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THE DETERMINANTS OF CREDIT INTEREST RATES IN AZERBAIJAN. ADJUSTED LIQUIDITY PREFERENCE NETWORK

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ABSTRACT

The paper examines the relationship between income & inflation with interest rates of loans in Azerbaijan by applying adjustments to the liquidity preference framework. Based on the research findings, exchange rate, GDP, money supply and household savings are the determinants of credit interest rates given in USD, but not in AZN. Moreover, inflation and nominal income of the population have a statistically significant impact over loan interest rates neither in AZN nor in USD. Hereby, the paper does not promulgate that the assumptions of Keynesian economics upon the positive correlation of income & price level with interest rates are valid in the case of Azerbaijan within a minorly modified model. Furthermore, the more households save money, the more financial institutions should try to incentivize customers to take out loans by determining interest rates at lower rates since an increase in total savings plummets the demand for extracting loans.

Key words: Liquidity preference; interest rates; loans; national income; money supply; exchange rate; Keynesian economics.

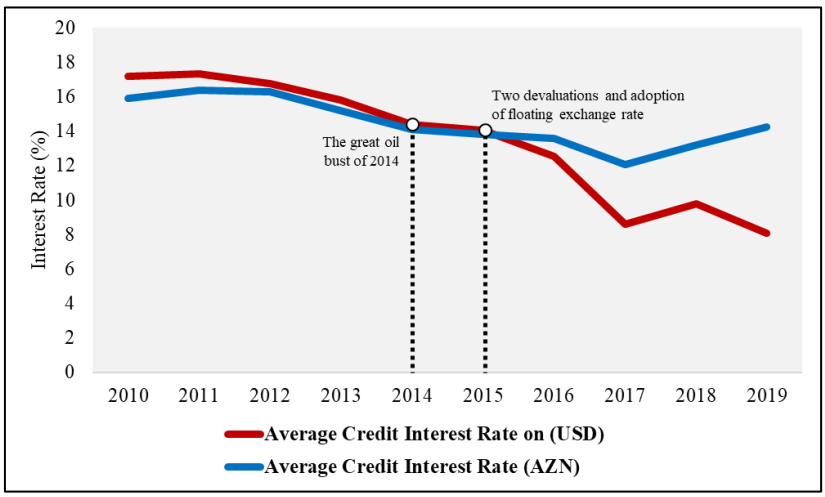
INTRODUCTION

From 2010 through 2014, the period recognized as resplendent as oil price boom for oil-dependent economies, Azerbaijan Economy was also burgeoning, in parallel witnessing the average annual interest on loans in both U.S. Dollars and Azerbaijani Manat (AZN) fluctuations in the same direction with a rough variance of 4%, namely in-between 14-18%. However, during ensuing four years starting from 2015, the year when two-fold devaluation occurred and double-digit inflation was in place, interest rates on loans in USD plummeted more than 8%, while interest rate on loans in AZN stayed above 12%. [see Figure 1] The average interest rate hereby is measured by Central Bank of Azerbaijan based on loan rates for legal entities and individuals, with the periods of:

- up to 1 month;
- from 1 month to 3 months;
- from 3 months to 6 months;
- from 6 months to 9 months;
- from 9 months to 1 year;
- from 1 year to 3 years;
- from 3 years to 5 years;
- from 5 years to 10 years;
- over ten years.

A plain variation in the direction of interest rate representing lines, therefore, escalates the study goal to determine which factors influence these rates to oscillate.

Figure 1: Average Credit Interest Rates in Azerbaijan Economy over a decade



Source: *Central Bank of the Republic of Azerbaijan*

Exchange rate volatility between USD and EUR, causing pricing inefficiencies in crude oil in 2014 (Tokic, 2015) had further negative consequences, particularly for the list of fuel-dependent economies, including Azerbaijan. Mistrust towards oil prices skyrocketed the demand for USD, and the world economy witnessed manifold depreciations and devaluations against USD (Baffes et al., 2015). This had created hard times for the exchange rate fixed by The Central Bank of the Republic of Azerbaijan too. CBAR, therefore, with sharp plummets in its reserves, decided to depower manat twice a year, followed by "crisis".[2]

