MINISTRY OF EDUCATION OF THE REPUBLIC OF AZERBAIJAN

AZERBAIJAN STATE ECONOMIC UNIVERSITY

INTERNATIONAL CENTER FOR MASTERS AND DOCTORS

MASTER'S DISSERTATION

on the topic

“DYNAMICS OF NON-PERFORMING LOANS DURING COVID-19 CRISES IN AZERBAIJAN: REASONS AND RISKS FOR THE FINANCIAL SECTOR”

Seyfullali Javid Ilgar

BAKU - 2022

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Elm andı

Mən, Seyfullalı Cavid İlqar oğlu and içirəm ki, “Dynamics of non-performing loans during Covid-19 crises in Azerbaijan: Reasons and risks for the financial sector” mövzusunda magistr dissertasiyasını elmi əxlaq normalarına və istinad qaydalarına tam riayət etməklə və istifadə etdiyim bütün mənbələri ədəbiyyat siyahısında əks etdirməklə yazmışam.

AZƏRBAYCANDA COVİD-19 BÖHRANI DÖVRÜNDƏ PROBLEMLİ KREDİTLƏRİN DİNAMİKASI: SƏBƏBLƏR VƏ MALİYYƏ SİSTEMİ ÜÇÜN RİSKLƏR

XÜLASƏ

Tədqiqatın aktuallığı: Böhran dövründə problemli kreditlərin həcminin artması maliyyə sistemi üçün müəyyən risklərin yaranmasına şərait yaradır. Azərbaycan kimi maliyyə bazarları inkişaf etməmiş ölkələrdə kreditlər bizneslərin maliyyələşməsinin əsas mənbəyidir. Buna görə də Covid-19 dövründə problemli kreditlərin dinamikasının təhlili xüsusi əhəmiyyət kəsb edir.

Tədqiqatın məqsədi: Bu işin məqsədi, Azərbaycanda problemli kreditlərin dinamikasının təhlili, həmçinin Covid-19 dövründə bu dinamikanın necə dəyişməsinin öyrənilməsidir.

İstifadə olunmuş tədqiqat metodları: Eviews proqram təminatı vasitəsi ilə "FMOLS", "DOLS" və "CCR" kimi ekonometrik metodları tətbiq edilmişdir.

Tədqiqatın informasiya bazası: Tədqiqatın informasiya əsasını Dünya Bankı, Federal Ehtiyatlar İqtisadi Məlumat Bazası, Azərbaycan Dövlət Statistika Komitəsi və Azərbaycan Respublikasının Mərkəzi Bankının məlumat bazaları təşkil etmişdir.

Tədqiqatın məhdudiyyətləri: Dövlətin bizneslərin kreditləşməsinə ayırdığı yardımlarla bağlı və pandemiya dövründə istehlak və yığım davranışları ilə bağlı yetərli statistik məlumat bazasının olmaması.

Tədqiqatın elmi yeniliyi və praktiki nəticələri: İnflyasiya və faiz dərəcələri ilə problemli kreditlər arasında mənfi əlaqə tapılmışdır, kreditlərin girov təminatı və bankların kredit siyasətinə dövlət nəzarətinin gücləndirilməsi tövsiyyə olunmuşdur.

Nəticələrin istafadə oluna biləcəyi sahələr: Dissertasiyanın nəzəri və metodoloji nəticələri dövlətin pul-kredit siyasətində və gələcək tədqiqatlar üçün elmi mənbə kimi istifadə edilə bilər.

Açar sözlər: COVİD-19, problemli kreditlər, pul-kredit siyasəti, Azərbaycan

DYNAMICS OF NON-PERFORMING LOANS DURING COVID-19 CRISES IN AZERBAIJAN: REASONS AND RISKS FOR THE FINANCIAL SECTOR

The actuality of the subject: Increase of NPL rates in crisis periods creates environment for increasing risks for financial system. Bank loans are main source of financing businesses in the countries with non-developed financial markets like Azerbaijan. Hence, analysis of dynamics of non-performing loans during Covid-19 has uttermost importance.

Purpose of the research: The purpose of this study is to analyze dynamics and impact of Covid-19 to dynamics of NPL in Azerbaijan.

Used research methods: Econometric methods like "FMOLS", "DOLS" and "CCR" are applied using Eviews software.

The information base of the research: The information base of the study is based on the World Bank database, Federal Reserve Economic Database, The State Statistical Committee of the Republic of Azerbaijan and Central Bank of the Republic of Azerbaijan databases.

Restrictions of research: Lack of statistical database on government support to financing of businesses and change in consumption and saving behaviors of people during pandemic.

The novelty and practical results of investigation: Significant negative link is detected between NPL rates and macroeconomic factors like inflation and lending rates. As a policy recommendation, it is proposed that government should improve regulations on collateralization of loans and banks' loan policies.

Scientific-practical significance of results: Theoretical and methodological results of the work can serve as a scientific source for further research and can be used in monetary policy of government.

Keywords: COVID-19, non-performing loans, monetary policy, Azerbaijan

ABBREVIATIONS:

GDP	**Gross Domestic Product**
CBAR	**Central Bank of the Republic of Azerbaijan**
USA	**United States of America**
AZN	**Azerbaijani manat**
DDOLS	**The Dynamic Ordinary Least Squares**
FMOLS	**Fully Modified Least Squares**
CCR	**Canonical Cointegrating Regression**
USD	**United States dollar**

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INTRODUCTION

The actuality of the subject: The banking system is the crucial and greatest part of the financial system of Azerbaijan, as a country with non-developed financial markets, bank loans are the most essential fuel for the economic growth of Azerbaijan. Amid the importance of bank loans in financing economic growth, the possibility of an increase in non-performing loan 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 global economy, as well as Azerbaijan's economy. Despite the economic downturn, non-performing loan ratio in Azerbaijan decreased from the average of 10.76% in 2019 to the average of 7.44% in 2020 and average of 6.02% in the first three quarters of 2021. Analyzing cases of other countries, it is observed that most countries which experienced the negative real GDP growth in the Great Financial Crisis of 2008, also experienced increase in the non-performing loan rates. But in the almost 44% of those countries experienced 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 causes of them, the Great Financial Crisis of 2008 was already caused by rising non-performing loan rates in subprime mortgage loan markets and hence increase in non-performing loan rates were not just result of crisis, but also reason of crisis. Other reasons of decreasing non-performing loan rates in Covid-19 pandemic period, can be government transfer payments to support closed businesses, increasing saving rate as a result of distant working practices and many entertainment activities being closed down.

Formulation of problem: Previously, there is one detailed research on the topic of non-performing loan rates in Azerbaijan, they used both bank-specific (Capital adequacy ratio, Total Assets) and macroeconomic (unemployment rate, interest rate, GDP Growth rate, exchange rate) determinants in regression analysis and among macroeconomic determinants found 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,S. et al, 2018). They didn't include inflation into model to prevent multicollinearity problem. Per my knowledge, this research paper will be the second analyzing dynamics of non-performing loan rates in Azerbaijan.

Globally, main macroeconomic factors impacting non-performing loan rates found to be real GDP growth, inflation rates, interest rates, unemployment rates and exchange rates. Most research found significant negative relationship between real GDP growth and NPL rates (Wood and Skinner, 2018; Ahmad F. and Bashir T., 2013; Akinlo, O. and Emmanuel M.,2014; Zeman 2007; Greenidge and Grosvenor, 2010; Kastrati, 2011; De Bock and Demyanets, 2012; Rajah, 2016; Jordan and Tucker, 2013; Jakubik, 2007). Some research found significant positive relationship between inflation and NPL rates (Klein – IMF study, 2013; Bhattari, 2015; Ahmad F. and Bashir T.,2013; Babouceck and Jancar, 2005; Greenidge and Grosvenor, 2010), while some of them found significant negative relationship between these 2 variables (Solarin and Daharan, 2011; Gerlach et al, 2005; Kastrati, 2011; Ouhibi,S. and Hammami,S., 2015; Rajah, 2016; Jakubik, 2007) and some of research found no significant releationship between them (Akinlo, O. and Emmanuel, M., 2014). Some research found significant positive relationship between interest rates and non-performing loan rates rates (Solarin and Daharan, 2011; Akinlo, O. and Emmanuel M., 2014; Zeman, 2007; Rajah, 2016; Jakubik, 2007), while some found significant negative relationship (Wood and Skinner, 2008; Ahmad F. and Bashir T., 2013) and some of them found no significant relationship (Saba, Kouser and Azeem, 2012).

In this research paper, focus will be on impacts of Real GDP growth, interest rates and inflation rates on non-performing loan rates. The study has three sections, the first section will provide a theroetical and conceptual framework, the second section will provide information on outbreak of Covid-19 in Azerbaijan and its socio-economic impacts, while the third section will include empirical analysis.

Purpose and tasks of the research: The purpose of this study is to analyze dynamics and impact of Covid-19 to dynamics of NPL in Azerbaijan. In order to complete this task:

- theoretical background has been established;
- previos research on this topic has been reviewed
- statistical analysis has been applied
- policy recommendations have been introduced.

The object and predmet of the research: The determinants of non-performing loans in Azerbaijan are the object of the research. Establishing the theoretical background of this problem is the predmet of research.

The methods of research: FMOLS, DOLS and CCR methods are used.

The information database: The information base of the study is based on the World Bank database, Federal Reserve Economic Database, The State Statistical Committee of the Republic of Azerbaijan and Central Bank of the Republic of Azerbaijan databases.

Restrictions of research: Lack of statistical database on government support to financing of businesses and change in consumption and saving behaviors of people during pandemic

The novelty and practical results of investigation: Significant negative link is detected between NPL rates and macroeconomic factors like inflation and lending rates. As a policy recommendation, it is proposed that government should improve regulations on collateralization of loans and banks' loan policies.

Scientific-practical significance of results: Theoretical and methodological results of the work can serve as a scientific source for further research and can be used in monetary policy of government.

CHAPTER I. NON-PERFORMING LOANS AND THE COVID-19 CRISIS: A THEORETICAL AND CONCEPTUAL FRAMEWORK

1.1. Non-performing loans as a threat to financial stability

Financial system has a very crucial role in the economic development of society. Financial system enables transfer of funds among different parties. Let us explain the main role of the financial system in simple words. For instance, imagine a situation where there is one person who has excess savings, but does not have any idea how to invest it, thus this person just keeps this money without investing and earning on this. At the same time there is another person who has a very good investment idea, but does not have enough money to invest this money. To improve efficiency, these persons should transact with each other. The person with excess savings should lend this money to the person with a good investment idea. Doing that, both can be better off. The person with excess savings can earn return on money he or she lends and the person with shortcoming of savings but with a good investment idea can earn on his or her investment idea.

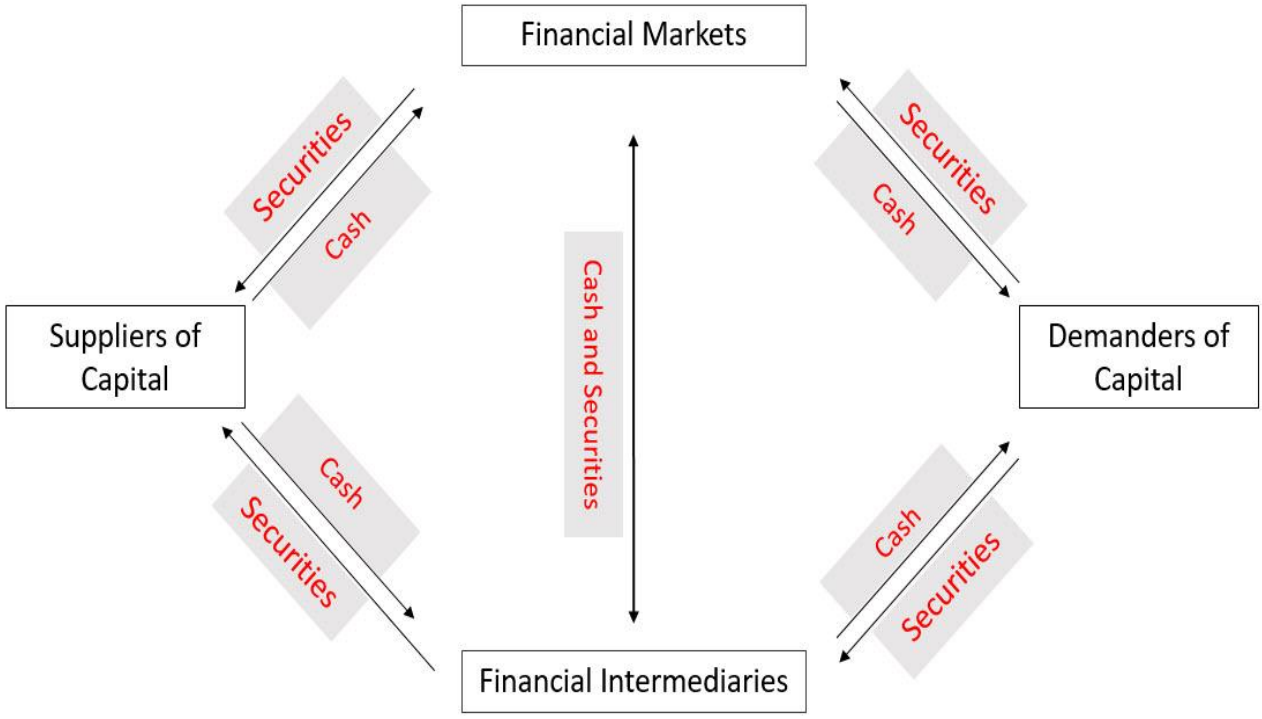
Simply put, the financial system's role in economic development can be explained as above. The process explained above can happen directly or with the use of intermediaries. Generally, the idea is that the role of intermediaries is crucial in the financial system. Again simply put, for instance in direct transaction, if one person has excess savings should search out a person with a good investment idea, but with shortcoming of savings, should evaluate this person's investment plan and decide whether this investment is feasible or not. This process can be burdensome for most people, as very few people have enough financial knowledge in evaluating investments, and even fewer people would have enough time to do that properly. But in another example, imagine that there is an intermediary called a bank, which takes deposits from people with excess savings and lends to people with shortcoming of savings. These banks can evaluate feasibility of investment projects better than ordinary people, can run legal operations more efficiently, etc.

There are many financial intermediaries in the financial system:

- Commercial banks
- Investment banks
- Credit unions
- Brokers and dealers
- Mutual funds
- Hedge funds
- Insurance companies, etc.

The graph below explains financial system well:

Diagram 1. Structure of financial markets



Source: Bracker; Lin and Pursey, 2018

Although Banks are not as large a part of the financial system as before, they still have a very crucial role in the financial system. Especially, in countries where financial markets did not improve as in the developed countries, banks even play a more important role. We should include a note here that Azerbaijan is one of these countries

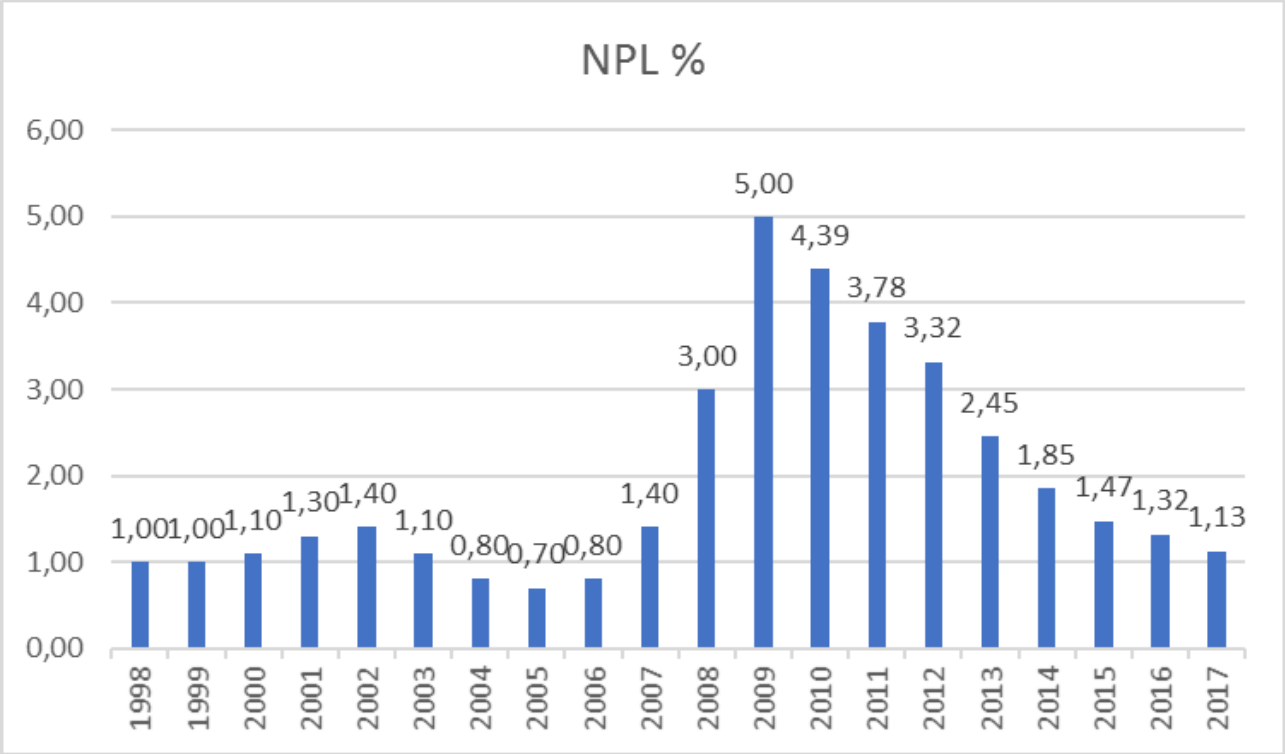
where Banks dominate the financial system of the country. Some research found significant positive link between bank credits and non-oil GDP (Mukhtarov, Humbatova and Seyfullayev, 2019).

As we said in the paragraph above Banks have a crucial role in the financial system as intermediaries. In order to understand the role of non-performing loans better in the economy, firstly let us look at what role Banks have. Banks are important, because they take our savings as deposit and lend to parties with shortcoming of funds more efficiently than us. How does the Bank do that more efficiently than us? Answer is by specializing, Banks have departments on credit analysis which specialize on evaluation of borrowers, banks have legal departments which specialize on issues like bankruptcy, covenants, etc. Banks have millions of depositors and borrowers, and significantly fewer employees can serve these millions by specializing. Thus, simply put we can say that banks are more efficient for people with excess funds, because these people think that banks can invest their money in better projects than themselves, so that they can get their money back when needed. But when there is a significant amount of non-performing loans, it means that the bank fails to operate efficiently and cannot implement its role in the financial system. This may cause panic in the financial system, all depositors may come to demand their money and banks can fail which will result in destruction for the financial system and economy. This kind of situation has happened many times in different countries and the most popular one may be the Great Financial Crisis of 2008.

One of the biggest economic crises of recent history is an example of how non-performing loans can be problematic for the economy. Before the 2008 Financial Crisis, banks increased excessive lending on mortgage products, as banks then securitized these loans into mortgage-backed securities and sold them to investment funds (other financial intermediaries), they started to overlook individual risks in these loans and lend money to people with low credit rating and low payment ability. This situation created a great bubble as housing prices continued increasing. Borrowers purchased

houses with a mortgage and after one, or two months they could sell the same house for higher value and get profits. But when the FED got aware of this bubble and raised the rates in order to stop this, the housing market stopped increasing and housing prices started to decline, hence as a result, the Loan-to-Value (comparison of loan value to collateral's value) ratios declined and many loans to borrowers with low credit history and low payment ability became non-performing loans. Below you can see graph of share of non-performing loans held by banks in USA and observe how these figures rose in 2008:

Diagram 2: Non-performing loan rates in United States of America

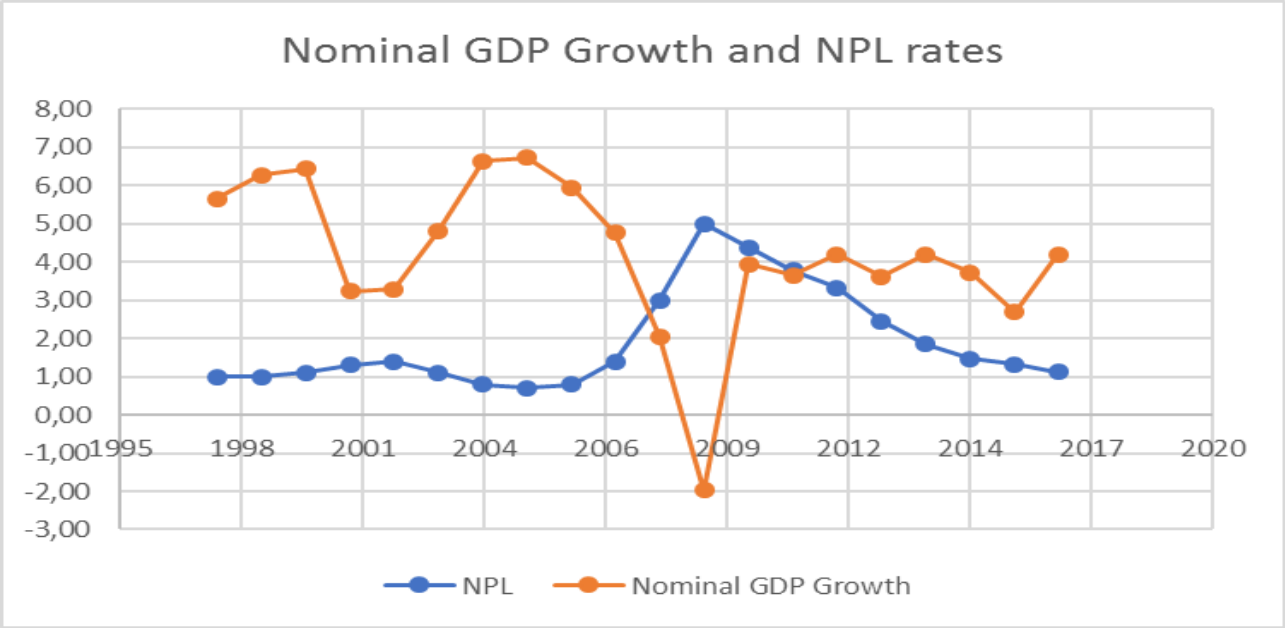


Source: Federal Reserve Economic Data, 2022 (www.fred.stlouisfed.org)

As a result of the sharp increase in non-performing loans, many banks and investment funds declared their bankruptcy, many people lost their jobs and savings and the global financial crisis evolved. Hence, it would reasonably be expected that significant disruption would be observed in the general economy simultaneously with increasing non-performing loan rates, bankrupt banks and other financial institutions.

