RESEARCH ARTICLE

The Effect of Sectoral Bank Loans on Economic Growth in Turkiye

Türkiye'de Sektörel Banka Kredilerinin Ekonomik Büyümeye Etkisi

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ABSTRACT

In this study the effect of the loans extended by banks on the growth of the sector on a sectoral basis in the quarter of 2004Q1 and 2021Q2 in Turkiye has been examined. The variables used as data in the study are real loans extended by banks to the construction, food, metal, personal loans, textile, transportation and wholesale retail sectors. The VAR method, the Johansen cointegration test and the Engle-Granger causality test were used as methods while performing the analysis. While analyzing whether the loans extended by banks to various sectors have a long-term relationship with growth with the Johansen cointegration test, the direction of these relations was determined with the Engle-Granger Causality test. Finally, the effect of shocks in sectoral loans on economic growth was evaluated by using impulse-response functions. The variables used were obtained from the CBRT (Banks Association of Turkiye Risk Center). According to the Johansen cointegration test results, it was determined that there is cointegration between the data in the long term. According to the Engle-Granger test results, at the 10% significance level, there is a one-way causality relationship from GDP to transportation, personal loans and construction in the long run and there is a unidirectional causality relationship in the long run from the metal sector to GDP.

Keywords: Sectoral loans, Economic growth, Bank loans, Johansen cointegration test, Engle-Granger casuality analysis
JEL Classification: E51, O47, C32

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1. Introduction

We can briefly define economic growth as the expansion of a country's production channels of goods and services over a certain period of time. Credit channels are the most important channel for the expansion in production channels. An established banking system in a country has a positive effect on economic growth. As a matter of fact, studies on this subject have proved this opinion.

The most important representative of the contribution of financial development to economic growth is undoubtedly Schumpeter. According to Schumpeter (1939), innovative entrepreneurs do their investment activities through the banking system and through loans, and the banking system provides financing for investments through loans and as a result, economic development is achieved. In the literature the relationship between financial development and economic growth has been discussed within the framework of different views. In general, four different views have emerged. The first of these; In 1966, Patrick (1966) and Cameron (1967) examined the relationship between economic growth and credit within the framework of causality. The result obtained is the existence of a demand and supply-side relationship between economic growth and loans. In the demand-led approach, the need for financial intermediaries arises as savings increase with the increase in national income and these savings are directed to investments. From the other side, in the supply-led approach with the increase of financial institutions, the funds are transformed into investments through savings and this results in economic growth. Apart from these two approaches, there is a third type of approach that shows that economic growth and financialization are in a mutually causal relationship. The fourth assumption is that there is no causality between financialization and economic growth.

In the relationship between domestic loans, which are an indicator of financial development, and economic growth, loans extended by banks on a sectoral basis were preferred. The studies in the literature cover all four views on the relationship between economic growth and credit. While some of the studies examining the relationship between economic growth and credit in Turkiye, the existence of a two-way relationship has been determined, some studies have determined this relationship as being one-way.

The 2001 crisis is a turning point for the banking sector in Turkiye. Imbalances in the sectoral distribution of loans extended by banks can both lead to the deterioration of economic stability and make banks more fragile over time. Making the loans extended with a good sectoral analysis and examination can provide an opportunity to draw a road map in this direction. For example, the use of bank funds in non-productive sectors that do not provide much return for the country's economy causes real growth rates to decrease over time. Failure to achieve sufficient growth causes many macroeconomic effects, such as a decrease in the income of countries, an increase in unemployment rates and even an increase in inflation rates. As a result, studies and examinations about the loans extended by the banks of the countries are very important. In this context, sectoral credit analysis is carried out in this study, and it has a different quality to previous studies.

Factors such as low Federal Reserve System (FED) interest rates, public economic enterprises privatizations, increases in short and direct investments in Turkiye, especially in the post-2000 period, have been the factors that increased the amount of capital in the country. In the period of capital abundance, investments also increased in parallel. The main problem and the point to be emphasized in the study is the point on which sectors the investments are channeled. The sectoral analysis of the loans extended by the banks to the private sector by the countries is important in terms of making a diagnosis.

