

## DYNAMICS OF THE NON-PERFORMING LOANS IN AZERBAIJAN: EMPIRICAL ANALYSIS

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### ABSTRACT

Bank loans are the primary source of financing for businesses in the countries with non-developed financial markets like Azerbaijan. Thus, analysis of the dynamics of non-performing loans has uttermost importance in preventing banking crises in recession scenarios. This study aims to analyze the dynamics of non-performing loans in Azerbaijan. Employing three different estimation methods (FMOLS, DOLS and CCR), the study reveals a significant negative link between non-performing loan rates and macroeconomic factors like inflation and interest rates. There is no statistically significant relationship between non-performing loan rates and real GDP growth in Azerbaijan. The lack of a statistical database on government support to the financing of businesses is a restriction of research. As a policy recommendation, it is proposed that government should improve regulations on collateralization of loans and banks' loan policies. This study's theoretical and methodological results can serve as a scientific source for further research and can be used in the monetary policy decision-making process.

**Keywords:** Azerbaijan, non-performing loans, monetary policy, inflation, interest rates, Covid-19

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## INTRODUCTION

The banking system is the crucial and most significant part of the financial system of Azerbaijan. As a country with non-developed financial markets, bank loans are essential to fuel Azerbaijan's economic growth. Amid the importance of bank loans in financing economic growth, the possibility of an increase in non-performing loan (NPL) rates caused by a disruption in the Covid-19 pandemic period emerged as a critical danger to the economic stability of Azerbaijan. The Covid-19 pandemic measures caused significant disruption in the global economy and Azerbaijan's economy. Despite the economic downturn, the non-performing loan ratio in Azerbaijan decreased from an average of 10.76% in 2019 to 7.44% in 2020 and to 6.02% in the first three quarters of 2021. Analyzing cases of other countries, it is observed that most countries that experienced the negative real GDP growth in the Great Financial Crisis of 2008 also experienced an increase in the non-performing loan rates. But in the almost 44% of those countries experienced a decrease in the non-performing loan rates in 2020 compared to 2019 levels. One reason for the different movement of non-performing loan rates in these two crisis periods can be found in the causes of them, the Great Financial Crisis of 2008 was already caused by rising non-performing loan rates in the subprime mortgage loan markets. Thus, the increase in non-performing loan rates was not just a result of the crisis, but also the reason for the crisis. Other reasons for decreasing non-performing loan rates during the Covid-19 pandemic can be government transfer payments to support closed businesses, increased saving rates due to distant working practices, and many entertainment activities being closed down.

Previously, there is one detailed research on the topic of non-performing loan rates in Azerbaijan. Mukhtarov et al. (2018) used both bank-specific (Capital adequacy ratio, Total Assets) and macroeconomic (unemployment rate, interest rate, GDP Growth rate, exchange rate) determinants in regression analysis. They didn't include inflation in the model to prevent the multicollinearity problem. Among macroeconomic determinants, the research finds a significant negative relationship between interest rates and NPL rates, significant positive relationship between unemployment rates and NPL rates, and no significant relationship between GDP growth or exchange rates and NPL rates. (Mukhtarov et al, 2018). This research paper should be, to our best knowledge, the second analyzing dynamics of non-performing loan rates in Azerbaijan.

Globally, the main macroeconomic factors impacting non-performing loan rates were found to be real GDP growth, inflation rates, interest rates, unemployment rates, and exchange rates. Most research found a significant negative relationship between real GDP growth and NPL rates. Research papers' results contradict the impact of inflation and interest rates on NPL rates, as some found a significant negative relationship, while others found a significant positive relationship. It is noteworthy that some researchers did not find any significant impact of inflation and interest rates on NPL rates.

This research focuses on the impacts of Real GDP growth, interest rates, and inflation rates on non-performing loan rates. The following section provides the theoretical background and literature review. Section III provides data and empirical methodology, section IV provides empirical results, and section V provides concluding remarks.

## 1. LITERATURE REVIEW AND THEORETICAL BACKGROUND

Per the literature review, the main factors impacting non-performing loans are real gross domestic product growth, inflation, and interest rates. However, some research papers find a significant impact of other macroeconomic variables like unemployment and currency value on non-performing loan rates.