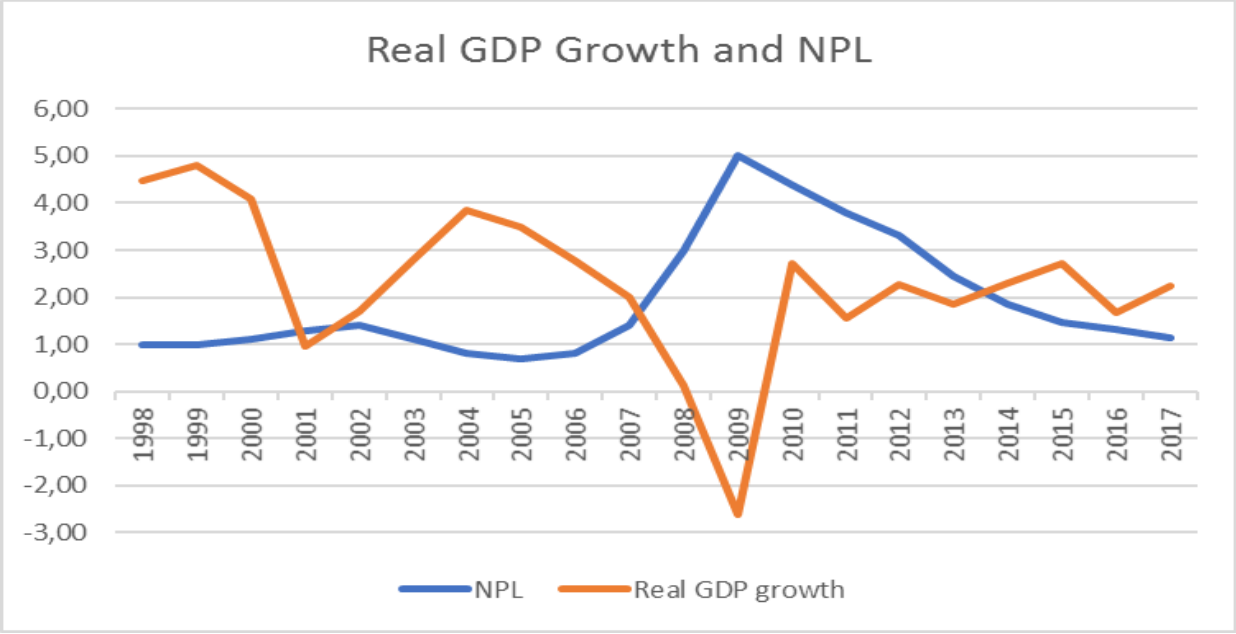
In the graphs below, relationship between the non-performing loan rates and nominal and real gross domestic production growth rates can be observed:

Diagram 3: NPL rates and Nominal GDP Growth in United States of America



Source: Federal Reserve Economic Data, 2022 (fred.stlouisfed.org)

Diagram 4: NPL rates and Real GDP Growth in United States of America



Source: Federal Reserve Economic Data, 2022 (fred.stlouisfed.org)

The negative relationship between non-performing loan rates and nominal and real Gross Domestic Product growth rates can be observed clearly. You can also see

correlation matrix between these variables in the table below. Again, this is also evidence for clear negative correlation:

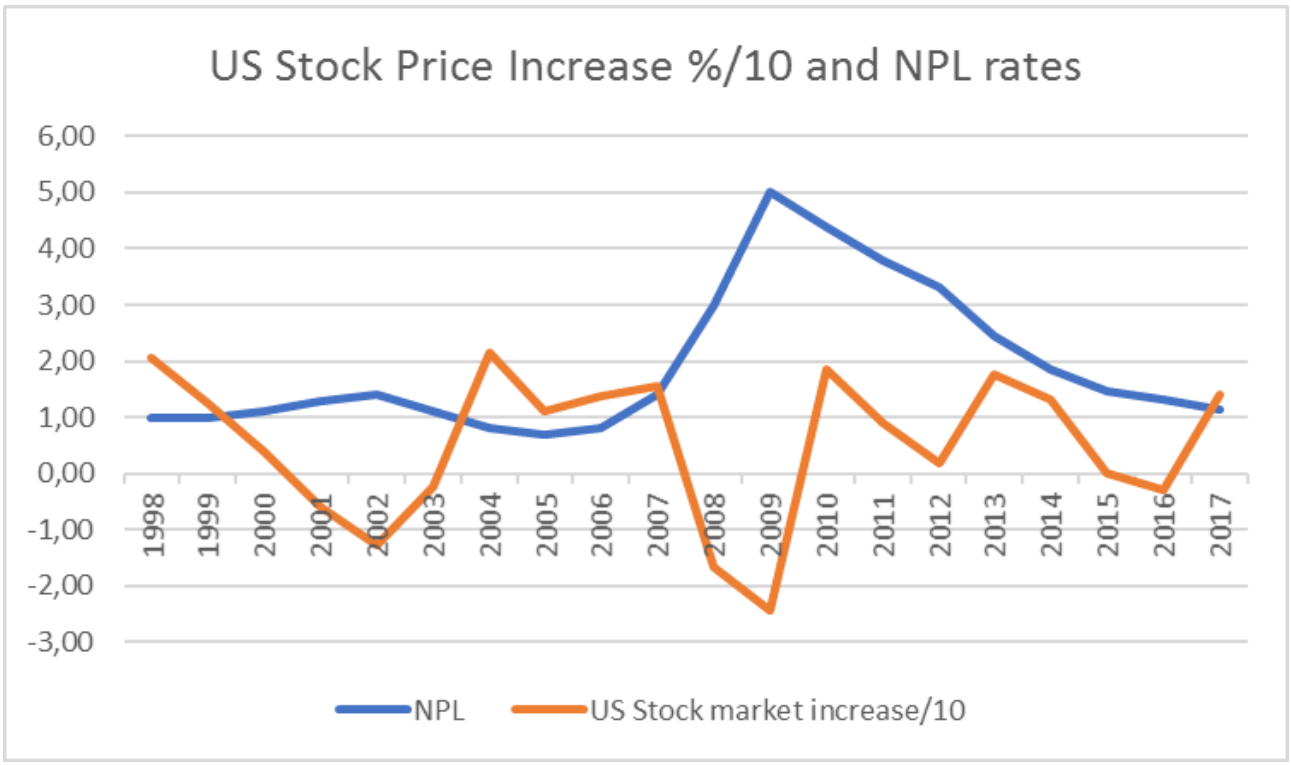
Table 1: Correlation matrix between NPL and Nominal and Real GDP Growth rates in United States of America

Correlation matrix	Nom GDP Growth (USA)	Real GDP Growth (USA)
NPL (USA)	-0,71282764	-0,659503909

Source: Federal Reserve Economic Data (www.fred.stlouisfed.org); Author calculations

The graph below shows how the 2008 Financial Crisis and general non-performing loans rate impacted stock market:

Diagram 5: NPL rates and Stock Market price returns in United States of America



Source: Federal Reserve Economic data, 2022 (fred.stlouisfed.org)

It can be observed from the graph above that the relationship between non-performing loan rates and total share price increase in the United States of America is less clear-cut than the relationship between non-performing loan rates and nominal and

real gross domestic product growth rates. It can also be observed from the correlation matrix below:

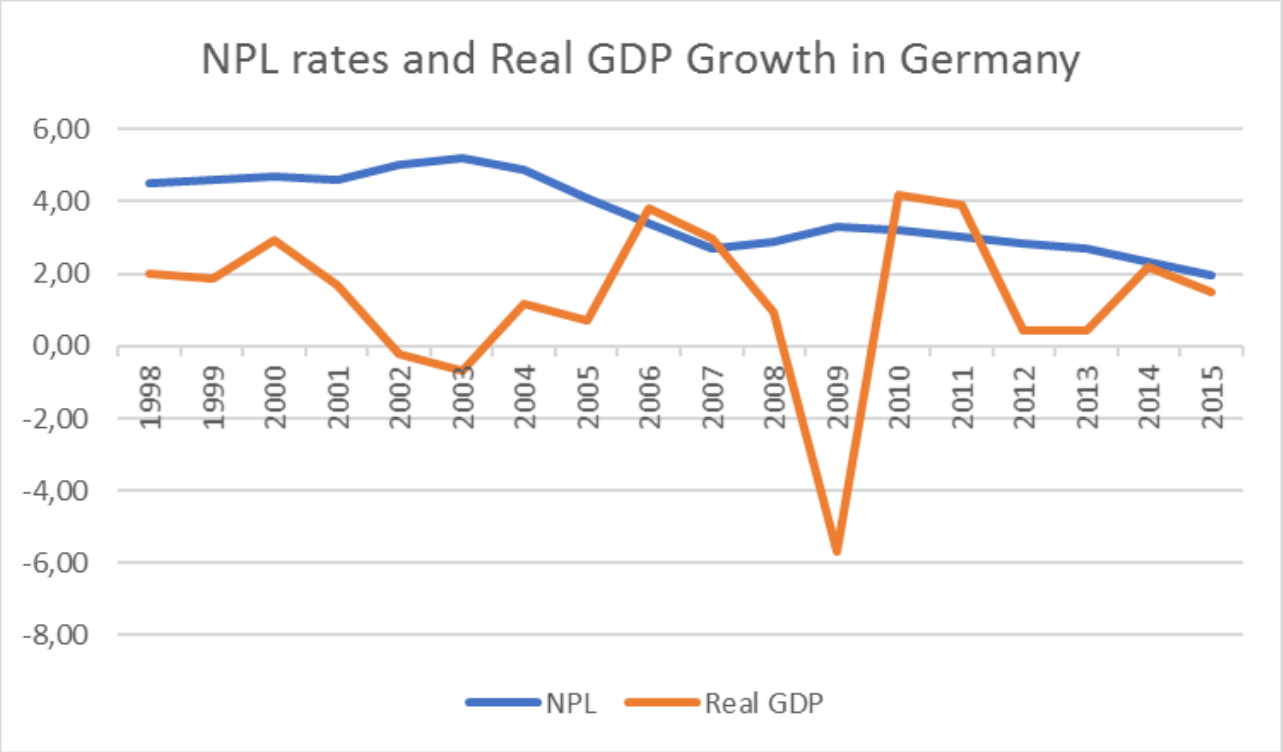
Table 2: Correlation matrix between NPL, Nominal and Real GDP Growth rates and Stock market price returns in United States of America

Correlation matrix	US Nom GDP Growth	US Real GDP Growth	US Stock market price increase
NPL	-0,71282764	-0,659503909	-0,346999472

Source: Federal Reserve Economic Data, 2022 (fred.stlouisfed.org); Author calculations

In order to observe another country's case, Germany is chosen as the largest country for its gross domestic product in the European Union:

Diagram 6: NPL rates and Real GDP growth in Germany



Source: Federal Reserve Economic Data (www.fred.stlouisfed.org), 2022

Differently from the graph showing this relationship in the United States, there is less clear-cut correlation. Thus, when correlation matrix is calculated it can be observed that there is still negative correlation, but not the strong one:

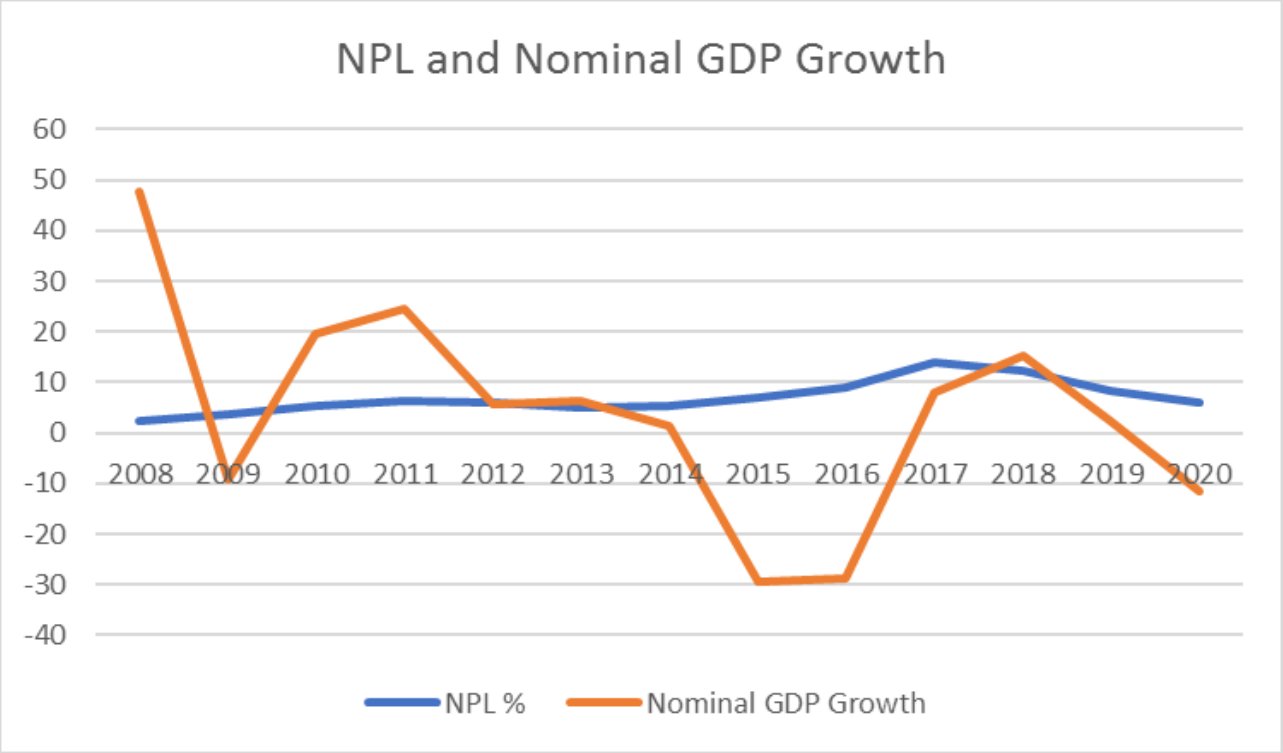
Table 3: Correlation matrix between NPL and Real GDP Growth rates in Germany

Correlation matrix	Real GDP
NPL	-0,12163

Source: Federal Reserve Economic Data, 2022 (www.fred.stlouisfed.org); Author calculations

As the Germany case presents different results, it is rational to look at another examples. Azerbaijan is one of the countries that did not take severe damage in 2008 Financial Crisis. In the graph below, relationship between non-performing loan rates and nominal gross domestic product growth rates in Azerbaijan can be observed:

Diagram 7: NPL rates and Nominal GDP growth in Azerbaijan



Source: Statistics Committee of Azerbaijan (stat.gov.az) and Central Bank of Azerbaijan (cbar.az), 2022

More similar to Germany's case, there is no clear-cut observable relationship between non-performing loan rates and nominal gross domestic product growth rates. But there is still negative correlation even if it is not strong. Calculation correlation matrix presents results below:

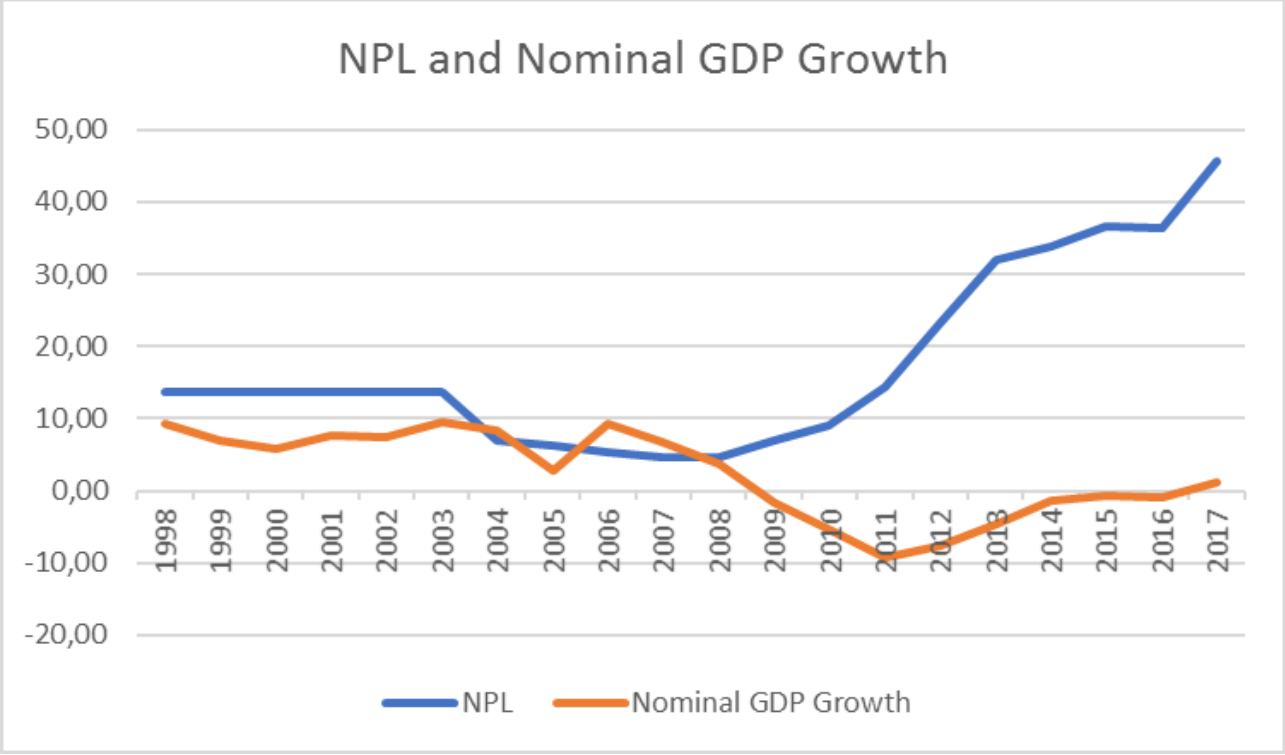
Table 4: Correlation matrix between NPL and Nominal GDP Growth rates in Azerbaijan

Correlation matrix	Nominal GDP Growth (Azerbaijan)
NPL rates (Azerbaijan)	-0,20623

Source: Statistics Committee of Azerbaijan and Central Bank of Azerbaijan (stat.gov.az), 2022; Author calculations

Another interesting case may be Greece, which is one of the countries most impacted by the 2008 Financial Crisis. In Greece, correlation between non-performing loans and nominal gross domestic product rates seems stronger than in Germany And Azerbaijan:

Diagram 8: NPL rates and Nominal GDP growth in Greece



Source: World Bank (data.worldbank.org), 2022

Correlation matrix is also presented below:

Table 5: Correlation matrix between NPL and Nominal GDP Growth rates in Greece

Correlation matrix	Nominal GDP Growth (Greece)

NPL (Greece)	-0,405293708

Source: World Bank (data.worldbank.org), 2022; Author calculations

According to the US government organizations, the number of closed banks during and afterwards of the 2008 financial crisis was 465. And this number is just in the United States of America and not including other countries in the world.

As a result of all previous discussions, one question arises: are non-performing loans such a bad, intolerable thing? This question has also no clear-cut answer as many questions in Finance. One thing is straightforward that excessive risk-taking may result in excessive non-performing loans and this can result in failure of banks, and if these banks are big ones, a new global financial pandemic can happen. But one thing to consider is that as much as non-performing loans are risks to financial stability, banks cannot perform without non-performing loans in the real practice. Many banks have millions and even billions USD of loan portfolio and of-course there will be some non-performing loans. Here, we can mention very important financial phenomenon - diversification.

Simply put, diversification is about improving the risk-return relationship of a portfolio by adding assets to the portfolio with correlation less than 1. As in our case, assets are loans, how can diversification be achieved? For instance, let us take the example of X bank, imagine that this bank has a 1 billion USD loan portfolio. This portfolio must be diversified in order to minimize non-systematic, or individual risks. For instance, if any A company has a 200 million USD loan by X Bank, it means that X bank's 20% portfolio consists of just one company and this means low diversification. Any event that causes A company's performance to deteriorate, could result in a 20% non-performing loan rate for X Bank and may cause X Bank to declare bankruptcy. And we should note that this diversification is not just about companies, but also different industries and sectors, geographical areas, etc. Ideally, banks' risk departments should draft target distribution of loans to economic sectors and when there

is a mismatch between reality and target, corrective measures should be taken. For example, such draft file can be like:

15% - Agriculture sector

15% - Oil and energy sector

15% - Retail

15% - Residential construction

15% - Industrial construction

15% - Health

15% - Other sectors

After drafting initial targets, it can be changed due to different situations arising. For example, if there is a negative outlook about oil prices, distribution for the oil sector can be decreased or if the government plans to increase the investment into the healthcare sector, distribution to healthcare sector can be increased etc.

To summarize information above we can say that non-performing loans can be very harmful for the economy when there are excessive amounts of it, but also low numbers of non-performing loan rates are totally normal. In order to further summarize the threat of non-performing loans to economy, let us note points how non-performing loans may harm economy:

- Increase in non-performing loans will result in a decrease in operating profits of banks, which will result in lower payment ability of banks. Lower payment ability will also increase interest rates on new debt banks will take and banks must increase interest rates on its loans in order to maintain operating profitability. This may result in lower payment ability of bank's borrowers and further this process may continue. And in the extreme cases, rise in non-performing loans result in bankruptcy of banks.
- Increase in non-performing loans may result in bankruptcy of a single bank, which may cause panic among depositors of other banks, so they may go to their banks to draw their deposits back and banks may not be able to give back people

their money in this systemic crisis and may be forced to declare bankruptcy. In this kind of situation, governments must intervene, provide liquidity to the banks or guarantee deposits of people.

- On the country level, high rates of non-performing loans indicate high risk, thus credit rating institutions lower countries' credit ratings and this results in increase of interest rates on a country's debt, and make a country's debt more burdensome.

1.2. Determinants of the non-performing loans: a literature review

Although there is not very large literature based on Covid-19 pandemic and non-performing loans, we can investigate general determinants of non-performing loans and then estimate whether Covid-19 impacted non-performing loan rate through these determinants.

Saba, Kauser and Azeem (2012) researched US Commercial Banks in the period of 1985-2010 using different econometric models. Previous studies (Keeton, W. & Charles, S. M. (1987)) has found that the significant percentage of variation in the non-performing loan rates can be explained by macroeconomic factors. Saba, Kauser and Azeem (2012) have chosen three independent variables (Real GDP per capita, interest rate and total loans) and the dependent variable was non-performing loan rate. They found that Real GDP per capita has a negative relationship with non-performing loan rate, and also interest rates seemed to have a negative relationship with non-performing loan rate, but not statistically significant.