Selected sectors to examine the effects of loans extended to sectors by banks in Turkiye on growth; construction, food, metal, personal loans, textile, transportation and wholesale retail sectors. The periods 2004:01 and 2021:02 were taken into consideration. The reason for starting in 2004 was the year 2004, since the data on personal loans started in 2003. Data are taken quarterly. Johanson cointegration test and Engle-Granger causality analysis were performed to diagnose both the long-term interaction between growth- sectoral loans and the direction of this relationship, if any. In the final analysis, impulse-response functions were created in order to see the impact of any shock in sectoral loans on economic growth more clearly. In the data, the real gross domestic price (GDP) was obtained from the CBRT, while the loans extended by the banks were obtained from the Risk Center of the Banks Association of Turkiye.

The first part of the study consists of the introduction part. In the second part, the development of bank loans in Turkiye is explained, in the third part a literature review is made, in the third part the method part of the study is given and in the fourth part, which is the last part, the results of the analysis are given.

2. Development of Bank Loans in Turkiye

The expansion in bank loans does not always parallel economic growth. As a matter of fact, it is an important issue in which sectors the loans extended are evaluated. Channeling loans in sectors with productivity and return and especially in sectors with high added value will have a positive effect on economic growth. Before proceeding to the loan analysis, in this section, it would be appropriate to examine the sectoral distribution of loans in Turkiye in 2021.
Graphic 1 shows the proportional distribution of total loans in 2021. The share of commercial and corporate loans in total loans was 55%, consumer loans and credit cards 22%, and small and medium enterprises (SME) loans 23%.

**Graph 1. Distribution of Loans (2021-10 Month)**
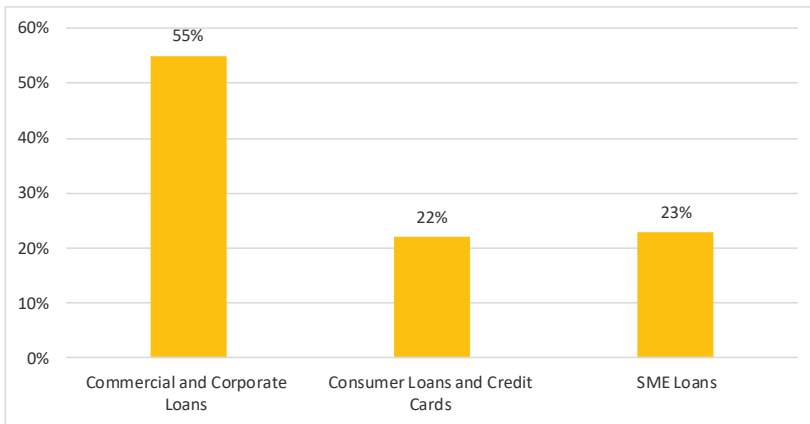
Source: Risk Center of the Banks Association of Turkiye, 2021.

Graphic 2 shows the sectoral distribution of total loans for 2021. The construction sector has the highest share with 8%. The share of electricity, gas-water resources sector and wholesale trade and brokerage sector is 7%.

Agriculture and retail trade 3.6%, basic metal industry 3.4%, textile and the food sector 3% in total loans.

Graph 2. Sectoral Distribution in Total Loans (2021-10 Month)
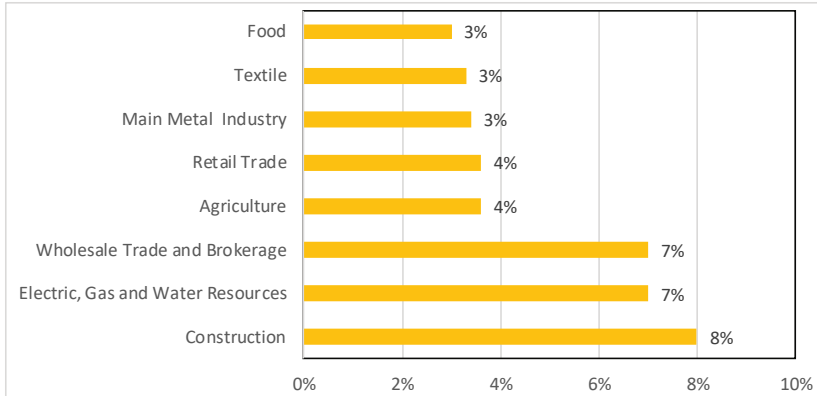
When the sectoral utilization rates in cash loans in Turkiye are evaluated, it is seen that the share of the industrial sector is low. The loans given by the banks were mostly used in areas such as the non-productive construction sector.

