existence of a unidirectional causality relationship from financial development to economic growth.

Bozoklu and Yılancı (2013) examined the relationship between financial development and economic growth in a study covering the period 1988-2009 for 14 developing countries. As a result of the study, it was determined a unilateral causality relationship from financial development to economic growth. Altunç (2008) explored the causal relationship between money supply and economic growth for the period 1970-2006 in Turkey. The results reveal that there was a bidirectional causal relationship between

money supply and economic growth. Güven (2002) investigated the relationship between bank loans and economic growth in Turkey by employing Granger causality, variance decomposition, and regression analysis. The results obtained from the Granger causality test show that loans were influential on economic growth. Danışoğlu (2004) surveyed the relationship between financial development and economic growth in the 1987Q4-2004Q4 period using the Granger causality test. The results showed that there was a one-way causality relationship from financial development to economic growth.

These findings are in line with the results obtained from the analysis of Kar and Pentecost (2000) using money supply as a measure of financial development. Similar findings that financial development causes economic growth in Turkey were also obtained by Aslan and Küçükaksoy (2006), who examined the period 1970-2004. Öztürkler and Çermikli (2007) used industrial production index data for the period 1990-2006 in their study in which they investigated the relationship between bank loans and economic growth. In the study, in which Vector Autoregression and Granger causality tests were employed by adopting a model that includes the monetary transmission channel as an empirical method, evidence was obtained regarding the bidirectional causal relationship between real loans and the industrial production index.

Ceylan and Durkaya (2010) analyzed the causal relationship between credit volume and economic growth in Turkey. Granger causality test and error correction model were employed in the analysis utilizing data stretching from 1998Q4 and 2008Q4. According to the results, it was detected that there was a one-way causality relationship from economic growth to credits. Contuk and Güngör (2016) assessed the causal relationship between growth and financial development using the Granger causality and asymmetric causality analysis method in Turkey during the period between 1984 and 2014. According to the asymmetric causality results, it was established that there was a one-way causality relationship from growth to financial development.

Çakar et al. (2018) studied the relationship between the total loan volumes of investment-development banks and economic growth over the period 2005Q4-2016Q4 for Turkey. The results obtained from the Granger causality test evidence that there was a one-way causality relationship from the total loan volumes of development and investment banks to economic growth, from economic growth to the total loan volumes of participation banks, and from economic growth to the total loans volume of the Central Bank. Demir Bingöl et al. (2022) examined the effect of conversion rates of consumer and investment loans on economic growth in the conversion of total deposits to total loans in the period 2006:Q1-2020:Q4 utilizing two different models. Accordingly, it was detected that while consumer loans negatively affected economic growth in Turkey, investment loans had a positive effect. The results show that although the credit mechanism of the Turkish economy, which prioritizes and supports consumption, has a positive effect in the short term, it has negative effects in the long term. Additionally, according to Granger causality test results, it was determined that there was a one-way causality relationship from economic growth to loans.

Within the scope of the literature reviewed, a complete consensus has not yet been attained on the causal relationships between bank loans and economic growth (Nyasha & Odhiambo, 2014). Moreover, in the current studies, no research examining the relationship between credit and economic growth on a provincial basis has been found. These two reasons constitute the main motivation source of the present study.

In the light of the studies in the literature, the following hypotheses have been developed by considering the gap in the literature and related theories. The research hypotheses of this study can be summarized as follows:

Hypothesis A: Total loans Granger causes economic growth.

Hypothesis B: Economic growth Granger causes total loans.

Hypothesis 1_A: Commercial and industrial loans Granger causes economic growth.

Hypothesis 1_B: Economic growth Granger causes commercial and industrial loans.

Hypothesis 2_A: Consumer loans Granger causes economic growth.

Hypothesis 2_B: Economic growth Granger causes consumer loans.

Hypothesis 3_A: Construction loans Granger causes economic growth.

Hypothesis 3_B: Economic growth Granger causes construction loans.

Hypothesis 4_A: Agricultural loans Granger causes economic growth.

Hypothesis 4_B: Economic growth Granger causes agricultural loans.

2.1 Gap in literature

In previous studies, the relations between economic growth and financial variables have been intensively surveyed for several countries and country groups by adopting various methods with the loan and economic growth data over the long years. On the other hand, these studies possess some specific gaps and limitations.

First of all, the relationships between financial development and economic growth have been dominantly investigated in the literature. In these studies, variables of foreign direct investment, share of private sector loans in GDP, financial development index, etc. are mainly utilized as indicators of financial development. Differing from the studies in the literature, the present study employs the total and sub-loans as an indicator of financial development. Second, in most of the studies linking economic growth and loans, while the data for total loans are regarded, the data for sub-loans are ignored. In this context, the study explores the relationship between economic growth and the important sub-loans that support growth and employment and have a significant share in total loans such as commercial and industrial loans, consumer loans, construction loans, and agriculture loans. Third, when the cross-section dependence and slope heterogeneity are ignored in panel data analysis, the findings achieved can lead to biased results and misleading inferences. On the other hand, most of the previous studies analyzing the relationship between economic growth and loans utilize first-generation tests (conventional tests) that ignore cross-section dependence and slope heterogeneity. In this study, empirical results are conducted by using Dumitrescu and Hurlin's (2012) panel Granger non-causality test, which regards the cross-section dependence and slope heterogeneity. Fourth, there is no consensus on studies investigating the relationships between economic growth and loans. Considering all of these, this study would expect to contribute to the existing literature examining the relationship between economic growth and loans.

3. Date and Model

The study explores the causal relationships between economic growth and loans on a provincial basis in Turkey in the period of 2007-2019.. In this sense, gross domestic product per capita data is employed for economic growth or income (GDP). Bank credits are represented by four different types of credits: total loans (ΔTL), commercial and industrial loans (ΔCIL), consumer loans (ΔCONL), construction loans (ΔCNTL) and agricultural loans (ΔAGRL). The data for GDP are retrieved from Turkish Statistical Institute (TUIK, 2022), while the data for ΔTL, ΔCIL, ΔCONL, ΔCNTL, and ΔAGRL are collected from the database of BDDK.

The data spans the period 2007-2019, the longest available data set. Due to the fact that all data are given with ratio except GDP, GDP data is only converted into natural logarithms. Table 1 reveals the description of variables employed in the study.

Table 1: Description of Variables

Acronym	Variable	Definition (Unit)	Source
GDP	Economic growth by province	Gross domestic product per capita (constant 2010 US$)	TUIK
ΔTL	Total loans by province	Change in total loans scaled by beginning total assets	BDDK, TBB
ΔCIL	Commercial and industrial loans by province	Change in commercial and industrial loans scaled by beginning total assets	BDDK, TBB
ΔCONL	Consumer loans by province	Change in consumer loans scaled by beginning total assets	BDDK, TBB
ΔCNTL	Construction loans by province	Change in construction loans scaled by beginning total assets	BDDK, TBB

ΔAGRL	Agricultural loans by province	Change in agricultural loans scaled by beginning total assets	BDDK, TBB

Note: BDDK: Banking Regulation and Supervision Agency. TBB: Banks Association of Turkey.

The following models are developed to investigate the causality relationship between economic growth and loans.

