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THE LINKAGE BETWEEN FISCAL POLICY AND NON-PERFORMING HOUSEHOLD LOANS IN TURKEY

Ercan Özen, Sabina Hodžić, Ahmet Eren Yildirim

Abstract

Frequent changes in fiscal policies are the main cause of credit risk. To prevent households from increasing their non-performing loans, the government can use various policies and instruments. One of these tools is tax regulations, with a particular focus on the value-added tax. This paper examines whether tax policies have affected non-performing household loans in Turkey over the period from 2017 to 2021. To acquire meaningful empirical results, the Autoregressive Distributed Lag (ARDL) cointegration model have been applied. The results of analysis indicated that the effect of tax regulations on non-performing household loans is quite strong. It can be demonstrated that the strength of the income effect generated by tax cuts might be robust.

Keywords: *non-performing loans, household finance, fiscal policy, Turkey*

JEL classification: *D14, G10, H31*

1. Introduction

There are various definitions of non-performing loans (NPLs) in the economic literature, but the most commonly used is that it is a loan made because of the risk of nonpayment of loan principal and interest. For example, the European Central Bank (2016) describes an NPL as follows: "a bank loan is considered nonperforming when more than 90 days pass without the borrower paying the agreed installments or interest." On the other hand, the IMF (2004) describes an NPL as follows: "a loan is nonperforming when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons—such as a debtor filing for bankruptcy—to doubt that payments will be made in full" (p. 57). Following

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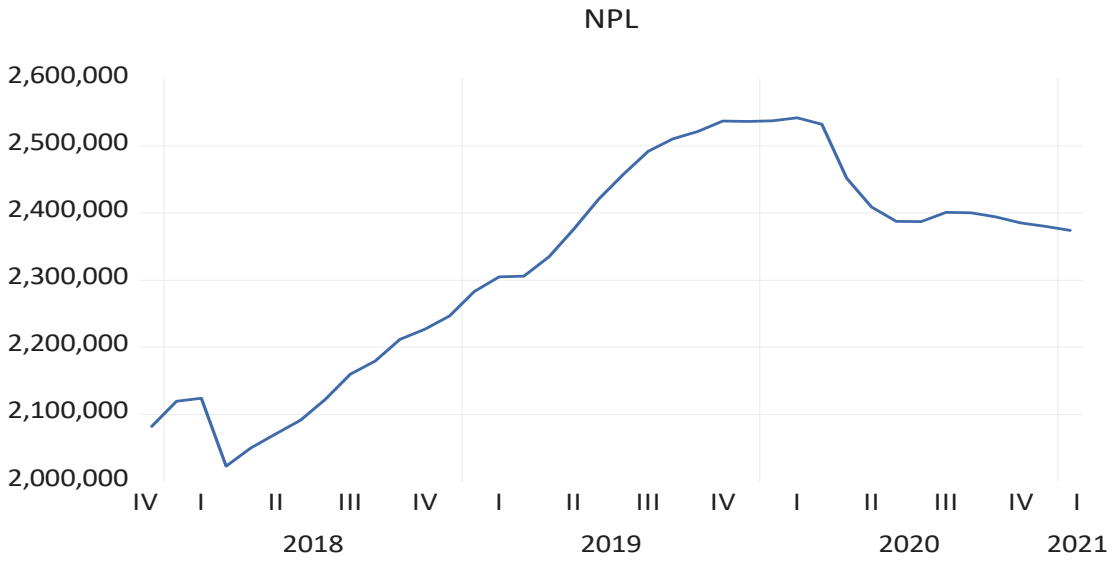
all the definitions, NPLs are called 'bad debt'. They are problematic for both banks and the national economy, especially with respect to monetary policy. For the banks, the "bad debt" is problematic, profitability suffers because they no longer earn enough money with the credit business. Hence, in this case, they cannot lend as much, so this mechanism to influence interest rates in the private sector is less effective. According to Yurttadur, Celiktas, and Celiktas (2019), they can be "problematic by several reasons such as occurring loss risk; postponement of payment by major infringement of the contract; being experienced problems in loan repayment by company or individuals" (p. 767). There are also some other arguments that deal with the recognition of NPLs. Bar, Seiford and Siems (1994) and Demirguç-Kunt and Detragiache (1998) concluded that an increase in NPLs in most cases indicates banking crises. This is consistent with a study by Reinhart and Rogoff (2011), while Sorge (2004) considers NPL as a test of financial system vulnerability. In general, the characteristic of NPLs is that they indicate the ability of households, as well as decision makers, to reimburse their debts. Following the financial privatization of 1989, the Turkish economy opened entirely to foreign investors in both direct investment and financial investment. In the 1990s, there were numerous crises in the Turkish financial system due to financial fluctuations. The crisis of 1999 was the most hard-hitting and permanent one and also deeply damaged the banking sector, and the crisis of 2001 was recorded as the biggest banking sector crisis to ever hit Turkey. The banking sector crisis of 2001 was a critical turning point for the Turkish economy. Worsening financial and economic conditions during the 1990s, which suffered from high inflation and a bad budget balance, made it impossible for the business sector to take advantage of new credit opportunities. Nowadays, the financial sector mostly consists of commercial banks, which accounted for 91% of the total financial sector assets as of the end of 2020. Due to large state participation in state-owned banks, i.e. more than 40% of the total banking sector assets, three of the four largest banks in Turkey are now state-owned. The explanation lies in two features. The first is the establishment of the Banking Regulation and Supervision Agency (BRSA), and the second is an autonomy of the Central Bank of the Republic of Turkey (CBRT). Regarding the economic situation in Turkey, the highest percentage of non-performing loans was recorded in January 2020 (5.4%) due to the foreign exchange crisis in 2018. The change in NPLs in Turkey over time is shown in Figure 1. The classification of loans in Turkey is presented in the Appendix (Table 1). The classification is undertaken by the CBRT and the banks pursuant to the implementation of the Regulation on Loan Loss Provisioning, which was announced in the Official Gazette No. 26333 (Official Gazette 2006). The common feature of all five loan groups is that they refer to individuals and legal entities with a creditworthy financial structure.