Graph 3. Ratio of Total Cash Loans to GDP
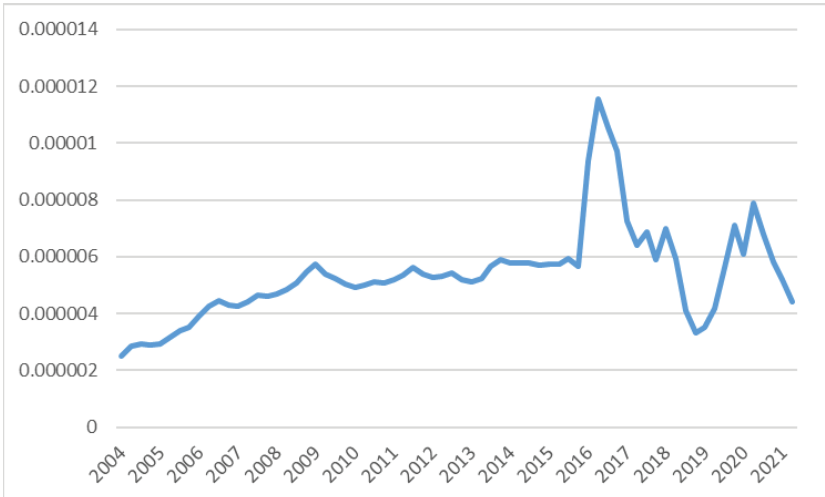
Graphic 3 shows the ratio of total cash loans to GDP. It is observed that total loans are in an increasing trend for a period of nearly 20 years. It is one of the expected results that investments and production will increase after the increase in the loans used. For this reason, the real sector and the banking sector affect each other and the positive or negative conjuncture in either of them affects the other. In short, increases in cash loans are an important factor in economic development.

3. Literature Review

The contribution of domestic loans to economic growth has been analyzed with different econometric methods. In the studies, the connection between economic growth and loans, especially, the total loan volume was accepted as data and generally only one country was preferred. In the literature, it can be said that there is a deficiency in the number of studies examining domestic loans in terms of sectors.

Kılıç (2018) examined the effect of credit volume on economic growth between 2003 and 2017 in Turkiye. He used domestic credit volume and real gross domestic product as data and used Johansen cointegration and Engle-Granger causality tests while examining the relationship between them. The test results revealed that there is a long-term and unidirectional relationship between domestic credit volume and economic growth.

Pehlivan (2018) examined the relationship between bank loans, deposits and GDP in Turkiye in the 2002-2015 period. Johansen cointegration test and Engle-Granger causality test were used in the analysis. In the results of the analysis, while there is a bidirectional long-term relationship between bank loans and GDP, no causal relationship was found between deposits and GDP.

Karahan, Yılgör, and Özekin (2018), the relationship between bank loans and economic growth in Turkiye between 2002 and 2016 was examined by Johanson cointegration and Engle-Granger causality tests. According to the results obtained,

it was revealed that there is a bidirectional causality relationship between bank loans and economic growth.

Apaydın (2018) examined the effects of the development of bank loans and their sectoral distribution on economic growth in Turkiye during the 2001-2009 period. The ARDL model was used in the analysis, and in the results of the analysis, loans from agriculture, industry and the services sector affect economic growth positively, whereas loans given to the construction sector negatively affect economic growth in the long run. In addition to these results, the industrial sector was the sector that increased the growth the most.

Černohorský (2017) analyzed the effects of loans to non-financial businesses, loans to households, housing loans, consumer loans and total loans on economic growth in the Czech Republic during the 2004-2015 period with the Johansen cointegration and the Engle-Granger causality test. According to the findings, the effect of other types of loans, excluding consumer loans, on economic growth is positive.