Model 1: $\ln(\mathrm{GDP}_{it}) = \beta_0 + \beta_1(\Delta \mathrm{TL}_{it}) + \varepsilon_{it}$

Model 2: $\ln(\mathrm{GDP}_{it}) = \gamma_0 + \gamma_1(\Delta \mathrm{CIL}_{it}) + u_{it}$

Model 3: $\ln(\mathrm{GDP}_{it}) = \lambda_0 + \lambda_1(\Delta \mathrm{CONL}_{it}) + \mu_{it}$

Model 4: $\ln(\mathrm{GDP}_{it}) = \delta_0 + \delta_1(\Delta \mathrm{CNTL}_{it}) + \omega\varepsilon_{it}$

Model 5: $\ln(\mathrm{GDP}_{it}) = \varphi_0 + \varphi_1(\Delta \mathrm{AGRL}_{it}) + \psi_{it}$

where ln represents the natural logarithms, t denotes the year (2007-2019), and i indicates the cross section (provinces of Turkey), β_1 $(\gamma_1, \lambda_1, \delta_1, \varphi_1)$ is the slope coefficient, β_0 $(\gamma_0, \lambda_0, \delta_0, \varphi_0)$ is the constant term, and ε_{it} $(u_{it}, \mu_{it}, \omega\varepsilon_{it}, \psi_{it})$ is the stochastic error term. Model 1 is for the relationship between economic growth and total loans; Model 2 is for the relationship between economic growth and commercial and industrial loans; Model 3 is for the relationship between economic growth and consumer loans; Model 4 is for the relationship between economic growth and construction loans; Model 5 is for the relationship between economic growth and agricultural loans.

4. Methodology

4.1 Cross-sectional Dependence Test

Empirical analysis consists of four steps. In the first step, it is checked to see if there is a cross-sectional dependence (CSD) among the cross-sections. Otherwise, the problem of CSD may lead to biased and unreliable outcomes. In the literature, possible CSD is investigated by different CSD techniques, such as (i) LM of Breusch and Pagan (1980), (ii) scaled LM of Pesaran (2004), (iii) CD of Pesaran (2004), and (iv) finally bias-corrected scaled LM of Baltagi et al. (2012). As the cross-sectional size (N) is larger than the time dimension (T), the current study employed the CD test proposed by Pesaran (2004). The mathematical explanation of the CD test is presented in Equation (1).

$$CD = \sqrt{\left(\frac{2T}{N(N-1)}\right)}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{p}_{ij}\right) \quad (1)$$

where N represents the cross-section dimension, T denotes the time period dimension. The null hypothesis (H_0) for CD test is that variables are cross-sectionally independent.

4.2 Slope Homogeneity Tests

The presence of slope homogeneity in the second step is investigated by Pesaran and Yamagata's (2008) Delta test. The slope homogeneity test, which was introduced to the literature by Pesaran and Yamagata (2008), is calculated using two different test statistics. These statistics are Delta ($\tilde{\Delta}$) and Delta Adjusted ($\tilde{\Delta}_{\text{adj.}}$) test statistics. $\tilde{\Delta}$ and $\tilde{\Delta}_{\text{adj.}}$ test statistics are defined by Equation (2) and Equation (3).

$$\tilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-k}{\sqrt{2k}}\right) \quad (2)$$

$$\tilde{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-E(\tilde{z}_{iT})}{\sqrt{Var(\tilde{z}_{iT})}}\right) \quad (3)$$

where $\tilde{S}$ refers to Swamy statistic, and k shows independent variable. Based on the test statistics calculated in Equation (2) and Equation (3), it assumes that null hypothesis slope homogeneity exists (Pesaran and Yamagata, 2008).

4.3 Panel Unit Root Test

In the third step, the stationarity properties of the variables are investigated using the Cross-sectionally Augmented Im-Pesaran-Shin (CIPS) test introduced by Pesaran (2007). Since the first-generation unit root tests ignore the presence of CSD, these tests can create misleading results. Therefore, in the study,

the stationarity properties are examined using the CIPS test, which considers CSD and slope heterogeneity. Besides, CIPS test provides reliable and accurate results for both N>T and T>N. Following Im et al. (2003), the CIPS test statistic is presented in Equation (4).

$$CIPS = N^{-1} \sum_{i=1}^{n} CADF_i \quad (4)$$

In equation (4), $CADF_i$ stands for the CADF t-test statistic for each cross-section. Null hypothesis assumes that the panel has a unit root, and alternative hypothesis indicates that the panel is stationary (Pesaran, 2007). In case the critical values are under the test statistic, the null hypothesis is rejected. Otherwise, the null hypothesis cannot be rejected.

4.4 Panel Granger Causality Test

In the fourth, namely, the final steps, the causal relationship among the variables is tested through the panel Granger causality test of Dumitrescu and Hurlin (D-H) (2012) as the advanced version of Granger (1969) causality. As different from a standard Granger causality test, D-H test offers four distinct advantages: (a) This causality approach regards the cross-sectional dependence and slope heterogeneity; b) D-H test is appropriate for both balanced and unbalanced panels; (c) and can be reliably utilized in case both N>T and T>N; (d) This test provides powerful results even in a relatively short span of data.

The variables included in the analysis must be stationary. Therefore, series that are stationary in the first difference (I[1]) should be analyzed by taking their difference. To test panel causality, the Dumitrescu and Hurlin (2012) introduced the linear model causality in equation (5).

$$y_{i,t} = \alpha_i + \sum_{k=1}^{K} \gamma_i^{(k)} y_{i,t-k} + \sum_{k=1}^{K} \beta_i^{(k)} x_{i,t-k} + \varepsilon_{i,t} \quad (5)$$

In equation (5), $y_{i,t}$ and $x_{i,t}$ represent the stationary variables in period t for each i. α_i and $\gamma_i^{(k)}$ show the individual fixed effects and the autoregressive parameters, respectively. K indicates the lag orders, and $\beta_i^{(k)}$ denotes the regression slope parameters. Unlike the Swamy model, D-H causality model is not a random coefficient.

The null hypothesis of homogeneous non-causality is shown as follows.

$$H_0 : \beta_i = 0 \quad \forall i = 1, \dots, N$$

The null hypothesis supposes non-causality in the panel. The alternative hypothesis assumes non-causality between x and y in case N_1 is smaller than N. The alternative hypothesis is demonstrated as follows.

$$H_A : \beta_i = 0 \quad \forall i = 1, \dots, N_1$$
$$\beta_i \neq 0 \quad \forall i = N_1 + 1, N_1 + 2, \dots, N$$

When the values of probability are under the values of significance, the null hypothesis is rejected. Conversely, the null hypothesis cannot be rejected.

D-H produced the individual Wald statistics to compute the test statistic for each of the cross-section units. The Wald test statistic which represents the panel is calculated by averaging the individual test statistics. The Wald test statistic is defined in Equation (6).

$$W_{N,T}^{Hnc} = \frac{1}{N} \sum_{i=1}^{N} w_{i,T} \quad (6)$$

where, $w_{i,T}$ refers to the individual test statistics.

5. Empirical Results

The presence of CSD was analyzed by Pesaran's (2004) CD test. Table 2 shows the CD test results.

Table 2: Cross-sectional Dependence Test Results

Variables	Test statistic	p-value
GDP	196.101[a]	0.000

ΔTL	195.405[a]	0.000
ΔCIL	186.894[a]	0.000
ΔCONL	174.064[a]	0.000
ΔCNTL	182.972[a]	0.000
ΔAGRL	113.484[a]	0.000

Note: a indicates significance at the 1% level.