Metin Vatansever and Ali Hepsen (2013) researched macroeconomic determinants of non-performing loan rates in Turkey during the period of 2007-2013. They used linear regression and cointegration models. They found that the Industrial Production Index had negative correlation with non-performing loan rates, and the Istanbul Stock Exchange 100 Index also had negative correlation with non-performing loan rates. Also, the unemployment rate has been found to have a significant positive relationship with non-performing loan rates.

Petr Jakubik (2007) researched Czech economy in the second part of 90s to analyze the correlation among economic factors and non-performing loans. Using Merton-type modelling, he found strong correlation between macroeconomic factors and non-performing loans. Variables representing GDP growth and Inflation were found significant at 5% level, and a variable representing nominal interest rate was found significant at a 1% level. GDP growth and inflation were found to have a negative impact on credit risk. Researchers also found a significant positive impact of nominal interest rate on credit risk.

An IMF working paper written by Nir Klein analyzed determinant factors of non-performing loans in Central Europe, Eastern Europe and South-Eastern Europe countries. These analyzed countries include Bosnia and Herzegovina, Bulgaria, Hungary, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Macedonia, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia and Ukraine. Period chosen for analysis is from 1998 until 2011. In this research paper, Klein found that higher unemployment rate is correlated with higher non-performing loan rates as expected. Klein also found that exchange rate depreciation in these countries against the euro is also correlated with higher non-performing loan rates. Another finding is the positive relationship between inflation rate and non-performing loan rate. Also, one of the interesting findings was about the global risk aversion factor which was represented by the VIX index. The Cboe Volatility index is accepted as an expected (by market) volatility over 30 days. Klein found that higher Cboe Volatility Index was associated with higher non-performing loan rates. Another finding offered by this working paper was a negative relationship between gross domestic product growth and non-performing loan rates.

Bhattari (2015) analyzed monthly data from 26 commercial banks of Nepal for the period of 2000-2012. Bhattari found that one of the most important economic factors that impact the non-performing loan rates is the 12 months lagged inflation rate. There was found a significant positive relationship between 12 months lagged inflation rate

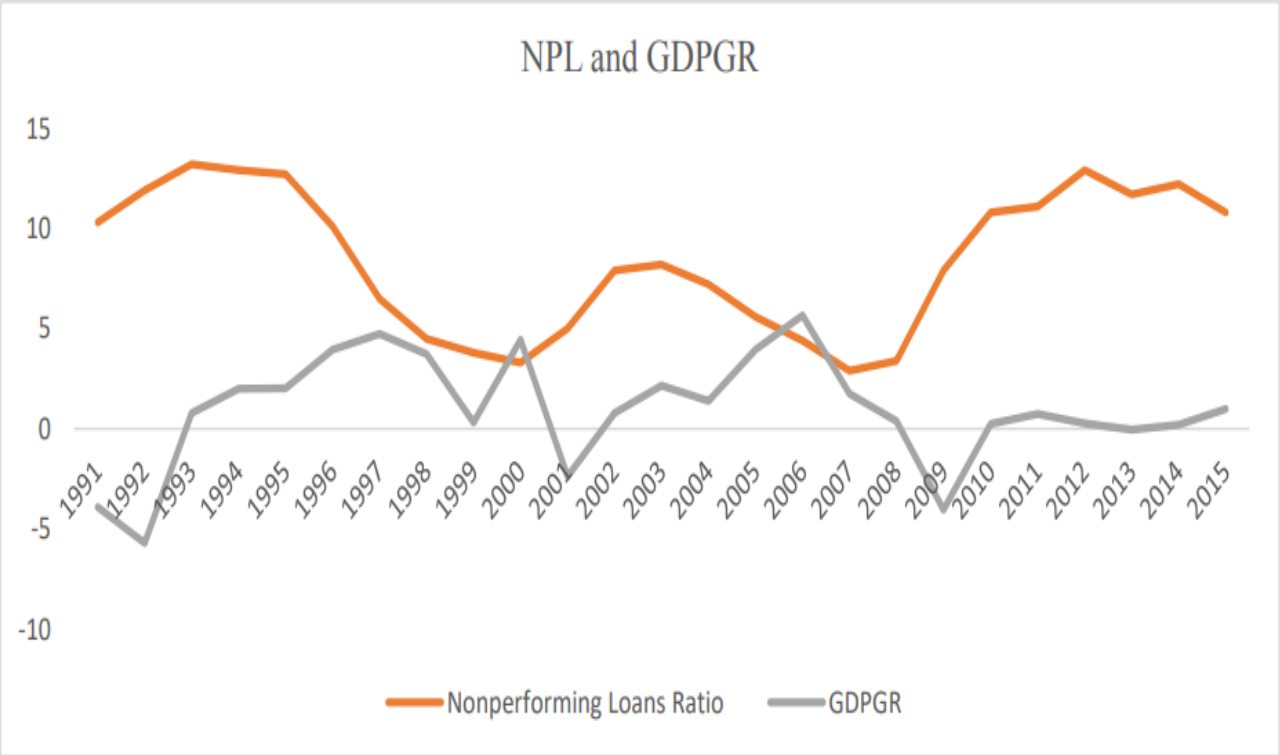
and non-performing loan rates. Another significant factor was found real exchange rates. Bhattari found a significant negative impact between real exchange rate and non-performing loan rate. One interesting result was about gross domestic product growth. Despite the results of most literature, in this research there was not found any significant relationship between gross domestic product growth of Nepal and non-performing loan rates in Nepal. Another finding was about real interest rates. Bhattari found that banks, which have higher real interest rates, have higher non-performing loan rates in their portfolio.

Mukhtarov, Yuksel and Mammadov (2018) applying panel logit methodology to the data from 2010 to 2015 analyzed credit risk of commercial banks in Azerbaijan. It should be noted that non-performing loan rate was calculated at bank-specific level as a ratio of non-performing loan value to total loan value in this research. Banks with above average ratio were given 1, and banks with below average ratio were given 0, and then a logit model was applied. In this article, only the unemployment rate from macroeconomic variables was found to have a significant relationship at 5% level with non-performing loan rates. Direction of the relationship was positive as expected. Interest rate, another macroeconomic variable, was found to be significant at 10% level and this relationship was found negative.

Wood and Skinner (2018) analysing the financial system of Barbados from the period of 1991 until 2005 also found that some of the macroeconomic factors have a statistically significant relationship with non-performing loan rates. One of the statistically significant factors found was gross domestic product growth. Gross domestic product growth was found to have a statistically significant negative relationship with non-performing loan rates. Another statistically significant factor found was interest rates. Interest rates were found to have a statistically negative relationship with non-performing loan rates. Another statistically significant factor found was unemployment rates. Unemployment rates were found to have a statistically negative relationship with non-performing loan rates. The graph below is from Wood

and Skinner (2018) showing co-movement of gross domestic product growth rates and non-performing loan rates:

Diagram 9: NPL rates and Nominal GDP growth in Barbados



Source: Wood and Skinner (2018)

S.Adebola, W.Yusoff and J.Dahalan (2011) used an autoregressive distributed lag (ARDL) approach to study Islamic Banking System in Malaysia. In their research, they used the increase in producer price index as a proxy to inflation rates. They found significant negative cointegration relationship between inflation index (represented by producer price index) and non-performing loans ratio. Another finding from this article was about relationship between interest rates and non-performing loan ratios. They used average lending rates to represent interest rates in their model. In the result, they found positive significant cointegration relationship between high lending rates and non-performing loans ratio. As a summary, this research paper presents conclusion that high lending rates increase non-performing loans ratio, but high inflation rates decrease non-performing loan ratio.

Another research on this topic is from Ahmad, F. and Bashir, T. (2013). They applied Ordinary Least Squares method to analyze the Pakistani banking system in the period of 1990-2011. As a dependent variable they chose non-performing loan rates and as an independent variable they chose GDP growth, unemployment rate, interest rate, inflation rate, real effective exchange rate, exports. Findings are listed below:

- They found a significant negative relationship between Pakistan's GDP growth rate and non-performing loan rates.
- They found no significant link among Pakistan's unemployment rate and non-performing loan rates.
- They found a significant negative relationship between Pakistan's interest rates and non-performing loan rates.
- They found no significant relationship among Pakistan's real effective exchange rate and non-performing loan rates.
- They found a significant negative link among Pakistan's inflation rate and non-performing loan rates.
- They found a significant negative link between Pakistan's exports and non-performing loan rates.
- They found significant negative link between Pakistan's industrial production and non-performing loan rates.
- They found no significant relationship among Pakistan's foreign direct exports and non-performing loan rates.

O.Akinlo and M.Emmanuel (2014) analyzing Nigeria banking system applied ordinary least squares regression analysis. They used a non-performing loan ratio as a dependent variable. They used Gross Domestic Product growth, inflation, unemployment rate and interest rates as independent macroeconomic variables:

- They found a significant negative link among Nigerian GDP growth rate and non-performing loan rates.

- They found a significant negative link among Nigerian interest rate and non-performing loan rates.
- They found a significant positive relationship between Nigerian unemployment rate and non-performing loan rates.
- They found no significant link between Nigerian inflation rate and non-performing loan rates.

Dash M. and Kabra G. (2010) analyzing Indian commercial banking system found that real gross domestic production growth rate has significant negative impact on non-performing loan rates.

J.J.Bercoff, J. Giovanni and F.Grimard (2002) analyzing banking system of Italy, Greece and Spain in the period of 2004-2008 used non-performing loan rates as a dependent variable and real gross domestic production growth rate, unemployment rate, real interest rate as independent macroeconomic variables:

- They found a significant negative relationship among Italian GDP growth rate and non-performing loan rates.
- They found a significant positive link between Italian unemployment rate and non-performing loan rates.
- They found a significant positive relationship between Italian interest rate and non-performing loan rates.

M.Bofondi and T.Ropele (2011) analyzing loan's quality in Italy on the period of 1990-2010 found:

- A significant negative link between Italy's GDP growth rate and non-performing loan rates.
- A significant positive relationship between Italy's short-term nominal interest rates and non-performing loan rates.
- A significant positive relationship between Italy's unemployment rate and non-performing loan rates.

T.Khemraj and S.Pasha (2009) analyzing Guayenese banking sector over period of 1994-2004 used a panel dataset and a fixed effect model. They used the natural logarithm of the non-performing loans ratio as a dependent variable. They used real gross domestic product growth, logarithm of real interest rates, logarithm of inflation rate, and logarithm of real exchange rates as independent macroeconomic variables. They found:

- A significant negative link between Guayenese real gross domestic product growth and non-performing loan rates.
- A significant positive link between Guayenese real exchange rate and non-performing loan rates
- Gerlach et al (2005) analyzing Hong Kong banking system over years of 1994-2002 used gross domestic production growth and inflation rate as independent macroeconomic variables. They found:
- A significant negative relationship between Hong Kong's GDP growth rate and non-performing loan rates.
- A significant positive relationship between Hong Kong's nominal interest rates and non-performing loan rates.

Babouceck and Jancar (2005) analysing Czech economy in the period of 1995-2011 applied the vector autoregression method. They have found:

- A significant positive relationship between Czech unemployment rate and non-performing loan rates.
- A significant positive relationship between Czech inflation rate and non-performing loan rates.

Zeman and Jurca (2007) analysing Slovakian banking sector found:

- A significant negative relationship between Slovakian real gross domestic production growth and non-performing loan rates.

- A significant positive relationship between Slovakian domestic currency value and non-performing loan rates.
- A significant positive relationship between Slovakian nominal interest rates and non-performing loan rates.

Greenidge and Grosvenor (2010) analysing Barbados banking system found:

- a significant negative relationship between Barbados real gross domestic production growth and non-performing loan rates.
- a significant positive relationship between Barbados inflation rates and non-performing loan rates.

Guy and Lowe (2011) analysing bank stability in Barbados found:

- a significant negative relationship between Barbados's real gross domestic production growth and non-performing loan rates.
- a significant negative relationship between Barbados's inflation rates and non-performing loan rates.
- a significant negative relationship between Barbados's nominal interest rates and non-performing loan rates.

Fofack (2005) analysing non-performing loans in Sub-saharan Africa economies found:

- a significant negative relationship between Sub-saharan Africa real gross domestic production growth and non-performing loan rates.
- a significant positive relationship between Sub-saharan Africa domestic currency value and non-performing loan rates.
- a significant positive relationship between Sub-saharan Africa real interest rate and non-performing loan rates.
- a significant positive relationship between Sub-saharan Africa broad money supply and non-performing loan rates.

Kastrati (2011) analysing drivers of non-performing loans in transition economies including Azerbaijan found:

- a significant negative relationship between transition economies' real gross domestic production growth and non-performing loan rates.
- a significant negative relationship between transition economies' inflation rate and non-performing loan rates.

De Bock and Demyanets (2012) analysing banking system's asset quality in emerging market found:

- a significant negative relationship between emerging market real gross domestic production growth and non-performing loan rates.
- a significant negative relationship between emerging market domestic currency value and non-performing loan rates.

Ouhibi, S. and Hammami, S. (2015) analysing banking system in Southern Mediterranean Countries found:

- No significant relationship between Southern Mediterranean Countries real gross domestic production growth and non-performing loan rates.
- No significant relationship between Southern Mediterranean Countries unemployment rate and non-performing loan rates.
- A significant negative relationship between Southern Mediterranean Countries inflation rates and non-performing loan rates.
- A significant positive relationship between Southern Mediterranean Countries domestic currency value and non-performing loan rates.

Rajah (2016) analysing non-performing loans in the Joardanian banking sector during the period of 2008-2012 used panel data regression. In this research paper, he used real gross domestic production growth, interest rate and inflation rates as macroeconomic independent variables. He found:

- A significant negative relationship between Joardanian real gross domestic production growth and non-performing loan rates.
- A significant negative relationship between Joardanian inflation rates and non-performing loan rates.
- A significant positive relationship between Joardanian interest rates and non-performing loan rates.

Jordan and Tucker (2013) analyzing Bahamas banking system in the period of 2002-2011 applied vector error correction method. In this paper, they found a significant negative relationship between real gross domestic production growth and non-performing loan rates.

Outbreak of COVID-19 crises and the impact over non-performing loans

At the end of 2019, in the Chinese city of Wuhan, the new virus – SARS-CoV-2 was first identified and it resulted in global pandemic whithin short time frame. This pandemic resulted in vast economic disruption. GDP growth has been found as one of main significant determinants of non-performing loan rates in literature review and as a result of Covid-19 outbreak, according to World Bank, Global GDP shrunk 3.36%. For the note, during the Global Financial Crisis global GDP only shrunk 1.3% in 2009.

Currently United States of America is the country with the most total cases (53,026,765) in the world. According to World Bank data GDP of USA shrunk 3.6% in 2020 and NPL rates rose to 1.065% in 2020 from 0.855% in 2019.

II CHAPTER. OUTBREAK OF COVID-19 IN AZERBAIJAN AND ITS SOCIO—ECONOMIC IMPACTS

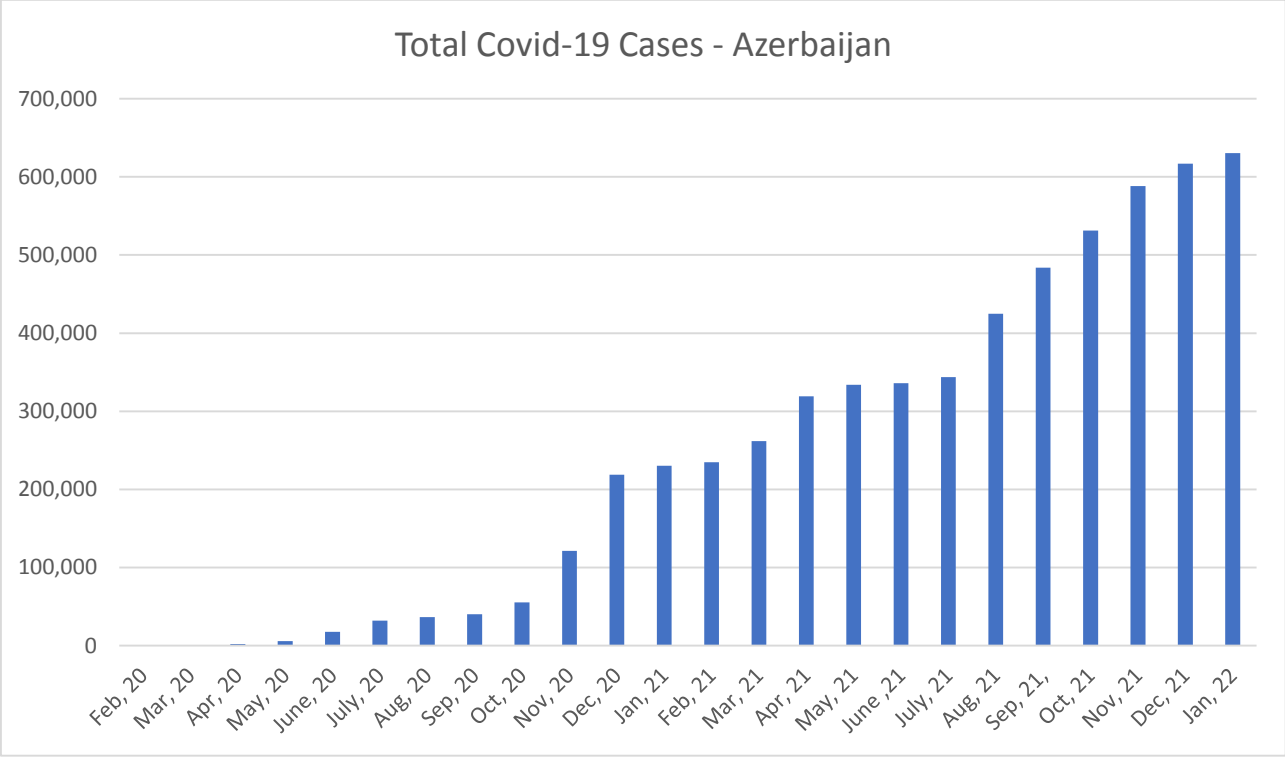
2.1 Outbreak of Covid-19 and the public policy responses in Azerbaijan

As of 26 December, 2021 Azerbaijan is the 58th country in the world for total cases with 614,119 total cases. According to World Bank data GDP of Azerbaijan shrunk 4.3% in 2020, but NPL rates decreased from 9.08% at the end of 2019 to 6.41% at the end of 2020. More about outbreak of Covid-19 in Azerbaijan, policy responses and possible reasons of decreasing NPL rates will be discussed in the next sections.

The first coronavirus case in Azerbaijan was officially recognized in 28th February, 2020. The special government entity – operational headquarter was founded on 27th February, 2020 which was one day before the first official case. The first death resulted from Covid-19 was recorded in 12th March.

The trend of total cases of Covid-19 in Azerbaijan is shown in the graph below:

Diagram 10: Total monthly Covid-19 cases in Azerbaijan



Source: World Health Organization (who.int), Worldometer (worldometers.info), 2022

As we can observe from the graph, total cases have increasing trend but at the different growth rates at the different periods and these differences in growth rates are impacts of policy responses, quarantine measures and restrictions.

Some of the early policy responses are listed below:

3th March – all education and related activities were stopped;

4th March – all import activities from Iran were restricted;

13th March – Borders were closed between Georgia and Azerbaijan;

14th March - Borders were closed between Georgia and Azerbaijan;

14th March – all public meetings, wedding and memorial ceremonies, theaters, museums, cinemas, fun centers, gyms were closed;

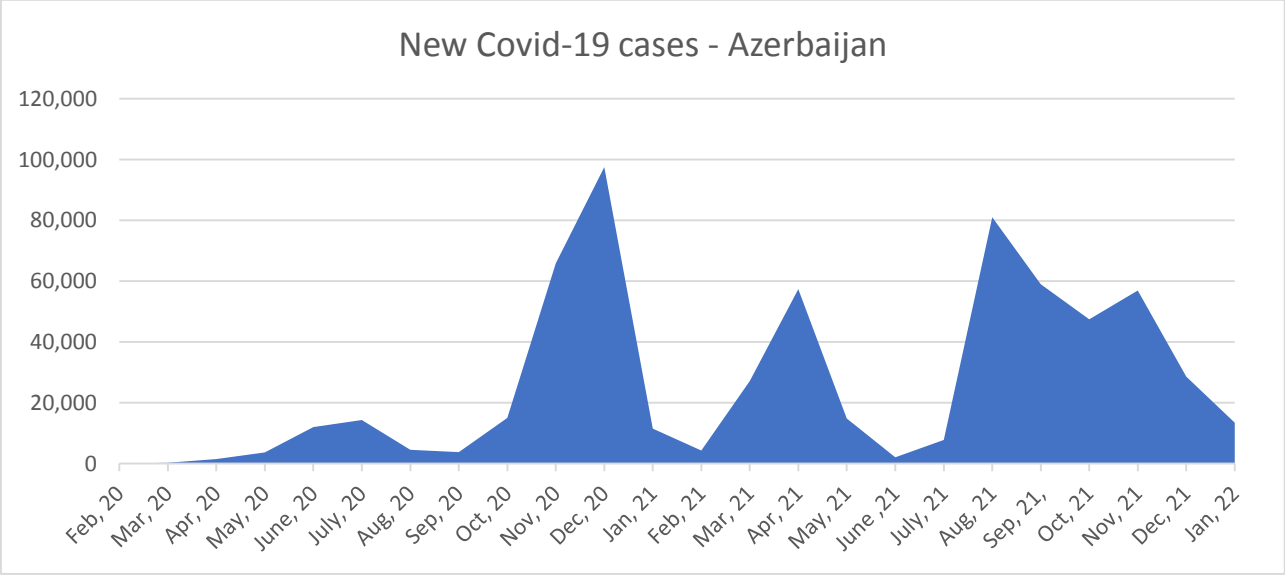
22th March – activities of all cafes and restaurants were restricted that they could only operate at hours within 9 a.m. and 3 p.m.;

23th March – all malls and shoppig centers were closed;

31st March – Nationwide quarantine was declared;

2nd April – Sms permission requirement to leave place of residence (for 2 hours) was declared;

Diagram 11: Monthy trend of Covid-19 cases in Azerbaijan

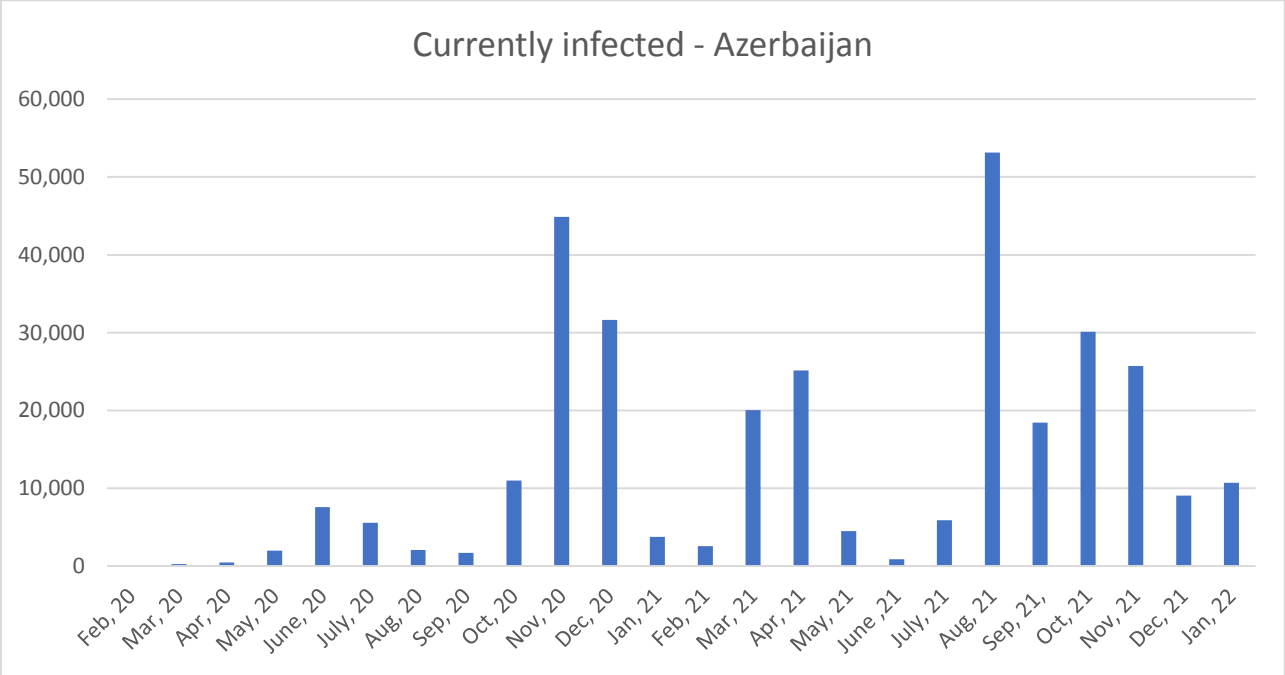


Source: World Health Organization (who.int), Worldometer (worldometers.info), 2022

As we can see from the graph, initial quarantine measures did not succeed to slow pandemic at early phase and there was high numbers of new cases per month as above ten thousand new cases in June and July of 2020.