Mercan (2013) examined the effect of total domestic credit volume on economic growth in Turkiye for the period 1992-2011 using the boundary test approach. According to the results of the analysis, there is a bidirectional long-term relationship between credit volume and economic growth.

Vurur and Özen (2013) investigated the relationship between bank loans, deposits and economic growth in Turkiye in the 1998-2012 period, using the Johansen cointegration and the Engle-Granger causality tests. As a result, deposits affect both bank loans and economic growth.

Lue and Shen (2012) examined the relationship between GDP and bank loans in banks belonging to 19 cities of China between 2004 and 2006 using a dynamic panel data analysis method. According to the results of the analysis, while foreign bank loans and other bank loans have a positive relationship with GDP, there is no clear relationship between city bank loans and GDP.

Oluitan (2012) used Johansen cointegration and Engle-Granger causality tests to investigate the importance of bank loans in promoting economic growth in Nigeria in 1970-2006. In the findings, there is a positive relationship between bank loans and economic growth.

Iyare, Lorde, and Francis (2005), with annual data between 1966 and 2000, examined the relationship between financial development and economic growth in Barbados, Grenada, Jamaica, St. Lucia, St. Vincent, Trinidad and Tobago and the Grenadines. It preferred to use GDP and total loans data with VAR and VECM methods in the model. In the results obtained, there is a bidirectional causality relationship between economic growth and financial development only in Trinidad and Tobago, while there is no causal relationship in other places.

Beck and Levine (2004) analyzed the relationship between stock markets (turnover ratios) and bank loans and economic growth covering 40 countries between 1976 and 1998 with a dynamic panel data analysis. Stock markets and bank loans play an important positive role for financial development in the economic growth process.

Table 1: Brief Summary of Literature Review

Author(s)	Variables	Period/ Country	Econometric Method	Results
Kılıç (2018)	Domestic Credit Volume - GDP	2003Q1-2017Q4 Turkiye	Johansen Cointegration Test and Engle-Granger Causality Test	Long-run unidirectional relationship between domestic credit volume-economic growth.
Pehlivan (2018)	Bank Loans-Deposits -GDP	2002Q1-2015Q4 Turkiye	Johansen Cointegration -Engle-Granger Causality Tests	Bank loans and GDP have a bidirectional causal relationship, while deposits-GDP do not have a causal relationship.
Karahan et al. (2018)	Bank Loans- GDP	2002Q1-2016Q4 Turkiye	Johansen Cointegration -Engle-Granger Causality Tests	Long-run bidirectional relationship between bank loans and GDP.

Apaydın (2018)	Sectoral Cash Loans-GDP	2001Q4-2009Q1 Turkiye	ARDL Model	Agriculture, industry and services sector loans affect economic growth positively. But loans given to the construction sector have a negative effect on economic growth.
Černohorský (2017),	Total Loans- GDP	2004Q1-2015Q4 Czech Republic	Johansen Cointegration -Engle-Granger Causality Tests	Total loans positively affect economic growth.
Mercan (2013)	Domestic Credit Volume - GDP	1992Q1-2011Q3 Turkiye	ARDL Model	Bidirectional and long-term relationship between variables.
Vurur & Özen (2013)	Deposits-Loans-GDP	1998Q1-2012Q1 Turkiye	Johansen Cointegration -Engle-Granger Causality Tests	Causal relationship from deposits to economic growth and loans, and from economic growth to loans.
Lue & Shen (2012)	Bank Loans - GDP	2004-2006 China	Dynamic Panel Data Analysis	Foreign bank loans and other bank loans have a positive relationship with GDP, there is no clear relationship between city bank loans and GDP.
Oluitan (2012)	Bank Deposits-Private Sector Bank Receivables - GDP per Capita	1970-2006 Nigeria	Johansen Cointegration Test and Engle-Granger Causality Test	Positive relationship between bank loans and economic growth.
Iyare et al. (2005)	Total Loans- GDP	1966-2000 Barbados, Grenada, Jamaica et.al.	VAR and VECM Model	There is a bidirectional causality relationship only in Trinidad and Tobago, but no causal relationship in other places.
Beck & Levine (2004)	Stock Markets - Bank Loans - GDP	1976-1998 Taiwan, Bangladesh, Peru et.al.	Dynamic Panel Data Analysis	Strong positive relationship between equity markets-bank loans and economic growth.