The first-thought remedy for economists during crises regards liquidity preference network by Keynes (1936) full of distinctive assumptions. Amidst investigated papers, there are a few studies of a positive correlation between income & price level and demand for money at various interest

[2] Guardian, (2015) Azerbaijan in crisis as currency plummets https://www.theguardian.com/world/2015/dec/22/azerbaijan-currency-plummets-oil-price

rates. Even though the author's works interpret interest rates of bonds, this paper applies minor adjustments by examining the relationship mainly between the national income of population & consumer price index and interest rates of Loans in Azerbaijan.4

1. LITERATURE REVIEW

Overall average interest rates, as well as loan interest rates in the economy, have ties with the number of macroeconomics determinants. These include factors occurring within the country and outside of its borders. Many researchers have conducted studies to figure out which variables have a significant relationship with interest rates, and which do not affect them. Sakyi (2017) examined macroeconomic determinants of interest rate spreads in Ghana for the period 1980-2013, finding out that that exchange rate volatility, fiscal deficit, economic growth, and public sector borrowing from commercial banks, increase interest rate spreads in Ghana in the long and short-run.

Tennant and Folawewo (2014) investigated the macroeconomic and market determinants of banking sector interest rate spreads in low- and middle-income countries. The research suggested that only one factor the banking sector reserve requirement significantly and positively affects interest rate spreads.

Paper by Agus in 2019 revealed an analysis of the effect of macroeconomic variables on the interest rate volatility in Indonesia. By conducting VAR analysis, the results were obtained that in the long-run, the coefficient estimates of money supply, exchange rate, and the GDP growth have a negative and significant effect.

Tumwine et al. (2018) in their study about the determinants of interest rate in emerging markets, focusing on banking financial institutions in Uganda indicated that liquidity, equity capital, market power and reserve requirement have a positive effect on the interest rate. Mutaka (2019) assessed the effect of central bank rate, deposit rate, money supply and exchange rate on the lending rate in Uganda. According to this research, the lending rate had a significant positive relationship with the exchange rate, bank rate, money supply and a negative relationship with trade balance.

Al Shubiri, Jamil (2017) examined the factors that determine the interest rate spread of commercial banks listed on Muscat security market over the period 2008 – 2014 by using OLS assumptions. Variables like a return to asset ratio, liquidity risk and risk aversion within the financial group and unemployment rate, debt services ratio have a significant relationship with interest rate spread, according to empirical results of this paper.

Chow and Kim (2004) constructed a bivariate VAR-GARCH model in order to examine the empirical relationship between exchange rates and interest rates. The results indicate that these countries do not implement interest rate policy very actively to stabilize exchange rates after the crisis, but their domestic currencies are more vulnerable to post-crisis exchange rates of competitors. Moreover, increased stability of the exchange rate in these economies has not resulted in more excellent stabilization of interest rates.

Messai and Jouini (2013) investigated the determinants of non-performing loans from 2004 through 2008 for a sample of 85 banks in Italy, Greece and Spain. According to the results of this research, loans correlate negatively with the GDP growth rate, the profitability of banks' assets and positively with the unemployment rate, the loan loss reserves to total loans and the real interest rate.

Saba et al. (2012) researched determinants of non-performing Loans on the case of the U.S. banking sector. The study claims that Real GDP per Capita, Inflation, and Total Loans have a significant impact on the performing loan ratio; however, values of coefficients were not much high.