*Real Gross Domestic Product growth* – literature review mostly agrees on the impact of this factor on non-performing loan rates. There is evidence of a significant negative impact of real GDP growth on NPL rates (Ahmad and Bashir, 2013; Akinlo and Emmanuel, 2014; Bercoff et al., 2002; Bofondi and Ropele, 2011; Dash and Kabra, 2010; De Bock and Demyanets, 2012; Gerlach et al., 2005; Greenidge and Grosvenor, 2010; Guy and Lowe, 2011; Jakubik, 2007; Jordan and Tucker, 2013; Kastrati, 2011; Khemraj and Pasha, 2009; Rajah, 2016; Saba et al., 2012; Wood and Skinner, 2018; Zeman and Jurca, 2007). This result is economically meaningful and expected too. An increase in real Gross Domestic Production means an increase in people's real income, which means that they can purchase more goods and services than in previous years. An increase in real income should expectedly improve the repayment ability of borrowers.

Nevertheless, it is noteworthy that some of the studies could not be able to detect a statistically significant relationship between these two variables (Bhattari, 2015; Ouhibi and Hammami, 2015), while one of these research papers focuses on Azerbaijan (Mukhtarov et al., 2018). The lack of a significant relationship between these variables may be due to some other factors like institutional changes, changes in people's consumption and saving behavior and etc. Considering the relationship between real GDP growth rates and non-performing loan rates, Azerbaijan should be analyzed carefully. The oil sector's share is much more significant in real GDP than the loan market.

*Inflation* – literature review contradicts the relationship between inflation rates and non-performing loan rates. Some studies provide evidence of a significant positive link between inflation rates and non-performing loan rates (Baboucek and Jancar, 2005; Bhattari, 2015; Greenidge and Grosvenor, 2010; Klein – IMF study, 2013). Some studies provide evidence of a significant negative link between inflation rates and non-performing loan rates (Adebola et al., 2011; Ahmad and Bashir, 2013; Gerlach et al., 2005; Guy and Lowe, 2011; Jakubik, 2007; Kastrati, 2011; Ouhibi and Hammami, 2015; Rajah, 2016; Solarin and Daharan, 2011). Some studies could not be able to detect any significant relationship between inflation and non-performing loan rates (Akinlo and Emmanuel, 2014). Providing economic meaning to both positive and negative relationships between inflation rates and non-performing loan rates is not much hard. About the positive relationship between inflation and non-performing loan rates, economists propose that high inflation rates can decrease borrowers' real income as daily consumption expenditures for individual borrowers, salaries, and other raw material expenses for corporate borrowers increase, and as a result, there is a significant decrease in debt repayment capacity of individual and corporate borrowers as a result of inflation, hence high inflation rates result in high non-performing loan rates. Another view among economists on the topic of the relationship between inflation rates and non-performing loan rates is about the classic example of the inflation effect on debt. In multiple finance theories, the impact of inflation is known as transferring wealth to borrowers from lenders. This phenomenon is because borrowers get money from lenders for some previously agreed period of time and repay at maturity. When there is high inflation, especially unexpected inflation, borrowers are better off during debt tenure. Thus, according to

Fisher equilibrium, interest rates on debt must include a premium on expected inflation and uncertainty on inflation. As a result, this view supports the negative impact of inflation rates on non-performing loan rates, as high inflation makes borrowers better off. It is noteworthy that both thoughts supporting positive and negative impacts have economic essence, and perhaps, these two impacts cancel off each other to some extent. One possible reason behind the negative relationship between inflation rates and NPL rates may be the rising value of collaterals of loans.

