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TODA-YAMAMOTO CAUSALITY TEST BETWEEN SMES LOANS AND ECONOMIC GROWTH: EVIDENCE FROM TURKIYE

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ABSTRACT

In Turkiye, SMEs comprise the great majority of businesses. Owing to their contributions to production, employment, innovation, and export, SMEs are crucial to the process of economic growth. However, SMEs' production operations are hampered by financial insufficiencies, which weaken the link between them and economic expansion. For SMEs that must depend on external financing because of equity capital deficiencies, the loan system is crucial. Using Turkiye as an example, this study examines the connection between SME loans and economic growth. Analysis was conducted for three different categories, namely loans extended to micro, small, and medium-sized enterprises. Quarterly data for the 2007Q1–2022Q2 period were considered and the Toda– Yamamoto causality test was used. It was determined that the causal relationship between SME loans and economic growth differs depending on the size of the enterprises. The relationship between loans extended to micro-enterprises and economic growth is unidirectional, and the direction of the relationship is from growth to loans. Although there is a bidirectional relationship between loans extended to small enterprises and economic growth, there is no causal relationship between loans extended to medium enterprises and economic growth.

Keywords: *SMEs Loans, Economic Growth, Toda-Yamamoto Causality Test.*

JEL classification: *E44, E60, F63, F65.*

1. INTRODUCTION

SME are one of the most important components of the economic and social structure. SMEs contribute significantly to investment, production, employment, and exports. Approximately 99% of the enterprises in Turkiye are SMEs, while the share of those employed in SMEs in total employment is over 70%. Therefore, it is possible to say that SMEs play a key role in the realization of both economic and social objectives. It is important to examine the issues that SMEs face and aid in solving them to boost their contribution to economic and social life.

The main problems faced by SMEs in Turkiye are insufficient capital, difficulties in obtaining external financing, and ineffective financial management. In most SMEs, it is seen that the equity capital is insufficient. Capital inadequacies cause SMEs to turn to external financing to meet their capital needs

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through loans. However, reasons such as problems in the repayment of loans and the failure to provide the guarantees requested by banks result in banks' reluctance to give loans to SMEs, thereby disrupting the credit processes of SMEs. Even though it has been seen that banks have shifted their attention to the SME banking system recently by eliminating this negative perception, there is a need for new and effective solutions to provide loans to SMEs under the most favorable conditions. Economic growth will be boosted because SMEs will increase their output volumes by making new investments, incorporating new technology into their production processes, and boosting their competitiveness in international markets. On the other hand, as economic growth increases, the number of loans to be extended to SMEs will increase. In this context, there is a reciprocal interaction between SME loans and economic growth. However, whether the empirical results support this assumption should be analyzed on a country basis. This is due to the possibility of regional variations in the results.

In this study, the relationship between loans, which play a critical role in the uninterrupted continuation of the production processes of SMEs, and economic growth is discussed. The main contribution of this study to the literature is its examination of the relationship between SME loans and economic growth under three different subgroups. In previous studies, total SME loans have generally been used. However, it is important to determine whether the causal relationship between the loans provided to micro, small- and medium-sized enterprises and economic growth is different. This study is noteworthy in that it seeks to answer this question. The answer to this question is very important, especially for policy makers. If there is a causal relationship between micro, small- and medium-sized enterprises and economic growth and the direction of causality is different, policies will need to be updated. In addition, another feature that makes the study important is that the data used are up-to-date and the method applied is different. Although there are studies that divide SME loans into subgroups, these studies were published in older years. The causality analysis used is often the Granger test. In this study, causality was tested with a different method by applying the Toda– Yamamoto test. The dataset covers the quarterly data between 2007Q1 and 2022Q2. In the Toda– Yamamoto causality test, there is no need to stationary the series before starting the analysis. Therefore, it is not necessary to calculate the difference in a series. Since the number of observations is not reduced by calculating the difference in the series, it is possible to obtain more reliable results.

This study first explains the meaning of the term "SME," how SMEs are defined in Turkiye, and the significance and roles that SMEs play in both economic and social life. The primary challenges affecting SMEs in Turkiye have been discussed, and the importance of the financing system has been emphasized. Then, how economic growth and the loans extended to SMEs changed over time are included. At the last stage, causality analyses were performed, and it was determined whether there is a causal relationship between economic growth and SME loans, and if so, in which direction.

2. SME DEFINITION AND THE IMPORTANCE OF SMES

The relationship between SME loans and economic growth is a field of study that has become increasingly widespread in recent years. SMEs have a significant impact on economic growth. Therefore, a structure focused on the SME sector was formed to ensure growth sustainability. National and international organizations and decision makers support SMEs and implement practices to solve their problems. The aim is to ensure the development of SMEs through various policies such as banking services, institutional arrangements, and SME-specific incentive policies (Cravo, Gourlay and Becker, 2010: 2).

Defining the concept of SME is quite difficult. The main reason for this is that there is no common indicator used in the definition of the concept. The type and number of indicators may vary from country to country. In general, the definition of SME uses the number of personnel employed in the company, the company's capital amount, and the company's sales or turnover figures. In addition, the criteria used in the definition may differ depending on the sector or institution. For example, one government agency in the same country may use a particular definition, while another may adopt another (Yoshino and Taghizadeh-Hesary, 2017: 1).

