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# Factors that increase credit risk of Azerbaijani banks

**Shahriyar Mukhtarov**
*Department of Economics and Management, Khazar University,*
*Department of Economics and Management, Azerbaijan State University of Economics (UNEC),*
*Azerbaijan,*
*smukhtarov@khazar.org*

**Serhat Yüksel**
*School of Business, İstanbul Medipol University,*
*Turkey*
*serhatyuksel@medipol.edu.tr*

**Elvin Mammadov**
*Department of Economics and Management, Khazar University,*
*School of Business,*
*Azerbaijan State University of Economics (UNEC),*
*Azerbaijan*
*elmammadov@khazar.org*

**Abstract**. The main purpose of this paper is to analyze the influencing factors behind credit risks in Azerbaijani banks. Within this scope, we analyzed 10 biggest banks of Azerbaijan with respect to their asset size. Furthermore, 10 explanatory variables were used to achieve this objective. Annual data for the period between 2010 and 2015 was tested using the panel logit methodology. According to the results of our analysis, it was defined that 4 independent variables affect credit risk of Azerbaijani banks. It was also determined that decrease in the capital adequacy ratio, interest rate and total assets leads to increasing credit risk. We have also identified that there is a positive relationship between unemployment rate and the credit risk of Azerbaijani banks. Therefore, it can be stated that Azerbaijani banks should increase their capital adequacy ratio and total assets amount in order to minimize the negative effects from the credit risk problem.

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**JEL Classification:** G19, G20, G21

## 1. INTRODUCTION

Globalization has already removed most of the barriers for trade among countries (Sassen, 1999). Due to this, interconnection between economies has increased very much. Thus, importance and popularity of the banking sector went up (Peek & Rosengren, 2000). The main reason behind this situation is that banks play the key role in the relations between depositors and investors. In other words, efficiency of the banking sector is a significant factor for increasing the investment volume in this economy (Yüksel et al., 2016). Therefore, economic advance of many countries, especially developing ones, depends on the success of their banking sectors.

In parallel to popularity and importance, we can also observe the increasing risks of the banking sector (Rodrik & Subramanian, 2009). Since banks have a crucial role in the improvement of economies, their risks should be managed most effectively (Aebi et al., 2012). However, most of the banking crises that have occurred in the last 20 years were caused by the ineffective management of such risks. As a consequence of these crises, many people have lost their jobs and a lot of companies went bankruptcy (Yüksel, 2016).

Credit risk is one of the most frequent risks for banks. It stems from the probability that customers cannot pay their loans back to banks (Duffie & Singleton, 2003). It is generally accepted that this risk is the most important and widespread risk for banks because it leads to significant losses for them and affects their cash balance negatively. Therefore, many methods were developed to manage credit risks effectively.

When taking into the consideration all these issues, it becomes understandable that studies analyzing credit risks are essential for the banking sector. Thus, the main purpose of this study is to determine the factors that increase the credit risk of banks. Within this context, the annual data of 10 biggest Azerbaijani banks in the period between 2010 and 2015 was analyzed using the panel logit method. Our analysis made it possible to define the reasons behind credit risks of Azerbaijan and to offer suggestions on how to minimize these risks. To the best of our knowledge, this subject is for the first time considered in the case of Azerbaijan, and this fact increases the originality of our study.

The study consists of five sections and is structured as follows. After giving the introduction in section 1, we provide information on similar studies in the literature review section. In this section, we also emphasize on the existing gap in literature. Section 3 describes the non-performing loans in Azerbaijani banking sector. After that, section 4 explains the panel logit method, describes the chosen variables and presents our estimation results. Finally, our findings are discussed in the concluding section.

## 2. LITERATURE REVIEW

In the literature, there are many studies that try to analyze credit risk in the banking sector. For example, Sinkey and Greenawalt (1991) made a study in order to identify the reasons for credit risk in the USA. Within this scope, the data for the period between 1984 and 1987 were analyzed by using regression method. Because of the analysis, it was determined that there is a positive relationship between total loans and credit risk. Kwan and Eisenbeis (1995), Boudriga et. al. (2009) and Saba et. al. (2012) also reached similar conclusions by using the same method. On the other hand, Rajan and Dhal (2003), Das and Ghosh (2007) and Yağcılar and Demir (2015) came to the same conclusion by making panel data analysis.