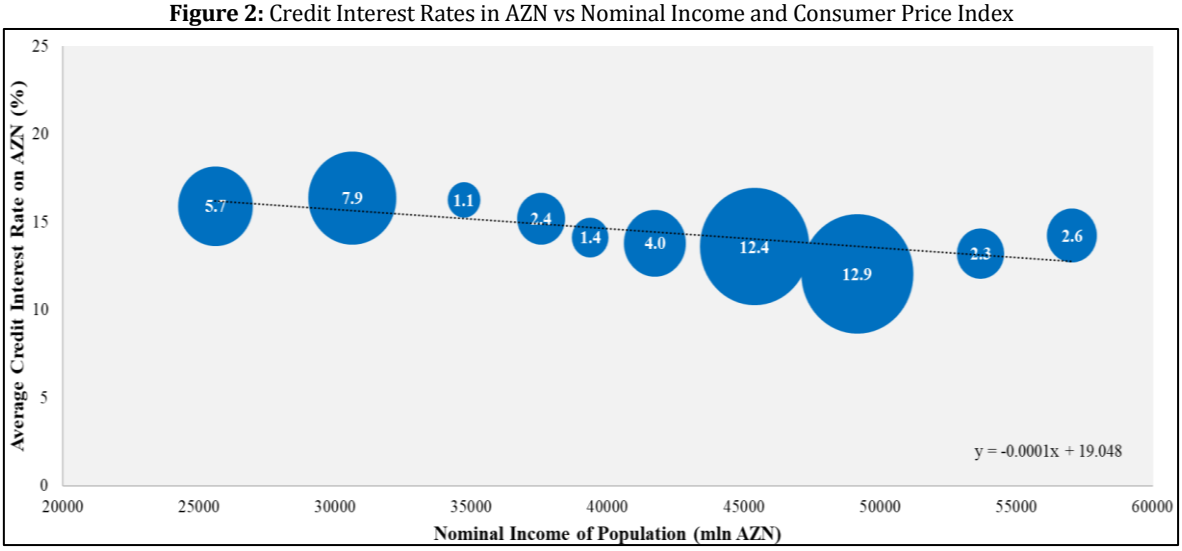
2. DATA

The study uses annual data from 2010 to 2019. Variable denotations, types, description, unit of the data and sources are given in Table 1:

Table 1: Raw Data

Variable denotation	Variable type	Description	Unit of measure	Source
LOAN_RT	Explained	The average interest rate on credits given in USD	percentage	CBAR, Statistics, monetary indicators
LOANRATE_AZN	Explained	The average interest rate on credits given in AZN	percentage	CBAR, Statistics, monetary indicators
EXCHNG_RT	Explanatory	Average annual exchange rate	AZN/USD	CBAR, Statistical bulletin № 12 (237), p. 39
LOG(GDP)	Explanatory	Gross Domestic Product of Azerbaijan	mln AZN	CBAR, Statistical bulletin № 12 (237), p. 3
LOG(INCOME_PPLTN)	Explanatory	Nominal Income of Population	mln AZN	CBAR, Statistical bulletin № 12 (237), p. 4
INFLATION	Explanatory	Consumer Price Index	percentage	CBAR, Statistical bulletin № 12 (237), p. 4
LOG(M2_MONEYSUPPLY)	Explanatory	M2 money supply (cash outside of banks, demand deposits, time deposits)	mln AZN	CBAR, Statistics, monetary indicators
LOG(HSHLD_SAVINGS)	Explanatory	Total Household Savings	mln AZN	CBAR, Statistical bulletin № 12 (237), p. 35

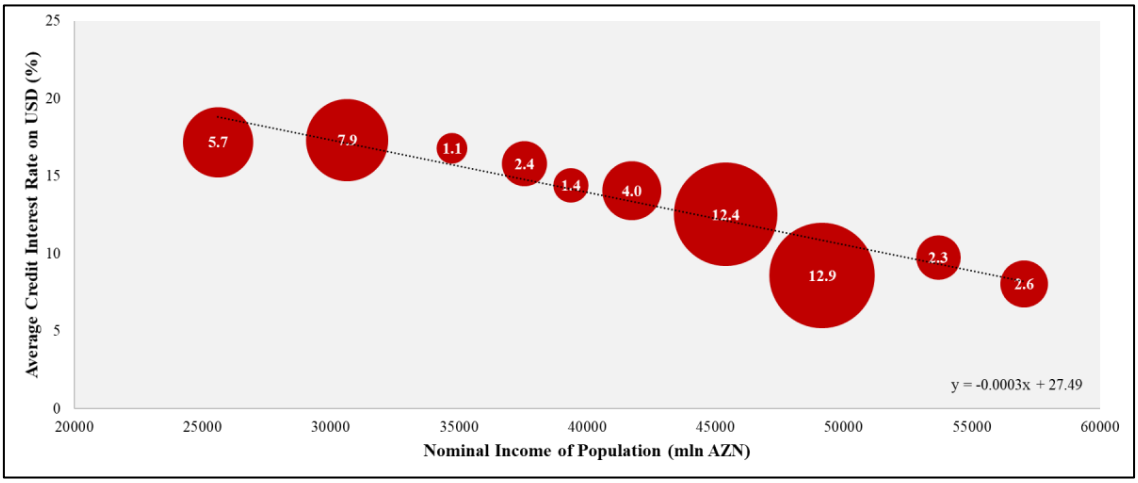
Figure 2: Credit Interest Rates in AZN vs Nominal Income and Consumer Price Index