Increasing quarantine measures after June, like restrictions on leaving residence place at weekends succeded on slowing case growth rate after July, 2020 and monthly new case numbers fell below five thousand at August and September. Then, easing of quarantine measures after decreasing new case numbers at September, 2020, resulted in accelerating new Covid-19 cases growth and almost equaled one hundred thousand at December, 2020. Again increased quarantine measures succeded to slow new cases growth and then easing quarantine measures resulted in accelerating growth. For better understanding, trend of currently infected people over 2 years is shown at the graph below:

Diagram 12: Number of currently infected people in Azerbaijan



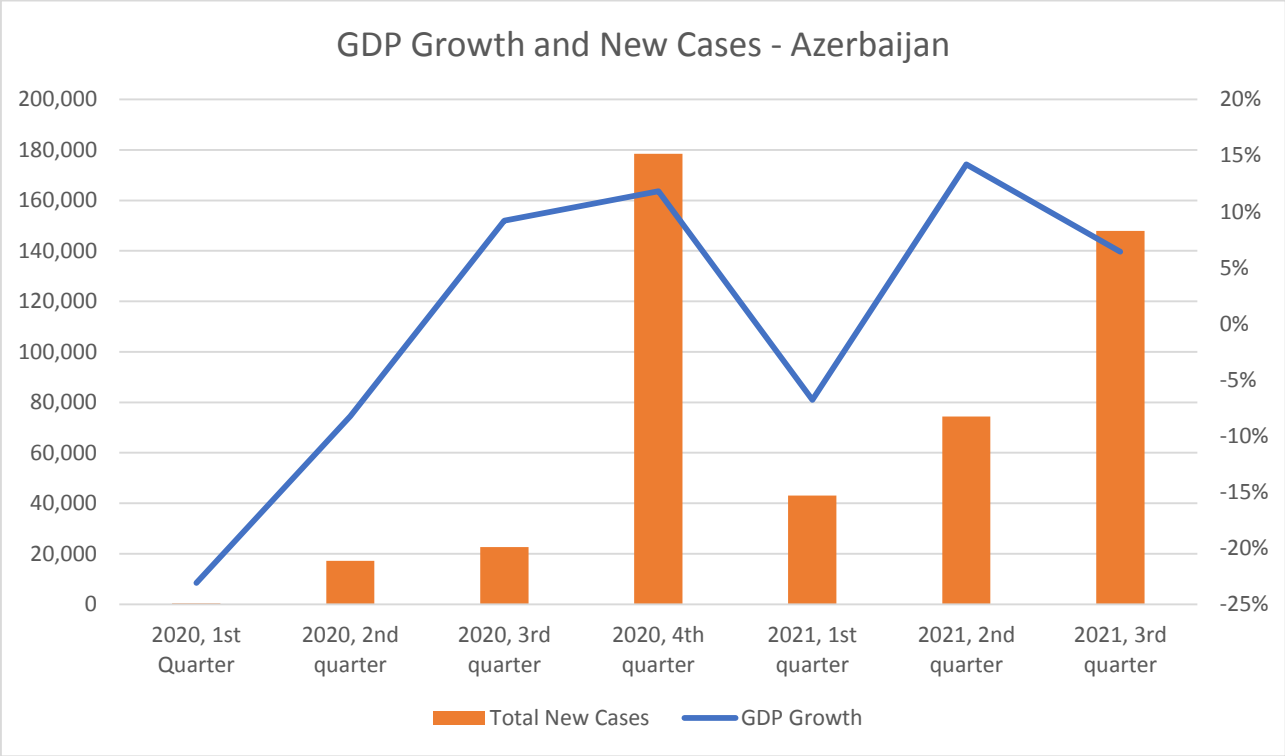
Source: World Health Organization (who.int), Worldometer (worldometers.info), 2022

As a result, we can observe wave-shaped trend of Covid-19 cases in Azerbaijan, cycle continued as increasing cases brought harsher quarantine measures, harsher quarantine measures slowed down case growth rate, slowed case growth rate brought easining quarantine measures, and easining quarantine measures brought higher case growth rate.

2.2. Primary socio-economic factors before and after the outbreak of Covid-19

According to literature review, we can assume that GDP growth is one of important factors that impact non-performing loan rates significantly. In the following graph, you can observe the comevement of New Covid-19 cases and GDP growth in Azerbaijan:

Diagram 13: Quarterly data of GDP Growth and number of new Covid-19 cases in Azerbaijan

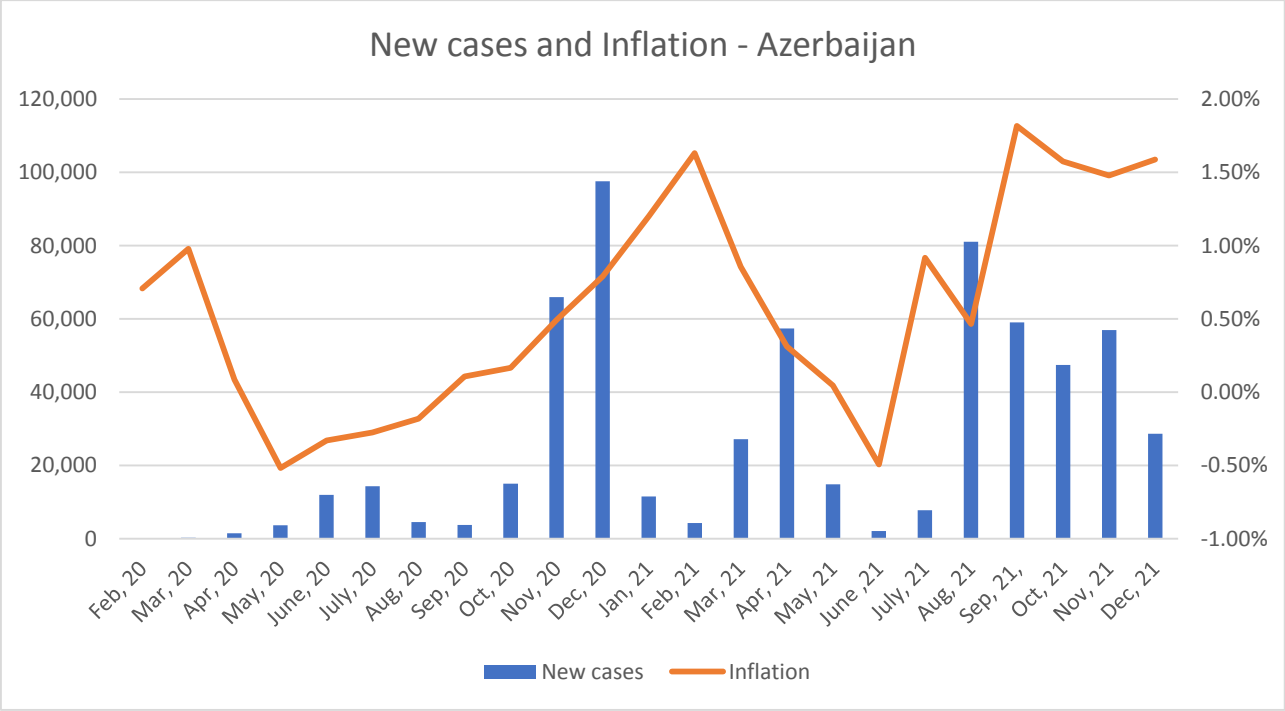


Source: WHO (who.int), Statistics Committe of Azerbaijan (stat.gov.az), 2022

Actually, there is no observable clear-cut relationship. It can be because of seasonality on data that GDP of Azerbaijan is, generally, significantly higher at the 4th quarter of each year than other periods. Another reason is that main factor impacting GDP was not number of diseased people, but quarantine regyme changes. These regyme changes, generally, happened with some lag, and this can be one of the reasons of blur relationship. In the next paragraphs, regression analysis will be used to determine whether there is a relationship between lagged value of Covid-19 cases and GDP growth in Azerbaijan.

In the following graph you can observe co-movement of new cases and inflation in Azerbaijan:

Diagram 14: Quarterly data of GDP Growth and number of new Covid-19 cases in Azerbaijan



Source: WHO (who.int), CBAR (cbar.az), 2022

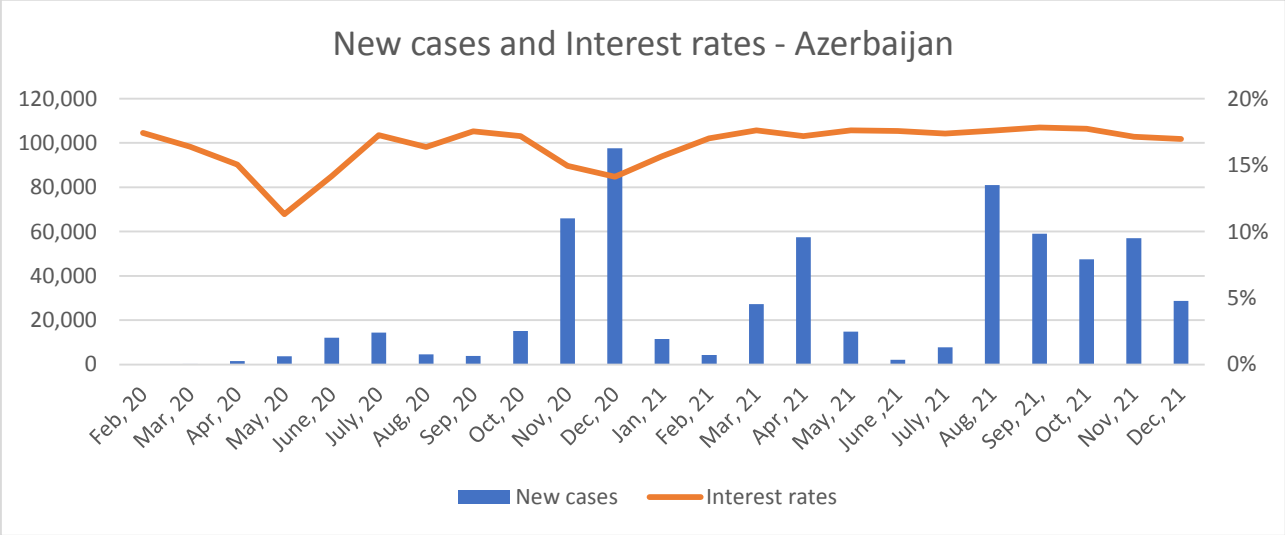
Amid similar reasons, there is no clear-cut relationship between inflation rates and number of new cases. It was not question with clear-cut answer to form expectations between inflation rates and number of new Covid-19 cases. Because there are some impacts moving in opposite directions. First of all, after the outbreak of Covid-19

pandemic with increasing number of cases, there was a certain economic disruption which impacted many people by causing losing jobs, increasing health expenditures and other directions. These impacts would result in lower discretionary income and can result in downward pressure to inflation as demand would decrease. But also, after Covid-19 pandemic, as the number of people working from home increased, the number of weddings decreased, most restaurants and other entertainment activities were closed, most people that did not lose job had a chance to save more. And after Covid-19 pandemic, these savings would be expected to form more demand to now-opened restaurants, entertainments, etc. As supply side may not keep pace with this demand, Covid-19 pandemic would expected to cause higher inflation in post-pandemic period and it caused.

In the next paragraphs, regression analysis will be used to determine whether there is a relationship between lagged value of Covid-19 cases and GDP growth in Azerbaijan.

In the following graph, you can observe co-movement of interest rates and number of new cases in Azerbaijan:

Diagram 15: Monthly data of interest rates and number of new Covid-19 cases in Azerbaijan

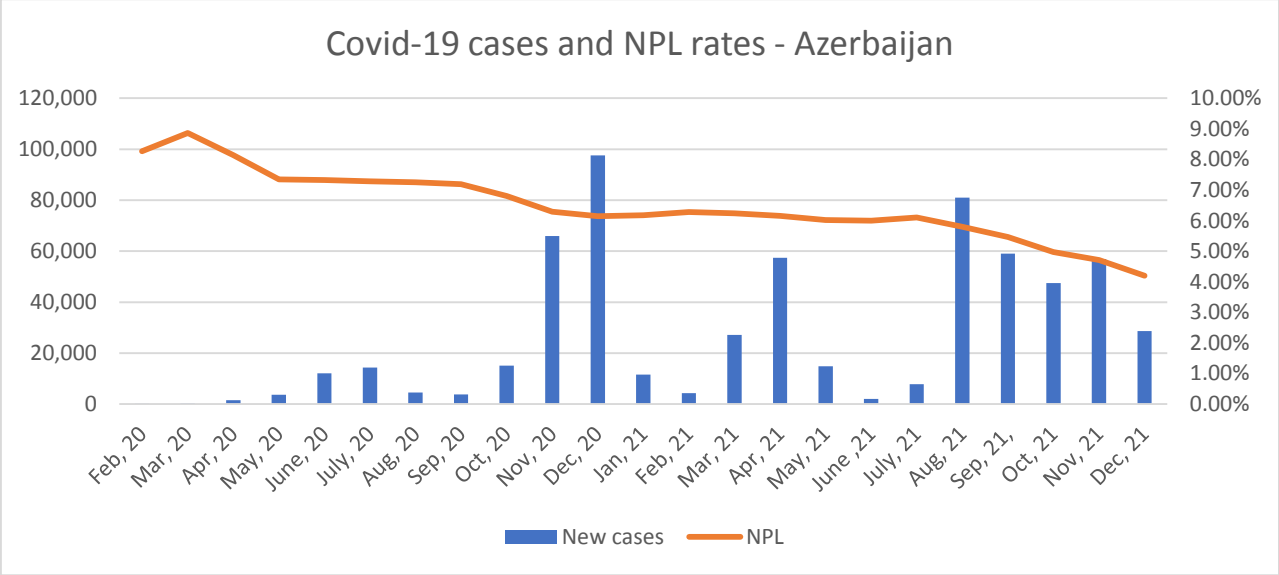


Source: CBAR (cbar.az), WHO (who.int), 2022

You can observe that interest rates are held stable in this period, generally, with some downward trends in quarantine periods. We should state that interest rates are dominated by actions of Central Bank in Azerbaijan and negotiations of commercial banks with its customers, as there is no developed financial markets. Most countries decreased interest rates significantly to prevent economic disruption caused by quarantine measures, but in Azerbaijan there is more slight downward trend. In regression analysis of next paragraphs, this relationship will be analyzed more deeply too.

In the graph below, the trend of non-performing loan rates in Azerbaijan is shown together with new covid-19 cases in Azerbaijan:

Diagram 16: Monthly data of NPL rates and number of new Covid-19 cases in Azerbaijan



Source: CBAR (cbar.az), WHO (who.int), 2022

As you can observe from the graph, despite increasing Covid-19 cases, quarantine measures and restrictions that resulted some people temporarily losing their jobs, non-performing loan rates continuously decreased during this period. Possible socio-economic reasons for that situation will be detailed in the next sections.

After observing suprising trend of non-performing loan rates in Azerbaijan during this period, it would be interesting to compare other countries' non-performing loan rate trends in this period.

In the World Bank database, there is NPL rate data for 2019 and 2020 of 104 countries. Average change of non-performing loan rate between 2019 and 2020 in these 104 countries is -0.04%. In 44 of these 104 countries (which sums up to 44%), non-performing loan rates decreased in 2020 compared to 2019. More detailed approach to individual countries, comparing GDP growth and non-performing loan rate trends in the Global Financial Crisis of 2008 and Covid-19 criris would be beneficial to derive some results.

To enable comparison between the Global Financial Crisis of 2008 and Covid-19 pandemic, only the countries that have non-performing loan rates data for 2007-2010 and 2019-2020 periods have been taken. In the next table, list of those countries and change of non-performing loan rate in 2020 compared to 2019 are given:

Table 6: Change in NPL rates from 2019 to 2020

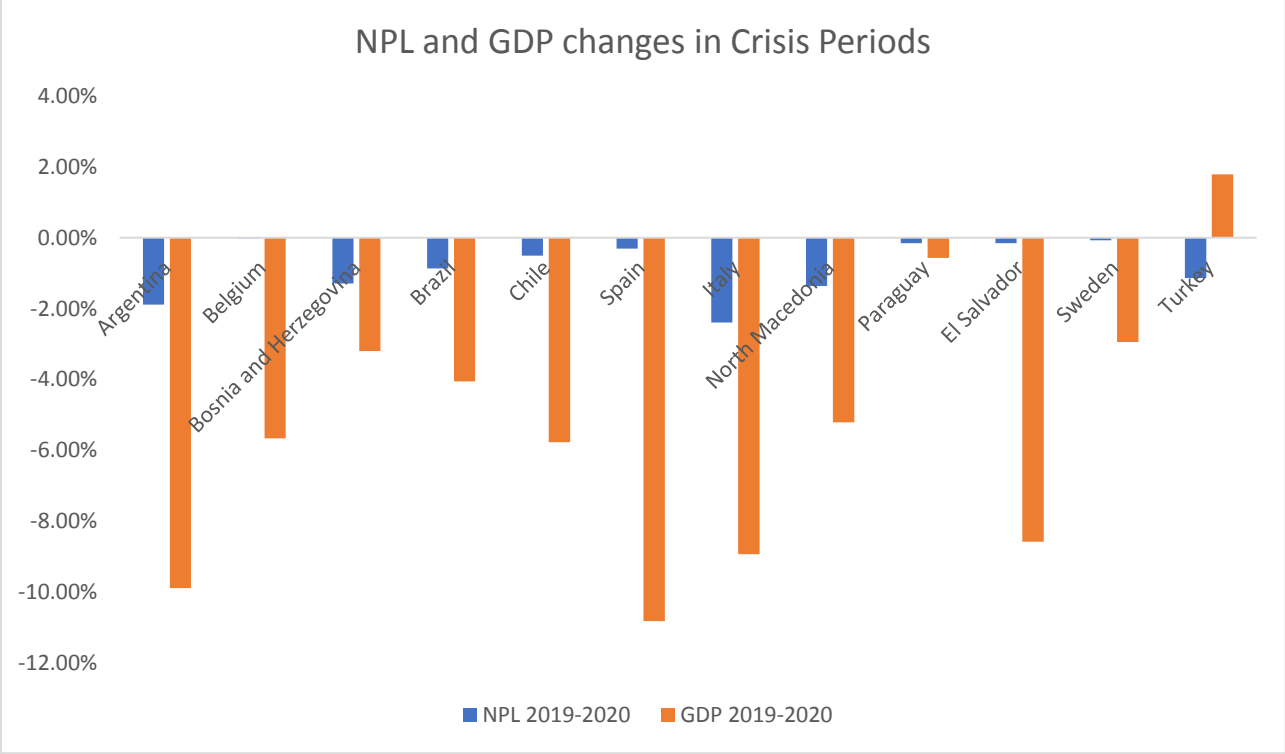
Country	NPL change in 2020
Argentina	-1.89%
Armenia	1.05%
Australia	0.15%
Belgium	-0.02%
Bosnia and Herzegovina	-1.29%
Brazil	-0.87%
Canada	0.03%
Switzerland	0.10%
Chile	-0.50%
Colombia	0.63%
Spain	-0.30%
Georgia	0.34%
Honduras	0.81%
Croatia	0.19%
Indonesia	0.32%
Ireland	0.18%
Italy	-2.39%
Kenya	2.12%
Madagascar	0.42%
Mexico	0.34%
North Macedonia	-1.36%
Malta	0.45%
Montenegro	0.78%

Malaysia	0.05%
Pakistan	0.60%
Panama	0.06%
Paraguay	-0.15%
El Salvador	-0.15%
Sweden	-0.07%
Thailand	0.10%
Trinidad and Tobago	0.29%
Turkey	-1.13%
Uganda	0.47%

Source: World Bank (data.worldbank.org), 2022

Firstly, comparing NPL change and GDP growth rates of countries that non-performing loan rates decreased during Covid-19 period may yield important results. If those countries' gross domestic production did not decrease during this crisis, it means that those countries' general economy was not significantly impacted by Covid-19 pandemic and hence, their non-performing loan rates did not increase.