There are two basic criteria used to define the enterprises to be considered as SMEs in Turkiye. These are the number of employees and the financial criteria. The table below shows the current criteria for expressing the SME definitions in Turkiye. As shown in the table, businesses with less than 10 employees are included in the micro-enterprise category, according to the classification based on the number of employees. If the number of employees is 10 or more and the number of employees is less than 50, these businesses are defined as small businesses. Enterprises with 50 and more than 50 but less than 250 employees are medium-sized enterprises. In the definition of SME based on financial criteria, the annual net sales revenue or financial balance sheet of the enterprises is considered. Micro-enterprises are businesses whose annual net sales revenue or financial balance sheet does not exceed 5 million TL. This financial limit is 50 million TL for small enterprises and 250 million TL for medium-sized enterprises (KOSGEB, 2023).

Tablo 1: SME Definition in Turkiye

Type	Employees	Revenue (Million TL)	Net Sales (Million TL)
Micro	< 10	≤ 5	≤ 5
Small	< 50	≤ 50	≤ 50
Medium	< 250	≤ 250	≤ 250

Source: KOSGEB, https://en.kosgeb.gov.tr/site/tr/genel/detay/5667/definitions-and-regulations

The information in the table contains the current criteria. Because in Turkiye, some changes have been made regarding the criteria used in the definitions of SMEs. These revisions specifically cover the financial criteria. Before 2012, the financial constraint in the definition of SME was 25 million TL. With the amendment made in 2012, this limit was increased to 40 million TL. Afterward, it was updated again in 2018, and the financial limit of the SME definition was determined as 125 million. The last update was made in 2022, and the upper limit required to be an SME was increased from 125 million TL to 250 million TL. The main reason for these updates is to ensure that more businesses are defined as SMEs (KOSGEB, 2023). There are various supports and advantages available to SMEs. If more businesses can benefit from this support and advantages, it will be easier to solve the problems of the enterprises and to continue the production process without interruption. The number of SMEs in Turkiye is more than 3 million, and their contribution to total production is quite high. SMEs should be provided with financial and technical support, and consultancy services should be provided. This is necessary for production to be sustainable in Turkiye.

The concept of SME has different meanings for companies, individuals, and the economy. For large companies, SMEs are potential competitors with whom they will compete in the future. For individuals, it usually represents their first job experience, the beginning of their career, and the main source of income. It is an important platform for entrepreneurs to transform their creativity into income. It is an important platform for entrepreneurs to transform their creativity into income. For the economy, it is an element that increases productivity and the effective use of resources by bringing together new ideas (Savlovschi and Robu, 2011: 278-279).

SMEs are the main drivers that contribute to economic growth in both developed and developing countries. SMEs are characterized as the engine of growth because of factors such as their high employment creation potential, helping the development of large industries, and enabling entrepreneurs to implement their ideas. In addition, SMEs are the main source of innovation and an important tool for generating income. However, SMEs require financial support to sustain their production, grow and develop, and increase their competitiveness by adapting to innovations. Access to finance is one of the main factors affecting the production performance of SMEs. Therefore, it is extremely important for SMEs to have easy access to credit and to strengthen their connections with the financial sector. Diversification of products and services offered by banks to SMEs can also help strengthen the connection between companies and the financial sector (Harash, Al-Timimi and Alsaadi, 2014: 1-2).

3. MAJOR CHALLENGES FACING SMES IN TURKIYE

There are various problems that SMEs face. These problems may differ between businesses located in rural areas and those located in cities. Different problems may occur between sectors, and even the problems experienced by enterprises in the same sector may not be similar. Despite the mentioned differences, it can be stated that some common problems can be considered valid for all

SMEs. The main common problems are lack of capital, difficulties in supplying raw materials, high transportation costs, low technological capacities, lack of knowledge in the marketing process, and long bureaucratic procedures. These problems may disrupt the functioning of the market by disrupting the production processes of the enterprises (Tambunan, 2008: 115).

Although SMEs are of great importance in the national economy, they have financing problems and face restrictions in accessing official financial instruments. The main reason for this is the reluctance of banks to extend loans to SMEs. Banks generally do not view SMEs as customers worth lending to. The default rates of loans to SMEs are high, information asymmetry is very common, and the failure rate and thus the termination of operations of the enterprises are high. Therefore, banks describe SMEs as risky customers, and the loans they extend to businesses in this category are limited. However, it has been observed that this perception has gradually decreased in recent years and that the number of loans extended by banks to SMEs has increased. Banks try to strengthen their financial relationships with SMEs. A different type of banking called "SME banking", which offers products and services only to businesses in this category, has emerged (Boadi et al., 2017: 257-258).

While the problems faced by SMEs are broadly similar, the depth of the problems may differ from country to country. Since this study is based on the Turkish example, the problems of SMEs will be explained in more detail by focusing on Turkiye.

Almost all the companies operating in Turkiye have the status of SMEs. Therefore, the roles of SMEs in production, employment, and export processes are of great importance in maintaining economic balances. For the production process to continue uninterrupted, the problems faced by SMEs should be resolved and more support should be given to these companies with the policies to be applied.

Fundamental problems of SMEs in Turkiye can be grouped as financing problems, management and organizational problems, production-related problems, marketing problems, R&D problems, and human resources problems (Şahin and Özüdoğru, 2019: 322-326).

One of the financing problems is the barriers to enterprises' access to credit. SMEs are usually established with small amounts of equity capital, but this equity capital is not sufficient for all investment, production, marketing, and R&D activities. Due to a lack of equity capital, businesses are forced to turn to external financing. In terms of external financing, bank loans are the most applied method. Therefore, SMEs need to be able to access bank loans on favorable terms. However, reasons such as high loan interest rates and the complexity of the guaranteed conditions determined by banks to extend loans make it difficult for businesses to obtain loans (Uçkun, 2009: 123).