Figure 1. The change in NPLs in Turkey between 12/2017 and 01/2021



Source: Authors' calculation.

As already mentioned, the high NPL ratios not only have a negative impact on the banking sector, but also on the national economy. First, "they reduce bank profits because they require higher provisions, they lead to lower interest income, generate higher expenses associated with their monitoring and management and lead to an increase in funding costs, as risk adverse investors are less willing to lend to institutions with a low credit quality" (European Central Bank 2020, p. 4). Second, NPLs have progressive risk weights, which leads to progressive capital requirements. Third, they may divert important management resources from more profitable activities. Besides banks, NPLs also affect businesses. This can be seen in the accumulated costs that corporate insolvencies cause, leading to lost sales, rising borrowing costs and declining profitability. Therefore, it is important to keep NPLs under control in the banking sector. In addition, debtors must be subject to fiscal discipline and act lawfully. The effects of NPLs can be noticed in the banking sector, capital adequacy, real sector, asset quality and profitability. For example, high NPLs require higher provisioning, which leads to lower interest income and higher expenses for monitoring them. In addition, this means a decline in lending to companies and households. From fiscal policies perspective, as government regulation increases value-added tax (VAT), the paying ability of households becomes weaker, since they have to increase the obligatory payment, which might affect their debt-to-income ratio, and as such increase the NPLs of banks.

The hypothesis of this paper is that *there is an accelerating effect of value-added tax on NPLs and alternatively there is not any effect*. Thus, the Turkish government must consider these effects when deciding fiscal policies. Based on this hypothesis, this paper aims to investigate whether fiscal policy affects nonperforming budget loans in Turkey in the period from 2017 to 2021. The main instrument within fiscal policy is value-added tax. The main motivation of the paper is the examination of whether there is an impact of value-added tax on non-performing loans. Does value-added tax matter for NPLs? The contribution of the paper is twofold. This is most likely the first paper which provides empirical results on the linkage between NPLs and value-added tax in Turkey over the 2017 – 2021 period using the ARDL model. The second contribution is to overcome the lack of studies, especially in Turkey, which will provide important empirical evidence and policy recommendations for the Turkish economy.

The remainder of the paper is organized as follows. After a brief introduction, Section 2 presents the relevant literature on the main determinants of NPL. The model, methodology, and data sample are described in Section 3. The empirical results and discussion of the findings are outlined in Section 4, albeit Section 5 outlines conclusions and recommendations for further research.