Diagram 17: Change in NPL rates and GDP from 2019 to 2020

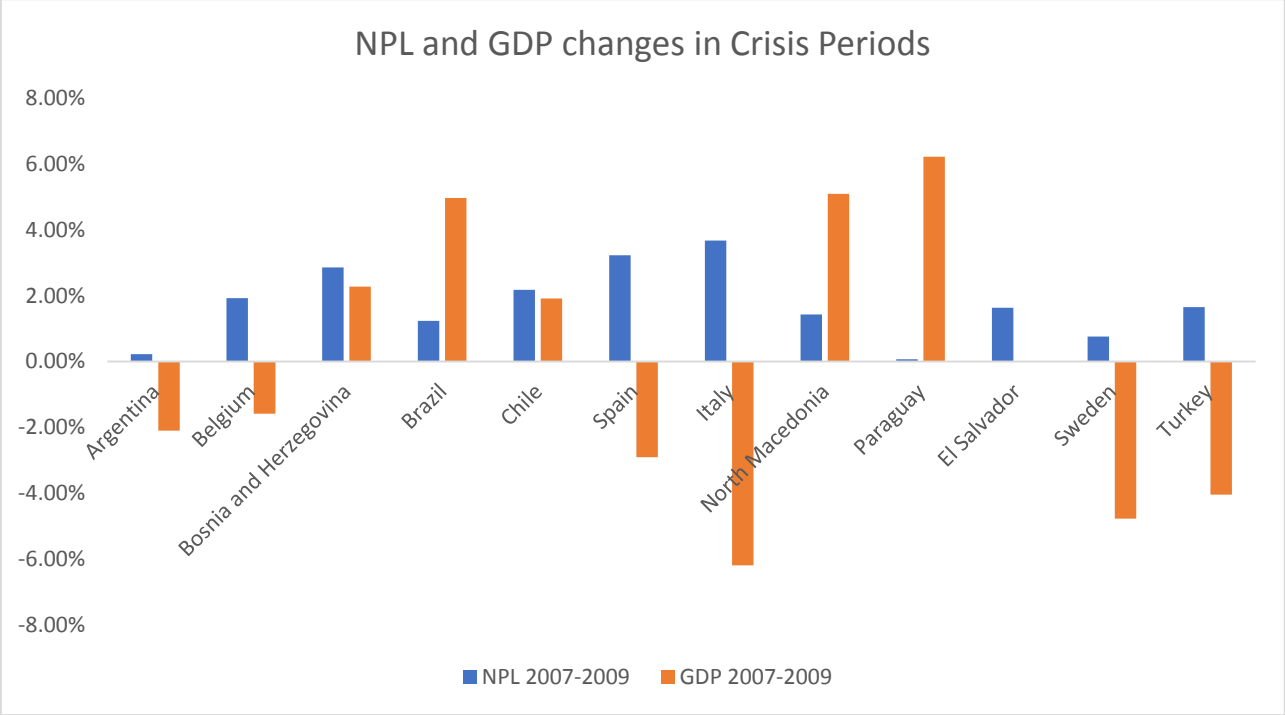


Source: World Bank (data.worldbank.org), 2022

As per graph above, almost all countries that experienced decrease in the non-performing loan rates in Covid-19 crisis period, also had negative Gross Domestic

Production growth rates. As in many previous researchs proved significant negative link between non-performing loan rates and real gross domestic production growth rates, this case is odd that countries experienced decrease in both GDP and NPL rates. Comparing these countries' gross domestic production growth rates and non-performing loan rate changes in the Great Financial Crisis period may also yield useful results:

Diagram 18: Change in NPL rates and GDP from 2007 to 2009 (The GFC period)



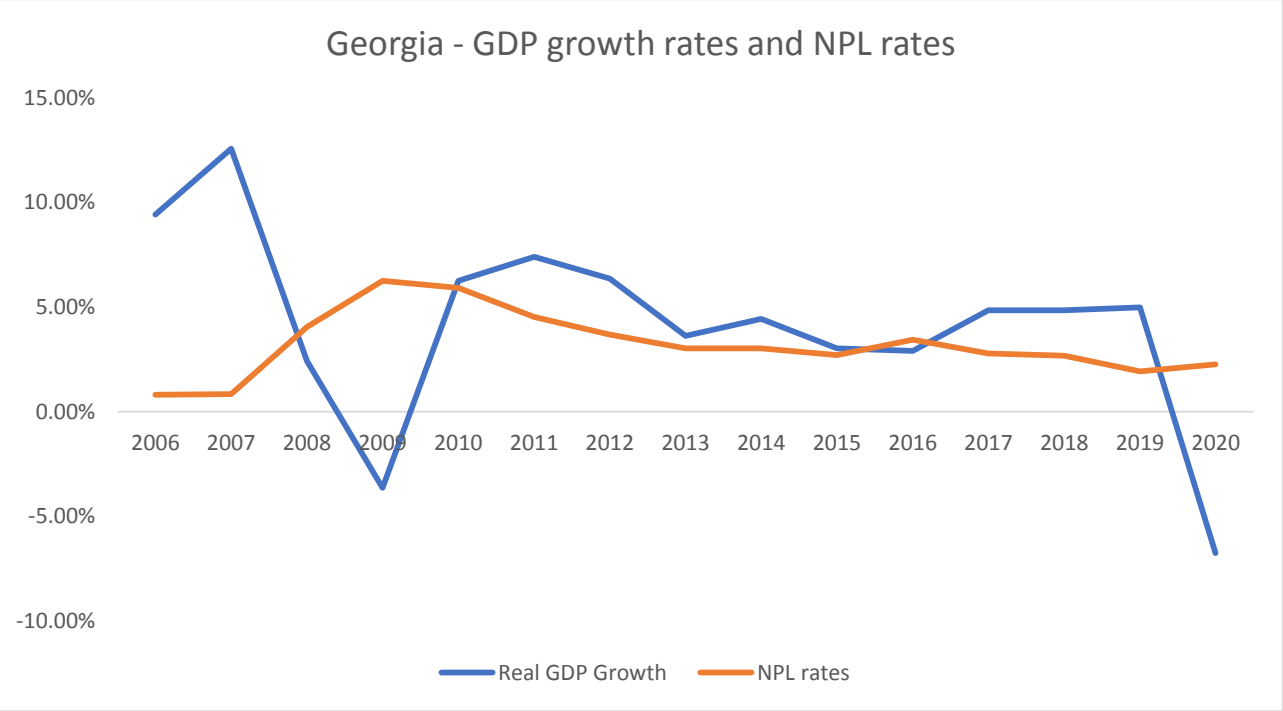
Source: World Bank (data.worldbank.org), 2022

As per graph above, it could be observed that in all of those countries non-performing loan rates increased, even if real gross domestic production grew in that period. Different movement of non-performing loan rates and real gross domestic production in the Great Financial Crisis and Covid-19 crisis should be researched further and in the next sections we will discuss possible reasons. But to state initial possible reasons, we can say that in the Great Financial Crisis period, non-performing loan rates were also a reason for economic crisis actually, not just a result of it. Non-

performing loans in the real estate – mortgage market initially triggered the start of the Great Financial Crisis, and then GFC itself deepened non-performing loan rates problem even more.

We can use data from neighbor countries in order to understand better situation in Azerbaijan:

Diagram 19: Real GDP Growth rates and NPL rates in Georgia



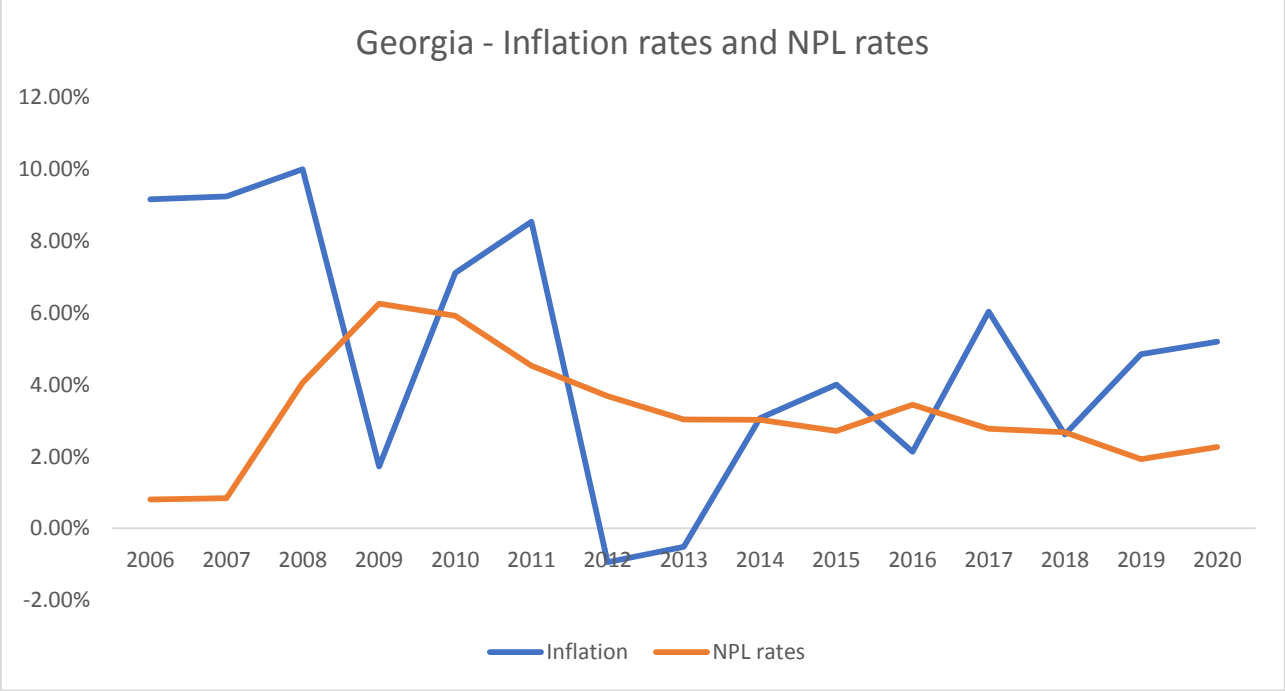
Source: World Bank (data.worldbank.org), 2022

In the case of Georgia, the negative correlation between real gross domestic production growth rates and non-performing loan rates can be observed as expected, even if it is not that much strong. In the 2020, real gross domestic production decreased and non-performing loan rates increased as expected. Calculated correlation during this period is negative (0.37).

As we already know from the literature review, another factor that significantly impacted the non-performing loan rates in many countries is inflation rate. Inflation rate may impact non-performing loan rates both positively and negatively. Negative (decreasing NPL rates) impact may be caused by known phenomenon of inflation

transfering wealth from lenders to borrowers. Positive impact (increasing NPL rates) may be caused by decreased payment ability of borrowers as a result of inflation decreasing real value of their income. In the graph below we can observe the relationship between inflation rates and non-performing loan rates:

Diagram 20: Inflation rates and NPL rates in Georgia



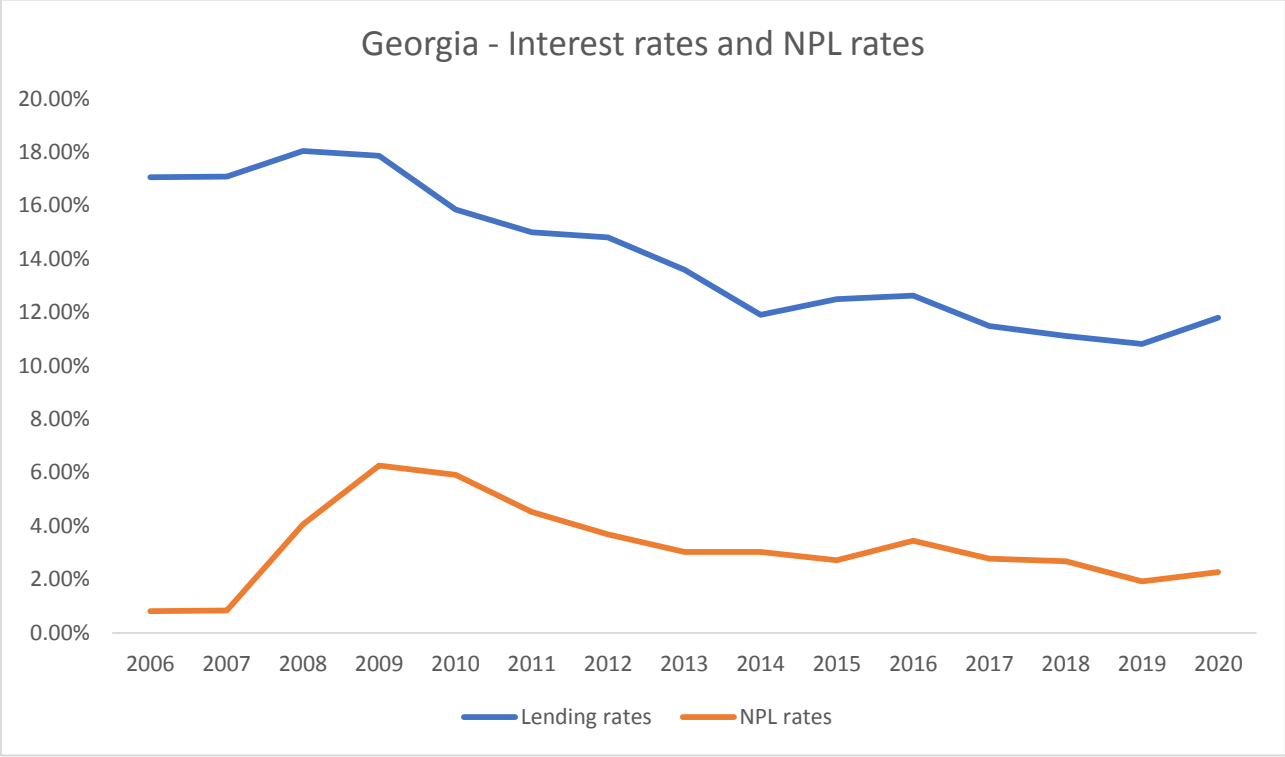
Source: World Bank (data.worldbank.org), 2022

Literature review offers differing results on the relationship between the inflation rates and non-performing loan rates. In Georgia, we can infer that this relationship is negative, even if it is not that much strong. Calculated correlation between inflation rates and non-performing loan rates in Georgia in the period of 2006-2020 is negative (0.021).

According to the literature review, another important sifniciant variable that impacts non-performing loan rates accross many countries is interest rate or lending rates. Interest rates also can impact non-performing loan rates positively or negative. Some researchs found positive relationship and some found negative relationship.

Dynamics of this relationship and possible economic background of both positive and negative relationship between them will be discussed in more detail in further sections too as well as real GDP growh and NPL rates, inflation and NPL rates. We can observe from the graph below the relationship between inflation rates and non-performing loan rates:

Diagram 21: Interest rates and NPL rates in Georgia

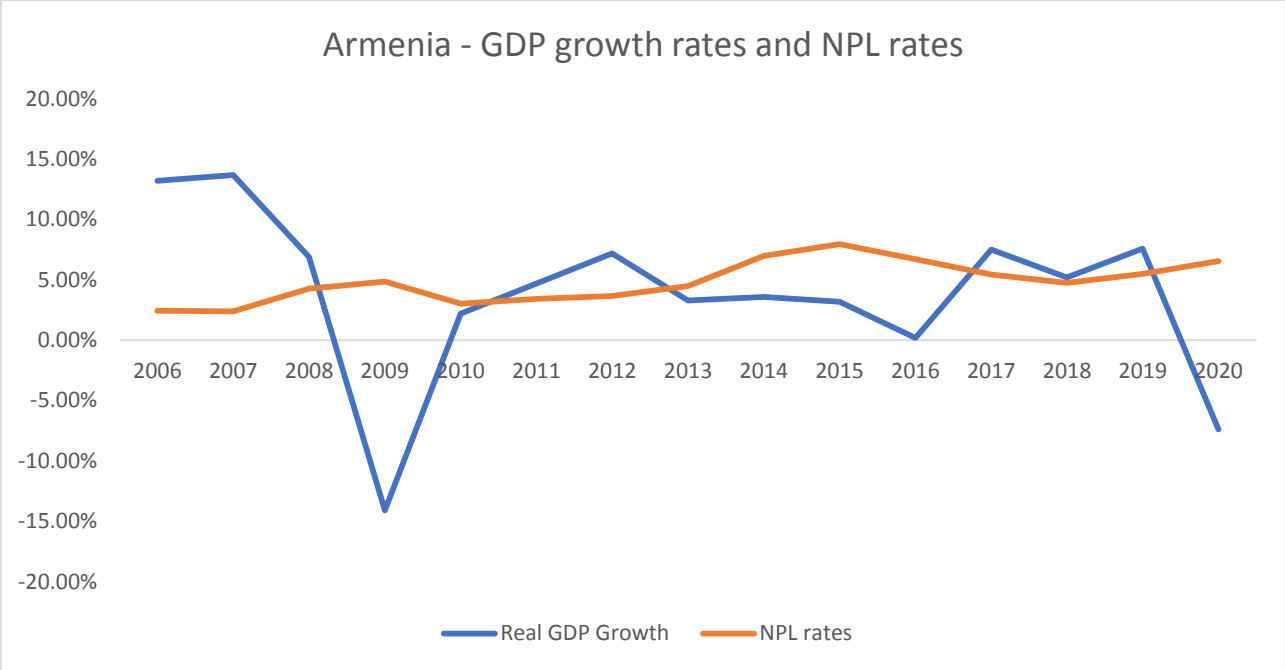


Source: World Bank (data.worldbank.org), 2022

Literature review offers differing results on the relationship between the interest rates and non-performing loan rates. In Georgia, we can infer that this relationship is positive, even if it is not that much strong. Calculated correlation between inflation rates and non-performing loan rates in Georgia in the period of 2006-2020 is positive 0.30. In the case of Armenia, we can observe even the stronger negative relationship between real real gross domestic production growth rates and non-performing loan rates. In the 2020, real gross domestic production decreased and non-performing loan rates increased as expected, which was also the case in the Great Financial Crisis period and

expected based on expectations of many analysts as it would result in decrease in people's and corporation's income, which would result in the decrease in payment capacity of them, which finally would result in increased non-performing loan rates. Calculated correlation during this period is negative (0.45).

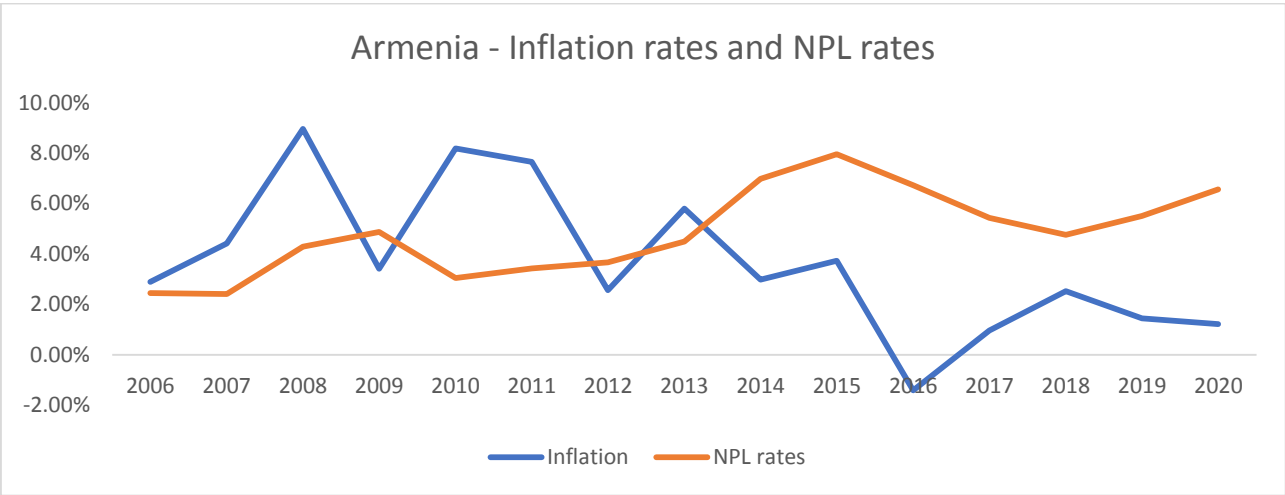
Diagram 22: Real GDP growth rates and NPL rates in Armenia



Source: World Bank (data.worldbank.org), 2022

Relationship between inflation rates and non-performing loan rates in Armenia is similar to the case of Georgia. There is negative correlation close to (0.5):

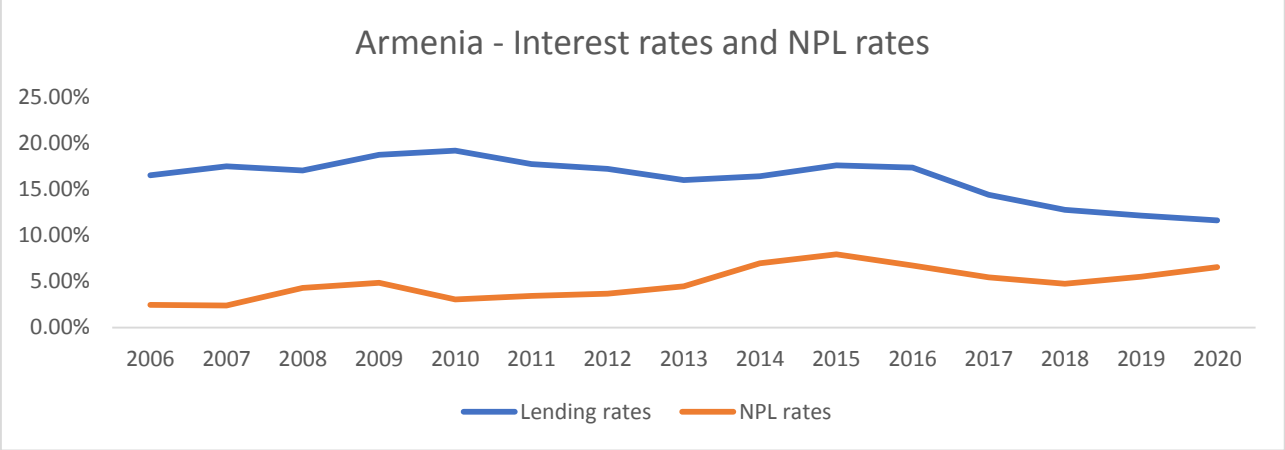
Diagram 23: Inflation rates and NPL rates in Armenia



Source: World Bank (data.worldbank.org), 2022

Correlation between interest rates (lending rates in the World Bank database) and non-performing loan rates in Armenia is negative on the contrary to the case of Georgia. These results actually matches with the results of literature review, as there were also some contradicting results. Correlation is approximately (0,31) between interest rates and non-performing loan rates in Armenia:

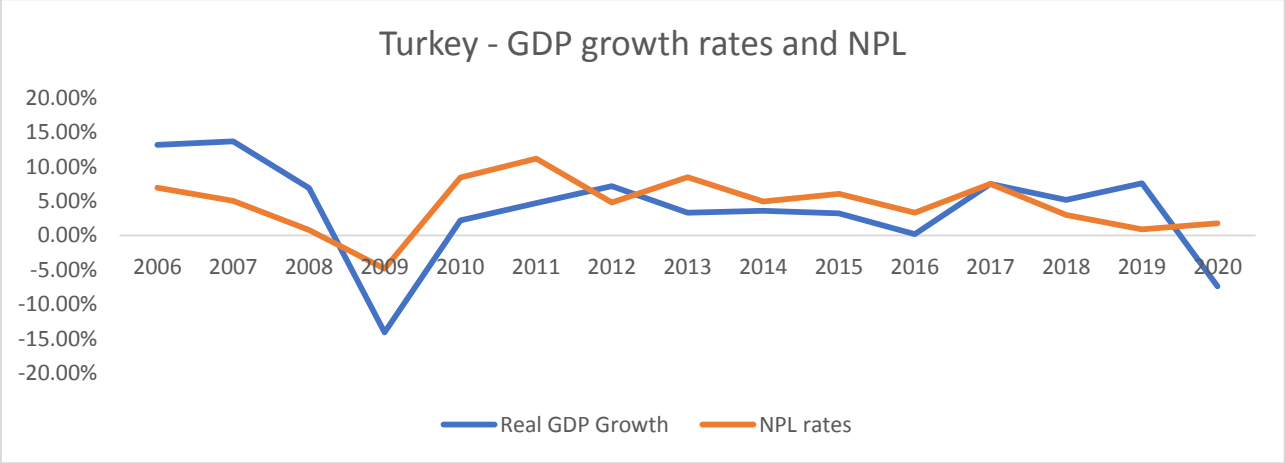
Diagram 24: Interest rates and NPL rates in Armenia



Source: World Bank (data.worldbank.org), 2022

Turkey is very interesting case for comparison of relationship between real real gross domestic production growth rates and non-performing loan rates. Interestingly, there is clear positive relationship, even if it is not much strong. Calculated correlation is 0.54.