Banks tend to prefer large enterprises rather than micro, small, and medium-sized enterprises when extending loans. The loan amount taken by large enterprises is much higher than that taken by other enterprises, and the risk of non-repayment of loans is lower. Thus, the cost of lending decreases. However, it is very difficult for SMEs to meet the collateral conditions that banks want. Some businesses

are unable to use loans because they cannot show the required collateral, whereas others show their assets as collateral because the business assets are limited. Business owners may face the possibility of losing their assets. Business owners who do not want to take such a big risk may hesitate to provide their financing needs with bank loans (Atay, 2014: 3-5).

It is possible to say that production, marketing, and R&D problems are largely due to a lack of capital. Businesses that do not have sufficient capital may have difficulties obtaining raw materials and other inputs that they will use in the production process. The inability to supply raw materials and inputs can interrupt the production process. For enterprises to increase their R&D activities, they need to allocate resources for these activities. If they cannot allocate sufficient resources to R&D activities, enterprises may not be able to adapt to new technologies and their competitive power may be less than that of other enterprises.

Another problem is poor marketing. These shortcomings are directly related to capital adequacy. For an enterprise to continue its production process, grow, and increase its competitive power, it should attach importance to marketing activities. Marketing activities should be performed professionally to advertise products, enter new markets, and expand the customer portfolio. Effective execution of marketing activities can only be achieved by allocating sufficient resources to this issue. Market research is costly. For marketing activities, working with a specialist team is necessary. The cost of personnel needed for marketing activities, advertising expenditures, and the costs encountered in entering new markets are other issues that require financial resources. Enterprises need financial resources for all of these. Since it is difficult for them to meet these costs with their equity capital, they tend to rely on external sources, especially bank loans (Çetinkaya Bozkurt and Dal, 2017: 4-6).

As can be seen, the difficulties of SMEs in obtaining bank loans trigger many problems. These problems can be reduced by ensuring that bank loans, which are the main external financing instruments, are offered to enterprises under favorable conditions.

In addition to financial problems, SMEs also have structural problems. Structural problems are especially related to management and organizational structure. The fact that business owners and managers are the same people in SMEs can cause problems. Business owners may want to undertake the management task themselves, rather than having the business managed by professional staff. Indeed, this situation is common in Turkiye. If the owners of the company do not have sufficient knowledge and experience in management, wrong decisions can be made about enterprise activities. Actions such as incorrect planning, mismanagement of company assets, taking unnecessary risks, and directing earnings to wrong investments may endanger the company's continuous production. Such a situation may prevent an enterprise from having a corporate identity. Therefore, it is of great importance that enterprises are managed by well-educated and expert personnel (Emecen and Çiçek, 2016: 145-147). The main reason for management and organizational problems is that most SMEs are family-owned companies. Being a

family-owned company can create barriers to the continuity of businesses. In family-owned companies, many negative situations can be encountered from the recruitment process to the operational processes. In the recruitment process, rather than talent and knowledge, the kinship relations of individuals with the business owner's family can be considered. A distinction can be made between employees who are family members and non-family members in terms of salary and other employee benefits. While the division of labor is done, it is not possible to behave customarily. Performance evaluation and control mechanisms for employees who are family members may not be effective. All these factors can adversely affect operating efficiency and harm business activities (Karabulut, 2008: 651-653).

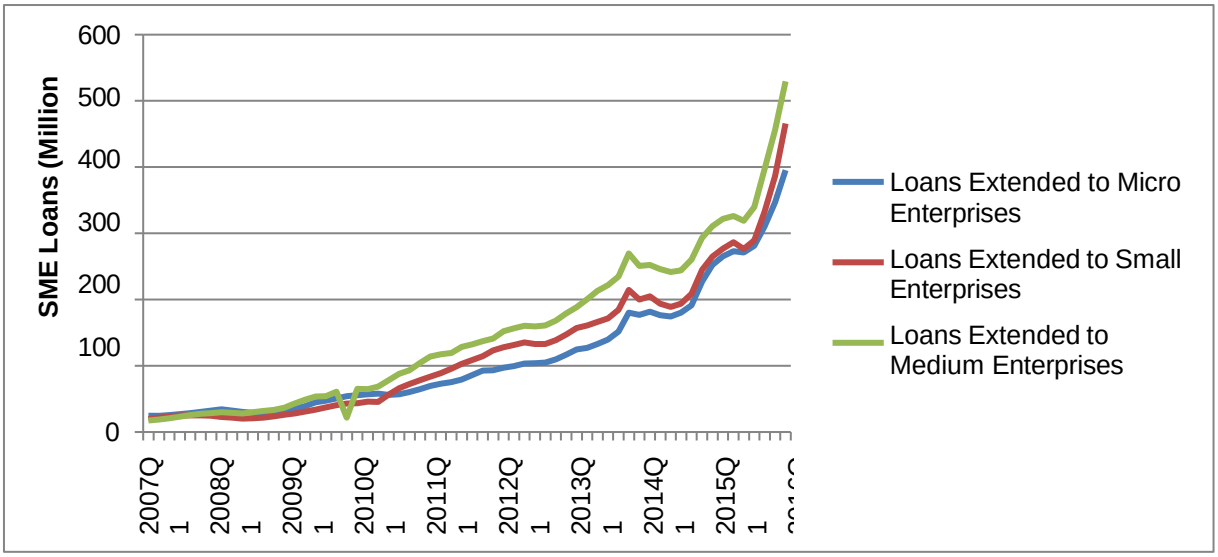
Problems in human resources arise due to both management and organization and financial reasons, as explained above. It is necessary to allocate a large budget to work with expert personnel. Employment of inadequate people due to family and kinship ties reflects the administrative aspect of the case. Therefore, it should not be forgotten that the problems experienced in businesses are interconnected and one problem affects the other.