2. Related literature review

From the analysis of the academic literature, it can be concluded that various studies and papers have examined the impact of NPLs on bank lending (Salas and Saurina 2002; Espinoza and Prasad 2010; Bofondi and Ropele 2011; Louzis, Vouldis, and Vasilios 2012; Abid, Nejib-Ouertani, and Zouari-Ghorbel 2014; Bijsterbosch and Falagiarda 2015; Kjosevski, Petkovski, and Naumovska 2019; Gaur and Mohapatra 2020) and economic activity (Babouček and Jančar 2005; Saurina and Jimenez 2006; Rinaldi and Sanchis-Arellano 2006; Kauko 2012; Klein 2013; Škarica 2014; Beck, Jakubik, and Piloiu 2015; Khan, Siddique, and Sarwar 2020; Kucuk, Ozlu, and Yunculer, 2021). The gap in the literature is that there are not so many papers investigating the linkage between NPLs and fiscal policy (Nurja and Kufo 2016; Dimitrios, Louri, and Tsionas 2016), so this gap was covered.

Gilchrist and Zakrajsek (2011) examined the relationship between credit supply and bank lending conditions in the U.S. economy over the data period from January 1952 to April 2010 using a VAR data analysis. To acquire empirical results, the following variables were used: unemployment rate, industrial production index, inflation, bond premiums, consumer credit, corporate credit, ten-year nominal treasury yields, and nominal federal funds rate. Financial market disruptions are measured by the increase in bond premiums. The results show that rejecting loan applications and reducing the volume of loans on their balance sheets was banks' initial response to financial problems. A cyclical decline in corporate credit after a certain delay proves to be the main feature of fluctuation. Škarica (2014) analyzed the factors of the NPL ratio in several Central and Eastern European countries between 2007 and 2012. He used the same variables as Gilchrist and Zakrajsek (2011), with additional variables-real GDP growth rate, harmonized consumer price index, three-month money market interest rate, NPLs, and stock price indexes. The empirical result shows that the key determinant of the increase in the NPL proportion in the analyzed countries is real GDP growth. Nkusu (2011) examined the relationship between NPLs and the macroeconomic performance of advanced economies over the period 1998 to 2009. The variables used in his analysis were very similar as in a study of Gilchrist

and Zakrajsek (2011) and Škarica (2014). The result of the analysis indicated that slower GDP growth, higher unemployment, or declining asset prices are associated with an increase in NPLs in advanced economies. The NPL problem at the Eurozone was investigated by Rinaldi and Sanchis-Arellano (2006). Their focus were sectoral household NPLs based on a case of several Eurozone countries from 1989/Q3 to 2004/Q2. The results indicated that household disposable income, household financial assets, and nominal lending rates exert significant explanatory power on household NPLs. Makri, Tsagkanos, and Bellas (2014) investigated which factors determined NPLs on an aggregate level in the Eurozone for the period 2000 – 2008. In the empirical analysis they included annual percentage growth rate of GDP, public debt as a percentage of GDP, unemployment as macro-variables, and micro-variables such as loans-to-deposits ratio, return on assets, return on equity. According to the results, there is a strong linkeness between NPLs and macroeconomic and bank-specific factors. Based on an investigation of a specific Italian banking system, Foglia (2022) also found interesting results. In the analysis Foglia (2022) employed an ARDL cointegration model to investigate the short and long-run effects of macroeconomics determinants on NPLs over the period 2008/Q3-2020/Q4. The results show that GDP, government debt, unemployment, and domestic credit have a short- and long-term impact on NPLs. In addition, GDP and government debt have a negative impact on the level of NPLs. Inaba et al. (2005) found that during a recession, as unemployment and wealth losses increase, NPLs also increase. Using a sample of Turkey, Kucuk, Ozlu, and Yunculer (2021) examined the relationship between credit and economic activity with particular attention to the factors of credit by borrower (households/businesses) and the factors of GDP by expenditure. They also divide loans to households into housing loans, personal loans, and business loans by type of currency-domestic and foreign loans. To acquire empirical results, vector autoregressive models were applied for the period 2009Q1-2018Q4. The results indicated that credit shocks have statistically meaningful effects on economic activity. Moreover, shocks that lead to an expansion of credit to households and domestic firms by the same percentage have quite similar effects on private consumption. On the other hand, the impact on investment is different, as consumer credit has a much smaller impact. Hence, the shocks to foreign currency-denominated corporate loans have a meaningful impact on aggregate investment. Thus, they have surprisingly weaker effects on equipment investment as well as on consumption and GDP. The authors contributed to the scientific literature by furnishing evidence on the differential impact of credit across different components of economic activity.