**Interest rates** – the literature review also contradicts the relationship between interest rates and non-performing loan rates. Some studies provide the evidence for a significant positive relationship between interest rates and non-performing loan rates (Adebola et al., 2011; Akinlo and Emmanuel, 2014; Bercoff et al., 2002; Bofondi and Ropele, 2011; Gerlach et al., 2005; Rajah, 2016 Solarin and Daharan, 2011; Jakubik, 2007; Zeman and Jurca, 2007). Some studies provide evidence for a significant negative relationship between interest rates and non-performing loan rates (Ahmad and Bashir, 2013; Akinlo and Emmanuel, 2014; Guy and Lowe, 2011; Wood and Skinner, 2008). One of the studies finding a negative relationship between interest rates and NPL rates was focused on Azerbaijan (Mukhtarov et al., 2018). Some studies provide evidence for a non-significant relationship between interest rates and non-performing loan rates (Saba et al., 2012). The explanation for the positive relationship between interest rates and non-performing loan rates is simpler than the negative relationship, as higher interest rates cause an increase in the amount of debt repayment and thus decrease borrowers' repayment capacity. About the explanation for a negative relationship between interest rates and NPL rates, it can be argued that higher interest rates increase the costs for both investment and consumption decisions, hence causing an even harsher due diligence process. It means that higher interest rates cause a more careful approach to investment and consumption behavior. An example can be any capital budgeting process of companies. One of the most popular measures is Net Present Value analysis to evaluate projects and decide on the project's approval.

One of the most important determinants in Net Present Value analysis is the cost of capital which is directly related to ghd cost of debt and cost of equity, hence interest rates. When there is a higher interest rate environment, it increases the cost of capital for the company and results in a lower calculation for Net Present Value. This situation makes the non-profitable projects of the company even less attractive. For instance, in a low-interest rate environment, it would be easier for top managers to approve unprofitable projects as a result of irrational decision-making projects (pet projects). But high-interest rates make it harder for unprofitable projects to have positive NPV, causing companies to approve only profitable projects and thus strengthen the company's debt repayment capacity. So, this is possible economic reasoning for the significant negative relationship between interest rates and non-performing loan rates. Again, as in the inflation rates, we should not approach these two approaches in isolation. We can accept the possibility of both impacts and consider the possibility that these two impacts may cancel off each other to some extent.

**Value of currency** – The evidence on the relationship between the value of a currency and non-performing loan rates also contradicts each other. Some studies have found a significant positive relationship between currency value and non-performing loan rates (Fofack, 2005; Khemraj and Pasha, 2009; Ouhibi and Hammami, 2015; Zeman and Jurca, 2007). Some other studies found a significant negative relationship between the value of a currency and non-performing loan rates (Bhattari, 2015; De Bock and Demyanets, 2012; Klein – IMF study, 2013). We could propose

economic background for both of these results. Suppose the production in a country is not dependent on imports. In that case, a decrease in the value of a local currency may decrease the price of local production for foreign countries, increase exports and general wellbeing in the country, which would result in increased debt repayment capacity. But if the local production itself is dependent on imported raw materials, then decreased value of the local currency would most likely result in higher-priced imported goods for consumers and higher costs for producers, which in turn would result in decreased debt repayment capacity,

*The unemployment rate* is another factor that has been used as the independent variable in the models of many previous research papers. Many research papers have found a significant positive relationship between unemployment rates and non-performing loan rates (Akinlo and Emmanuel, 2014; Babouček and Jancar, 2005; Bercoff et al., 2002; Bofondi and Ropele, 2011; Klein – IMF study, 2013; Mukhtarov et al., 2018; Vatanserver and Hepsen, 2013; Wood and Skinner, 2008). One research paper from the literature review has not detected any significant relationship between unemployment and non-performing loan rates (Saba et al., 2012). The economic background for this relationship between unemployment rates and non-performing loan rates is somewhat clear and similar to the relationship between the real GDP growth and non-performing loan rates. Unemployment rates are generally expected to move in the contrary direction to real gross domestic product. Rising unemployment means most likely a recessionary gap in the economy of a country and decreasing income, which results in a decrease of the loan payment ability of borrowers. Hence, we can expect a positive relationship between nonperforming loan rates and unemployment rates, as we expect a negative relationship between non-performing loan rates and real GDP growth.