4. DEVELOPMENT OF SME LOANS AND ECONOMIC GROWTH IN TURKIYE

This study examines the relationship between SME loans and economic growth in Turkiye. Therefore, before the econometric analysis, the changes in loans extended to SMEs and economic growth in Turkiye over time will be examined.

Loans extended to micro, small, and medium-sized enterprises are shown in the chart below. The data are quarterly, covering the first quarter of 2007 and the second quarter of 2022.

Figure 1: SME Loans in Turkiye (2007Q1-2022Q2) (Million TL)



Source: BDDK (Banking Regulation and Supervision Agency), Monthly Bulletin, Monthly Banking Sector Data, SME Loans, http://www.bddk.org.tr/BultenAylik/En

As can be seen in the figure, SME loans in Turkiye show an increasing trend over time. Between the first quarter of 2007 and the second quarter of 2009, loans extended to micro-enterprises were

slightly higher than loans extended to small and medium enterprises. As of the third quarter of 2009, loans extended to medium enterprises began to exceed those extended to micro and small enterprises.

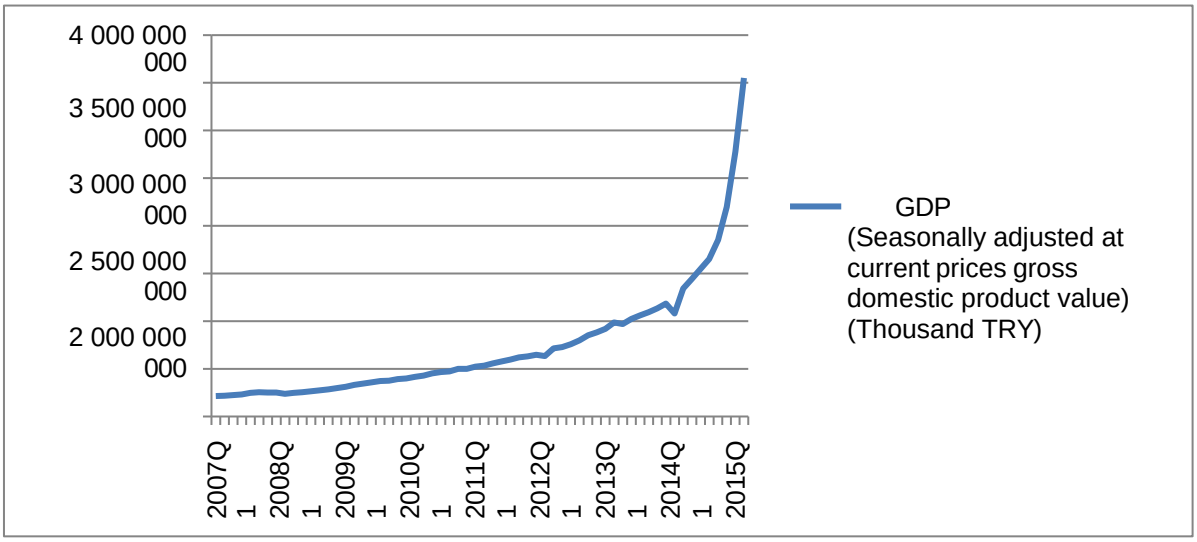
The loans extended to microenterprises increased from 24 million TL to 395 million TL between 2007 and 2022. Loans extended to micro-enterprises in the second quarter of 2020 amounted to more than 200 million TL, and in the fourth quarter of 2021, more than 300 million TL. The loans extended to micro-enterprises in the second quarter of 2022 amounted to 395.38 million TL.

Loans extended to small enterprises were less than those extended to microenterprises during the first quarter of 2007 to the third quarter of 2012. As of the fourth quarter of 2012, loans extended to small enterprises began to exceed those extended to micro-enterprises. In the second quarter of 2022, it exceeded 400 million TL and amounted to 465.87 million TL. Even though there were decreases in some periods compared to the previous quarter, these decreases remained temporary, and in general, loans extended to small enterprises increased gradually in the 2007Q1–2022Q2.

Until the third quarter of 2009, loans extended to medium enterprises were less than those extended to micro and small enterprises. While the loans extended to medium enterprises were 17.38 million TL in the first quarter of 2007, they exceeded 50 million TL and reached 53.82 million TL in the first quarter of 2011. The rise continued in the following years, and loans extended to medium enterprises exceeded 500 million TL in the second quarter of 2022. Loans extended to medium enterprises in the second quarters of 2017–2022 were 188.20, 234.60 , 246.16 , 293.5 , 319.14 , and 529.49 million TL, respectively.

Another variable examined in this study is economic growth. After examining the change in SME loans over time, this section discusses economic growth. Looking at the change in economic growth over time in Turkiye, an upward trend has occurred. In the figure below, GDP values are shown as one of the main indicators of economic growth. The data in the figure are the GDP values calculated using the production approach and consist of quarterly data. Values between the first quarter of 2007 and the second quarter of 2022 are calculated at current prices adjusted for seasonal effects.