In Table 2, the null hypothesis, which states that there is a cross-section dependency according to the CSD test results, was rejected at a 1% significance level in all the variables. In other words, it was determined that there was a cross-section dependence in the study. Accordingly, it was determined that other provinces of Turkey were also affected by the shock that occurred in any of the provinces in Turkey. The slope homogeneity test results are presented in Table 3.

Table 3: Slope Homogeneity Test Results

Models	$\tilde{\Delta}$ **test**		$\tilde{\Delta}_{adj.}$ **test**	
	Test stat.	**Prob.**	**Test stat.**	**Prob.**
Model 1	60.085[a]	0.000	69.380[a]	0.000
Model 2	56.583[a]	0.000	65.336[a]	0.000
Model 3	4.540[a]	0.000	5.242[a]	0.000
Model 4	55.205[a]	0.000	63.745[a]	0.000
Model 5	24.102[a]	0.000	27.831[a]	0.000

Note: a indicates significance at the 1% level.

According to the $\tilde{\Delta}$ test and $\tilde{\Delta}_{adj.}$ test results in Table 2, the null hypothesis claiming the existence of slope homogeneity was rejected at a 1% significance level in all models. Therefore, it was concluded that slope heterogeneity existed in all models, which indicates that the slope coefficients differ between the sections. Table 4 illustrates the CIPS panel unit root test results.

Table 4: CIPS Panel Unit Root Test Results

Variables	**Level**	**First difference**	**Integration order**
lnGDP	-1.880	-2.164[a]	I[1]
ΔTL	-1.984	-2.129[a]	I[1]
ΔCIL	-1.314	-3.345[a]	I[1]
ΔCONL	-1.935	-2.560[a]	I[1]
ΔCNTL	-1.645	-2.530[a]	I[1]
ΔAGRL	-1.724	-2.505[a]	I[1]

Note: a indicates significance at the 1% level.

According to the CIPS test results in Table 4, the null hypothesis, which assumes that the panel has a unit root, could not be rejected at the level. However, when the first difference of the variables was taken, the null hypothesis was rejected at a 1% significance level for all the variables. Accordingly, in other words, it was determined that all of the variables were stationary at the first difference (I[1]). Therefore, in causality analysis, variables should be used with their stationary situation. The D-H panel causality test results are reported in Table 5.

Table 5: Results of D-H Panel Causality Test for GDP and Total Loans

	Hypotheses			
	H_0: ΔTL ⇏GDP		**H_0: GDP⇏ ΔTL**	
Provinces	Wald stat.	Prob.	Wald stat.	Prob.
Adana	4.813[b]	0.028	0.147	0.701
Adıyaman	3.332[c]	0.068	0.389	0.533
Afyon	1.227	0.268	0.000	0.984
Ağrı	0.045	0.832	0.013	0.908
Aksaray	2.177	0.140	0.008	0.927
Amasya	0.135	0.713	2.102	0.147
Ankara	9.009[a]	0.003	0.451	0.502
Antalya	5.147[b]	0.023	0.277	0.599
Ardahan	0.109	0.741	0.144	0.704
Artvin	4.029[b]	0.045	0.144	0.704
Aydın	5.135[b]	0.023	0.191	0.662
Balıkesir	6.494[b]	0.011	1.007	0.316
Bartın	0.806	0.369	0.002	0.969
Batman	3.640[c]	0.056	0.824	0.364
Bayburt	1.135	0.287	1.068	0.301
Bilecik	2.034	0.154	0.122	0.726
Bingöl	0.993	0.319	0.307	0.580
Bitlis	0.962	0.327	0.017	0.895
Bolu	12.141[a]	0.000	0.785	0.376
Burdur	2.134	0.144	0.121	0.728
Bursa	0.025	0.875	0.620	0.431
Çanakkale	0.612	0.434	0.500	0.480
Çankırı	0.049	0.825	1.128	0.288
Çorum	3.899[b]	0.048	0.026	0.872
Denizli	2.572	0.109	0.006	0.936
Diyarbakır	0.665	0.415	0.119	0.730
Düzce	2.433	0.119	0.053	0.818
Edirne	2.280	0.131	3.204[c]	0.073
Elazığ	2.774[c]	0.096	0.123	0.726
Erzincan	3.320[c]	0.068	3.757[c]	0.053
Erzurum	0.275	0.600	0.813	0.367
Eskişehir	2.847[c]	0.092	0.138	0.710

Gaziantep	6.584[a]	0.010	0.003	0.954
Giresun	0.021	0.885	0.876	0.349
Gümüşhane	1.791	0.181	1.946	0.163
Hakkari	1.463	0.226	0.017	0.895
Hatay	13.934[a]	0.000	0.476	0.490
Iğdır	1.040	0.308	0.144	0.704
Isparta	0.133	0.716	0.088	0.767
İstanbul	3.366[c]	0.067	0.001	0.981
İzmir	6.157[b]	0.013	0.130	0.719
K. Maraş	11.768[a]	0.001	0.593	0.441
Karabük	2.965[c]	0.085	0.004	0.952
Karaman	0.051	0.821	0.036	0.850
Kars	1.547	0.214	0.232	0.630
Kastamonu	1.582	0.208	1.292	0.256
Kayseri	9.578[a]	0.002	0.249	0.618
Kırıkkale	9.339[a]	0.002	0.403	0.526
Kırklareli	1.790	0.181	1.393	0.238
Kırşehir	1.042	0.307	0.782	0.377
Kilis	2.418	0.120	0.025	0.875
Kocaeli	6.437[a]	0.011	0.303	0.582
Konya	3.917[b]	0.048	0.685	0.408
Kütahya	6.300[b]	0.012	0.217	0.641
Malatya	3.542[c]	0.060	0.459	0.498
Manisa	1.248	0.264	0.089	0.766
Mardin	0.751	0.386	0.020	0.888
Mersin	4.330[b]	0.037	0.178	0.673
Muğla	2.636	0.104	0.033	0.855
Muş	1.102	0.294	1.030	0.310
Nevşehir	0.036	0.850	0.554	0.457
Niğde	1.826	0.177	0.022	0.883
Ordu	0.097	0.755	0.729	0.393
Osmaniye	7.871[a]	0.005	0.413	0.521
Rize	4.031[b]	0.045	1.105	0.293
Sakarya	3.173[c]	0.075	0.104	0.747
Samsun	2.084	0.149	0.049	0.825
Siirt	0.946	0.331	0.053	0.818

Sinop	1.993	0.158	0.002	0.963
Sivas	0.556	0.456	0.292	0.589
Şanlıurfa	0.684	0.408	0.036	0.849
Şırnak	5.055[b]	0.025	0.725	0.394
Tekirdağ	4.073[b]	0.044	0.501	0.479
Tokat	0.206	0.650	0.483	0.487
Trabzon	4.686[b]	0.030	0.111	0.739
Tunceli	4.852[b]	0.028	1.859	0.173
Uşak	3.630[c]	0.057	0.553	0.457
Van	0.090	0.764	1.069	0.301
Yalova	2.488	0.115	0.141	0.707
Yozgat	0.515	0.473	0.067	0.796
Zonguldak	4.872[b]	0.027	8.864[a]	0.003
Turkey	6.229[a]	0.000	-2.671	1.992

Notes: a, b and c denote significance at the 1%, 5%, and 10% levels, respectively. "⇏" shows that there is no causality. ΔTL: Total loans.