## **2. DATA AND METHODOLOGY**

As a dependent variable, instead of non-performing loan rates of total loans, non-performing loan rates of loans in the local currency – the Azerbaijan manat, will be used to exclude the impact of the decrease in the value of the Azerbaijani manat against the USD in 2014 on non-performing loan rates of loans with the foreign currency. As independent variables, in the literature review, research papers investigated the impacts of real GDP growth rates, inflation rates, interest rates, currency value, and unemployment rates on the non-performing loan rates. Investigating the impact of foreign currency on non-performing loan rates in regression with Ordinary Least Squares methods will be problematic because the currency rate in Azerbaijan is fixed and changed only twice in the last ten years. Unemployment rates are also considered not worthy of including in the model because the impact of unemployment rates will be similar to real GDP growth, and using one of these variables can be enough.

The model will include non-performing loan rates of loans in Azerbaijani manat as the dependent variable (NPL), real GDP growth rates (RGDPG), inflation rates (INFL), and average lending rates of loans in Azerbaijani manat (INTR) as the independent variables:

$$NPL_t = \beta_0 + \beta_1 * RGDP_t + \beta_2 * INFL_t + \beta_3 * INTR_t + \varepsilon_t$$

Data on NPL rates, inflation and average lending rates are obtained from the Central Bank. Real GDP growth data was taken from the State Statistical Committee database.

### 3. RESULTS AND INTERPRETATIONS

Our database consists of time-series data, we should first check whether our database is time stationary. ADF unit root tests were applied to examine the stationarity of time-series variables. Results are presented in Table 1.

**Table 1:** ADF unit root test results

	I(0)		I(1)	
	<i>Intercept</i>	<i>Trend and intercept</i>	<i>Intercept</i>	<i>Trend and intercept</i>
NPL	-2.609*	-3.919***	-6.222***	-6.049***
RGDP	-2.806*	-2.438	-99.849***	-100.479***
INFL	-2.857*	-3.000	-10.354***	-10.262***
INTR	-1.531	-2.449	-4.894***	-4.850***

**Note:** \*\* , \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively.

According to the calculations above, none of the variables are I(0) at the 5% significance level, which means they all are non-stationary at level. However, all 4 variables are I(1) at the 5% significance level, which means they all are stationary at the first difference. As all of our variables are not I(0), but all of them are I(1), we can use Fully-modified OLS (FMOLS), Dnymanic OLS (DOLS), and Canonical Cointegrating Regression (CCR) cointegration methods while searching for statistical relationships among those variables.

When we use FMOLS, DOLS or CCR methods, To check the cointegration relationship among these variables to be able to use FMOLS, DOLS and CCR models, the Engle-Granger and Phillips-Ouliaris tests are applied.

**Table 2:** Engle-Granger Cointegration test results

Cointegration Test - Engle-Granger		
Specification: NPL RGDP INFL INTR C		
Cointegrating equation deterministic: C		
Null hypothesis: Series are not cointegrated		
Automatic lag specification (lag=0 based on Schwarz Info Criterion, maxlag=10)		
	Value	Prob.*
Engle-Granger tau-statistic	-6.380078	0.0001
Engle-Granger z-statistic	-29.35738	0.0375
*MacKinnon (1996) p-values.		

**Table 3:** Phillips-Ouliaris Cointegration test results

Cointegration Test - Phillips-Ouliaris		
Date: 04/17/22 Time: 20:30		
Equation: UNTITLED		
Specification: NPL RGDP INFL INTR C		
Cointegrating equation deterministic: C		
Null hypothesis: Series are not cointegrated		
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)		
No d.f. adjustment for variances		
	Value	Prob.*
Phillips-Ouliaris tau-statistic	-6.154684	0.0003
Phillips-Ouliaris z-statistic	-37.06402	0.0056
*MacKinnon (1996) p-values.		

According to both Engle-Granger (Table 2) and Phillips-Ouliaris (Table 3) cointegration test results, we reject the null hypothesis of no cointegration, which means selected variables have a statistically significant cointegration relationship. As a result, we can apply FMOLS, DOLS, and CCR methods to the stated variables.