Figure 2: Economic Growth in Turkiye (2007Q1-2022Q2) (Thousand TL)



Source: TurkStat, NationalDataPage,QuarterlyGrossDomesticProduct,https://data.tuik.gov.tr/Kategori/GetKategori?p=ulusal-hesaplar-113&dil=1

In the first quarter of 2007, the GDP value in Turkiye was 214 billion, 765 million TL. In the fourth quarter of 2010, this value exceeded 300 billion TL and reached 311 billion 085 million TL. The increase in GDP values continued in subsequent periods. GDP values were more than 400 billion TL in the fourth quarter of 2012 and more than 500 billion TL in the fourth quarter of 2014. GDP, which was 534 billion 196 million TL in the fourth quarter of 2014, increased even more in the following years and exceeded 900 billion TL in the second quarter of 2018. In the first quarter of 2019, GDP values in Turkiye reached 1 trillion TL. GDP in the first quarter of 2019 was 1 trillion 22 billion 243 million TL. In the following periods, GDP values remained over 1 trillion TL. The GDP values for the first two quarters of 2022 have been calculated as 2 trillion 777 billion 766 million TL and 3 trillion 551 billion 398 million TL, respectively.

As can be seen, economic growth and SME loans displayed an increasing trend in Turkiye in the period 2007Q1 to 2022Q2. An increase occurred in all three subgroups of SME loans, namely micro, small, and medium enterprises.

5. LITERATURE REVIEW

Studies examining the relationship between SME loans and economic growth usually use total SME loans data. Some of these studies have found that the causality relationship runs from SME loans to economic growth. Tutar and Ünlüleblebici (2014) aimed to determine whether there is a causal relationship between loans extended to SMEs and economic growth and the direction of the relationship, if any. In the study, an application was carried out in Turkiye. Co-integration analysis and Granger causality test were applied in the analysis, in which monthly data from 2006 to 2011 were used. It was concluded that there is a unidirectional causality relationship. The direction of the relationship is from SME loans to economic growth. Yüksel and Adalı (2017) investigated the causal relationship between

loans and economic growth in Turkiye. Three different types of loans, namely individual, commercial, and SME loans, are discussed. Analysis was carried out with the Toda– Yamamoto causality analysis using quarterly data 2008–2017. It was concluded that there is no causal relationship between commercial loans and economic growth. Conversely, a causal relationship was determined between individual loans and SME loans and economic growth. The direction of the relationship is from loans to economic growth.

Although there are studies examining the relationship between SME loans and economic growth by dividing them into subgroups according to firm size, they are fewer in number. In these studies, it was concluded that the causal relationship between credit and economic growth may differ depending on company size. Demirci (2017) examined the relationship between SME loans and economic growth in Turkiye. In the analysis in which co-integration analysis and Granger causality test were applied, monthly data between 2006 and 2016 were used. In addition, in this study, loans were considered in three different groups. Loans extended to micro, small, and medium enterprises were examined. It has been observed that there is a long-term causality relationship between economic growth and loans extended to micro-enterprises, and the direction of the relationship is from growth to loans. In the short run, a causal relationship exists between growth and loans extended to small businesses. The direction of the relationship is from growth to loans. It has been determined that there is no causal relationship between loans extended to medium enterprises and economic growth. Eryılmaz, Öksüz, and Zeren (2021) examined the interaction between SME loans and economic growth and employment. Quarterly data from 2007 to 2020 were used. The relationship between the variables was investigated using the ARDL boundary test and causality analysis. In this study, loans extended to micro, small, and medium enterprises are included in the model. They found a unidirectional causality running from economic growth to loans provided to microenterprises. The relationship between loans provided to small- and medium-sized enterprises and economic growth is bidirectional.

There are also studies examining the relationship between SME loans and economic growth using regression analysis as well as causality analysis. In some of these studies, researchers concluded that there is a positive and significant relationship between SME loans and economic growth. Jenkins and Hossain (2017) examined the relationships between commercial loans given to SMEs and macroeconomic factors. Six emerging market economies, namely Turkiye, Argentina, Brazil, Mexico, Chile, and Poland, were discussed. Regression analysis was applied in the study in which quarterly data 2007–2015 were used. According to the results of the analysis, the increase in the GDP growth rate and the increase in competition in the banking sector lead to an increase in commercial bank loans given to SMEs. High government domestic borrowings and high inflation have negative effects on SME loans. To solve the financing problems of SMEs, it has been proposed to ensure economic stability, reduce inflation, increase competition in the banking sector, and reduce the government's domestic borrowings. Johnny and Ayawei (2018) examined the effects of loans extended to SMEs on economic growth in

Nigeria. Unit root tests, co-integration analysis, and the least squares method were applied in the study, in which data 1992–2016 were used. The dependent variable in the model is economic growth, which is represented by gross fixed capital formation. The independent variables are deposit money bank loans to small and medium enterprises and bank lending rates. The inflation rate was included in the model as a control variable. According to the results of the analysis, there is a significant and positive relationship between bank loans extended to SMEs and economic growth in Nigeria. There is a significant but negative correlation between bank lending rates and economic growth. The relationship between the inflation rate and economic growth is negative and insignificant. Chandrarin et al. (2018) examined the effects of SME financing on economic growth and income inequality. In this study, an analysis was made based on provinces in Indonesia. The data from 33 provinces in Indonesia between 2011 and 2016 were used and regression analysis was applied. Two different models have been established. In one model, the dependent variable is economic growth, and in the other, income inequality. In addition to the loans extended to SMEs, variables related to financial inclusion were also included in the models to determine the effects of access to finance. It was concluded that SMEs are effective in both increasing economic growth and reducing income inequality. It is recommended that the government increase financing for SMEs and facilitate access to finance through financial inclusion policies.