According to the panel causality test results in Table 5, it was seen that there was a one-sided causal relationship from ΔTL to GDP in Adana, Adıyaman, Ankara, Antalya, Artvin, Aydın, Balıkesir, Batman, Bolu, Çorum, Elazığ, Erzincan, Eskişehir, Gaziantep, Hatay, İstanbul, İzmir, Kahramanmaraş, Karabük, Kayseri, Kırıkkale , Kocaeli, Konya, Kütahya, Malatya, Mersin, Osmaniye, Rize, Sakarya, Şırnak, Tekirdağ, Trabzon, Tunceli, Uşak, and Zonguldak.

On the other hand, unilateral causal relationship was found from GDP to ΔTL in Edirne, Erzincan, and Zonguldak. The results based on provinces showed that there was a causal relationship from total loans to economic growth in 35 of 81 provinces. It is also noteworthy that the majority of these provinces consist of big cities. While a causal relationship was found from ΔTL to GDP in the panel-wide results, there is no causal relationship from GDP to ΔTL.

Causality analysis shows which of two events over time occurred first and affected the other. The fact that there was a one-way causality relationship from ΔTL to GDP showed that in the long run, the use of loans emerges first, and then economic growth emerges with the effect of investment and production made with these loans. These results are crucial in terms of showing that the economic growth on a provincial basis in Turkey is supported by loans. The results of the present study are consistent with those of the studies conducted by Levine et al. (2000) for sub-Saharan African countries, Guru and Yadav (2019) for BRIC countries, Valickova et al. (2015) for 67 countries, and Bijlsma et al. (2018) for 68 countries. Table 6 represents the D-H panel causality test results between economic growth and sub-loans (ΔCIL, ΔCONL, ΔCNTL, and ΔAGRL).

Table 6: Results of D-H Panel Causality Test for GDP and Sub-Loans

	Hypotheses							
	H_0: ΔCIL ⇏GDP	**H_0: GDP ⇏ ΔCIL**	**H_0: ΔCONL ⇏GDP**	**H_0: GDP ⇏ ΔCONL**	**H_0: ΔCNTL ⇏GDP**	**H_0: GDP ⇏ ΔCNTL**	**H_0: ΔAGRL ⇏GDP**	**H_0: GDP ⇏ ΔAGRL**
Provinces	Wald stat.	Wald stat.	Wald stat.	Wald stat.	Wald stat.	Wald stat.	Wald stat.	Wald stat.
Adana	1.054	0.027	0.039	4.848[b]	0.098	0.037	0.254	1.974

Adıyaman	1.299	0.885	0.059	1.806	0.773	1.139	0.178	1.941
Afyon	9.212[a]	0.470	0.033	1.677	7.800[a]	0.094	0.355	1.774
Ağrı	0.071	0.002	0.193	0.896	0.000	0.052	0.004	0.009
Aksaray	0.252	0.221	0.516	7.812[a]	0.062	0.219	1.362	0.250
Amasya	3.623[c]	1.382	0.011	0.000	0.671	2.645	0.876	0.562
Ankara	3.262[c]	0.038	0.241	8.342[a]	1.153	0.106	0.385	0.103
Antalya	0.570	0.796	0.000	3.900[b]	0.106	0.046	0.295	0.003
Ardahan	0.058	0.758	0.030	3.119[c]	0.020	0.795	0.286	0.042
Artvin	9.805[a]	0.590	0.003	1.738	4.821[b]	0.408	5.343[b]	3.438[b]
Aydın	0.566	0.280	0.059	1.958	1.424	0.637	0.352	1.874
Balıkesir	1.930	0.024	0.443	3.477[c]	2.700	0.113	0.301	2.842[c]
Bartın	0.450	0.113	1.088	0.327	0.256	0.102	1.349	6.562[a]
Batman	0.383	0.659	0.001	0.119	0.011	0.215	0.014	8.573[a]
Bayburt	0.854	0.092	1.937	0.011	0.298	0.049	0.115	0.057
Bilecik	0.507	0.532	1.992	1.083	0.031	0.120	0.119	0.128
Bingöl	0.828	0.016	0.713	0.057	1.625	0.019	0.577	0.325
Bitlis	0.806	0.005	1.507	1.161	0.080	0.291	1.084	0.740
Bolu	0.054	0.012	3.081[c]	1.547	0.682	0.056	2.962[c]	6.307[b]
Burdur	1.353	0.540	0.053	2.979[c]	0.932	0.226	0.014	1.598
Bursa	2.395	0.190	0.001	9.559[a]	0.211	0.817	0.004	1.918
Çanakkale	1.980	0.058	0.054	2.692	0.833	0.258	0.113	0.063
Çankırı	0.060	0.002	1.217	1.638	0.094	0.096	2.088	2.477
Çorum	3.603[c]	0.765	0.008	0.452	3.319	0.639	1.304	0.738
Denizli	0.500	0.127	0.052	4.837[b]	0.097	0.004	0.438	2.635
Diyarbakır	0.052	0.177	0.282	1.436	0.041	1.869	0.044	2.564
Düzce	1.451	3.642[c]	0.768	1.229	0.011	0.014	0.874	0.395
Edirne	1.684	0.001	0.167	0.262	0.664	0.043	0.481	1.239
Elazığ	1.951	0.234	0.023	1.466	2.439	0.032	1.679	17.301[a]
Erzincan	1.160	0.359	0.464	0.615	0.011	0.000	5.443[b]	19.840[a]
Erzurum	1.374	0.005	0.008	0.713	0.920	0.103	0.542	0.001
Eskişehir	3.643[c]	0.257	0.067	5.195[b]	0.370	0.053	0.236	0.008
Gaziantep	1.011	0.157	0.001	2.598	2.393	0.112	0.627	0.380
Giresun	0.855	0.246	0.033	0.086	0.332	0.031	1.245	0.361
Gümüşhane	0.274	2.400	4.506[b]	0.924	0.451	1.302	0.714	4.272[b]
Hakkari	4.116[b]	1.475	0.215	0.000	0.001	0.356	1.223	0.388
Hatay	2.913[c]	5.393[b]	0.161	2.113	1.572	0.534	0.147	4.280[b]
Iğdır	9.122[a]	6.434[b]	0.126	1.424	0.237	2.429	5.941[c]	5.736[b]
Isparta	23.645[a]	0.170	0.179	0.878	0.000	0.479	0.145	1.348