Sources: *Authors' own calculation*

Whilst applying mere outlook to purpose-revealing connections, the analysis does depict signifycant economic relations neither with loan interest rates in AZN nor in USD (see Figures 2, 3). Besides unestablished correlation with national income, there is another evident lack of influence of inflation towards interest rates. Alternatively stated, the size of bubbles in mentioned scatter plots indicate consumer price indexes, cited in the centre; the trendline, however, is the link of vertical and horizontal axes, with simple regressive equations in the below right corners. Multiple linear regression is further applied to all explanatory variables.

Figure 3: Credit Interest Rates in USD vs Nominal Income and Consumer Price Index



Sources: *Authors' own calculation*

3. METHODOLOGY

The study makes use of OLS (Ordinary Least Squares) method for estimation purposes for its models. Moreover, the serial correlation test was conducted to test whether unobserved factors are correlated with independent variables overcome. According to the OLS assumptions, the volatility of the errors must not be related to the explanatory variables in any of the periods. Thus, to test whether there is a heteroskedasticity problem in this model, Breusch-Pagan-Godfrey heteroskedasticity test was conducted. Normality test was conducted in order to test for normality of distribution of residuals. The models mentioned below were used for empirical estimations:

Model (1)*:*

*LOAN_RT = C(1) + C(2)*EXCHNG_RT + C(3)*LOG(GDP) + C(4)*LOG(INCOME_PPLTN) + C(5)*INFLATION + C(6)*LOG(M2_MONEYSUPPLY) + C(7)*LOG(HSHLD_SAVINGS) + U,*

Model (2)*:*

*LOANRATE_AZN = C(1) + C(2)*EXCHNG_RT + C(3)*LOG(GDP) + C(4)*LOG(INCOME_PPLTN) + C(5)*INFLATION + C(6)*LOG(M2_MONEYSUPPLY) + C(7)*LOG(HSHLD_SAVINGS) + U.*

4. EMPIRICAL RESULTS AND DISCUSSION OF FINDINGS

EViews software is utilized for employing OLS technique for generating multiple linear regression parameters. The empirical results are as follows:

Model (1):

LOAN_RT = -56.75 – 13.92**EXCHNG_RT* – 7.77**LOG(GDP)* + 11.3**LOG(INCOME_PPLTN)* – 0.03**INFLATION* + 14.55**LOG(M2_MONEYSUPPLY*) – 12.35**LOG(HSHLD_SAVINGS) + U*

Table 2: Regression Coefficients for Credits in USD
Dependent variable: Loan interest rate in USD

Variable	Coefficient	Std. Error	t-Statistic
C	-56.75346	43.95556	-1.291155
EXCHNG_RT	-13.92612	3.311814	-4.204982**
LOG(GDP)	-7.770866	2.828539	-2.747307*
LOG(INCOME_PPLTN)	11.30804	6.597532	1.713980
INFLATION	-0.036520	0.067926	-0.537644
LOG(M2_MONEYSUPPLY)	14.55625	3.804843	3.825717**
LOG(HSHLD_SAVINGS)	-12.35371	3.011191	-4.102601**

*Notes: ***, ** and * indicate rejection of the null hypotheses at the 1%, 5% and 10% significance levels respectively. R-squared 0.99; 99% of total variations in the dependent variable are explained by independent variables.*