In addition to the studies that concluded that the relationship between SME loans and economic growth is positive and significant, there are also studies that found that the relationship between them is positive but insignificant. The relationship between SME loans and economic growth may differ depending on the country in which the empirical analysis is conducted. One of the studies that found the relationship between SME loans and economic growth positive but insignificant was carried out by Akanbi, Akin, and Sodiq (2016). Akanbi, Akin, and Sodiq (2016) applied to Nigeria in their study, in which they examined the effects of SME financing on economic growth. In the study, in which the least squares method was applied, data from 1981-2012 were used. The variables used in the model are the real GDP growth rate, the growth rate of loans extended to SMEs by commercial banks, the unemployment rate, and the interest rate. The analysis results indicate a positive but insignificant relationship between the financing of SMEs and economic growth in Nigeria. The increase in the growth rate of loans extended to SMEs by commercial banks increases the real GDP growth rate. It was stated that the inconsistency of the policies implemented in SME financing caused the relationship between the variables to be insignificant. It is recommended to facilitate SMEs' access to finance. Abiodun et al. (2021) reached a similar result. Abiodun et al. (2021) investigated how the financing opportunities offered to SMEs affect economic growth. In the research on Nigeria, a regression analysis was carried out using data from 2010 to 2019. In this study, the financial support given to SMEs is discussed in two categories. The first is loans and advances to the agriculture, forestry, and fishing industries. The second category is loans and advances to the general commerce industry. Loans and advances to SMEs in the agricultural sector have a statistically significant and positive effect on economic growth. The effect of

loans and advances to SMEs in the general commerce industry on economic growth is positive but insignificant. Another finding is that the effect of the inflation rate on economic growth is significant and negative. In Nigeria, it has been committed to increase the loans extended to SMEs in the agricultural sector.

In some studies, the relationship between loan costs and economic growth has been examined instead of the amount of loans granted to SMEs. High loan costs may reduce the rate of loans taken by businesses and limit the amount of loans provided to SMEs. Zidana (2015) aimed to determine the effects of financing SMEs on economic growth. The research was conducted in Malawi and covers data between 1980 and 2014. The effect of interest rates was also investigated in this study, in which the least squares method was used. According to the results, a 1% increase in the cost of capital causes a 1.6% decrease in GDP. Facilitating access to finance for SMEs has a positive impact on Malawi's economic growth; however, it is not sufficient on its own. It has been committed hat the inadequacy of access to finance should be dealt with along with other structural and institutional problems.

6. DATASET AND METHOD

This study examines the relationship between SME loans and economic growth. Since SMEs are grouped as micro, small, and medium enterprises within themselves, instead of total SME loans, the analysis was conducted according to enterprise size. Thus, it can be determined whether the relationship between SMEs and economic growth differs according to the size of the business. In this context, four different variables were used in the study. Variables used and explanations of the variables are given in the table below.

Table 2: Specifications of the Data

Variable name	Symbol	Measurement	Data Source
Economic Growth	GDP	Seasonally adjusted at current prices, gross domestic product value (Thousand TRY)	TurkStat,
Loans Extended to Micro Enterprises	MICRO	Total cash loans in Turkish Lira and foreign currency (Million TRY)	BDDK (Banking Regulation and Supervision Agency)
Loans Extended to Small Enterprises	SMALL	Total cash loans in Turkish Lira and foreign currency (Million TRY)	BDDK (Banking Regulation and Supervision Agency)
Loans extended to medium enterprises	MEDIUM	Total cash loans in Turkish Lira and foreign currency (Million TRY)	BDDK (Banking Regulation and Supervision Agency)

As shown in the table, the seasonally adjusted GDP values at current prices are used to represent economic growth. GDP values were calculated according to the production method. These values are announced by TÜİK with quarterly data. Data on SME loans were obtained from the Banking Regulation and Supervision Agency (BDDK) system. In the analysis, there are three different variables for loans. These are loans extended to micro, small, and medium enterprises. Loan data represent total cash loans in Turkish and foreign currencies. Values related to SME loans have been announced monthly since December 2006. Since GDP data are announced quarterly and SME loans are announced monthly, SME loans are converted to quarterly data using the arithmetic average method. For this reason, the period between 2007Q1 and2022Q2 is considered in the study. In addition, since GDP values are declared as seasonally adjusted, SME loans are also seasonally adjusted by us. The seasonal adjustment was performed using the Census X-13 method in the Eviews-12 program. The natural logarithms of the data were taken.

The method used in this study is the Toda– Yamamoto causality test. The Toda– Yamamoto test is a method introduced by Toda and Yamamoto in 1995 and aims to resolve some of the deficiencies of the Granger causality test. The Granger causality test is a model that is sensitive to lag length. Therefore, the selected lag length affects the results of the analysis. However, the Toda– Yamamoto test can be applied to all series regardless of the stationarity of the series. Another important feature of the test is that the co-integration properties of the series do not need to be tested beforehand. The Toda– Yamamoto test can be performed independently of the integration and co-integration characteristics of the variables. This ensures that the analysis results are more reliable. The specified features reduce the risks encountered while defining the model established for causality analysis (Simionescu, Schneider and Gavurova, 2022: 10).

7. EMPIRICAL RESULTS

The Toda– Yamamoto causality test is applied in three basic stages. First, the optimal lag length must be determined. Then, unit root tests are performed, and the maximum integration order of the series is determined. Finally, we determine whether there is a causal relationship between the series, and if there is, the direction of the relationship is determined. The results of the mentioned stages are explained below.

The Toda– Yamamoto causality test is an analysis method using the VAR model. To establish the VAR model, two main criteria must be determined. The first is the optimal lag length (k), and the second is the maximum integration order of the series (dmax). Finally, the VAR model is created by adding the maximum integration order of the series to the optimal lag length (k + dmax) (Samırkaş, 2019: 12).