Table 4 tabulate results obtained from FMOLS, DOLS, and CCR. According to FMOLS regression results, there is a significant negative link between non-performing loan rates and inflation, also between interest rates and NPL rates. Still, there is no significant relationship between real GDP growth and NPL rates. On the other hand, DOLS regression results show a significant negative link between interest rates and NPL rates, but there is no significant link between Real GDP growth and NPL rates and between inflation rates and NPL rates. R-squared of regression with DOLS method is higher than FMOLS method. Furthermore, CCR reveals a significant negative relationship between inflation rates and NPL rates and between interest rates and NPL rates. Still, there is no significant relationship between real GDP growth and NPL rates.

**Table 4:** Regression results summary

	FMOLS	DOLS	CCR
C	0.291** (0.036)	0.307** (0.034)	0.291** (0.036)
Real GDP Growth	-0.024 (0.165)	-0.401 (0.261)	-0.029 (0.027)
Inflation rates	-0.394** (0.151)	-0.375 (0.275)	-0.489** (0.193)
Interest rates	-1.478*** (0.240)	-1.462** (0.245)	-1.466** (0.237)

**Note:** \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. Standard error of coefficients are given in ( ).

A statistically insignificant relationship is revealed between Real GDP Growth and NPL rates. This result is similar to the results of several studies (Bhattari, 2015; Ouhibi and Hammami, 2015) and the study from Azerbaijan (Mukhtarov et al., 2018). The main reason behind a non-significant relationship between Real GDP growth and NPL rates can be share of oil sector in the GDP of Azerbaijan is much higher than the share of the oil sector in loans. Hence, these two variables have different dynamics behind their movements.

Inflation rates are found to have a significant negative relationship with NPL rates in regressions run using FMOLS and CCR methods, but no significant relationship is detected by the DOLS method which has the highest R-squared value. Results of FMOLS and CCR methods are similar to the results of selected earlier studies (Adebola et al., 2011; Ahmad and Bashir, 2013; Gerlach et al, 2005; Guy and Lowe, 2011; Jakubik, 2007; Kastrati, 2011; Ouhibi and Hammami, 2015; Rajah, 2016; Solarin and Daharan, 2011), while DOLS method results also have some predecessors rates (Akinlo and Emmanuel, 2014). Inflation, especially unexpected inflation, is widely known as transferring wealth from lenders to borrowers. Also, a negative relationship between inflation rates and NPL rates may be caused by the use of collaterals. If many loans are used to finance these collaterals and collateral values rise as a result of inflation, lower NPL rates may be the reasonable result of higher inflation.

Using all three methods, interest rates are found to have a statistically significant negative relationship with NPL rates. These results are also similar to the results of several studies (Ahmad and Bashir, 2013; Akinlo and Emmanuel, 2014; Guy and Lowe, 2011; Wood and

Skinner, 2008). Austrian school theories argue that a low-interest rate environment results in a credit boom and overinvestment in non-profitable, low- NPV projects. Also, many corporate finance theories support the view that when the credit environment is tighter, the management of companies is investing more responsibly. Hence, the reason behind a negative relationship between lending rates and NPL rates may be this kind of behavioural bias.

## **CONCLUSION AND POLICY RECOMMENDATIONS**

Statistics show that during the Covid-19 pandemic, NPL rates in Azerbaijan decreased despite the economic disruption caused by anti-epidemic measures. In this research paper, inflation rates and interest rates have a significant negative relationship with NPL rates, while there is no significant relationship between real GDP growth and NPL rates.

The finding of this study regarding an insignificant link between NPL rates and real GDP growth supports evidence of the research papers from Bhattari (2015), Ouhibi and Hammami (2015) while contradicting the results of studies by Ahmad and Bashir (2013), Akinlo and Emmanuel (2014), Bercoff et al. (2002), Bofondi and Ropele (2011), Dash and Kabra (2010), De Bock and Demyanets (2012), Gerlach et al. (2005), Greenidge and Grosvenor (2010), Guy and Lowe (2011), Jakubik (2007), Jordan and Tucker (2013), Kastrati (2011), Khemraj and Pasha (2009), Rajah (2016), Saba et al. (2012), Wood and Skinner (2018), and Zeman and Jurca (2007).