Although the above-mentioned table states economic significance, p-values depict that the total income of population and inflation does not have a statistically significant impact over loan rates in USD. However, other variables, more precisely AZN/USD exchange rate, log(HSHLD_SAVINGS), and log(M2_MONEYSUPPLY) have significant impact at 5% level of significance, where the null hypothesis gets rejected. Impact of GDP over loan interest rate is also statistically significant, but at 10% level of significance. This empiric analysis elicits the outcome that in order to persuade customers to take out loans from the banks, interest rates need to go down for playing incentivizing roles. On top of that, the coefficient of household savings demonstrates that, when household savings increase by 1%, the interest rate on loans in USD will decrease by 0.041% on average, keeping all other variables constant.

Model (2):

LOANRATE_AZN = -27.77 - 6.21*EXCHNG_RT – 6.41*LOG(GDP) – 7.53*LOG(HSHLD_SAVINGS) + 7.26*LOG(INCOME_PPLTN) - 0.14*INFLATION + 9.88*LOG(M2_MONEYSUPPLY) + U

In juxtaposition with the model (1), none of the independent variables has a statistically significant impact over loan interest rates in AZN. At 1%, 5% or 10% level of significance, we cannot reject the null hypothesis for all the independent variables of the model (2). Moreover, both the total income of population and inflation have a statistically insignificant impact over dependent variables in both models. The conclusion is derived that inflation and total national income of the population do not affect the interest rates of loans given in both AZN and USD. Since none of these variables has a significant impact over loan interest rates in AZN, following test are conducted over the model (1) only.

Trend variable, as well as the lagged variables of all independent variables separately, were added to the model (1) to check whether they have significant results on interest rates of loans given in USD. The results are as following:

Table 3: Regression Coefficients for Credits in AZN
Dependent variable: Loan interest rate in AZN

Variable	Coefficient	Std. Error	t-Statistic
C	-27.77269	60.03043	-0.462644
EXCHNG_RT	-6.212174	4.522968	-1.373473
LOG(GDP)	-6.415496	3.862956	-1.660774
LOG(INCOME_PPLTN)	7.263769	9.010298	0.806163
INFLATION	-0.140297	0.092766	-1.512371
LOG(M2_MONEYSUPPLY)	9.883121	5.196302	1.901953
LOG(HSHLD_SAVINGS)	-7.539800	4.112405	-1.833428

*Notes: ***, ** and * indicate rejection of the null hypotheses at the 1%, 5% and 10% significance levels respectively.*
R-squared 0.89; 89% of total variations in the dependent variable are explained by independent variables.

Table 4: Regression Coefficients for Credits in USD with Trend variable

Variable	Coefficient	Std. Error	t-Statistic	Probability
@TREND	-1.202359	1.984265	-0.605947	0.6062
EXCHNG_RT(-1)	-5.126274	19.05971	-0.268959	0.8327
LOG(GDP(-1))	1.066611	8.461609	0.126053	0.9202
LOG(INCOME_PPLTN(-1))	-3.102912	18.65458	-0.166335	0.8951
INFLATION(-1)	0.038265	0.098234	0.389532	0.7635
LOG(M2_MONEYSUPPLY(-1))	-15.50446	11.21683	-1.382250	0.3987
LOG(HSHLD_SAVINGS(-1))	-6.033178	10.11662	-0.596363	0.6577

According to p-values of all individually added variables to the model of loan interest rate in USD, none of those has a statistically significant impact over interest rates on loans in USD, so there is no enough evidence to reject the null hypothesis of statistical significance for the added variables. Interest rates on loans given in USD are not associated with trend variable, or with lagged variables of independent variables by prior periods.

To test whether there is a heteroskedasticity problem in this model, Breusch-Pagan-Godfrey heteroskedasticity test was conducted.

- Hypothesis: H_0: There is no heteroskedasticity problem.
  H_1: H_0 is not true.