4. Methodology and Data

In this study, the effect of Turkiye's loans extended by banks by sectors on economic growth has been examined. As a sector, loans extended to the construction, food, metal, personal loans, textile, transportation and wholesale

retail sectors were preferred. As a period, the quarterly data for the first quarter of 2004 and the second quarter of 2021 were calculated in real terms and included in the analysis. VAR analysis, Johansen cointegration test and Engle-Granger causality test were used to determine the long and short-term relationship between GDP and loans extended to sectors. Finally, evaluations were made by creating impulse-response functions in order to see the effect of any shock in sectoral loans on economic growth.

Table 2: Descriptive Statistics

Variable	Abbreviation	Mean	St. Deviation	Minimum	Maximum
Real gross domestic product	GDP	33.68	0.67	32.53	35
Construction sector real loans	CONS	7.32	1.07	5.25	8.96
Food sector real loans	FOOD	4.38	0.72	3.07	5.68
Metal sector real loans	METAL	4.41	0.76	2.67	5.76
Personal loans	PER_CRED	6.19	0.95	3.75	7.61
Textile sector real loans	TEXT	4.47	0.67	3.56	5.82
Transportation sector real loans	TRANS	3.73	0.61	2.51	5.02
Wholesale Retail sector real loans	W_R	3.39	0.90	1.20	4.84

5. Econometric Analysis Results

Augmented Dickey Fuller (1979) and Philips-Perron (1988) unit root tests were used to test the level values of the series. In order to protect the series to be used in the analysis against possible varying variance and partial autocorrelation, logarithmic transformations were taken and seasonally adjusted. Afterwards, since all series were not stationary at their first level, they were made stationary by taking the 1st difference. Since the series has both fixed and trending models, fixed and trending models are used.

Table 3: ADF and Philips-Perron Unit Root Test Results

Series	ADF		Phillips- Perron	
	Level	1. St Difference	Level	1. St Difference

LNGDP_SA	0.9986	0.0000	0.8582	0.0000
LNCONS	0.4706	0.0000	0.3470	0.0000
LNFOOD	0.6735	0.0000	0.1604	0.0000
LNMETAL	0.3218	0.0000	0.0555	0.0000
LNPER_CRED	0.0633	0.0001	0.1242	0.0000
LNTEXT	0.8537	0.0000	0.3480	0.0000
LNTRANS	0.6261	0.0000	0.1407	0.0000
LNW_R	0.3753	0.0000	0.1153	0.0000

After all the series were made stationary, the appropriate lag length was determined. Using the Akaike and Schwarz criteria, the appropriate lag length was determined as the part number 2 where the most stars are located.

Table 4: Selection of Lag Order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	833.1501	NA	8.74e-22	-25.78594	-25.51608*	-25.67963*
1	893.1617	103.1449	1.00e-21	-25.66130	-23.23256	-24.70450
2	**972.9228**	**117.1491***	**6.72e-22***	**-26.15384***	**-21.56621**	**-24.34654**
3	1020.202	57.62101	1.45e-21	-25.63130	-18.88479	-22.97351
4	1068.085	46.38687	4.05e-21	-25.12765	-16.22226	-21.61936
5	1155.617	62.91391	5.40e-21	-25.86304	-14.79876	-21.50426

Note: * indicates lag order selected by the criterion.

After the lag length was found to be two, the LM test was performed. The LM test gives us the result of whether there is autocorrelation in the series. For the autocorrelation LM test results, "prob" value is greater than 0.05. Therefore, there is no autocorrelation.

Table 5: LM Tests Results

Lags	LM-Stat	Probability
1	57.20124	0.7137
2	**56.48202**	**0.7366**

3	55.19912	0.7755
4	51.19623	0.8764
5	59.38072	0.6403
6	107.2215	0.0006
7	55.36658	0.7706
8	67.89639	0.3459
9	72.97451	0.2069
10	55.76223	0.7588
11	46.07814	0.9556
12	70.69682	0.2640

Note: Probabilities from chi-square with 64 df.