3. Model, methodology and data

This paper analyzes the linkage between NPLs, VAT and some control variables. The paper mainly explores the impact of value-added tax on NPLs in the long term in the Turkish economy during the period between 12/2017 and 01/2021. The reference model that was used in the analysis can be summarized as follows:

$$npl = f(vat, u, cpi, y) \tag{1}$$

Where:

npl: non-performing loans
vat: value-added tax
u: unemployment rate
cpi: consumer price index
y: industrial production index

The dependent variable are non-performing loans, while the value-added tax, unemployment rate, consumer price index and industrial production index are the independent variables. The variables are used in the analysis in logarithmic form to acquire more interpretable results in the estimation. Moreover, the logarithmic form of the variables allows us to explain the results as elasticities. Thus, the long-term linkage between the variables can be transformed into a linear logarithmic form as:

$$lnnpl_t = \beta_0 + \beta_1 lnvat_t + \beta_2 lnu_t + \beta_3 lncpi_t + \beta_4 lny_t + \varepsilon_t \tag{2}$$

β_0 represents the constant term and ε_t represents the error term, and β_1, β_2, β_3, β_4 indicate the elasticity parameters in the long term. Except for the β_4 coefficient, the remaining parameters are expected to be positive in parallel to the main arguments of the paper. In general, value-added tax may play a critical role on households' disposable income. An increase in value-added tax may lead to a higher expense in their income and vice versa. Therefore, if value-added tax increases, the paying ability of borrowing in credit mechanism can be affected negatively and non-performing loans will increase, and β_1 is positive. When the unemployment rate increases, because of a decrease in the income level, NPLs will also increase, and β_2 is also positive. In this paper, the industrial production index is used as

a proxy variable for the income level. Thus, when the income level increases, NPLs will decrease.

In this paper, we use the widely used ARDL cointegration model (Pesaran, Shin, and Smith 2001) to investigate whether there is a long-run association between variables in Turkey. Compared to conventional cointegration tests, this method has several advantages. The ARDL methodology can decide the long-term linkage depending on the result of the F-test, which is used in the bound test of the ARDL methodology process. Therefore, the ARDL bound test (Pesaran and Shin 1999) also works better in the case or limited observations. The sample size of the data of this paper is only 36, thus, the ARDL bound test can be used for the empirical analysis. The ARDL approach can be used with the variables that of at I(0) or I(1) process, but not be at I(2) or more. The other advantage is that this methodology can estimate the long and short-term coefficients simultaneously. However, to estimate the empirical linkage between variables with the ARDL method, this study utilizes the following equation:

$$\Delta lnnpl = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta lnnpl_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta lnvat_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta lnu_{t-i} + \sum_{i=1}^{p} \beta_4 \Delta lncpi_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta lny_{t-i} + \lambda_1 lnnpl_{t-1} + \lambda_2 lnvat_{t-1} + \lambda_3 lnu_{t-1} + \lambda_4 lncpi_{t-1} + \lambda_5 lny_{t-1} + \varepsilon_t \quad (3)$$

where Δ denotes the difference term, β_0 indicates the constant term and ε_t denotes the error term. Also, β_1, β_2, β_3 and β_4 indicate the short-term coefficients, while λ_1, λ_2, λ_3 and λ_4 are the long-term coefficients in the estimated model. p shows the optimal lag length, which is determined in the model selection criteria by Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC) or Hannan-Quinn Information Criteria (HQ). The ARDL method runs in two important steps.

There is a hypothesis test for the determination of a cointegration linkage between the variables. Therefore, the null and alternative hypotheses to be tested by the F-test are as follows:

H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$
H_1: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0$

The null hypothesis states that there is no cointegration linkage between the variables. If the null hypothesis is rejected, it means that there is a cointegration linkage between the variables. For any cointegration linkage, the unrestricted error correction model (UECM) (Pesaran and Shin 1999) can be estimated as in the following equation:

$$\Delta lnnpl = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta lnnpl_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta lnvat_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta lnu_{t-i} + \sum_{i=1}^{p} \beta_4 \Delta lncpi_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta lny_{t-i} + \theta ECT_{t-1} + \varepsilon_t \quad (4)$$