In addition to these studies, it was also understood that some other studies underlined the relationship between the capital amount and credit risk. Berger and DeYoung (1997) tried to analyze the influencing factors of credit risk in the USA. In order to achieve this objective, they used Granger causality analysis for the data between 1985 and 1994. It was identified that capital amount of the banks has a relationship with credit risk. The similar conclusion was also reached by Makri and others (2014) with GMM approach and Gezu (2014) with panel data analysis. Adayemi (2011) also concluded that low amount of capital adequacy is an important factor of the credit risk of Nigerian banks.

Moreover, it was also identified that some studies emphasized the relationship between the credit risk and profitability. Siddiqui et. al. (2012) made an analysis so as to determine the increasing factors of the credit risk in Pakistan. Within this context, annual data for the periods between 1996 and 2011 was used in this study. Furthermore, they used GARCH method in order to achieve this objective. According to the results of the analysis, it was defined that there is a negative relationship between credit risk and ROA. Castro (2013), Gezu (2014) and Yağcılar and Demir (2015) came to the same conclusion by using a different method.

Furthermore, it was also seen that some studies underlined the importance of the macroeconomic factors in the credit risk of the banks. Mileris (2012) analyzed 22 European countries so as to identify the causes of the credit risk of the banks. In this study, the data between 2008 and 2010 were analyzed by using logit model. They determined that unemployment rate, inflation and growth rate are significant variables of credit risk. Konstantakis et. al. (2016) reached the similar results for Greek banks with VEC method. In addition to these variables, Farhan et. al. (2012) and Chaibi and Ftiti (2015) concluded that exchange rate volatility is a significant indicator of the credit risk.

While analyzing similar studies in the literature, it can be understood that there are lots of different studies that focus on the determinant of credit risk. In addition to this situation, it is also identified that many different methodologies are considered in these studies, such as regression, vector error correction and generalized method of moment. However, it is determined that there is not a study that considers the leading indicators of credit risk for Azerbaijan. Therefore, a new study which covers this country will be very beneficial to the literature.

## 3. CREDIT RISK IN BANKING SECTOR

Loans are the most significant source of the revenue of the banks. In addition to this issue, they constitute the largest part of the assets of these banks. Moreover, giving loans is the main function of the banks. However, it can be said that this situation includes some risk for the banks. The main risk in this circumstance is the possibility that customers cannot pay back this credit amount to the banks. This risk is also named as the credit risk of the bank (Heffernan, 2005). Mandacı (2003) and Graham and Coyle (2000) also defined credit risk as the expected volatility in the value of the net profit and capital of the banks due to the late payment and nonpayment of the debts by the customers. Furthermore, Sinkey (1983) explained the credit risk as the financial loss of the banks because of the failure of the customers to comply with contractual provisions.

As it can be understood from the definitions above, credit risk is mainly related to non-performing loans of the banks. It causes many problems for the banks. First of all, when customers cannot pay their debt to the banks, these banks start to have liquidity problem because they do not have their cash flows on time (Neal, 1996). In addition to this problem, high credit risk declines the net profit of the banks since non-performing loans refer to the expenses (Altman et. al., 1998). Moreover, it leads to decrease the image of the banks in the market because investors do not like the banks with low profit. While taking into the consideration of these aspects, it can be understood that high credit risk is essential for the banks and it may even cause the bankruptcy of these banks (Jarrow & Turnbull, 2000).

Because credit is risk vital for the banks, measuring this risk is also significant. Hence, there are some different methods so as to measure this risk of the banks. Additionally, it was also seen that the quality of the methods has been increased over the years. Standard method is the oldest and simplest model of measuring credit risk. It depends on the independent credit rating. According to this method, risk weights of the credits are defined similarly for all banks with respect to the customer groups (Teker et. al., 2005). For example, the weight of the credits given to public institutions is 0%. On the other hand, if the customer

is not evaluated by an independent credit rating institution, this weight will be 100%. Moreover, when there is a mortgage as collateral of a credit, the weight of the credit will be 35%. In this method, national authority determined which independent credit rating agency will evaluate the customers (Karabulut, 2003).

Internal rating method is more extensive approach than standard method. According to this method, banks evaluate their credit risk internally. That is to say, bank personnel, who are expert to credit evaluation, calculate the credit risk. As it can be understood from the definition, it depends on the subjective evaluation. While making this calculation, the amount of default, the probability, loss amount and the maturity of the loan are taken into the consideration (Teker et. al., 2005). The details of this evaluation are given below.