The lag lengths calculated for the series used in this study is given in the table below. As can be seen from the table, according to the Schwarz and Hannan-Quinn information criterion, the optimal lag length is 1. However, the optimal lag length according to the other three criteria is 2. These are the LR

test statistic, FPE final prediction error, and Akaike information criterion. Therefore, the optimal lag length (k) for the VAR model to be created was determined to be 2.

Table 3. VAR Lag Order Selection Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	4.22e-06	-1.024777	-0.881405	-0.969057
1	528.4554	2.86e-10	-10.62598	-9.909117*	-10.34738*
2	36.81769*	2.35e-10*	-10.83161*	-9.541261	-10.33014
3	16.15757	2.91e-10	-10.63742	-8.773587	-9.913073
4	24.98575	2.85e-10	-10.70066	-8.263339	-9.753436
5	7.822805	4.32e-10	-10.35656	-7.345747	-9.186455

*Indicates lag order selected by the Criterion
LR: Sequential modified LR test statistic (each test at 5% level)
FPE: Final Prediction Error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan - Quinn information criterion

After the optimal lag length has been determined, the next step is to determine the maximum integration order (dmax). To determine the maximum integration order, a stationarity analysis of the series should be performed, and it should be seen at the order of integration for each time series. In this study, the Phillips– Perron (PP) test was used for the analysis of stationarity.

The main reason for using the PP test is that it has more flexible assumptions for error terms than the DF and ADF tests. In the DF and ADF tests, it is assumed that the error terms are independent and have a constant variance. However, the PP test abandons these limitations and accepts that there may be a weak dependence between error terms. According to the PP test, the error terms can be heterogeneous. The PP test can be represented by the regression equation below (Gülmez, 2015: 144):

$$Y_t = \alpha_0 + \alpha_1 y_{t-1} + u_t \quad (1)$$

$$Y_t = \alpha_0 + y_{t-1} + \alpha_2 (t-T/2) + u_t \quad (2)$$

(T: Number of Observation, u_t: Random Error Terms)

The PP test results are in the table below.

Table 4: PP Unit Root Test Results

Variables	Model	t-statistics	Critical value at 1% significance level	Critical value at 5% significance level	Critical value at 10% significance level
LNMICRO	None	7,526035	-2,603423	-1,946253	-1,613346
	Intercept	1,437015	-3,542097	-2,910019	-2,592645
	Trend and intercept	-2,102871	-4,115684	-3,485218	-3,170793
ΔLNMICRO	None	-2,709035	-2,604073*	-1,946348**	-1,613293***
	Intercept	-4,537197	-3,544063*	-2,91086**	-2,59309***
	Trend and intercept	-4,725811	-4,118444*	-3,486509**	-3,171541***
LNSMALL	None	4,691649	-2,603423	-1,946253	-1,613346
	Intercept	0,304369	-3,542097	-2,910019	-2,592645
	Trend and intercept	-1,906317	-4,115684	-3,485218	-3,170793
ΔLNSMALL	None	-2,756114	-2,604073*	-1,946348**	-1,613293***
	Intercept	-4,001016	-3,544063*	-2,91086**	-2,59309***
	Trend and intercept	-4,060998	-4,118444	-3,486509**	-3,171541***
LNMEDIUM	None	4,386716	-2,603423	-1,946253	-1,613346
	Intercept	-0,739188	-3,542097	-2,910019	-2,592645
	Trend and intercept	-4,920998	-4,115684*	-3,485218**	-3,170793***
ΔLNMEDIUM	None	-11,39386	-2,604073*	-1,946348**	-1,613293***
	Intercept	-17,42827	-3,544063*	-2,91086**	-2,59309***
	Trend and intercept	-18,23723	-4,118444*	-3,486509**	-3,171541***
LNGDP	None	4,680989	-2,603423	-1,946253	-1,613346
	Intercept	3,52232	-3,542097	-2,910019	-2,592645
	Trend and intercept	4,193439	-4,115684	-3,485218	-3,170793
ΔLNGDP	None	-2,364663	-2,604073	-1,946348**	-1,613293***
	Intercept	-4,547464	-3,544063*	-2,91086**	-2,59309***
	Trend and intercept	-5,573623	-4,118444*	-3,486509**	-3,171541***

*, ** and *** denotes significant at 1%, 5% and 10% levels, respectively. Δ denotes on first differences of the series.

As seen from the unit root test results, the series in the model contains a unit root at the level. Therefore, the series is not stationary at this level. The PP test was performed again by taking the first difference of the series, and the series became stationary after the first difference. The order of integration is I (1). Because all four series are I (1), the maximum integration order (dmax) of the series is 1. To apply the Toda– Yamamoto causality test, the maximum integration order should be less than the lag length (Akkaş and Sayılgan, 2015: 575). Because the maximum integration order is 1 and the lag length is 2 in the study, the series fulfills this condition (dmax = 1 < k=2).

After determining the optimal lag length and the maximum integration order, the necessary conditions for the test were met, and the test was applied. The Toda– Yamamoto causality test was performed using the Eviews-12 program. The test results are shown in the following table.