Table 6: Johansen Cointegration Test

Trend assumption: No deterministic trend				
Series: LNFOODD LNCONSD LNMETALD LNPER_CREDD LNTEXTD LNTRANSD LNW_RD LNGDP_SAD				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Probability**
None *	0.533655	183.3686	143.6691	0.0000
At most 1 *	0.478880	133.0218	111.7805	0.0011
At most 2 *	0.413276	90.00470	83.93712	0.0169
At most 3	0.344399	54.81343	60.06141	0.1282
At most 4	0.160164	26.94802	40.17493	0.5286
At most 5	0.131941	15.42779	24.27596	0.4223
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.**
None *	0.533655	50.34681	48.87720	0.0348
At most 1 *	0.478880	43.01711	42.77219	0.0470
At most 2	0.413276	35.19127	36.63019	0.0729
At most 3	0.344399	27.86541	30.43961	0.1013
At most 4	0.160164	11.52022	24.15921	0.8182
At most 5	0.131941	9.338698	17.79730	0.5568

Table 6 shows that the Johansen cointegration test results. The probe value being less than 0.05 indicates that there is cointegration between the variables. It is seen that a cointegration model can be established in at least two of the variables. For the results, the variables affect each other in the long run and they will come to equilibrium in the long run.

Table 7: Causality Test Results

| Null Hypothesis	F-Statistic	Probability
FOOD doesn't Causally GDP	2.28665	0.6231
CONS doesn't Causally GDP	2.13825	0.9607
METAD doesn't Causally GDP	**1.26630**	**0.0873**
PER_CRED doesn't Causally GDP	1.79201	0.4294
TEXT doesn't Causally GDP	0.90625	0.6055
TRANS doesn't Causally GDP	1.45891	0.5666
W_R doesn't Causally GDP	1.66908	0.4619
GDP doesn't Causally FOOD	1.70707	0.1960
GDP doesn't Causally CONS	**3.29079**	**0.0743**
GDP doesn't Causally METAL	2.27752	0.1361
GDP doesn't Causally PER_CRED	**4.16249**	**0.0454**
GDP doesn't Causally TEXT	2.03900	0.1581
GDP doesn't Causally TRANS	**2.90048**	**0.0933**
GDP doesn't Causally W_R	0.97766	0.3264

Note: Number of observations is 67.

$H_0 = \sum_{i=1}^{n} B_i = 0$ Sectoral Credit does not affect GDP.

$H_1 = \sum_{i=1}^{n} B_i \neq 0$ Sectoral Credit affects GDP.

After determining the long-term relationship between the variables, the Engle-Granger causality test was used to determine the direction of the relationship. In the analysis results in Table 7 and at the 10% significance level, there is a one-way causality relationship from GDP to transportation, personal loans and construction in the long run, while no causality relationship has emerged from GDP to other sectors. It was detected that there is a unidirectional causality relationship in the long run from the metal sector to GDP.