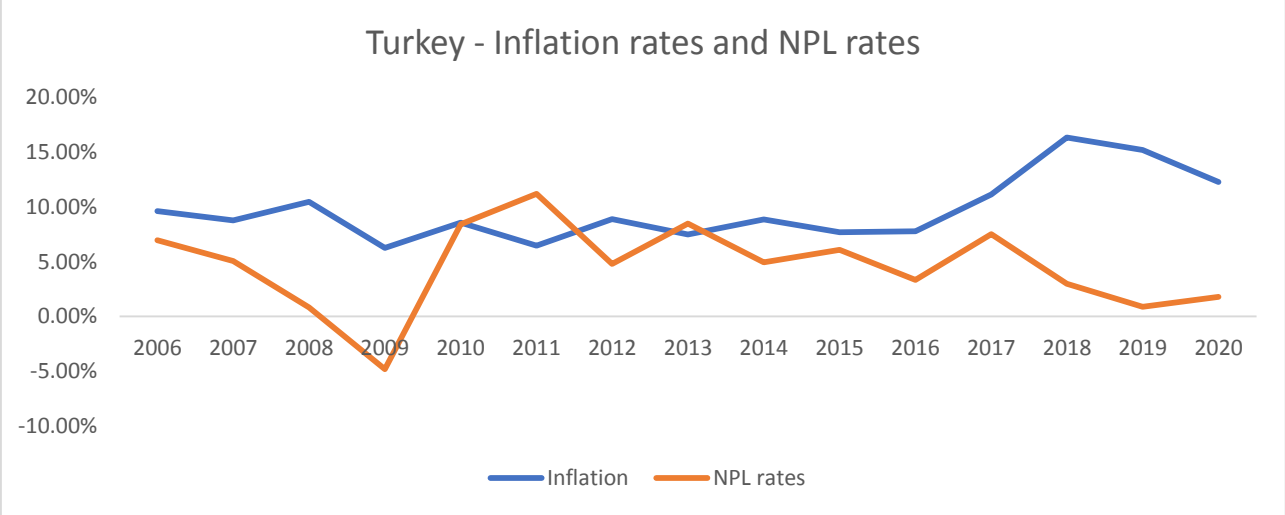
Diagram 25: Real GDP growth rates and NPL rates in Turkey



Source: World Bank (data.worldbank.org), 2022

Comparing inflation rates and non-performing loan rates in Turkey, we get the similar results to the cases of Georgia and Armenia. There is again the negative correlation between inflation rates and non-performing loan rates in Turkey. Calculated correlation coefficient is approximately equal to (0,25). Comovement between these variables can be observed below:

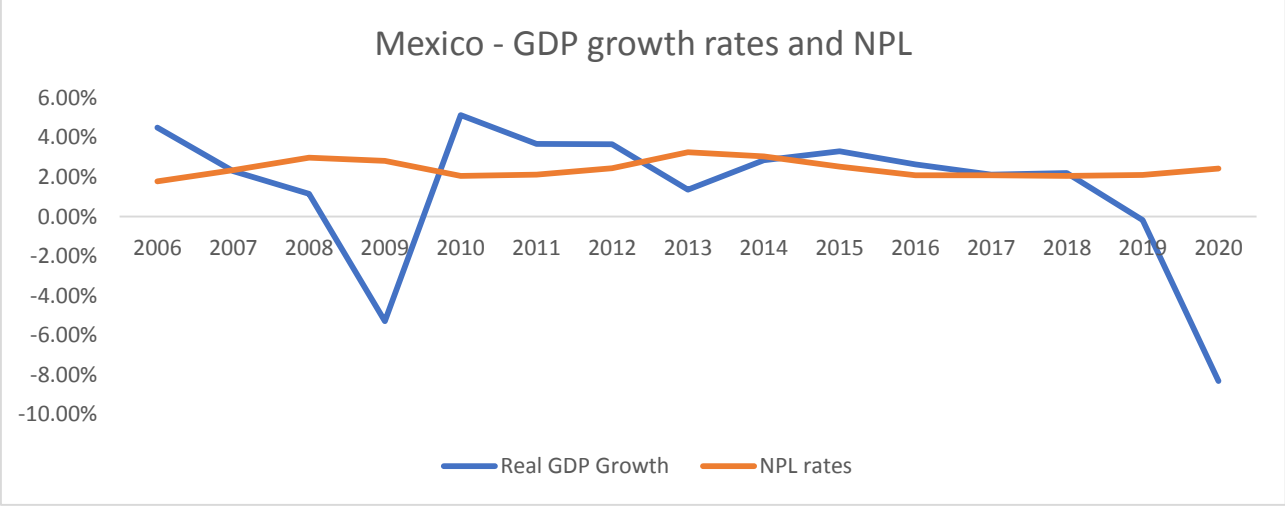
Diagram 26: Inflation rates and NPL rates in Turkey



Source: World Bank (data.worldbank.org), 2022

Unfortunately, there is no data of lending rates of Turkey in the World Bank database, thus we cannot present relationship between interest rates and non-performing loan rates in Turkey.

Diagram 27: Real GDP growth rates and NPL rates in Mexico

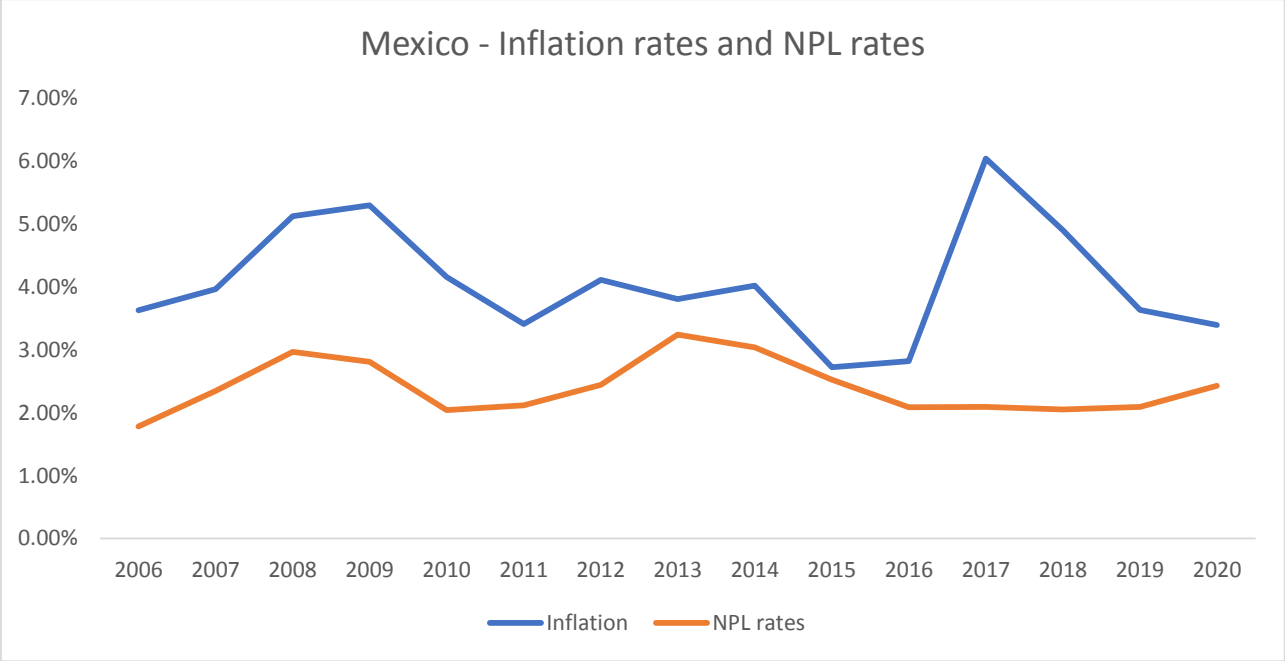


Source: World Bank (data.worldbank.org), 2022

Another interesting comparison would be Mexico for Azerbaijan as it is oil dependent country similar to Azerbaijan. Negative correlation (as expected) between non-performing loan rates and real gross domestic production growth rates can be observed, although this correlation is not very strong. Calculated correlation between these two variables during that period is negative (0.29).

Relationship between inflation rates and non-performing loan rates in Mexico is contradicting results of this comparison in the previous cases of Turkey, Georgia and Armenia. Correlation between inflation rates and non-performing loan rates in Mexico is slightly positive and approximately equal to 0,13. Comovement between these 2 variables in Mexico can be observed below:

Diagram 28: Inflation rates and NPL rates in Mexico

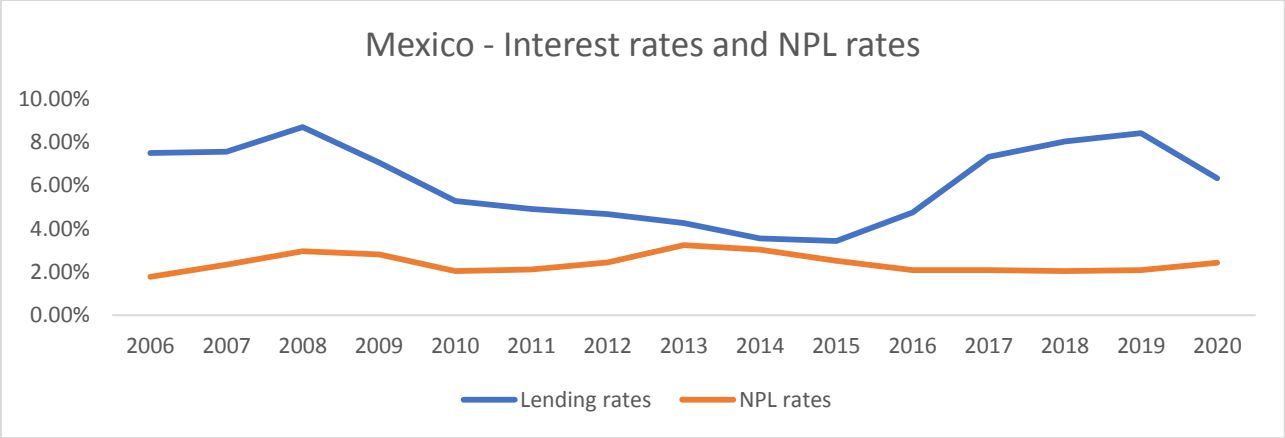


Source: World Bank (data.worldbank.org), 2022

Relationship between interest rates and non-performing loan rates in Mexico is similar to the case of Armenia and contradicting the result of the case of Georgia. Calculated correlation coefficient between interest rates and NPL rates in Mexico is equal to (0,31).

Comovement between these 2 variables in Mexico can be observed in the graph below:

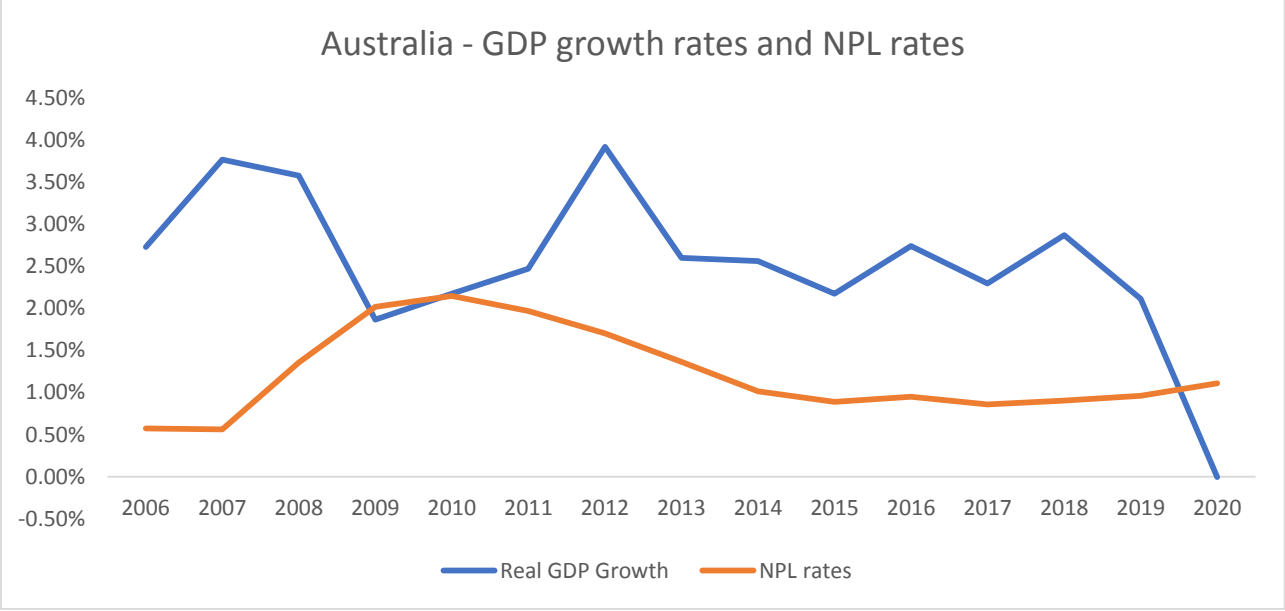
Diagram 29: Interest rates and NPL rates in Mexico



Source: World Bank (data.worldbank.org), 2022

As previously compared countries are all developing countries, few examples from developed countries would be useful to enable comparison in order to detect if there is any difference between comovement of real gross domestic production growth rates and non-performing loan rates in developed versus developing countries.

Diagram 30: Real GDP Growth rates and NPL rates in Australia

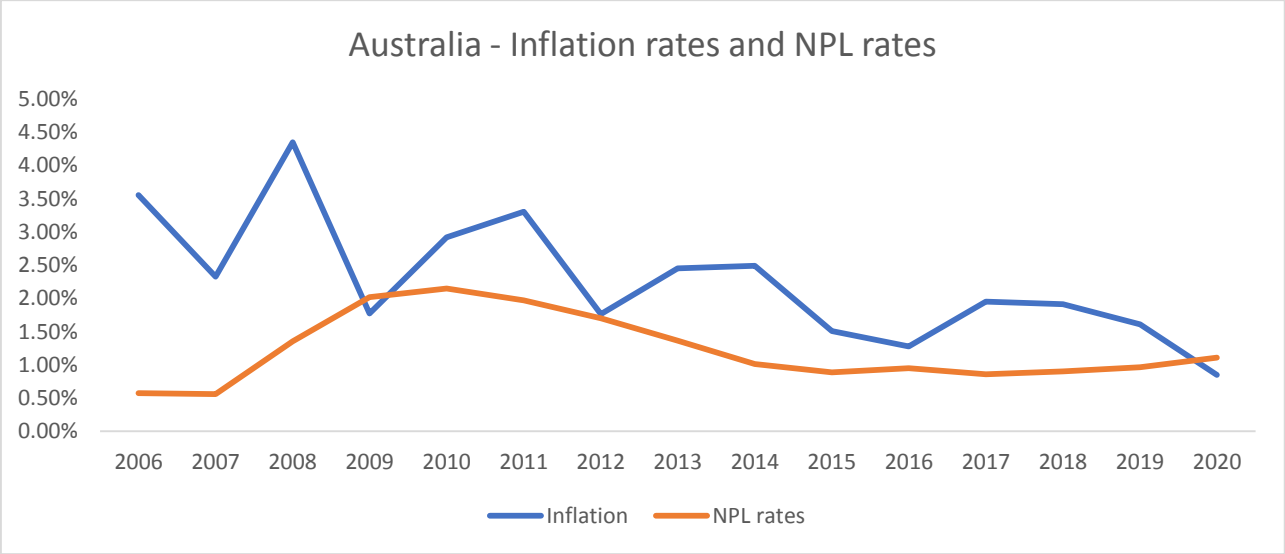


Source: World Bank (data.worldbank.org), 2022

Australia is one of the developed countries that non-peforming loan rates increased in 2020, Covid-19 crisis period. By observing the graph above, we can see negative relationship (as expected) between non-performing loan rates and real gross domestic production growth rates, despite it is not very strong relationship. Another point is that in the Global Financial Crisis period of 2008-2010 there is clear upward trend of non-performing loan rates. Calculated correlation is negative (0.09).

The relationship between inflation rates and non-performing loan rates in Australia is similar to the case of Mexico and contradicting the results of the cases of Turkey, Georgia and Armenia. The calculated correlation coefficient between inflation rates and non-performing loan rates in Australia is slightly positive and approximately equal to 0,18. Comovement between these 2 variables in Australia can be observed in the graph below:

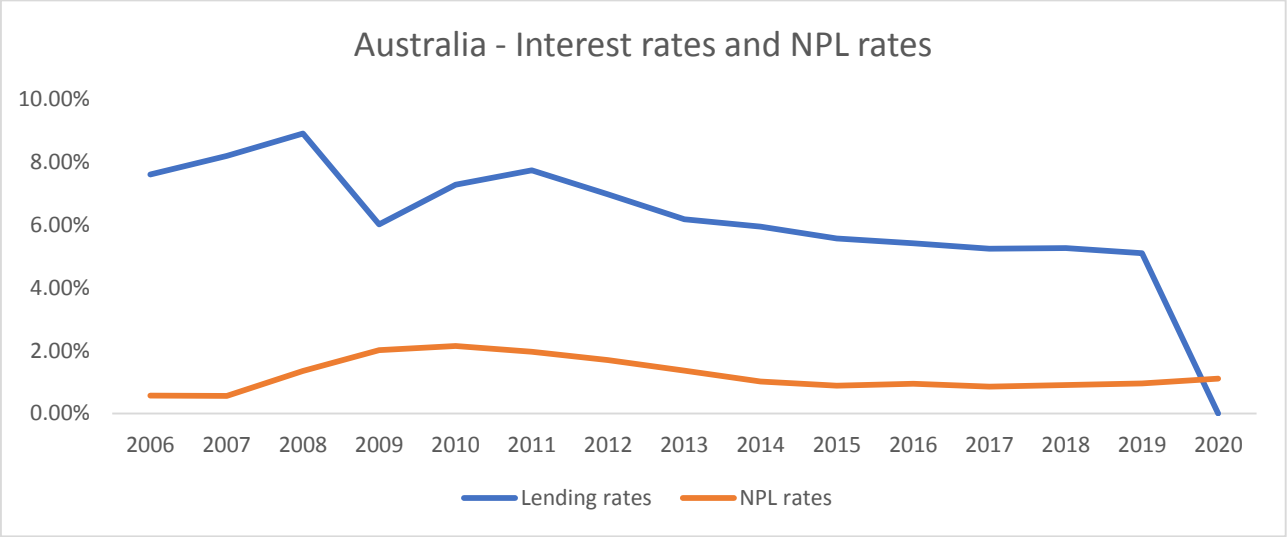
Diagram 31: Inflation rates and NPL rates in Australia



Source: World Bank (data.worldbank.org), 2022

Relationship between interest rates and non-performing loan rates in Australia is similar to the case of Georgia and contradicting the results of cases of Armenia and Mexico. Calculated correlation coefficient between interest rates and non-performing loan rates in Australia is approximately 0,18. Comovement between these 2 variables in Australia can be observed in the graph below:

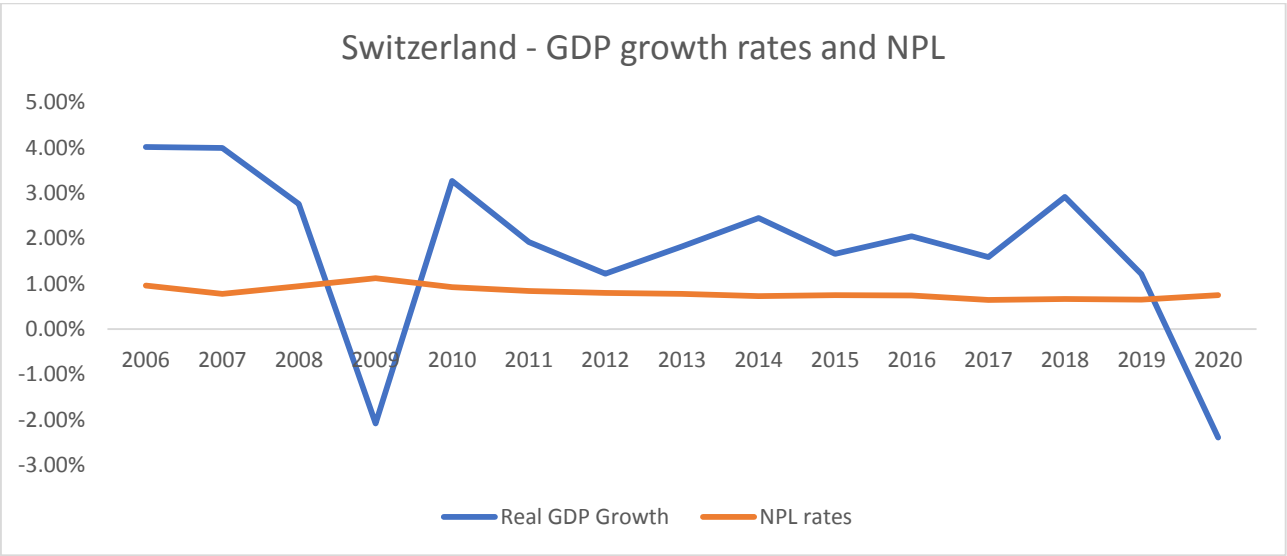
Diagram 32: Interest rates and NPL rates in Australia