Credit Risk = The Amount of Default*f(Probability of Default, Loss Given Default, Maturity)

It was accepted by many researchers that available methods are not adequate to measure the credit risk of the banks (Gray et. al., 2007; Neal, 1996; Wei & Chen, 2009). Owing to this situation, new credit risk measuring methods were developed. They aim to calculate credit risk of the banks more accurately. The most important new methods are Merton-based model and RAROC model (Zhang & Wu, 2016; Bluhm et. al., 2016). Differently from other methods, they calculate credit risk by considering many different factors that may affect this risk.

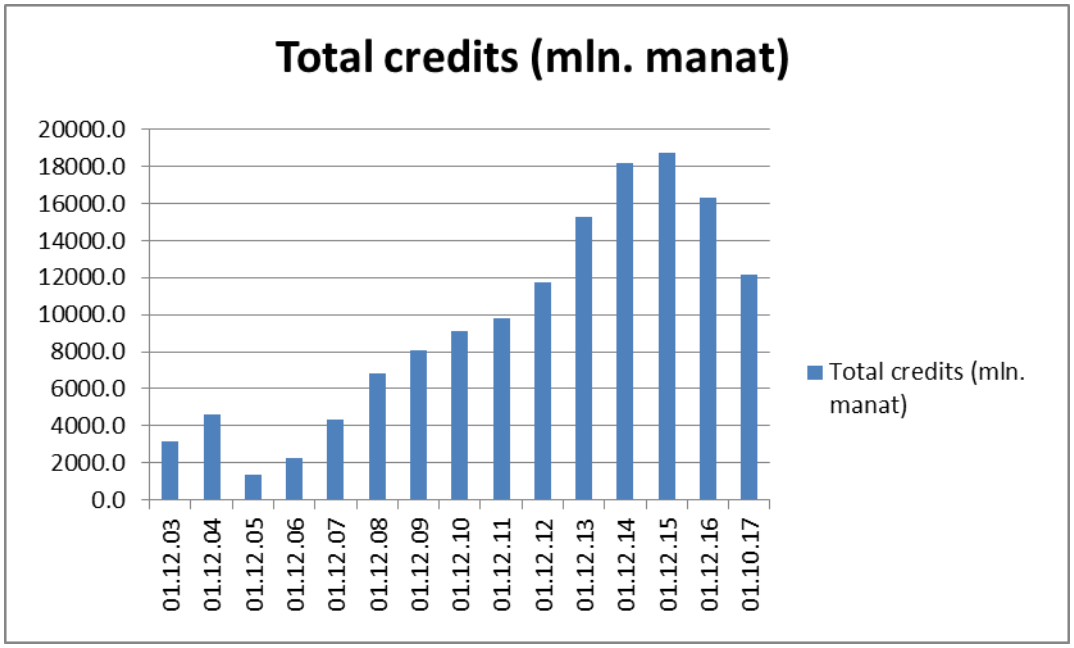
## 4. NON-PERFORMING LOANS IN AZERBAIJANI BANKING SECTOR

After 2008 global financial crisis, the subjects of risk management and auditing in banking sector became more important. Within this context, the banking sector in Azerbaijan has entered restructuring process for risk management with the help of criteria developed by the Central Bank of Azerbaijan. According to the studies related to this topic, it was understood that last regulations in banking focused on the performance, risk management, efficient supervision and audit of this sector (Çağıl & Mukhtarov, 2014). Unfortunately, until last years, evaluation of risk management system occurred as the assessment of the performance of bank managers according to CAMELS approach. In addition to this situation, the compliance of the corporate governance principals was also evaluated (Mammadov & Mukhtarov, 2014).