İstanbul	4.006[b]	0.412	0.134	15.421[a]	4.205	0.002	2.240	1.071
İzmir	2.050	0.000	0.000	8.578[a]	1.507	0.008	0.282	4.907[b]
K. Maraş	2.540	0.645	0.027	2.061	0.613	1.397	0.054	0.995
Karabük	0.883	0.153	1.414	0.801	0.257	0.000	23.357[a]	6.161[b]
Karaman	2.004	0.720	1.674	2.561	0.283	0.014	0.532	3.024[c]
Kars	0.060	0.000	0.132	0.103	0.005	0.192	0.304	0.409
Kastamonu	0.393	0.567	0.058	1.955	0.197	1.201	7.401[a]	6.839[a]
Kayseri	2.199	1.551	0.169	2.824[c]	0.001	0.614	0.759	12.346[a]
Kırıkkale	0.572	0.067	0.121	0.595	0.000	0.001	5.759[b]	1.532
Kırklareli	0.436	0.112	0.003	0.705	0.321	0.063	0.052	0.529
Kırşehir	0.530	6.121[b]	0.043	0.459	0.492	0.869	2.609	7.113[a]
Kilis	0.007	1.009	0.458	1.053	0.028	0.003	0.987	0.059
Kocaeli	0.750	0.204	0.437	6.379[b]	1.128	0.038	1.873	39.518[a]
Konya	1.323	0.739	0.025	7.913[a]	0.831	0.071	0.013	0.424
Kütahya	4.732[b]	1.278	0.006	1.965	2.663	0.816	2.511	0.527
Malatya	8.093[a]	2.808[c]	0.098	0.883	0.745	1.38	4.333[b]	5.246[b]
Manisa	6.089[b]	0.653	0.223	2.016	0.688	0.918	0.420	6.229[b]
Mardin	0.146	0.197	1.137	0.177	0.462	0.000	0.236	0.079
Mersin	6.638[a]	0.274	0.005	3.703[c]	2.852[c]	0.002	0.061	0.153
Muğla	2.081	0.735	0.001	1.704	2.064	0.747	0.302	0.014
Muş	0.155	0.779	1.787	0.333	0.136	0.032	0.354	0.294
Nevşehir	0.746	0.282	0.365	0.368	1.139	0.167	0.110	0.042
Niğde	1.117	2.746[c]	0.942	0.699	0.941	0.558	0.043	0.732
Ordu	9.624[a]	3.448[c]	0.291	0.441	1.317	1.658	1.054	0.051
Osmaniye	0.562	0.072	0.108	0.777	0.010	0.027	0.056	0.169
Rize	3.609[c]	0.558	0.474	2.642	0.007	1.460	0.858	0.599
Sakarya	2.974[c]	0.431	0.000	6.803[a]	3.891[b]	2.422	0.648	2.343
Samsun	2.647	3.061[c]	0.645	2.281	2.074	0.042	0.034	5.412[b]
Siirt	0.990	0.864	0.006	1.023	0.505	0.002	1.674	0.729
Sinop	0.623	0.541	2.586	0.381	0.34	2.721[c]	12.556[a]	5.391[b]
Sivas	0.232	1.792	1.257	0.261	0.369	0.310	5.438[b]	14.186[a]
Şanlıurfa	0.686	0.103	0.058	0.427	0.012	0.333	0.000	0.103
Şırnak	0.076	3.884[b]	0.363	0.036	0.000	0.864	0.476	0.009
Tekirdağ	0.541	0.031	0.007	2.894[c]	0.786	0.035	0.020	0.004
Tokat	6.728[a]	6.998[a]	0.375	0.584	2.757[c]	0.488	0.236	0.643
Trabzon	1.627	0.385	0.517	6.709[a]	0.098	0.104	0.000	0.002
Tunceli	0.603	0.129	0.000	1.446	0.849	0.459	0.422	0.131
Uşak	0.017	0.020	0.366	0.701	2.090	0.003	10.758[a]	5.510[b]

Van	0.764	0.738	0.009	0.923	0.340	5.651[b]	1.230	2.878[c]
Yalova	0.186	0.881	0.042	4.051[b]	0.395	0.006	0.996	2.514
Yozgat	0.408	0.067	0.065	0.002	0.632	0.702	1.688	0.637
Zonguldak	2.203	15.004[a]	0.104	8.018[a]	1.235	0.011	1.748	5.549[b]
Turkey	3.269[a]	-0.775	-3.169	3.591[a]	-1.390	-2.898	1.158	6.332[a]

Notes: a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively. "⇏" shows that there is no causality. ΔCIL: Commercial and industrial loans, ΔCONL: Consumer loans, ΔCNTL: Construction loans, and ΔAGRL: Agricultural loans.

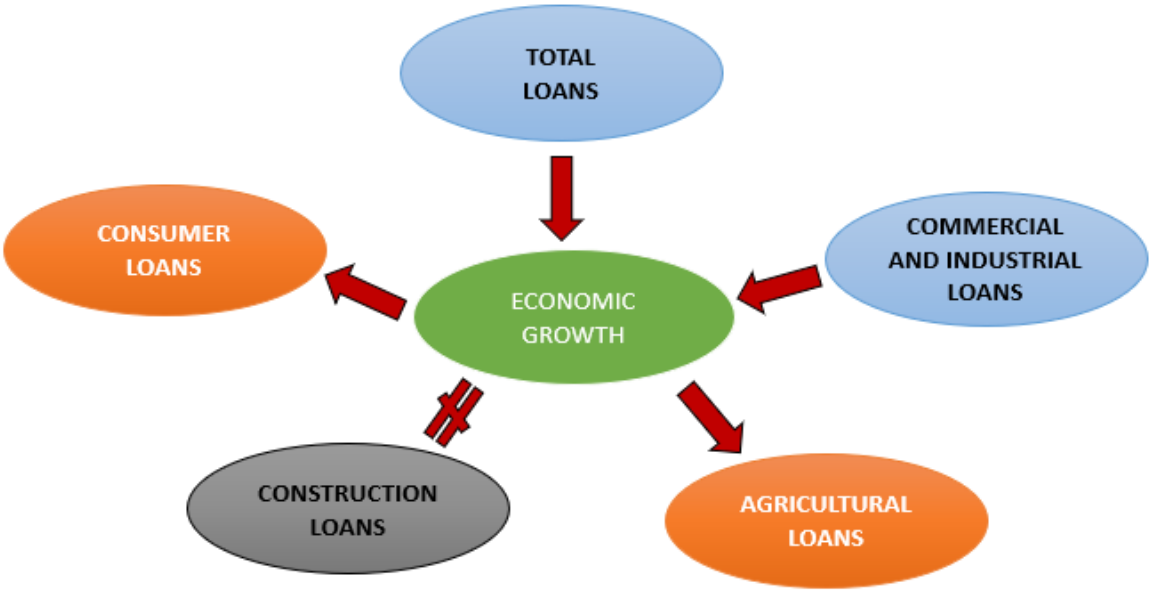
According to the panel causality test result in Table 6, a unilateral causality relationship can be seen from ΔCIL to GDP in Afyon, Amasya, Ankara, Artvin, Çorum, Eskişehir, Hakkari, Hatay, Iğdır, Isparta, İstanbul, Kütahya, Malatya, Manisa, Mersin, Ordu, Rize, Sakarya, and Tokat. On the other hand, it was determined that there was a unilateral causality relationship from GDP to ΔCIL in Düzce, Hatay, Iğdır, Kırşehir, Malatya, Niğde, Ordu, Samsun, Şırnak, Tokat, and Zonguldak. While a causal relationship was determined from ΔCIL to GDP in the panel-wide results, there was no significant causal relationship from GDP to ΔCIL. These results show that commercial and industrial loans, which have a share of 32% in total loans (TBB, 2021), stimulate economic activities and encourage economic growth. In other words, these results reveal that commercial and industrial loans are substantial in supporting economic growth in Turkey.

In Bolu and Gümüşhane, a unilateral causality relationship is detected from ΔCONL to GDP. On the other hand, it was found that there was a unilateral causality relationship from GDP to ΔCONL in Adana, Aksaray, Ankara, Antalya, Ardahan, Balikesir, Burdur, Bursa, Denizli, Eskisehir, İstanbul, İzmir, Kayseri, Kocaeli, Konya, Mersin, Sakarya, Tekirdag, Trabzon, Yalova, and Zonguldak. It is notable that the majority of provinces in which causality is determined from economic growth to consumer loans are composed of metropolitan cities. In fact, this situation might be a sign that metropolitan cities have received an earlier and larger share of economic growth. While no causal relationship was found from ΔCONL to GDP in the panel-wide results, there was a unilateral causality relationship from GDP to ΔCONL. These results prove that the economic growth in Turkey has increased the demand for consumer loans, whose share in total loans is 24% (TBB, 2021). It is remarkable that as the economy grows, especially in metropolitan cities, the demand for consumer loans increases in the consumer segment.