Source: World Bank (data.worldbank.org), 2022

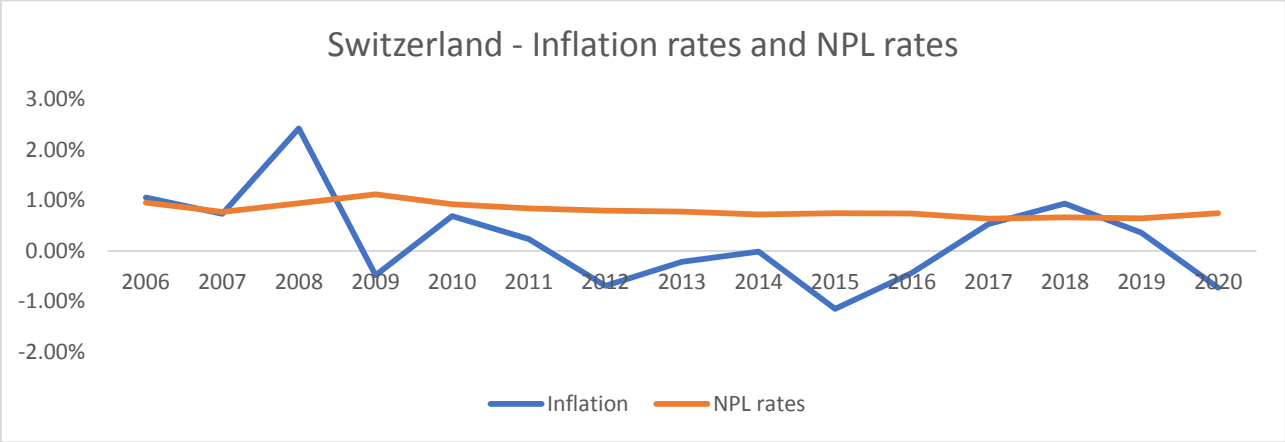
Switzerland is also one of the developed countries that non-peforming loan rates increased in 2020, Covid-19 crisis period. By observing the graph above, we can see negative relationship (as expected) between non-performing loan rates and real gross domestic production growth rates, despite it is not very strong relationship, but it is slightly stronger than Australia case. Another point is that non-performing loan rates are very stable in Switzerland, but there was sligh increase in the Global Financial Crisis period of 2008-2010. Calculated correlation is negative (0,14):

Diagram 33: GDP growth rates and NPL rates in Switzerland



Source: World Bank (data.worldbank.org), 2022

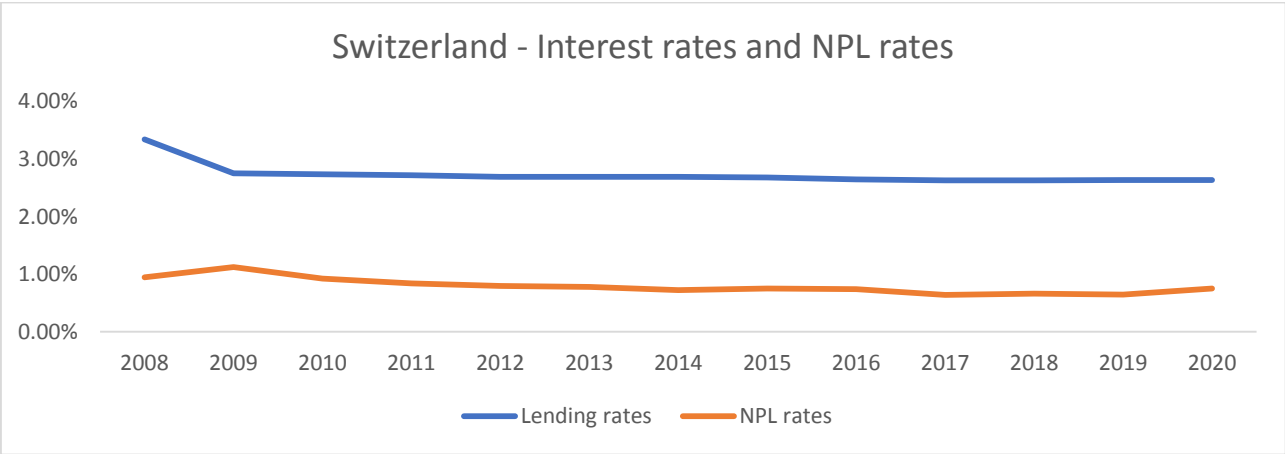
Diagram 34: Inflation rates and NPL rates in Switzerland



Source: World Bank (data.worldbank.org), 2022

Relationship between inflation rates and non-performing loan rates in Switzerland is consistent with the results of the cases of Australia and Mexico, but contradicting the results of cases of Turkey, Georgia and Armenia. The calculated correlation coefficient between inflation rates and non-performing loan rates in Switzerland is approximately 0,17. The comovement of these 2 variables in Switzerland can be observed in the graph above. Relationship between interest rates and non-performing loan rates in Switzerland is complying with the results of Australia and Georgia, but contradicting with the results of Mexico and Armenia. The correlation coefficient between interest rates and non-performing loan rates in Switzerland is positive and approximately equal to 0,51.

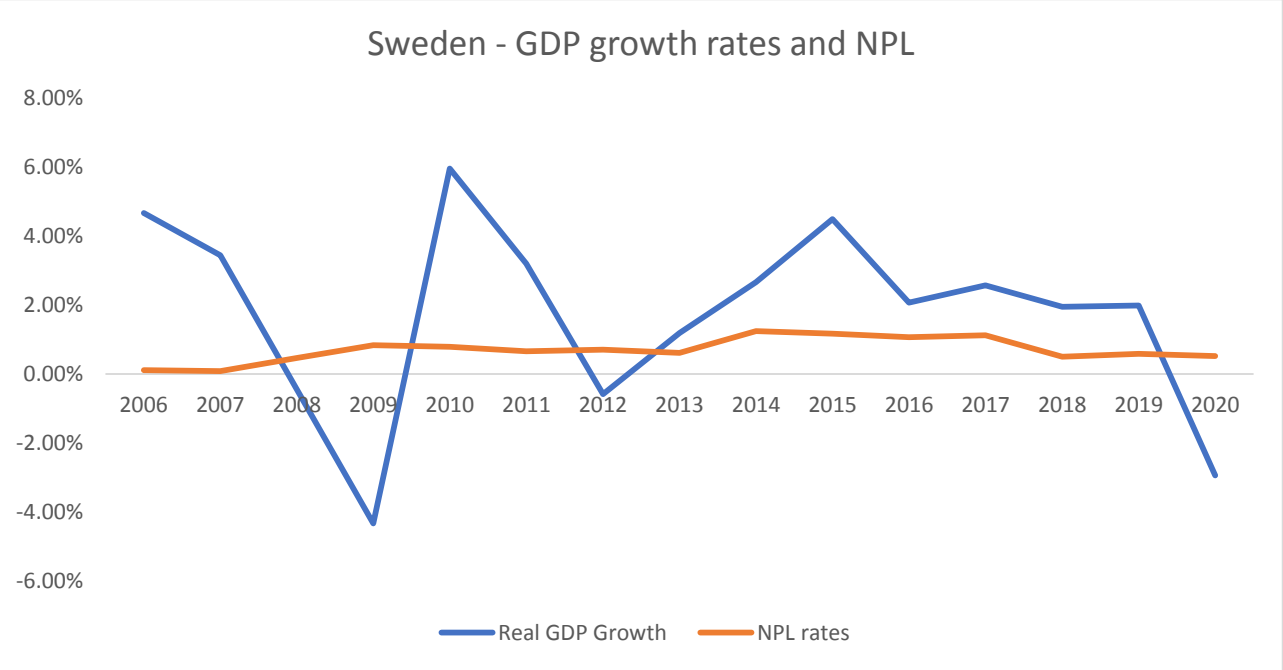
Diagram 35: Interest rates and NPL rates in Switzerland



Source: World Bank (data.worldbank.org), 2022

On the contrary of Australia and Switzerland, in Sweden ther was no increase in non-performing loan rates in 2020 compared to 2020, but there was slight decrease. Generally, in Sweden non-performing loan rates seem very stable and as there is no correlation between real gross domestic production growth rates and non-performing loan rates. But we can still observe slight increase in non-performing loan rates in the Global Financial Crisis period of 2008-2010. Calculated correlation is almost equal to zero, 0.02.

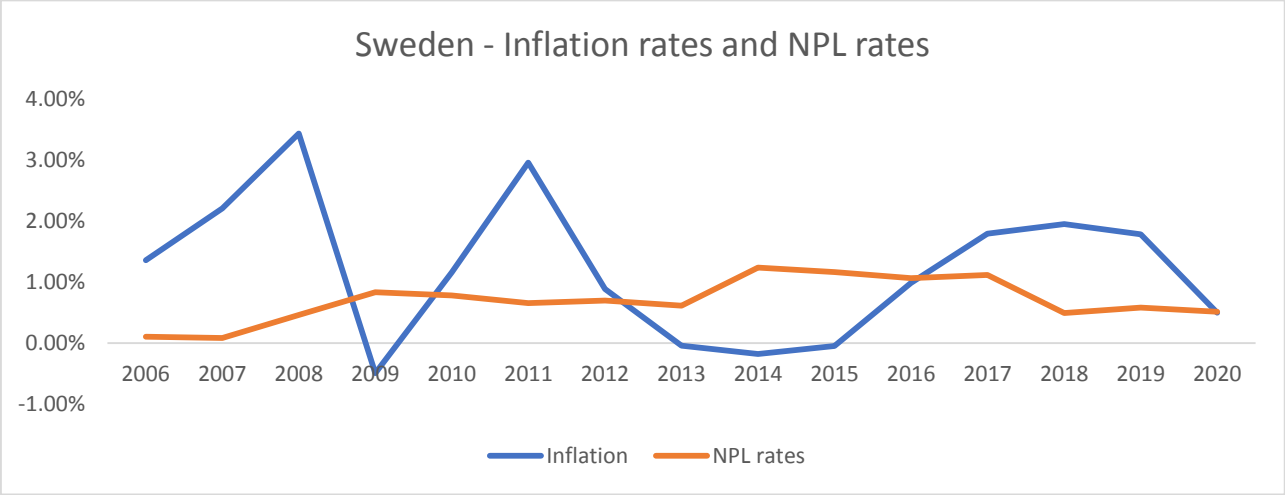
Diagram 36: GDP growth rates and NPL rates in Sweden



Source: World Bank (data.worldbank.org), 2022

The relationship between inflation rates and the non-performing loan rates in Sweden is consistent with Turkey, Georgia and Armenia and contradicting with the results of Mexico, Australia and Switzerland. This situation is similar to the results of the literature review as they also contradicted each other. Some of them showed positive and some of them showed negative relationship between those variables. The calculated correlation coefficient between inflation rates and the non-performing loan rates is negative and (0,47). The comovement between these 2 variables in Sweden can be observed in the graph below:

Diagram 37: Inflation rates and NPL rates in Sweden



Source: World Bank (data.worldbank.org), 2022

To summary the results of analysis above, the correlation matrix is presented below:

Table 7: Correlation matrix between Real GDP growth, inflation, interest rates and NPL rates in different countries

Correlation matrix	Turkey	Georgia	Armenia	Mexico	Australia	Switzerland	Sweden
Real GDP Growth vs NPL	0,54	-0,37	-0,44	-0,29	-0,09	-0,14	0,02
Inflation vs NPL	-0,25	-0,21	-0,50	0,13	0,18	0,17	-0,47
Interest rates vs NPL	n/a	0,30	-0,31	-0,31	0,18	0,51	n/a

Source: World Bank (data.worldbank.org), 2022; Author calculations

By examining the information about the relationship between real gross domestic production growth rates and non-performing loan rates provided, we can state that there were different socio-economic factors impacting non-performing loan rates before Covid-19 and after this crisis. In the above graphs, it is observed that in some of countries non-performing loan rates decreased despite decreasing real gross domestic production growth rates in 2020 Covid-19 crisis. But all of these countries observed upward trending non-performing loan rates in the Great Financial Crisis of 2008.

One possible reason for stated difference may be in the different causes of two crisis periods. The Great Financial Crisis was caused by real estate market bubble and default of the subprime mortgages. Thus, it could be expected to result in increasing non-performing loan rates. But still, Covid-19 crisis resulted in the decreasing real gross domestic production growth rates and we know from literature review that there is evidence for significant negative relationship between real gross domestic production growth rates and non-performing loan rates. Countries that experienced both decrease in the real gross domestic production growth rates and non-performing loan rates are contradicting evidence from previous literature. Possible reasons for this contradicting results will be discussed in the next sections.

In hard quarantine regyme periods, Azerbaijani government made some tax exemptions to employers in return that they would continue paying salaries of employees, even if business was locked down. Also, for unemployed people monthly payment equal to minimum living wage was granted during these periods.

Another factor is that many banks eased their policies on restructuring existing loans of borrowers affected by pandemic and also some low-interest loans with government subsidy were also offered by banks with the subsidy of government. Unfortunately, there is not exact statistics related to these amounts.

Additional factors include people's consumption behaviour during pandemic. As many leisure activities were banned and office employees were made work at home, we can assume that saving rate of people increased significantly during pandemic, which can be one of the reasons of declining non-performing loan rates. Unfortunately, there is no research basis on the consumption behaviour of Azerbaijani people before and after pandemic too.

III CHAPTER. DETERMINANTS OF NON-PERFORMING LOANS IN AZERBAIJAN BEFORE AND AFTER THE OUTBREAK OF C0VID-19: AN EMPIRICAL ANALYSIS

3.1 Dynamics of non-performing loans

As per literature review, main factors impacting non-performing loans are real gross domestic production growth, inflation and interest rates. Economically meaningful relationships should be established between these variables and non-performin loan rates before moving to econometric analysis:

- Real Gross Domestic Production growth – literature review mostly agrees on impact of this factor on non-performing loan rates. There is evidence of significant negative impact of real GDP growth on NPL rates (Ahmad F. and Bashir T., 2013; Wood and Skinner, 2018; Kastrati, 2011; Akinlo, O. and Emmanuel M.,2014; Zeman 2007; Jakubik, 2007; Greenidge and Grosvenor, 2010; Rajah, 2016; Jordan and Tucker, 2013; De Bock and Demyanets, 2012;). This result is economically meaningful and expected too. Increase in real Gross Domestic Production means increase in people's real income, which means that they can purchase more of goods and services compared to previous years. Increase in real income should expectedly increase in the payment capacity of borrowers. Literature review proves this relationship that there is negative relationship between real Gross Domestic Production growth and non-performing loan rates in the most studies. Nevertheless, it is noteworthy that some of studies could not be able to detect statistically significant relationship between these 2 variables (Bhattari, 2015; Ouhibi,S. and Hammami,S.,2015; Saba, Kouser and Azeem, 2012). Lack of significan relationship between them may be due to some other factors like institutional changes, changes in people's consumption and saving behaviour and etc. The evidence from previously analysed countries also mostly agrees on the negative correlation between real Gross Domestic Production growth rates and non-performing loan rates (Switzerland, Australia, Mexico, Armenia and Georgia).

Only in Sweden there is almost no correlation (positive 0,02) and in Turkey there is positive correlation of 0,54. It is noteworthy that this is standalone analysis and does not imply statistically significant relationships.

- Inflation – literature review contradicts on the relationship betwen inflation rates and non-performing loan rates. Some studies provide evidence of significant positive link between inflation rates and non-performing loan rates (Bhattari, 2015; Klein – IMF study, 2013; Babouceck and Jancar, 2005; Ahmad F. and Bashir T.,2013; Greenidge and Grosvenor, 2010). Some studies provide evidence of significant negative link between inflation rates and non-performin loan rates (Gerlach et al, 2005; Kastrati, 2011; Rajah, 2016; Solarin and Daharan, 2011; Ouhibi,S. and Hammami,S., 2015; Jakubik, 2007). Some studies could not be able to detect any significant relationship between inflation and non-performing loan rates (Akinlo, O. and Emmanuel, M., 2014). Trying to provide economic meaning to both positive and negative relationship between inflation rates and non-performing loan rates is not much hard. About 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 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. Other view among economists on the topic of relationship between inflation rates and non-performing loan rates is about classic example of inflation effect on debt. In multiple finance theories, impact of inflation is known as transfering wealth to borrowers from lenders. Reason for this phenomenon is that borrowers get money from lenders for some previously agreed period of time and repays at maturity. When there is high inflation, especially unexpected inflation, during debt tenure borrower is better off, because borrower was able to use money before high inflation and purchase more

real goods and services than after inflation. Thus, according to Fisher equilibrium, interest rates on debt must include premium on expected inflation and uncertainity on inflation. As a result, this view supports 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 impact has economic essence and perhaps, these two impacts cancel off each other to some extent. The evidence from previously analysed countries also contradicts each other on the relationship between inflation rates and non-performing loan rates. In the cases of Switzerland, Mexico and Australia, there is positive correlation between inflation rates and non-performing loan rates. On the contrary, in the cases of Turkey, Georgia, Armenia and Sweden, there is negative correlation between inflation rates and non-performing loan rates. It is noteworthy that this is standalone analysis and does not imply statistically significant relationships.

- Interest rates – literature review also contradicts on the relationship betwen interest rates and non-performing loan rates. Some studies provide the evidence for significant positive relationship between interest rates and non-performing loan rates (Akinlo, O. and Emmanuel M., 2014; Solarin and Daharan, 2011; Jakubik, 2007; Zeman, 2007; Rajah, 2016). Some studies provide the evidence for significant negative relationship between interest rates and non-performing loan rates (Ahmad F. and Bashir T., 2013; Wood and Skinner, 2008;). Some studies provide the evidence for non-significant relationship between interest rates and non-performing loan rates (Saba, Kouser and Azeem, 2012). Trying to provide both positive and negative results with economic background is noteworthy. Positive relationship between interest rates and non-performing loan rates are more expected rather than negative relationship, because higher interest rates cause increase in the amount of debt repayment and thus decreases borrowers' repayment capacity. Trying to provide explanation for the negative relationship

between interest rates and non-performing loan rates are even harder because of previous explanation for positive relationship. But it can be argued that higher interest rates increase the costs for both investment and consumption decisions, hence cause even harsher due diligence process. It means that higher interest rates cause more careful approach to investment and consumption behaviour. Example can be any capital budgeting process of companies, most companies use Net Present Value analysis to evaluate projects and decide whether they should approve the project. One of the most important derterminants of Net Present Value of the project is cost of capital which is directly related to cost of debt, hence interest rates. When there is higher interest rate environment, it increases the cost of debt, hence cost of capital for company and thus decreases Net Present Value. This situation make non-profitable projects of company even less attractive. For instance, in low interest rate environment it would be easier for top managers to approve unprofitable projects as a result of irrational decisionmaking projects (pet projects). But high interest rates cause higher due diligence, cause companies to approve only profitable projects and thus strenghten debt repayment capacity of company. So, this is possible economic reasoning for the significant negative relationship between interest rates and non-performing loan rates. Again as the case in the inflation rates, we should not approach to these two approaches in isolation. We can accept the possibility of both impact and consider the possibility that these two impacts may even cancel off each other to some extent. The evidence from previously analysed countries also contradicts each other on the relationship between interest rates and non-performing loan rates. In Georgia, Switzerland and Australia, there is positive correlation between interest rates and non-performing loan rates. On the contrary, in Mexico and Armenia, there is negative correlation between interest rates and non-performing loan rates. It is noteworthy that this is standalone analysis and does not imply statistically significant relationships.

- Value of currency – The evidence on the relationship between value of currency and non-performing loan rates also contradicts each other. Some studies have found the significant positive relationship between the value of currency and non-performing loan rates (Zeman, 2007; Fofack, 2005; Ouhibi, S. and Hammami, S., 2015). Some other studies found significant negative relationship between the value of currency and non-performing loan rates (Klein – IMF study, 2013; Bhattari, 2015; De Bock and Demyanets, 2012). We could propose economic background for both of these results. Background for the positive relationship between local currency value and non-performing loan rates can be explained by simple formula of gross domestic production. As we know gross domestic production is the sum of Consumption, Investment, Government spending and Net Export which is equal to Exports – Imports. When local currency value is higher, Imports are cheaper for us and Exports are more expensive for foreigners. Hence, higher currency value may result in lower Gross Domestic Production, lower profit for local producers as their goods are less competitive now compared to foreign products in high local currency environment. This situation may result in the decrease in the debt repayment capacity of local producers. Background for the negative relationship between local currency value and non-performing loan rates can also be explained by dynamics of foreign trade. For instance, country may be resource lacking country which situation makes this country to import essencial products for production facilities and whole economy, for example Turkey is fully dependent on imports on energy recourses. This type of country must always import these recourses and lower local currency value impose higher cost burden for local producers and thus decrease their debt repayment capacity. As the previous cases of inflation rates and interest rates, we should not look this relationship in isolation. Direction of this relationship is probably dependent on the type of country and its foreign trade structure and in some

countries, perhaps, positive and negative impact cancels off each other to some extent.