Table 2. The Summary Statistics

Variables	Notation	Source	Obs.	Mean	Min.	Max.	St. Dev.
Non-performing Loans	npl	Banking Association of Turkey	38	2325397	2022478	2542040	161114.3
Value-added Tax	vat	Strategy and Budget Association	38	16544605	4730000	27427000	4798448
Unemployment Rate	u	CBRT	38	12.51842	9.800000	14.10000	1.377200
Consumer Price Index	cpi	CBRT	38	417.1613	327.4100	513.3000	51.84727
Industrial Production Index	y	CBRT	38	11484.47	7822.000	14469.00	1314.639

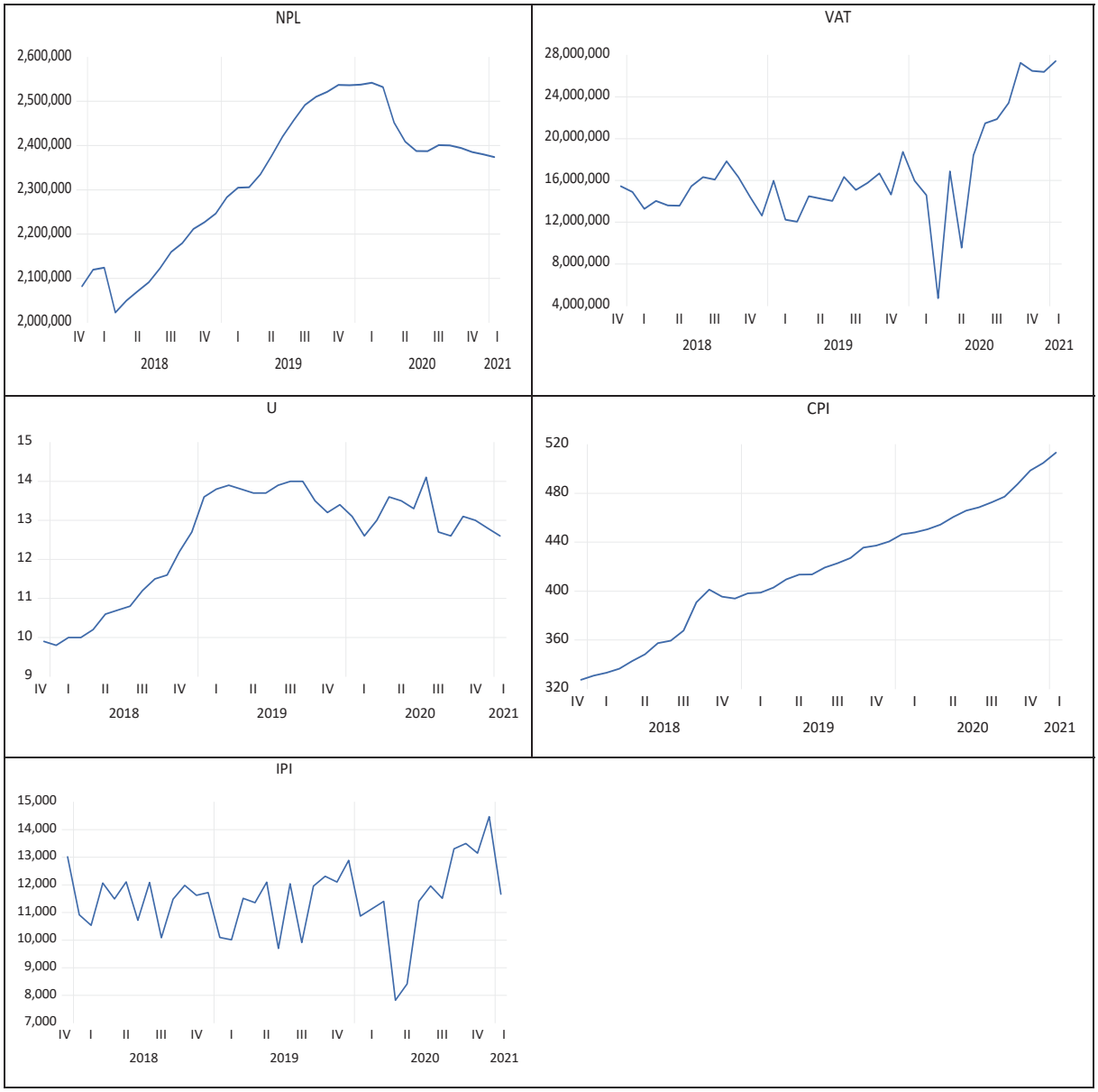
Source: Authors' calculation.

where θ indicates the coefficient of the error correction term (ECT_{t-1}) and provides information about the speed of adjustment on the correction mechanism after a deviation in the long-term equilibrium. The error correction model distinguishes between short-term and long-term effects. Additionally, the expectation of the coefficient of the error correction term is negative and statistically significant, i.e. between 0 and -1, to get a smooth correction to the long-term equilibrium.