It was detected that there was a unilateral causality relationship from ΔCNTL to GDP in Afyon, Artvin, Mersin, Sakarya, and Tokat, and from GDP to ΔCNTL in Sinop and Van. According to the causality results based on provinces, there was a significant causal relationship between construction loans and economic growth in only 7 provinces. In regard to the panel-wide results, no causal relationship was found either from ΔCNTL to GDP, or from GDP to ΔCNTL. These results are crucial with respect to showing that construction loans, which have a share of 8% (TBB, 2021) in total loans in Turkey, do not have any effect on economic growth or are not used effectively. Hence, it can be stated that construction loans in Turkey are not as effective as thought on economic growth in the long run, supporting the results of Bayrak and Telatar (2021).

It was detected that while there was unilateral causal relationship from ΔAGRL to GDP in Artvin, Bolu, Erzincan, Iğdır, Karabük, Kastamonu, Kırıkkale, Malatya, Sinop, Sivas, and Uşak, there was evidence of unilateral causality from GDP to ΔAGRL in Artvin, Balikesir, Bartin, Batman, Bolu, Elazığ, Erzincan, Gümüşhane, Hatay, Igdır, İzmir, Karabuk, Karaman, Kastamonu, Kayseri, Kırşehir, Kocaeli, Malatya, Manisa, Samsun, Sinop, Sivas, Uşak, Van, and Zonguldak. Besides, it was determined that there was a bilateral causality in Artvin, Bolu, Erzincan, Iğdır, Karabük, Kastamonu, Malatya, Sinop and Sivas. Agricultural policies in these provinces can be revised considering this situation due to the bilateral relationship between agricultural loans and growth.

Figure 1: Flow of Causality Relationship



Source: The Authors

According to the panel-wide results, it was determined that there was only a one-sided causal relationship from GDP to ΔAGRL. These results reveal that increases in income in Turkey increase attention to agricultural loans which have a %4 share in total loans (TBB, 2021). This situation becomes even more prominent in provinces where agricultural activities are prevalent. Flow of causality relationship between economic growth and credit varieties is shown in Figure 1.

6. Discussion and Conclusion

Economic growth is one of the key macroeconomic indicators that represent the welfare level of countries and societies. On the other hand, the sustainability and stability of economic growth are the fundamental goals of the country's economies. There are numerous macroeconomic and socio-economic factors that affect economic growth in achieving these goals. One of the factors affecting economic growth and affected by economic growth is the loans offered through banks. In this respect, investigating the possible causal relationship and direction between economic growth and credits is of critical importance in the sense of determining the appropriate policies, especially for developing countries such as Turkey. Within this scope, it is very important to identify total and sub-loans that can support economic growth in Turkey, which has limited capital, and to transfer loans to these areas in terms of efficient use of fund resources.

For this purpose, the study investigates the causal relationships between economic growth and total loans, as well as sub-loans (commercial and industrial loans, consumer loans, construction loans, agricultural loans) that have the highest share in total loans by employing D-H (2012) panel Granger non-causality test in the period covering the years 2007-2019. According to the analysis findings, it is concluded that there is a unilateral causal relationship from total loans to economic growth. Due to this causal relationship from total loans to economic growth, the supply-side theory is valid in Turkey. This result proves that the increase in total loans has a critical role in increasing the economic performance of Turkey. Moreover, this result suggests that the total loans extended by the banks encourage investments and are channeled into production. The results obtained in the present study that there is a unilateral causality relationship from loans to economic growth are consistent with the results of Güven (2002) for Turkey, Ofori-Abebrese et al. (2017) for Ghana, Çakar et al. (2018) for Turkey, Pradhan et al. (2018) for 49 European countries. On the other hand, the results conflict with the results showing

that there is a one-way causality relationship from economic growth to loans reported by Ceylan and Durkaya (2010) for Turkey, Demir Bingöl et al. (2022) for Turkey.

Similar to total loan results, it is found that there is a unilateral causal relationship from commercial and industrial loans to economic growth. This result reveals that commercial loans stimulate economic growth by encouraging commercial and industrial activity in Turkey. In addition, this result supports that the supply-side view is valid for commercial and industrial loans in Turkey. On the other hand, a unilateral causality relationship was determined from economic growth to consumer loans and agricultural loans. These results demonstrate that economic growth in Turkey is decisive in the tendency for consumer and agricultural loans. In other words, consumer and agricultural loans enhance in parallel with the economic growth in Turkey. These results are important in that they show that economic growth in Turkey increases the demand for consumer and agricultural loans. As economic growth increases, the need for credit in the consumer and agricultural sectors also increases. These results verify the validity of the demand-side theory for both consumer and agricultural loans.

Finally, contrary to expectations, no causal relationship is obtained between construction loans and economic growth. Eventually, the causal relationship results between economic growth and total loans differ in sub-loans except for commercial and industrial loans. Based on these results, some policy recommendations are made for sustainable development and economic stability in Turkey:

i) It has been determined that total loans and commercial and industrial loans are effective in economic growth in Turkey. For this reason, it is recommended that decision-makers give more share to commercial and industrial loans in total loans. This process will prepare the environment for the Turkish economy to achieve stable and sustainable growth rates.

ii) Contrary to expectations, it has been established that construction loans have no significant effect on economic growth, and economic growth has no significant effect on construction loans. For this reason, instead of infrastructure and construction activities, policies that support commercial and industrial loans that would encourage the export and production economy should be emphasized.

iii) In the study, it is founded that there is a causal relationship from economic growth to consumer loans. Especially in developing countries, the majority of incomes is utilized in consumption expenditure due to various structural problems and the lack of savings awareness. Therefore, it is expected that as income grows, people can tend to spend more in general in the developing countries such as Turkey. Within this scope, policymakers can use consumer loans as an effective policy tool in order to lessen pressure on inflation.

iv) It has been noticed that economic growth is decisive in terms of the enhancement of agricultural loans in Turkey. For this reason, policymakers should increase the share of agricultural loans and incentives in total loans during periods of accelerated economic growth.

v) Finally, for sustainable growth and a stable economic structure in Turkey, where savings are not sufficient, loan policies that prioritize and encourage investments rather than consumption should be implemented.

The study investigates the causal relationships between economic growth and total loans, and sub-loans on a provincial basis in Turkey during the period of 2007-2019. Future studies can use asymmetric or non-linear test techniques in examining the relationships between economic growth and loans for different countries including Turkey. The present study has some limitations. First, because of the unavailability of economic growth and loan data before 2007 for all provinces of Turkey, the study period is limited from 2007 to 2019. Second, the scope of this study is limited to Turkey which is one of the developing countries. Third, in the study, the causal relationship between variables is only tested utilizing the linear method.