Table 5: Toda-Yamamoto Causality Test Results

Hypothesis	Optimal VAR Lag Length ($k + d_{max}$)	Wald (X^2)	p Value	Result
Loans Extended to Micro Enterprises → Economic Growth	3	1.380078	0.5016	No Causality
Economic Growth → Loans Extended to Micro Enterprises	3	30.64601	0.0000	Causality
Loans Extended to Small Enterprises → Economic Growth	3	4.904091	0.0861	Causality
Economic Growth → Loans Extended to Small Enterprises	3	11.55344	0.0031	Causality
Loans Extended to Medium Enterprises → Economic Growth	3	2.229585	0.3280	No Causality
Economic Growth → Loans Extended to Medium Enterprises	3	3.376470	0.1848	No Causality

According to the Toda– Yamamoto causality test, a unidirectional causality exists between loans extended to micro-enterprises and economic growth in Turkiye. The direction of the relationship is from economic growth to loans. In other words, economic growth is the reason for loans extended to micro-enterprises. A two-way causality relationship was determined between the loans extended to small enterprises and economic growth. Accordingly, while loans extended to small enterprises are the reason for economic growth, economic growth is also the reason for loans extended to small enterprises. Another important finding of the Toda– Yamamoto test is the relationship between medium enterprises and economic growth. The test results show that there is no causal relationship between economic growth and loans extended to medium enterprises in Turkiye.

Causality relations between economic growth and various indicators are examined. Causality analyses regarding economic growth are divided into four groups in the literature.

These are the growth, protection, feedback, and neutrality hypotheses (Oncel, Kırca and Inal, 2017: 402). Considering the content of the hypotheses, we can state the following about the hypotheses, since the variables in this study are economic growth and SME loans. According to the growth hypothesis, there is a unidirectional causality between economic growth and SME loans. The direction of causality is from SME credits to economic growth. According to the protection hypothesis, the direction is from economic growth to SME loans. According to the feedback hypothesis, there is bidirectional causality. According to the neutrality hypothesis, there is no causal relationship between the variables (Syzdykova, 2018: 88).

According to the analysis results of this study, a unidirectional causality exists between economic growth and loans provided to microenterprises. The direction of causality is from economic growth to loans provided to micro-enterprises. This confirms the protection hypothesis.

We found bidirectional causality between economic growth and loans provided to small businesses. This result confirms the feedback hypothesis.

No causality has been identified between economic growth and loans to medium-sized enterprises. This finding confirms the neutrality hypothesis. As can be seen, we found that different hypotheses were confirmed depending on the company size.

8. CONCLUSIONS

The main problems of SMEs in Turkiye are the inability to adapt quickly to new technologies, inadequacies in product quality, low competitiveness, management, and organizational problems, and inadequacies in the management of financial assets. Lack of financial resources has a positive effect on the emergence of these problems and the inability to produce effective solutions. In general, it is observed that the equity capital of SMEs is insufficient and therefore they tend to seek external financing. On the other hand, the main source of external financing is bank loans. SMEs should be provided with access to the loan they need under favorable conditions, and the loan mechanism should function effectively to overcome the financing problems they experience. The interruption of the production activities of SMEs can create negative effects in many areas, from growth to employment, from exports to innovation.

In this study, the causal relationship between SME loans and economic growth was attempted to be revealed. SME loans are not analyzed but in three categories according to the size of the enterprises. In this way, we aim to obtain more reliable results. Analysis was performed using the Toda– Yamamoto causality test with quarterly data covering the period 2007Q1 to2022Q2. The analysis results demonstrate that the causal relationship between SME loans and economic growth differs according to the size of the enterprises. According to the results, there is a one-way relationship between the loans extended to micro-enterprises and economic growth in Turkiye, and the direction of the relationship is from economic growth to loans. The relationship between loans extended to small enterprises and economic growth is two-way. On the other hand, it has been observed that there is no causal relationship between loans extended to medium enterprises and economic growth.

According to the analysis results, loans provided to micro-enterprises depend on economic growth. In periods when economic growth slows down, the volume of microcredit may decrease. Therefore, the government should encourage financial institutions to increase the amount of loans available to microenterprises. Financial institutions may be reluctant to provide loans to micro-enterprises because of high repayment risks and low profit margins. This situation may become more

evident during periods of declining economic growth. However, micro-loans are essential in supporting entrepreneurship and providing regular income to low-income people. Policy makers should create policies that increase microcredit. Small businesses, on the other hand, are both dependent on and affect economic growth. Different policies should be created according to the company size. We found that the relationship between economic growth and SME loans varies depending on company size. This should also be reflected in policies.

The findings obtained in the study have some similarities with the analyses of Demirci (2017) and Eryılmaz, Öksüz and Zeren (2021), who examined the relationship between SME loans and economic growth according to company size. Demirci (2017) identified a causal relationship between loans granted to microenterprises and economic growth. The direction of the relationship is from growth to micro-enterprise loans. The results are like those of this study. Demirci (2017) found a unidirectional causality between economic growth and small businesses. However, in this study, we concluded that there is a bidirectional causality between economic growth and loans provided to small businesses.

Eryılmaz, Öksüz and Zeren (2021) found a unidirectional causality relationship between economic growth and loans granted to microenterprises. We also reached a similar conclusion in this study. However, Eryılmaz, Öksüz and Zeren (2021) revealed a bidirectional relationship between loans provided to small- and medium-sized enterprises and economic growth. According to the results of this study, there is a bidirectional causality relationship between loans provided to small businesses and economic growth. We did not detect a causal relationship between loans provided to medium-sized enterprises and economic growth.

The main limitations of this study are related to the dataset. SME loans have been subdivided into loans granted to micro, small- and medium-sized enterprises since December 2006. For this reason, the data were collected from 2007 and data collected before 2007 could not be included in the study. Additionally, the study was conducted in Türkiye. In future studies, similar studies can be conducted in different countries and the results can be compared. Thus, it can be revealed how the relationship between SME loans and economic growth differs by country.

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