The analysis uses monthly data covering period between 12/2017 and 01/2021. As the value-added tax data is available from the end of 2017 as a monthly figure, the data period does not include data before this time span. For the structural change in March 2020, a dummy variable has been included, which represents the starting date of the COVID-19 pandemic. The NPL data represents the number of people with unpaid personal loans and credit card borrowing for a period of time – usually 90 or 180 days – and was retrieved from the Banking Association of Turkey's databases. Monthly data for VAT are from the Strategy and Budget Association database; other data are from the CBRT database. E-views 12 package program were used to estimate the linkage between the variables.

Figure 2 displays the trends of those variables that were used in the analysis. It can be clearly seen that the NPLs in Turkey significantly increased starting in early 2018. The value-added tax also increased in the second half of 2020. The remaining variables also have an increasing trend over that period.

Figure 2: The trends of analyzed variables in Turkey over the period 12/2017 – 01/2021



Source: Authors' calculation.

4. Empirical result discussions

This section presents the results of the empirical estimation for Equations (3) and (4), in turn. The results of unit root test are indicated in Table 3. Except for the industrial production index, which is in *I (0)* process, all the variables are in *I (1)* process. The null hypothesis of unit root for the variables that are in *I (1)* process cannot be rejected in their level values. Therefore, as all the variables provide the necessary condition for the ARDL estimation, the long-term cointegration linkage between the variables can be estimated.

Table 4 shows the results of the bound test, and according to the calculated F-statistic value, which is higher than the upper value, there is a cointegration linkage between the variables because the null hypothesis is rejected. Thus, there is a long-term linkage between the dependent variable, the logarithm of nonperforming loans, and the independent variables, the logarithm of VAT, unemployment, the consumer price index and the index of industrial production.

Table 5 gives the ARDL estimation results in the long and short term. According to the results, a positive and significant association was found between VAT and NPLS in the long term, which is in line with expectations. Also, there is a negative and significant association between the industrial production index, which represents the income level, and NPLs in the long term. The unemployment rate has a significant and positive impact on the NPL in the long run, while the consumer price index has no significant impact on the NPL in this period. In this paper, the potential effect of value-added tax on NPLs was the main focus, so the long-term estimation results indicate that the value-added tax variable's coefficient corresponds to the preliminary expectations and proposed hypothesis.

The estimation of Equation (3) indicates that the value-added tax coefficient was estimated at about 0.46. This result means that a one-percent increase in value-added tax leads to an increase in NPLs by 0.46%. Also, a one-percent increase in the unemployment rate increases NPLs by about 1.03%. Moreover, the results show that a one-percent increase in the

Table 3. Results of Unit Root Test

Test Type	Variable	At Level		At 1st Difference	
ADF		Cons.	Cons. and Trend	Cons.	Cons. and Trend
lnnpl		-1.27 (0.63)	-0.66 (0.97)	-4.13 (0.00)***	-4.27 (0.00)***
	lnvat	-1.41 (0.56)	-1.94 (0.61)	-11.81 (0.00)***	-11.80 (0.00)***
	lnu	-2.09 (0.25)	-0.84 (0.95)	-5.53 (0.00)***	-6.32 (0.00)***
	lncpi	-1.07 (0.72)	-2.96 (0.16)	-3.04 (0.04)**	-5.19 (0.00)***
	lny	-4.30 (0.00)***	-4.36 (0.00)***	-8.61 (0.00)***	-8.45 (0.00)***
PP	lnnpl	-1.52 (0.51)	-0.46 (0.98)	-4.18 (0.00)***	-4.29 (0.00)***
	lnvat	-3.69 (0.00)***	-4.26 (0.00)***	-11.89 (0.00)***	-12.09 (0.00)***
	lnu	-2.09 (0.25)	-0.72 (0.96)	-5.56 (0.00)***	-6.32 (0.00)***
	lncpi	-0.79 (0.81)	-2.03 (0.56)	-4.15 (0.00)***	-4.08 (0.01)**
	lny	-4.30 (0.00)***	-4.36 (0.00)***	-10.62 (0.00)***	-10.58 (0.00)***

Note: ***,** represents significance at the 1% and 5% level, respectively.