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Research Article

Investigating the Relationship between Economic Growth and Loans by the Provinces of Turkey: Empirical Evidence from Panel Causality Analysis

Türkiye'de İllere Göre Ekonomik Büyüme ve Krediler Arasındaki İlişkinin İncelenmesi: Panel Nedensellik Analizinden Ampirik Kanıtlar

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1. Giriş

Ülkelerin ve dolayısıyla bireylerin refahını artırmanın en önemli yolu olan ekonomik büyüme, ülke ekonomilerinin gelişimi için kilit bir role sahiptir. Bu rolü itibarıyla literatürde teorik ve ampirik açıdan büyümeyi etkileyen, diğer yandan dabüyümenin etkilendiği birçok faktör araştırmacılar tarafından yakından incelenmektedir. Bu faktörlerin başında emek ve sermaye gelmektedir. Bununla birlikte makroekonomik yapı, çevresel faktörler, bölgesel farklılıklar, etnik ve dini özellikler, çevresel faktörler, dışa açıklık, araştırma-geliştirme, beşeri sermaye gibi sosyal ve ekonomik değişkenlerin yanı sıra finansal piyasaların en önemli kolu olan bankacılık sektörü de ekonomik büyümenin önemli belirleyicileri arasında yerini almaktadır.

Ekonomik büyüme ile finansal gelişme ilişkisinin açıklanmasında, arz yönlü ve talep takipli hipotezler büyük önem taşımaktadır (Schumpeter, 1911; Patrick, 1966; Hicks, 1969). Arz yönlü hipotez, finansal gelişmenin ekonomik büyümeyi arttırdığını (Hicks, 1969; Miller, 1998), talep takipli hipotez ekonomik büyümeden finansal gelişmeye doğru bir etki olduğunu belirtmektedir (Gurley ve Shaw, 1967; Goldsmith, 1969). Bankalar fon fazlası olanlardan fon ihtiyacı olanlara fon transferi yaparak yatırımcılara, ihracatçılara ve girişimcilere destek olurlar. Diğer bir ifade ile bankalar aracılığıyla ekonomik kaynaklar daha üretken sektörlere kanalize edilerek ekonomik büyümeye katkı sağlanır (Patrick, 1966). Bu durumda arz yönlü hipotez geçerli olmaktadır.

Ekonomik yapı ve işleyişteki etkinlik finansal piyasaların daha güvenli, hızlı ve verimli çalışmasına neden olmaktadır. Reel piyasalardan gelen bu pozitif hava bankaları kredi kullandırma noktasında teşcik ederekekonominin gelişmesine katkıda bulunmaktadır. Bu durum talep takipli hipotezin geçirli olduğunu ifade etmektedir. Son olarak iki durumun geçerli olduğu ekonomik koşullarda bulunmaktadır. Son dönemde bu iki koşulun geçerli olduğunu destekleyen diğer bir ifade ile bankacılık sektörü ve ekonomik büyüme arasında çift yönlü nedenselliğin var olduğunu tespit eden araştırmalar da vardır (Demetriades ve Hussein, 1996).

Literatürde, bankaların öneminin zaman içinde arttığı ve ülkelerin ekonomik büyümelerinde önemli bir rol üstlendiğibelirtimektedir. Dolayısıyla ekonomiler büyüdükçe, küreselleşme ve uluslararası ticaret arttıkça finansal piyasalar tarafından sağlanan hizmetlerin ekonomiler için daha önemli hale geldiği görülmektedir (Beck ve Levine, 2004; Deidda ve Fattouh, 2008; Demirgüç Kunt ve ark., 2013).

Banka kredileri, geniş anlamda finansal piyasalar açısından ekonomik büyüme ile ilişkisi, büyümeyi tetikleyen finansal faktörlerin belirlenmesi ve büyümenin finansal piyasalara etkilerinin belirlenebilmesi açısından önemli bir değişkendir/faktördür. Bu bağlamda gelişmekte olan bir ülke olarak Türkiye'de ilk defa 81 il bazındaki kredi ve büyüme verileri kullanılarak "ekonomik büyüme mi kredileri yoksa krediler

mi ekonomik büyümeyi etkiler ya da söz konusu değişkenler birbirini mi tetiklemektedir?" sorusuna Dumitrescu and Hurlin (2012) panel Granger causality testi ile cevap aranmaktadır.

Bu çalışmada Türkiye'nin 81 ili için toplam kredi büyümesi ile il bazında kişi başı milli gelir verileri panel nedensellik analizine tabi tutulmuştur. Bununla birlikte toplam krediler daha detaylı politika çıkarımları için ticari krediler, tüketici kredileri, inşaat kredileri ve tarım kredileri şeklinde alt kredi tülerinde ayrılarak ayrıca nedensellik analizine tabi tutulmuştur. Bu çalışma 81 il bazında toplam kredi ve ekonomik büyüme verilerini ele alması yanı sıra alt kredileri türleri ile ekonomik büyüme arasındaki ilişkileri incelemesi açısından diğer çalışmalardan ayrılmaktadır.

2. Literatür Boşluğu

Bu çalışma Türkiye'de il bazında kredi türleri ve ekonomik büyüme arasındaki nedensellik ilişkisini incelemektedir. Geçmiş çalışmalarda ilgili değişkenler arasındaki ilişkiler ülke ve ülke grupları için ve yıllar itibariyle ülkelerin kredi ve ekonomik büyüme verileri ile çeşitli yöntemler kullanılarak araştırılmıştır. Bu çalışmalar bazı specific gaps and limitations sahiptir. İlk olarak, literatürde çoğunlukla finansal gelişme ile ekonomik büyüme arasındaki ilişkiler araştırılmıştır. Bu çalışmalarda finansal gelişme göstergesi olarak doğrudan yabancı yatırım, özel sektör kredilerinin GDP içindeki payı, finansal kalkınma endeksi vb. çeşitli veriler kullanılmış ancak krediler özelinde yapılan çalışmaların sınırlı olduğu görülmüştür. İkincisi, ekonomik büyüme-kredi ilişkili çalışmaların önemli bir kısmında toplam kredi verisi kullanılmış ve alt kredi türleri dikkate alınmamıştır. Bu çalışmada ise toplam kredi ile birlikte ticari, tüketici, inşaat ve tarım gibi toplam krediler içerisinde önemli paya sahip olan, büyümeyi ve istihdamı destekleyici önemli alt kredi türlerinin de ekonomik büyüme ile olan ilişkileri araştırılmaktadır. Üçüncüsü, geçmiş çalışmalarda yatay kesit bağımlılığını ve slope heterogeneity göz ardı eden first-generation testsler kullanılmıştır. Bu çalışmada cross-section dependence and slope heterogeneity dikkate alan Dumitrescu and Hurlin (2012) tarafından ileri sürülen panel Granger causality testi ile analizler uygulanmıştır. Ayrıca this test sayesinde panel geneli sonuçları yanı sıra paneli oluşturan her bir kesit için de il bazında sonuçlar elde edilmektedir. Bu çalışmanın en ayırt edici yönlerinden birisidir. Dördüncüsü, ekonomik büyüme ve kredi arasındaki ilişkileri araştıran çalışmalar üzerinde bir görüş birliği sağlanamamıştır. İlişkinin yönü, seçilen örneklem ve uygulanan test tekniklerine göre farklılık göstermektedir. Bu yönüyle de bu çalışmanın ekonomik büyüme, toplam kredi ve alt kredi türlerinin ilişkisinin araştırıldığı mevcut literatüre katkı yapması beklenmektedir.