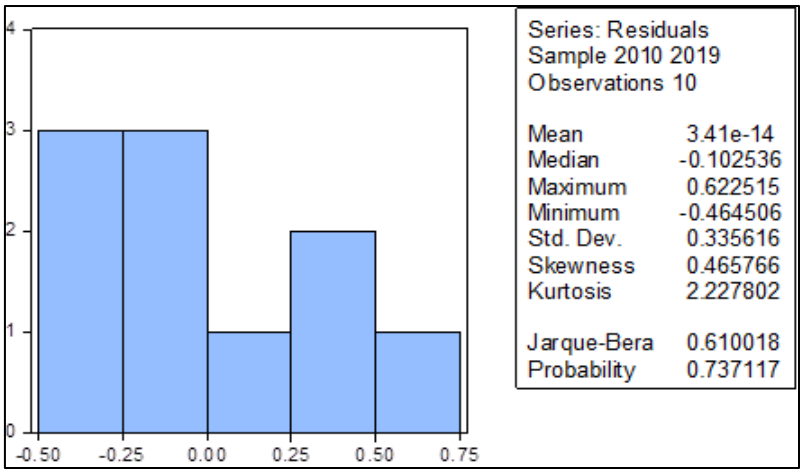
The p-value is 0.23, such that we fail to reject the null hypothesis. There is no enough evidence to reject the null hypothesis. There is no heteroskedasticity problem in the model.

Table 5: Heteroskedasticity test

Breusch-Godfrey Serial Correlation L.M. Test			
F-statistic	8.427049	Prob. F(2,1)	0.2367
Obs*R-squared	9.439904	Prob. Chi-Square(2)	0.0089

To test for normality of distribution of residuals, normality test was conducted:

Figure 4: Normality test, Histogram



- Hypothesis: H_0: Residuals are normally distributed
  H_1: Residuals are not normally distributed

The p-value is 0.61, such that we fail to reject the null hypothesis. There is no enough evidence to reject the null hypothesis. Residuals are normally distributed in the model.

According to OLS assumptions, there should not be serial correlation in time series data. Thus, the Breusch-Godfrey Serial Correlation L.M. Test was conducted:

Table 6: Serial correlation test

Breusch-Godfrey Serial Correlation L.M. Test			
F-statistic	8.427049	Prob. F(2,1)	0.2367
Obs*R-squared	9.439904	Prob. Chi-Square(2)	0.0089

- Hypothesis: H_0: No serial correlation in data
  H_1: There is a serial correlation in data

The p-value is 0.23, such that we fail to reject the null hypothesis. There is no enough evidence to reject the null hypothesis. There is no serial correlation in the model.

CONCLUSION

The paper examines the relationship between national income of population & consumer price index with interest rates of loans in Azerbaijan by applying adjustments to the liquidity preference framework. Based on the research findings, the analyses altogether display that exchange rate, gross domestic product, money supply and household savings are determinants of interest rates of loans given in USD, but not in AZN. According to the empirical results, inflation and nominal income of the population have a statistically significant impact over loan interest rates neither in AZN nor in USD. Thus, the paper does not extrapolate that the assumptions of Keynesian economics upon the positive correlation of income & price level with interest rates are valid in the case of Azerbaijan with a minor modification in terms interest rates of loans. Furthermore, interest rates of loans given in USD are associated neither with trend itself nor any lagged variables by prior periods, separately added to the model (1). The more households save money, the more financial institutions in Azerbaijan try to incentivize customers to take out loans by determining interest rates at lower rates since an increase in total savings plummets the demand for extracting loans. Based on conducted tests, model (1) is free from heteroskedasticity problem, serial correlation, while residuals are distributed normally.

The occurrence of a centrally planned economy to a certain level in Azerbaijan could be one of the crucial reasons why the Keynesian liquidity preference network is not plausible for Azerbaijan's case. The economic environment in country allows the central authority to make economic decisions regarding the manufacturing, distribution, and other free-market based settlements, in the corollary of which price level and income of the population is being affected. Moreover, the government regulatory system controlling USD/AZN exchange rate has a latent effect on a number of macroeconomic indicators such as trade, overall demand & supply in the economy, which creates a ground to more than likely affect components which Keynes takes into account such as inflation and income level.

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