Source: Authors' calculation.

Table 4. Bound Test Results

Model	F-statistic	Critical Values	
		I (0)	I (1)
npl=f(vat, u, cpi, y, dummy)			
Lag Length Structure (1,1,4,3,0,1)	21.23***	3.93	5.23

Note: The critical values are from Kripfganz and Schneider (2020). *** means statistically significant at 1 %.

Source: Authors' calculation.

Table 5. The ARDL Estimation Results

Variables	
	Long Run
lnvat	0.457 (0.06)*
lnu	1.026 (0.02)**
lncpi	0.903 (0.18)
lny	-0.288 (0.07)*
dummy	0.178 (0.17)
	Short Run
Δlnvat	0.027 (0.00)***
Δlnu	-0.045 (0.02)**
lnu (-1)	-0.111 (0.00)***
lnu (-2)	-0.077 (0.00)***
lnu (-3)	-0.042 (0.03)**
Δlncpi	-0.170 (0.00)***
lncpi (-1)	0.002 (0.96)
lncpi (-2)	-0.144 (0.01)**
Δdummy	0.036 (0.00)***
Error Correction Term (-1)	-0.08 (0.00)
Constant	0.190 (0.00)***
R-squared	0.95
N	38
	Diagnostic Tests
Breusch-Godfrey Serial LM	0.919 (0.826)
Breusch-Pagan-Godfrey Heteroscedasticity	0.349 (0.317)
J-B Normality	0.499 (0.778)
Ramsey RESET	0.777 (0.676)
Durbin-Watson	2.11
Cusum	Stable
CusumSQ	Stable

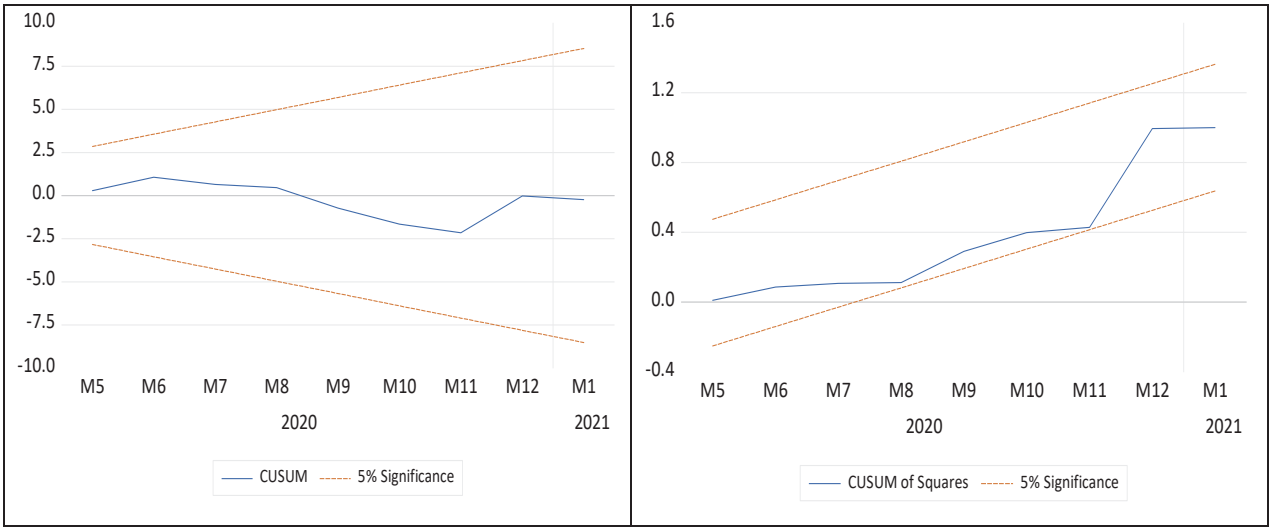
Source: Authors' calculation.

industrial production index reduces NPLs by about 0.29%. The consumer price index shows a positive effect on NPLs, but this effect is not statistically significant at 10%. Table 5 also shows the short-term results. The short-term results seem to show that most of the coefficients are statistically meaningful at the 1 and 5 % levels.