3. Değişkenler ve Hipotezler

Bu çalışmada 2007-2019 döneminde Türkiye'de il bazında ekonomik büyüme ile toplam krediler ve alt kredi seçenekleriyle ilgili nedensellik araştırılmaktadır. Kişi başına gayri safi yurtiçi hasıla verileri, ekonomik büyüme veya gelir (GSYİH) için kullanılmaktadır. Banka kredileri dört farklı kredi türü ile temsil edilmektedir: toplam krediler (ΔTL), ticari ve endüstriyel krediler (ΔCIL), tüketici kredileri (ΔCONL), inşaat kredileri (ΔCNTL) ve tarım kredileri (ΔAGRL). lnGDP verileri Türkiye İstatistik Kurumu'ndan (TÜİK, 2022), ΔTL, ΔCIL, ΔCONL, ΔCNTL ve ΔAGRL verileri BDDK veri tabanından alınmıştır.

Veriler, mevcut en uzun veri seti olan 2007-2019 dönemini kapsamaktadır. GSYİH dışındaki tüm verilerin oran olması nedeniyle GSYİH verileri yalnızca doğal logaritmalara dönüştürülür. Tablo 1, çalışmada kullanılan değişkenlerin tanımını göstermektedir.

Bu çalışmanın araştırma hipotezleri şu şekildedir:

Hipotez A: Toplam kredi büyümesi ekonomik büyümeye neden olur

Hipotez B: Ekonomik büyüme toplam kredi büyümesine neden olur

Hipotez 1_A: Ticari kredi büyümesi ekonomik büyümeye neden olur

Hipotez 1_B: Ekonomik büyüme ticari kredi büyümesine neden olur

Hipotez 2_A: Tüketici kredisi büyümesi ekonomik büyümeye neden olur

Hipotez 2_B: Ekonomik büyüme tüketici kredisi büyümesine neden olur

Hipotez 3_A: İnşaat kredisi büyümesi ekonomik büyümeye neden olur

Hipotez 3_B: Ekonomik büyüme inşaat kredisi büyümesine neden olur

Hipotez 4_A: Tarım kredisi büyümesi ekonomik büyümeye neden olur

Hipotez 4_B: Ekonomik büyüme tarımsal kredi büyümesine neden olur

4. Tartışma ve Sonuç

Ekonomik büyüme ülkeler ve toplumların refah seviyesini temsil eden önemli bir makroekonomik göstergedir. Diğer yandan ekonomik büyümenin sürdürülebilir ve istikrarlı olması ülke ekonomilerinin temel hedeflerden biridir. Bu hedeflere ulaşılmasında ekonomik büyüme ile etkileşimde olan birçok makreokonomik ve sosyo-ekonomik faktör bulunmaktadır. Ekonomik büyümeyi etkileyen ve ekonomik büyümeden etkilenen faktörlerden biri de bankalar aracılığıyla ile piyasaya sunulan kredilerdir. Bu doğrultuda ekonomik büyüme ve krediler arasında olası nedensellik ilişkisinin ve yönünün araştırılması özellikle Türkiye gibi kalkınma hamlesini tam olarak gerçekleştirememiş gelişmekte olan ülkeler için gerekli/uygun politikaların belirlenmesi açısından kritik öneme sahiptir. Bu sebeple sınırlı sermayeye sahip Türkiye'de ekonomik büyümeyi destekleyecek kredi türlerinin tespit edilmesi ve kredilerin bu alanlara aktarılması fon kaynaklarının verimli kullanılması açısından oldukça önemlidir. Bu amaçla bu çalışmada 2007-2019 yıllarını kapsayan 13 yıllık dönemde Türkiye'de il bazında ekonomik büyüme ile toplam kredilerin yanı sıra toplam krediler içerisindeki en yüksek paya sahip ve ekonomik büyümeyi tetiklemesi beklenen kredi türleri arasındaki ilişkiler Dumitrescu-Hurlin (2012) panel Granger causality yaklaşımı ile ampirik olarak test edilmiştir.

Diğer yandan ekonomik büyümeden tüketici kredileri ile tarım kredilerine tek taraflı bir nedensellik ilişkisi tespit edilmiştir. Bu sonuçlar Türkiye'de ekonomik büyümenin tüketici ve tarım kredilerine olan talebi artırdığını göstermesi bakımından önemlidir. Ekonomik büyüme arttıkça tüketici ve tarım kesiminde kredi ihtiyacı artmaktadır. Nedensellik ilişkisinin ekonomik büyümeden bu iki kredi türüne doğru olması Türkiye'de bu iki alt kredi türü için talep yönlü teorinin geçerliğini kanıtlamaktadır. Son olarak beklenilenin aksine inşaat kredileri ile ekonomik büyüme arasında herhangi bir nedensellik ilişkisi elde edilememiştir. Sonuç itibarıyla Türkiye için ekonomik büyüme ve kredi ilişkisi ticari krediler hariç alt kredi türlerinde farklılık göstermektedir. Bu sonuçlardan hareketle Türkiye'de sürdürülebilir ve istikrarlı bir ekonomik büyüme için bazı politika önerilerinde bulunulmaktadır:

i) Türkiye'de toplam kredilerin ve ticari ve endüstriyel kredilerin ekonomik büyüme üzerinde etkili olduğu belirlenmiştir. Bu sebeple karar alıcılara toplam krediler içerisinde ticari ve endüstriyel kredilere daha fazla pay vermeleri önerilmektedir. Bu süreç, Türkiye ekonomisinin istikrarlı ve sürdürülebilir büyüme rakamlarını yakalamasına ortam hazırlayacaktır.

ii) Beklenenin aksine inşaat kredilerinin ekonomik büyüme üzerinde ve ekonomik büyümenin inşaat kredileri üzerinde herhangi bir etkisi olmadığı belirlenmiştir. Bu sebeple alt yapı ve inşaat faaliyetleri yerine ihracatı ve üretim ekonomisini teşvik edecek sanayi ve ticaret kredilerini destekleyici politikalara ağırlık verilmelidir.

iii) Beklenildiği üzere tüketici kredileri ekonomik büyümeye bağlı olarak hareket etmektedir. Ekonomik büyüme sağlanırken tüketim artmakta aksi halde azalmaktadır. Dolayısıyla politika yapıcılar tüketici kredilerini daha dengeli kullanarakenflasyon üzerinde baskı oluşturmaması yönünde etkili bir politika aracı olarak kullanabilirler.

iv) Türkiye'de tarımın gelişmesi ve tarımsal ihracatın artmasını açısından ekonomik büyümenin önemli olduğu anlaşılmıştır. Bu sebeple ekonomik büyümenin hızlandığı dönemlerde tarımsal kredi ve teşviklerin toplam kredi içerisindeki payının artırılmasının önem arz ettiği ifade edilebilir.

v) Sektörü denetleyici ve düzenleyici kurumlar ile bankalar kredi politikalarını belirlerken sadece kârlılığı ve riski değil ülke menfaatleri ön planda tutarak ekonomik büyümeyi sağlayacak, daha verimli ve katma değeri yüksek ürünlerin yatırımına dönüşecek kredileri kullandırma noktasında bir yönelim sergileyebilirler.

vi) Son olarak, tasarrufların yeterli düzeyde olmadığı Türkiye'de sürdürülebilir büyüme ve istikrarlı bir ekonomik yapı için tüketimden ziyade yatırımları önceleyen ve teşvik eden kredi politikalarının uygulamaya konulması gerekmektedir.

Bu çalışmada Türkiye'de il bazında ekonomik büyüme ile toplam krediler ve alt kredi çeşitli arasındaki nedensellik ilişkileri araştırılmıştır. Gelecek çalışmalarda Türkiye dahil farklı ülkelerde asimetrik ya da doğrusal olmayan test teknikleri ile söz konusu değişkenler arasındaki ilişkiler incelenebilir.