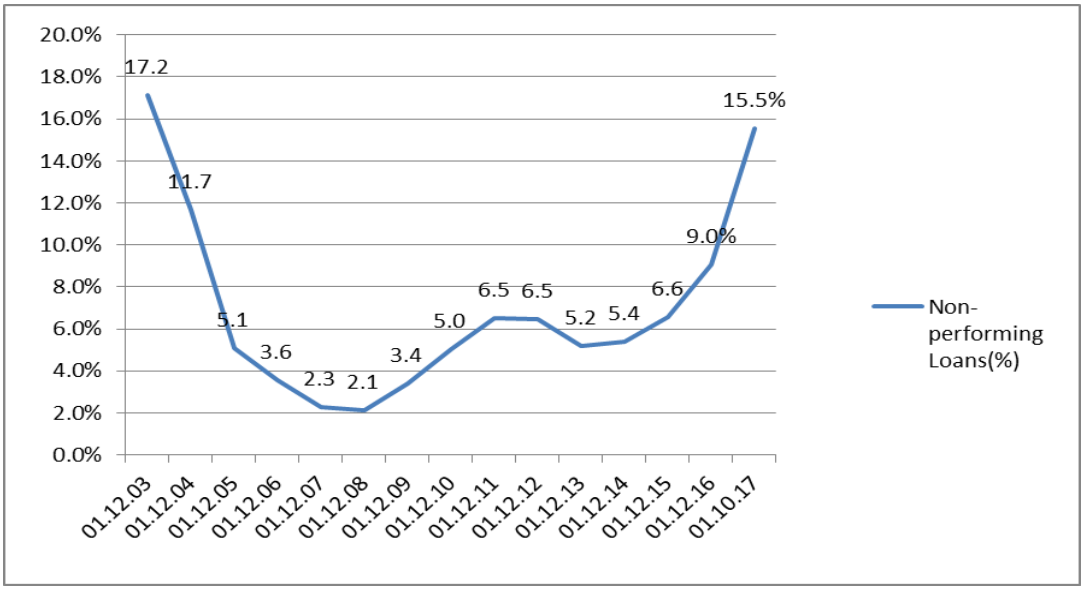
Basel II criteria were implemented significantly in Azerbaijan banking sector. It can be said that works related to the second and third pillar were completed and the first pillar was implemented partially. The only capital requirement for credit risk is calculated although the capital requirement for market and operational risk was also demanded in the first pillar. The works in order to calculate this requirement for operational risk are going on.

Moreover, non-development of the securities in Azerbaijan led to decrease in the amount of commercial portfolio of the banks. This situation saved the banks against market risk considerably. The implementation of the anchored exchange rate regime and high amount of foreign exchange reserves minimized currency risk of the banks. The amount of the credits in Azerbaijan over the years was emphasized on Graph 1.

As it can be seen from the Graph 1, there was a significant increase in credits for the period of 2003-2015. The main reason behind this situation is the economic growth in Azerbaijan during this period. For the 2015-2017 time span the relative decrease can be observed in credits. This decrease can be explained with rapid decrease in oil prices since the second quarter of 2014 led to an important decline in foreign exchange revenues and owing to this issue, GDP growth went down for the appropriate time intervals. Graph 2 gives information about non-performing loans in Azerbaijani banking sector.




**Graph 1. Total Credits of Azerbaijan (2003-2017)**
*Sources:* The Central Bank of Republic of Azerbaijan




**Graph 2. Non-performing Loans in Azerbaijan Banking Sector (2003-2017)**
*Sources:* The Central Bank of Republic of Azerbaijan

As it can be seen from Graph 2, there was a decrease in the amount of non-performing loans in spite of the increase in credit amount for the period of 2003-2008. The main reason for this decrease is the structural improvement in Azerbaijan during this period, such as more effective risk management and auditing implications. Owing to this issues, there was a decrease in non-performing loans ratio although there is an increase in the total loans amount. This situation gives information that Azerbaijani banks can manage credit risks reasonably. However after the financial crisis which began in 2008 the amount of non-

performing loans has been edging up steadily. The reason behind this situation was global oil price falling which led to significant GDP shortfalls in Azerbaijan. The effects of the decrease in oil prices on its turn worsened the socio-economic situation of the Azerbaijani population and their income. On the other hand after the sharp decline of oil prices national currency of Azerbaijan twice suffered devaluation in 2015. The aim of devaluation was to compensate the losses from the oil price falls, but the incomes of Azerbaijan households have double declined. An important part of loans borrowed from banks were consumer loans and over 55% of loans fall to the share of households. A significant decline in households revenues cause loan repayment problems which led to an increase in NLP.

## 5. METHODOLOGY

### 5.1. The Scope of the Study

We aimed to determine the factors that affect credit risk of Azerbaijani banks. Within this scope, 10 biggest banks in Azerbaijan were analyzed. The main reason of choosing these banks is data availability. In addition to this situation, annual data for the periods between 2010 and 2015 was used in this study. The data was provided by the financial reports of the banks and internet site of World Bank. The banks, which were analyzed in this study, were detailed in Table 1.