Graph 4. Impulse Response Functions

Response to Cholesky One S.D. Innovations ± 2 S.E.
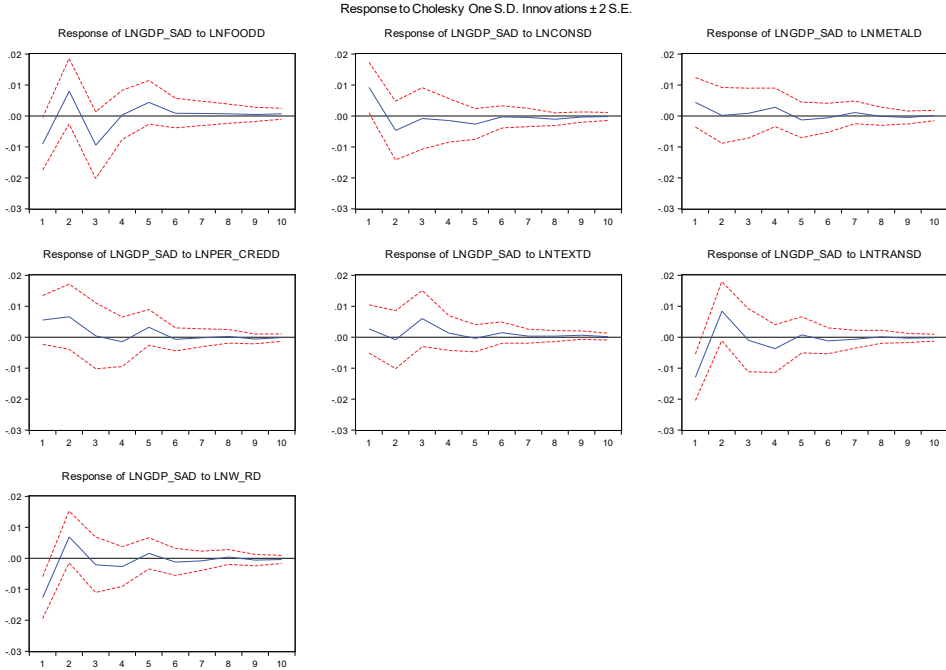
In graphic 4, impulse response functions are estimated in order to show the effect of any shock in sectoral loans on GDP in the period of 2004-2021 in Turkiye. Any shock in the loans extended to the food sector affects the GDP negatively in the first periods and positively in the following periods. While a shock in loans extended to the construction sector negatively affects GDP in the short run, this effect disappears in the long run. Any shock in the loans extended to the metal sector generally affects the GDP positively. While the effect of personal loans, textile and transportation sector loans on GDP is positive in the first periods, this effect disappears in the following periods. While shocks in the wholesale retail sector have a positive effect on GDP in the first period, this effect disappears in the following periods.

6. Conclusion

In this study, the sectoral distribution of loans extended by banks in Turkiye was examined and the relationship between them and economic growth was tested with the Johansen cointegration and the Engle-Granger causality tests. In another analysis, the impact of the impulse-response functions and the shocks in sectoral loans on economic growth was examined. The data starts from the 2004-ends of 2021 were included in the analysis on a quarterly basis. In the Johansen cointegration test results, it was determined that there is cointegration between the data in the long term. According to the Engle-Granger test results, at the 10% significance level, there is a one-way causality relationship from GDP to transportation, personal loans and construction in the long run, while no causality relationship has emerged from GDP to other sectors. There is a unidirectional causality relationship in the long run from the metal sector to GDP.

When the analysis results of the study conducted for Turkiye within the framework of the relationship between economic growth and financial development are evaluated, the loans extended for construction, transportation and personal loans have also increased with the increase in economic growth. However, a causal relationship from these sectors to economic growth has not been found. In short, loans extended to construction, transportation and personal loans do not contribute to economic growth in the long run. On the other hand, another result obtained is that the metal sector is in a unidirectional causality towards economic growth. In other words, loans extended to the metal sector contribute to economic growth in the long run. When the output results are compared with the literature on economic growth and financial development, while the causal relationship from construction, transportation and personal loans to economic growth is supported in Turkiye, only the metal sector supports this view in the causal relationship from loans to GDP.

While Kılıç (2018) finds a unidirectional relationship from economic growth to loans, Pehlivan (2018), Karahan (2018), Cernohorsky (2017), Mercan (2013), Vurur and Özen (2013), Lue and Shen (2012), Qluitan (2012), Beck and Levine

(2004) found a bidirectional relationship between total loans and economic growth in the long run. Analyzing the total loans on a sectoral basis, Apaydın (2018) found that agriculture, industry and services sector loans had a positive effect on economic growth, while he concluded that the contribution of the construction sector to economic growth in the long term is negative. The findings obtained in this study show that there is an imbalance in the sectoral distribution of total loans and the loans extended are mostly allocated to sectors that are less productive and contribute less to economic growth.

The increase in loan funds in Turkiye in the 2000s brought along the loan expansion. These loans extended by banks caused imbalances in loan allocation due to wrong banking policies. Although the contribution of loans to non-productive real growth is positive in the short term, directing them to investments with negative effects in the long term both increases the fragility of banks and puts the country's economies in a difficult situation. By giving priority to more supervisory, more systematic and well analyzed projects in loan allocation, and the government's concentration on sectors that will contribute to the development of the country in the long run, it will be possible to reduce the fragility of banks and to bring countries to a more advanced level in development.

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