The long-term results summarize the fact that the use of a fiscal policy tool is a very critical factor for the Turkish banking sector. As stated in the introduction, as a regulatory tool for the market in the Turkish economy, value-added taxes have a damaging effect on the level of NPLs in the banking system. However, the effect of the unemployment level on the NPL level is more than twice as strong as the effect of value-added tax. This is also another important indicator for the Turkish economy. Policymakers should consider value-added tax as a critical factor for taking action related to fiscal and monetary policy. Therefore, fiscal policy may have a damaging impact on monetary policy in the Turkish economy. Also, as expected, the industrial production index may provide a payment power to households.

Finally, both the error correction mechanism and some diagnostic tests after estimation are shown in Table 5. Accordingly, as expected, the error correction

Figure 3. The CUSUM and the CUSUM Square Test Results



Source: Authors' calculation.

term is negative and statistically significant. The ECT coefficient is about 0.08 in the model. It means that a bit of the short-run deviation would disappear in the long run in the model. Moreover, the post-estimation diagnostic tests indicated that there is not any auto-correlation, heteroscedasticity or normality problem. The Jarque-Bera test result also provides the normality condition. Finally, Figure 3 shows the CUSUM test and the CUSUMSq test results. Accordingly, there is not any stability problem in the coefficients due to the test statistics being between the critical levels.

Similar research was done by Nurja and Kufo (2016), where they investigated the impact of NPLs on certain macroeconomic factors, specifically corporate income tax for the period of Q4/2008 - Q4/2014. Their results show that the tax rate affects NPLs, which is also in line with empirical results of this paper.

5. Conclusion

NPLs as an indicator of an economic crisis were more volatile during the banking crisis which affected Turkey in 2001. As a consequence of this crisis and to maintain central budget stability, VAT rates were increased. In Turkey, VAT was established in 1985 to replace production tax. Besides budgetary stability in terms of revenue, the objective of implementing VAT was to harmonize the tax structure with the EU members. The rates are: 18% standard rate, 8% reduced rate, and super-reduced rate of 1%. Although it can be concluded that VAT rates are stable, frequent changes in fiscal policies will head to a higher credit risk. Thus, this paper examined the long-term impact of VAT on NPLs in the Turkish economy during 12/2017 and 01/2021. In order to acquire empirical results, an ARDL cointegration model analysis was performed, to show how the dependent and independent variables affect the NPLs. This model has more advantages in relation to conventional cointegration tests, since it can decide the long-term linkage. Specifically, a positive and significant linkage between VAT and NPLs was found. That means that if government regulations increase VAT, households become less able to pay. In this situation households need to borrow more money, i.e. NPLs. Similar research was done by Nurja and Kufo (2016), where they found that the tax rate affects NPLs. A negative and significant relationship was found with respect to the index of industrial production and NPL.

Like any scientific paper, this one also has a limitation. The limitation of this paper is the data availability, especially the data on VAT. In addition, there are several ways in which the work could be improved. First, new econometric techniques with different time frequencies could be used. The quantile-specific short- and long-term effects on the NPL could be analyzed using an ARDL approach (Guo et al. 2021). In addition, it would be interesting to analyze each European Union country separately. This would identify country-specific determinants of NPLs and help policymakers stabilize national economies.

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APPENDIX

Table 1. The classification of loans in Turkey

1. Loans of a Standard Characteristics	This group of loans refers to individuals and legal entities with a creditworthy financial structure, where payments are made when due or up to 30 days after due date. Thereafter, no repayment problems are expected in the future, and they are fully recoverable without realization of collateral.
2. Loans Under Close Supervision	Loans in this group are made to individuals and entities that have a creditworthy financial structure, but where adverse indications of the borrower's solvency or cash flow have been identified or projected due to adverse trends in economic conditions or the areas in which the borrower operates.
3. Loans with Limited Collectability	In this group, full repayment without liquidation of the collateral is unlikely because the net realizable valuation of the collateral or the borrower's own funds are insufficient to pay the debt. In addition, loans are restricted as performing loans after the application of forbearance measures.
4. Doubtful Loans	The characteristics of this group of loans are the maximum collection of the principal and/or interest following the agreement; the creditworthiness of the debtor is not considered a complete loss, since chances such as a merger, new financing opportunities or an increase in capital are available to the debtor and the loan is collectible.
5. Loans classified as Loss	In this group, no or little recovery is expected because the debtor's creditworthiness has completely deteriorated. In addition, late payments of more than one year are to be expected.

Source: BRSA, 2018.