Table 1

List of Banks Analyzed in this Study (2015)

| Bank | Total Asset (mil USD) | Asset Size (% of total banks) |
|---|---|---|
| Azerbaijan International Bank (IBA) | 10,697 | 42.48 |
| Capital Bank | 1,716 | 6.81 |
| Xalq Bank | 1,552 | 6.16 |
| Pasha Bank | 1,370 | 5.44 |
| AccessBank | 1,275 | 5.06 |
| UniBank | 1,051 | 4.17 |
| Bank of Baku | 901 | 3.58 |
| Bank Technique | 745 | 2.96 |
| AGBank | 654 | 2.60 |
| Bank Respublika | 633 | 2.51 |
| **Total** | **20,594** | **81.78** |

*Sources:* Financial Reports of the Banks

### 5.2. Logit

The logit model is the method in which dependent variable takes two different values, such as "yes-no". The most important advantage of logit model in comparison with similar methods is that logistic distribution function is used in this model. The details of logistic distribution function are emphasized in equation 1.

$$F(Y_i) = 1 / (1 + e^{-Yi}) = 1 / (1 + e^{-(B0 + BiXi + \varepsilon i)}) \quad (1)$$

In equation 1, "Y" refers dependent variable whereas "X" shows independent variable. Furthermore, "ε" represents error term and "B" explains coefficient of independent variables. Moreover, the term "e"

equals to 2.72. Because this value is positive, the value of equation 1 will be positive as well. In addition to this aspect, since "e" is in the denominator, equation 1 will take the value between 0 and 1 (Albert and Chib, 1993). Additionally, the data set should be stationary so as to use logit model in the analysis. For this purpose, unit root test is used. The details of unit root test is given in equation 2.

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{k=1}^{n} \beta_k \Delta Y_{t-k} + \varepsilon_t \quad (2)$$

In equation 2, "$\Delta Y_t$" shows the first difference of the series. In this equation, if "$\gamma$" equals to "0", this means that there is not a unit root and this data set is stationary (Granger, 1969).

### 5.3. Variables

Credit risk means the situation in which customers cannot pay back their debts to the bank (Bielecki & Rutkowski, 2013). As it can be seen from the definition, the most suitable ratio with respect to the credit risk is non-performing loans. Owing to this issue, we also used non-performing loans as a dependent variable. In order to give better results, we preferred to use the ratio of non-performing loans to total loans. Within this context, first of all, we calculated the average value of this ratio. After that, we gave the value of "1" to the banks whose ratio is more than the average value. On the other hand, other banks got the value of "0". In other words, the value of "1" refers to the higher credit risk. In addition to the dependent variable, we also used 10 independent variables in order to find the influencing factors of the credit risk. The details of these variables are emphasized in Table 2.

As it can be seen from Table 2, we defined 5 bank-specific variables and 5 macroeconomic variables. When total assets and total loans of the banks increase, this means that banks take higher risk. Therefore, we expect that there should be a positive relationship between total assets and total loans with credit risk (Sinkey & Greenawalt, 1991; Kwan & Eisenbeis, 1995; Saba et. al., 2012; Konstantakis et. al., 2016). However, there were also some studies in the literature that found the opposite results (Boudriga et. al., 2009; Siddiqui et. al., 2012; Yağcılar & Demir, 2015).

Moreover, since capital adequacy ratio and return on equity are positive performance indicators of the banks, there should be inverse relationship between these variables and credit risk (Berger & DeYoung, 1997; Adayemi, 2011; Siddiqui et. al., 2012; Curak et. al., 2013; Makri et. al., 2014; Gezu, 2014; Yağcılar & Demir, 2015). However, because the expense is a factor that decreases the profitability, we expect a positive relationship between total expense and credit risk (Das & Ghosh, 2007; Espinoza & Prasad, 2010).

In addition to bank-specific variables, we also used 5 different macroeconomic variables. Because high inflation and unemployment rate and low GDP growth rate show negative conditions related to the economy of the country, we expect positive relationship between these issues and credit risk (Das & Ghosh, 2007; Espinoza & Prasad, 2010; Greenidge & Grosvenor, 2010; Louzis et. al., 2012; Vogiazas & Nikolaidou, 2011; Farhan et. al., 2012; Mileris, 2012; Saba et. al., 2012; Messai &Jouini, 2013; Skarica, 2014; Klein, 2013; Curak et. al., 2013; Makri et. al., 2014; Chaibi & Ftiti, 2015; Konstantakis et. al., 2016).