Result of a significant negative link between interest rates and NPL rates supports evidence of then previous papers studying Azerbaijan (Mukhtarov et al., 2018) and other studies by Ahmad and Bashir (2013), Akinlo and Emmanuel (2014), Guy and Lowe (2011) Wood and Skinner (2008) while contradicting the results of studies from Adebola et al. (2011), Akinlo and Emmanuel (2014), Bercoff et al. (2002), Bofondi and Ropele (2011), Gerlach et al. (2005), Rajah (2016), Solarin and Daharan (2011), Jakubik (2007), and Zeman and Jurca (2007).

Result of this study on a significant negative link between inflation and NPL rates support the evidence from the research papers by Adebola et al. (2011), Ahmad and Bashir (2013), Gerlach et al (2005), Guy and Lowe (2011), Jakubik (2007), Kastrati (2011), Ouhibi and Hammami (2015), Rajah (2016), Solarin and Daharan (2011) and contradicts the evidence from studies by Baboucek and Jancar (2005), Bhattari (2015), Greenidge and Grosvenor (2010), Klein – IMF study, (2013).

While decreasing NPL rates during the Covid-19 period may be because of higher inflation, a non-significant relationship between real GDP growth and NPL rates may be because of the different weights of the oil sector in GDP and bank loans of Azerbaijan. Hence, the relationship between non-oil GDP growth and NPL rates in Azerbaijan should be further investigated. Previous research papers analyzing factors impacting non-oil GDP growth in Azerbaijan found a significant positive link between bank credits and non-oil GDP growth (Mukhtarov et al., 2019), a significant positive link between social expenditures of government and non-oil GDP growth, and a significant positive link in long-term between government expenditures and non-oil GDP growth (Aliyev et al., 2016), a significant positive link in the short-term between the trade openness and GDP growth (Seyfullayev, 2022), and no significant link between protectionist policies and non-oil GDP growth (Seyfullayev, 2020). Possible impacts of non-oil GDP and the stated factors impacting the dynamics of non-oil GDP on NPL rates in Azerbaijan should also be researched further.



Respectively, 82%, 54% and 53% R-squared values from DOLS, FMOLS, and CCR methods may imply that there can be some omitted variables that may help in explaining the dynamics of NPL rates. Other than previously stated non-oil GDP growth, these omitted factors may include changes in consumption and saving behavior and government support for the financing of businesses of different sizes (especially important for the Covid-19 period) through the Mortgage and Credit Guarantee Fund of the Republic of Azerbaijan and the Entrepreneurship Development Fund of the Republic of Azerbaijan. Also another possible omitted variable is banks' lending policy which includes financial analysis of borrowers, collateralization and other risk management policies.

Finding a negative relationship between NPL rates and macroeconomic factors like inflation rates and interest rates does not mean that government should stimulate higher inflation and interest rates to protect loan quality. We should focus on the underlying dynamics of this relationship. As stated before, a negative relationship between inflation and NPL rates may result from inflation increasing collateral value, especially considering that frequently loans are used to purchase some assets like the cases of mortgages, auto loans, and then purchased assets become collateral for the loan. Hence, this relationship may imply that collateralization is important in protecting loan quality and keeping NPL rates low in an inflationary environment. On the topic of lending rates, theories of corporate finance and the Austrian school of economics suggest that low-interest rate environment may cause overinvestment in non-profitable projects. This relationship can be the reason behind a negative link between lending and NPL rates. Hence, instead of keeping interest rates high and undermining the investment process, governments should try to improve capital market's efficiency by improving regulations on the lending process.

In conclusion, inflation and interest rates are identified as significant factors impacting NPL rates in this research paper. Questioning dynamics behind a negative relationship between NPL rates and macroeconomic factors like inflation and interest rates, it is suggested that collateralization of loans is an important factor in protecting loan quality and keep NPL rates down during inflationary periods, and regulation of credit analysis practices is an important factor in protecting loan quality and keeping NPL rates down during in low interest-rate environment. Impacts of factors like non-oil real GDP growth, government support to the financing of businesses through different funds, consumption and saving behavior of people should be researched further.

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