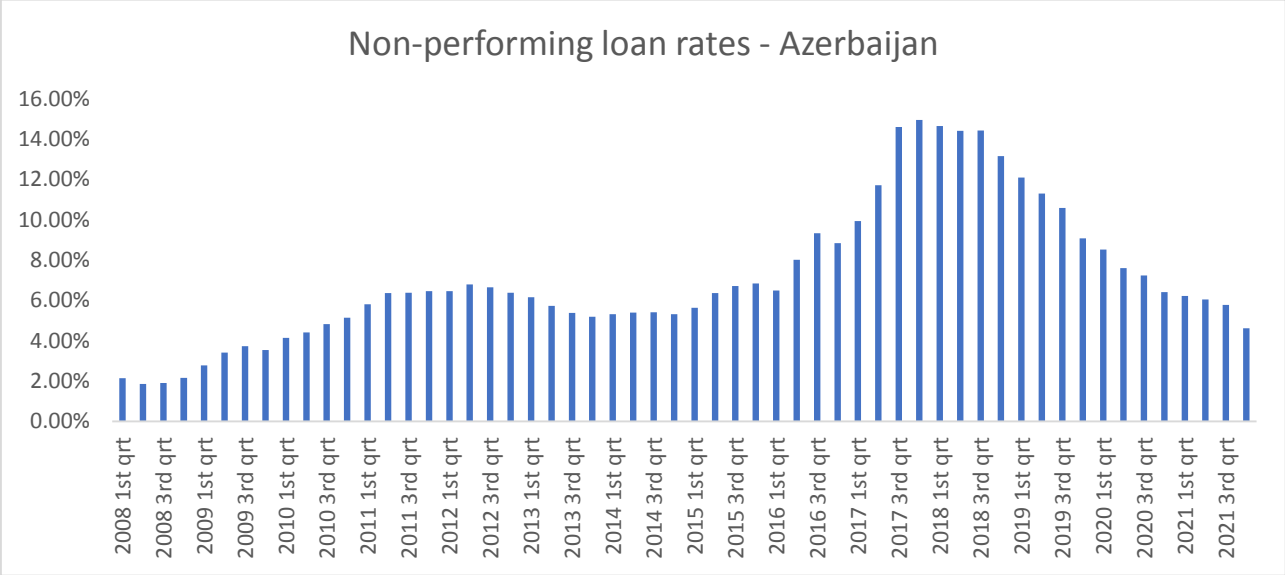
- Unemployment rate is another factor that has been used as the independent variable in the models of many previous research papers. Many research papers have found significant positive relationship between unemployment rates and non-performing loan rates (Vatansever and Hepsen, 2013; Klein – IMF study, 2013; Mukhtarov, Yuksel and Mammadov, 2018; Wood and Skinner, 2008; Babouceck and Jancar, 2005). One research paper from literature review has not been able to detect any significan relationship between unemployment rate and non-performing loan rates (Saba, Kouser and Azeem, 2012). Economic background for this relationship between unemployment rates and non-performing loan rates is somewhat clear, and similar to the relationship between real gross domestic production growth and non-performing loan rates. Unemployment rates are generally expected to move at contrary direction with real gross domestic production. Rising unemployment means most likely recessionary gap in the economy of country and decreasing income, which results in decrease in loan payment ability of borrowers. Hence, as well as real gross domestic production growth, we can expect the positive relationship between nonperforming loan rates and unemployment rates, as we expect negative relationship between non-performing loan rates and real gross domestic production growth.

3.2 Data and methodology

The initial goal of this research was to analyse the impact of Covid-19 pandemic on the non-performing loan rates in Azerbaijan. But there are only 7 quarters (from the first quarter of 2020 to the third quarter of 2021) of data in the period of pandemic which is very small number to implement any kind of regression or other quantitative analysis and from previous the parts of this paper, we understand that after the first

Covid-19 cases were detected and pandemic started, non-performing loan rates decreased in Azerbaijan, not increased which is certainly not expected result. It can be observed in the graph below that after the first quarter of 2020, which is the quarter of the first Covid-19 cases in Azerbaijan, non-performing loan rates decreased constantly. More detailed statistical analysis will be implemented in the following sections:

Diagram 38: Non-performing loan rates in Azerbaijan



Source: CBAR (cbar.az), 2022

Thus, any regression based on variables of Covid-19 cases and non-performing loan rates would not yield meaningful results. To understand why non-performing loan rates did not increase, but decreased in Azerbaijan in Covid-19 pandemic period, we should determine what factors impacts non-performing loan rates in Azerbaijan, how these factors changed in the Covid-19 pandemic period in Azerbaijan and what was the response of non-performing loan rates to change in these factors.

Instead of non-performing loan rates of total loans, non-performing loan rates of loans in the local currency – Azerbaijani manat, will be used in order to exclude the impact of the decrease in the value of Azerbaijani manat against USD in 2014 on non-performing loan rates of loans with the foreign currency. As independent variables, in the literature review research papers investigated impacts of real gross domestic

production growth rates, inflation rates, interest rates, currency value and unemployment rates on the non-performing loan rates. To investigate the impact of foreign currency on non-performing loan rates in regression with Ordinary Least Squares method will be problematic because currency rates in Azerbaijan is fixed and changed only twice in the last 10 years. Unemployment rates are also considered not worthy to include to the model, because impact of unemployment rates will be similar to real gross domestic production growth and using one of these variables can be enough.

Different regression methosd will be applied depending on characteristics of database (stationarity, etc.) and model will include non-performing loan rates of loans in Azerbaijani manat as the dependent variable (NPL), real gross domestic production growth rates (RGDPG), inflation rates (INFL) and average lending rates of loans in Azerbaijani manat (INTR) as the independent variables:

$$NPL = \beta_0 + \beta_1 * RGDPG + \beta_2 * INFL + \beta_3 * INTR + \varepsilon \quad (Model\ 1)$$

Data of non-performing loan rates of loans in Azerbaijani manat is from Central Bank of the Republic of Azerbaijan. Data of real gross domestic production growth is from The State Statistical Committee of the Republic of Azerbaijan. Data of inflation rate is from Central Bank of the Republic of Azerbaijan. Data of average lending rate of loans in AZN is also from Central Bank of the Republic of Azerbaijan.

Main method of analysis will be econometric model – Ordinary Least Squares method of regression. Firstly, necessary assumptions of Ordinary Least Squares method will be checked in order to prove that database related to variables is according with these assumptions, like all variables are stationry. Then regression will be run and results will be analyzed.

3.3. Estimating econometric model and interpretation of results

As our database consists of time-series data, we should check firstly whether our database is time stationary. Time-series being staionary means that statistic characteristics lik mean, variance and standard deviation of variable is stable and does not change over time period in consistent manner. If data is not stationary then error variance will not be same and stable across observations which is clear violation of assumptions of linear regression. Example of non-stationary time-series is random walk. Random walk is type of data that drifts apart over observations without any clear statistically significant trend. The most popular example of random walk in Economics and Finance is freely floating currency rates in the short-term. When data series is not time stationary, it becomes very difficult to run regression on them and finding meaningful relationship between them and other variables.

To check the stationarity of time-series, the most widely used test is an augmented Dickey–Fuller test which gives the answer that whether variable has unit root or not. In econometrics, a unit root problem is a characteristic that may create issues in statistical estimations involving time series models. An augmented Dickey–Fuller test's null hypothesis is that there is unit root problem.

Table 8: ADF unit root test results

	I(0)		I(1)	
	Intercept	Trend and intercept	Intercept	Trend and intercept
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.				

Source: Compiled by author based on Eviews calculations

According to calculations above, all 4 variables are not I(0) at 5% significance level which means they all are non-stationary at level. All 4 variables are I(1) at 5% significace level which means theye all are stationary at the first-difference. When 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, we should first check whether there is cointegration relationship among these variables before interpreting initial regression results. Engle-Granger test results are presented below:

Table 9: Engle-Granger Cointegration Test results

Cointegration Test - Engle-Granger
Specification: NPL RGDP INFL INTR C
Cointegrating equation deterministics: 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.
Source: Compiled by author based on Eviews calculations

Another ofteny used cointegration test is Phillips-Ouliaris method, results of cointegration test using this method are presented below:

Table 10: 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 deterministics: 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.
Source: Compiled by author based on Eviews calculations

According to both Engle-Granger and Phillips-Ouliaris cointegration test results, we reject the null hypothesis of no cointegration, which means selected variables have statistically significant cointegration relationship.

Applying FMOLS method, initial results from equation are presented below:

Table 11: Regression results (FMOLS method)

Dependent Variable: NPL
Method: Fully Modified Least Squares (FMOLS)
Sample (adjusted): 2005Q2 2021Q3
Included observations: 66 after adjustments
Cointegrating equation deterministics: C
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	-0.024035	0.016495	-1.457097	0.1501
INFL	-0.393785	0.151195	-2.604490	0.0115
INTR	-1.477565	0.240401	-6.146248	0.0000
C	0.290884	0.035935	8.094822	0.0000

R-squared	0.544713	Mean dependent var	0.063073
Adjusted R-squared	0.522683	S.D. dependent var	0.028118
S.E. of regression	0.019426	Sum squared resid	0.023397
Long-run variance	0.000839		

Source: Compiled by author based on Eviews calculations

According to FMOLS regression results, there is significant negative link between non-performing loan rates and inflattion, also between interest rates and NPL rates, but there is no significant relationship between Real GDP growth and NPL rates.

Another method for the regression with not I(0), but I(1) variables is Dynamic OLS method. This method is similar to FMOLS method that there must be cointegration relationship between variables in order to correctly inerpret results of regression. Engle-Granger and Phillips-Ouliaris test results are presented above and significant cointegration relationship are proved. once Results of regression run using Dynamic OLS method are presented below:

Table 12: Regression results (DOLS method)

Dependent Variable: NPL
Method: Dynamic Least Squares (DOLS)
Sample (adjusted): 2006Q2 2021Q3
Included observations: 62 after adjustments
Cointegrating equation deterministics: C
Automatic leads and lags specification (lead=0 and lag=4 based on SIC criterion, max=4)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	-0.400578	0.260865	-1.535578	0.1320
INFL	-0.375029	0.275424	-1.361641	0.1804
INTR	-1.462141	0.245256	-5.961683	0.0000
C	0.306917	0.034486	8.899737	0.0000

R-squared	0.823285	Mean dependent var	0.063747
Adjusted R-squared	0.749311	S.D. dependent var	0.027677
S.E. of regression	0.013858	Sum squared resid	0.008257
Long-run variance	0.000561		

Source: Compiled by author based on Eviews calculations

According to DOLS regression results, there is significant negative link between interest rates and NPL rates, but there is no significant link between Real GDP growth and NPL rates, also between inflation rates and NPL rates. R-squared of regression with DOLS method is higher than FMOLS method.

CCR method results are also presented below (Table 13):

According to CCR regression results, there is significant negative relationship between inflation rates and NPL rates, also between interest rates and NPL rates, but there is no significant relationship between Real GDP growth and NPL rates.

Results of three models are summarized below (Table 14):

Table 13: Regression results (CCR method)

Dependent Variable: NPL
Method: Canonical Cointegrating Regression (CCR)
Date: 04/17/22 Time: 21:40
Sample (adjusted): 2005Q2 2021Q3
Included observations: 66 after adjustments
Cointegrating equation deterministics: C
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	-0.029499	0.027343	-1.078869	0.2848
INFL	-0.489414	0.193253	-2.532496	0.0139
INTR	-1.466322	0.237098	-6.184446	0.0000
C	0.291057	0.035542	8.189048	0.0000

R-squared	0.528779	Mean dependent var	0.063073
Adjusted R-squared	0.505978	S.D. dependent var	0.028118
S.E. of regression	0.019763	Sum squared resid	0.024215
Long-run variance	0.000839		

Source: Compiled by author based on Eviews calculations

Table 14: Regression Results Summary

	FMOLS method	DOLS method	CCR method
Real GDP Growth	-0.024 (0.150)	-0.401 (0.132)	-0.029 (0.285)
Inflation rates	-0.394 (0.012)**	-0.375 (0.180)	-0.489 (0.014)**
Interest rates	-1.478 (0.000)***	-1.462 (0.000)***	-1.466 (0.000)***
Note: ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.			

Source: Compiled by author based on Eviews calculations

No statistically significant relationship can be detected between Real GDP Growth and NPL rates. This result is similar to the results of several studies (Bhattari, 2015; Ouhibi,S. and Hammami,S.,2015; Saba, Kouser and Azeem, 2012). Main reason behind non-significant relationship between Real GDP growth and NPL rates can be share of oil

sector in GDP of Azerbaijan being much higher than share of oil sector in loans. Hence, these two variables have different dynamics behind their movements.

Inflation rates are found to have significant negative relationship with NPL rates in regressions run using FMOLS and CCR methods, but no significant relationship is detected by DOLS method which has the highest R-squared value. Results of FMOLS and CCR methods is similar to results of several studies (Solarin and Daharan, 2011; Gerlach et al, 2005; Kastrati, 2011; Ouhibi,S. and Hammami,S., 2015; Rajah, 2016; Jakubik, 2007), while DOLS method results also have some predecessors (Akinlo, O. and Emmanuel, M., 2014). Inflation, especially unexpected inflation is widely known as transferring wealth from lenders to borrowers. Also, negative relationship between inflation rates and NPL rates may be caused by 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 reasonable result of higher inflation.

Using all of 3 methods, interest rates are found to have statistically significant negative relationship with NPL rates. These results are also similar to results of several studies (Wood and Skinner, 2008; Ahmad F. and Bashir T., 2013). Austrian school theories argue that low interest rate environment results in credit boom and overinvestment to non-profitable, low NPV projects. Also, many corporate finance theories support this view that when credit environment is more tight, managements are investing in more responsible way. Hence, reason behind negative relationship between lending rates and NPL rates may be as this kind of behavioral bias.

CONCLUSION AND POLICY RECOMMENDATIONS

Statistics show that during Covid-19 pandemic, NPL rates in Azerbaijan decreased despite economic disruption caused by anti-epidemic measures. In this research paper, inflation rates and interest rates are found to have significant negative relationship with NPL rates, while there is not found any significant relationship between real GDP growth and NPL rates. While decreasing NPL rates during Covid-19 period may be cause of higher inflation, non-significant relationship between real GDP growth and NPL rates may be cause of different weights of oil sector in GDP and bank loans of Azerbaijan, hence relationship between non-oil GDP growth and NPL rates in Azerbaijan should be further researched. Previous research papers analyzing factors impacting non-oil GDP growth in Azerbaijanfound significant positive link between bank credits and non-oil GDP growth (Mukhtarov, Humbatova and Seyfullayev, 2019), significant positive link between social expenditures of government and non-oil GDP growth, significant positive link in long-term between government expenditures and non-oil GDP growth (Aliyev, 2016), significant positive link in short-term between trade opennes and GDP growth (Seyfullayev, 2022), and no significant link between protectionist policies and non-oil GDP growth (Seyfullayev, 2020). Possible impacts of this kind of variables to 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 which may help explaining dynamics of NPL rates. Other than previously stated non-oil GDP growth, these omitted factors may include changes in consumption and saving behaviour and government support to financing of businesses of different size (especially important for Covid-19 period) through Mortgage and Credit Guarantee Fund of the Republic of Azerbaijan and Entrepreneurship Development Fund of the Republic of Azerbaijan, and also banks' lending policy which includes financial analysis of borrower, collateralisation and other risk management policies.

Finding of 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 in order to protect loan quality, we should focus on underlying dynamics of this relationship. As stated before, negative relationship between inflation and NPL rates may be result of inflation increasing collateral value especially considering the fact that frequently loans are used to purchase some assets like mortgages, autoloans and then purchased asset become collateral for loan. Hence, this relationship may imply that collateralisation is important factor to protect loan quality and keep NPL rates low in inflationary environment. On the topic of lending rates, theories of corporate finance and Austrian school of economics suggest that low interest rate environment may cause overinvestment in non-profitable projects and this relationship can be the reason behind negative link between lending rates and NPL rates. Hence, instead of keeping interest rates high and undermining investment process, government should try to improve capital markets efficiency by improving regulations on lending process.

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

REFERENCES

1. Adebola, S., Yusoff, W. and Dahalan, J. (2011). An ARDL Approach to the Determinants of Nonperforming Loans in Islamic Banking System in Malaysia. Kuwait Chapter of Arabian Journal of Business and Management Review, 1(2), pp. 20

2. Ahmad, F. and Bashir, T. (2013). Explanatory Power of Macroeconomic Variables as Determinantsof Non-performing Loans: Evidence from Pakistan. World Applied Sciences Journal, 22(2), pp.243-255.

3. Akinlo, O. and Emmanuel, M. (2014). Determinants of Non-performing Loans in Nigeria. Accounting and Taxation, 6(2), pp. 21-28.

4. Aliyev, K., Dehning, B., Nadirov, O. (2016). Modelling the Impact of Fiscal Policy on Non-Oil GDP in a Resource Rich Country: Evidence from Azerbaijan. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 64(6), p.1869-1878. doi:10.11118/actaun201664061869.

5. Aliyev, K., Mikayilov, C. (2016). Does the Budget Expenditure Composition Matter for Long-Run Economic Growth in a Resource Rich Country? Evidence from Azerbaijan, Academic Journal of Economic Studies, vol 2, issue 2, p.147-168. Available at: https://www.researchgate.net/publication/304827952.

6. Asgarzade G.G. (2016). Rapıd rise ın NPLs as a threat to economıc recovery ın Azerbaıjan. Economıcs, Law, Socıety: Resume of 2016

7. Babouc̆ek, I., Janc̆ar, M., (2005). A VAR analysis of the effects to macroeconomic shocks to the quality of the aggregate loan portfolio of the Czech banking sector. Working Paper Series, No. 1/2005, the Czech National Bank, Prague.

8. Bercoff, J.J., Giovanni, J. and Grimard, F. (2002). Argentinean banks, credit growth and the tequila crisis: A Duration Analysis". International Journal of Economics and Financial Issues Vol. 3, No. 4, 2013, pp.852-860.

9. Bofondi, M. and Ropele, T. (2011). Macroeconomic determinants of bad loans: evidence from Italian banks. Occasional Papers, 89.

10. Bracker, Kevin; Lin, Fang; and Pursley, Jennifer (2018). "Business Finance Essentials" (2018). Open Educational Resources.

11. Dash, M., and Kabra, G. (2010). The determinants of non-performing assets in Indian commercial bank: An econometric study. Middle Eastern Finance and Economics, 7, 94-106.

12. De Bock, R. and Demyanets, A. (2012). Bank Asset Quality in Emerging Markets: Determinants and Spillovers. IMF Working Paper, WP/12/71.

13. Erjavec, N., Cota, B. and Jaksic S. (2012). "Sign restriction Approach to Macro Stress-testing of the Croatian Banking System", Financial Theory and Practice, Vol. 36(4) pp 395-412

14. Fofack, H. (2005). Nonperforming Loans in Sub-Saharan Africa: Causal Analysis and Macroeconomic Implications. World Bank Policy Research Working Paper No. 3769.

15. Gambera M., (2000). Simple forecasts of bank loan quality in the business cycle, Emerging Issue Series, 3, Federal Reserve Bank of Chicago, Chicago,

16. Gerlach, S., Peng, W., Shu, C., (2005). Macroeconomic conditions and banking performance in Hong Kong SAR: A panel data study. BIS Papers, No. 22, Bank for International Settlements, Basel

17. Greenidge, K. and Grosvenor, T. (2010). Forecasting Non-performing Loans in Barbados. Business, Finance & Emerging Economies, 5(1), pp. 79-108.

18. Guy, K. and Lowe, S. (2011). Non-performing Loans and Bank Stability in Barbados. Central Bank of Barbados Economic Review, XXXVII (3), pp. 77-99.

19. Ilgar Seyfullayev (2020). Protectionism and non-resource economic growth: Evidence from Azerbaijan. Problems and Perspectives in Management, 18(4), 121-129. doi:10.21511/ppm.18(4).2020.11

20. Ilgar Seyfullayev (2022). Trade openness and economic growth: Evidence from Azerbaijan. Problems and Perspectives in Management, 20(1), 564-572. doi:10.21511/ppm.20(1).2022.45

21. Jakubik P., (2007). Macroeconomic Environment and Credit Risk. Czech Journal of Economics and Finance, 2007, 57(1-2).

22. Jordan, A. and Tucker, C. (2013). Assessing the Impact of Non-performing Loans on Economic Growth in the Bahamas. Monetaria, 1(2), pp. 372-400.

23. Kalirai H., and Scheicher, M., (2002). Macroeconomic stress testing: Preliminary evidence for Austria. Austrian National Bank Financial Stability Report, May, no.3

24. Kastrati (2011). The Determinants of Non-performing Loans in Transitioun Countries. Financial Stability Report.

25. Keeton, W. & Charles, S. M. (1987). Why Do Banks' Loan Losses Differ? Federal Reserve Bank of Kansas City, Economic Review, May, 3-21.

26. Khemraj, T., and Pasha, S. (2009). The determinants of non-performing loans: An econometric case study of Guyana. Paper presented at the Caribbean Centre for Banking and Finance Bi-annual Conference on Banking and Finance, St. Augustine, Trinidad.

27. Klein N., (2013). Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. IMF Working Paper, No. 13/72

28. Louzis, D. P., Vouldis, A. T., and Metaxas, V. L. (2011). Macroeconomic and bank-specific determinants of nonperforming loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. Journal of Banking & Finance

29. Nkusu, M. (2011) "Nonperforming Loans and Macrofinancial Vulnerabilities in Advanced Economies", IMF Working Paper 11/161.

30. Ouhibi, S. and Hammami, S. (2015). Determinants of Non-performing Loans in the Southern Mediterranean Countries. International Journal of Accounting and Economics Studies, 3(1), pp. 50-53.

31. Rajah, K. (2016). Determinants of Non-performing Loans: Evidence from the Jordanian Banking Sector. Journal of Finance and Bank Management, 4(1), pp. 125-136.

32. Rajan, R., and Dhal, S., (2003). Non-performing Loans and Terms of Credit of Public Sector Banks in India: An Empirical Assessment. Occasional Papers, 24:3, pp. 81-121, Reserve Bank of India.

33. Saba, Kouser and Azeem (2012). Determinants of Non Performing Loans: Case of US Banking Sector. Romanian Economic Journal.

34. Seema Bhattari (2015). Determinants of Non-Performing Loan in Nepalese Commercial Banks. Economic Journal of Development Issues Vol. 19 & 20 No. 1-2 (2015) Combined Issue pp. 22-38

35. Shahriyar Mukhtarov, Sugra Humbatova and İlgar Seyfullayev (2019). The impact of bank credits on non-oil GDP: evidence from Azerbaijan. Banks and Bank Systems, 14(2), 120-127. doi:10.21511/bbs.14(2).2019.10

36. Vatansever, M. and Hepsen, A. (2013). Determining Impacts on Non-Performing Loan Ratio in Turkey. Journal of Finance and Investment Analysis, Vol. 2, No. 4, 2013, pp.119-129.

37. Wood, A. and Skinner, N. (2018). Determinants of non-performing loans: evidence from commercial banks in Barbados. The Business and Management Review, Volume 9 Number 3.

38. Zeman, J., Jurcˇa, P., 2008. Macro stress testing of the Slovak banking sector. Working Paper, No. 1/2008, Slovak National Bank, Bratislava.

Internet resources

1. Cbar.az
2. Data.worldbank.org
3. Fred.stlouisfed.org
4. Stats.gov.az
5. Who.int
6. Worldemeters.info

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