Table 2

List of Independent Variables

| Type of the Variables | Variables | References |
|---|---|---|
| Bank Specific | Total Assets | Kwan & Eisenbeis (1995), Rajan & Dhal (2003), Berger & DeYoung (1997), Das & Ghosh (2007), Boudriga et. al. (2009), Karim et. al. (2010), Greenidge & Grosvenor (2010), Misra & Dhal (2010), Louzis et. al. (2012), Curak et. al. (2013), Chaibi & Ftiti (2015), Subrahmanyam et. al. (2016), Homburg et. al. (2016) |
| | Capital Adequacy Ratio | Berger & DeYoung (1997), Boudriga et. al. (2009), Maggi & Guida (2011), Adayemi (2011), Klein (2013), Gezu (2014), Chaibi and Ftiti (2015), Yağcılar & Demir (2015), Subrahmanyam et. al. (2016) |
| | Return on Equity (ROE) | Das & Ghosh (2007), Boudriga et. al. (2009), Louzis et. al. (2012), Klein (2013), Curak et. al. (2013), Makri et. al. (2014), Gezu (2014), Chaibi & Ftiti (2015), Yağcılar & Demir (2015), Subrahmanyam et. al. (2016), Misra & Naidu (2016), Homburg et. al. (2016) |
| | Total Loans | Kwan & Eisenbeis (1995), Das & Ghosh (2007), Khemraj & Pasha (2009), Boudriga et. al. (2009), Espinoza & Prasad (2010), Karim et. al. (2010), Greenidge & Grosvenor (2010), Louzis et. al. (2012), Maggi & Guida (2011), Richard (2011), Adayemi (2011), Saba et. al. (2012), Messai &Jouini (2013), Klein (2013), Castro (2013), Curak et. al. (2013), Makri et. al. (2014), Gezu (2014), Yağcılar & Demir (2015), Konstantakis et. al. (2016) |
| | Total Expense | Das & Ghosh (2007), Espinoza & Prasad (2010), Chaibi & Ftiti (2015) |
| Macroeconomic | Inflation | Sinkey & Greenawalt (1991), Khemraj & Pasha (2009), Greenidge & Grosvenor (2010), Vogiazas & Nikolaidou (2011), Farhan et. al. (2012), Mileris (2012), Saba et. al. (2012), Messai & Jouini (2013), Skarica (2014), Klein (2013), Curak et. al. (2013), Makri et. al. (2014), Gezu (2014), Chaibi & Ftiti (2015), Yağcılar & Demir (2015) |
| | GDP Growth | Sinkey & Greenawalt (1991), Rajan & Dhal (2003), Khemraj & Pasha (2009), Boudriga et. al. (2009), Espinoza & Prasad (2010), Greenidge & Grosvenor (2010), Misra & Dhal (2010), Louzis et. al. (2012), Farhan et. al. (2012), Mileris (2012), Saba et. al. (2012), Messai & Jouini (2013), Skarica (2014), Klein (2013), Castro (2013), Curak et. al. (2013), Makri et. al. (2014), Chaibi and Ftiti (2015), Yağcılar & Demir (2015), Konstantakis et. al. (2016) |
| | Unemployment Rate | Boudriga et. al. (2009), Espinoza & Prasad (2010), Louzis et. al. (2012), Vogiazas & Nikolaidou (2011), Farhan et. al. (2012), Mileris (2012), Messai & Jouini (2013), Skarica (2014), Klein (2013), Castro (2013), Chaibi and Ftiti (2015), Konstantakis et. al. (2016) |
| | Exchange Rate | Khemraj & Pasha (2009), Farhan et. al. (2012), Messai & Jouini (2013), Klein (2013), Castro (2013), Curak et. al. (2013), Chaibi & Ftiti (2015) |
| | Deposit Interest Rate | Khemraj & Pasha (2009), Espinoza & Prasad (2010), Greenidge & Grosvenor (2010), Misra & Dhal (2010), Louzis et. al. (2012), Vogiazas & Nikolaidou (2011), Farhan et. al. (2012), Siddiqui et. al. (2012), Messai & Jouini (2013), Klein (2013), Castro (2013), Curak et. al. (2013), Gezu (2014), Chaibi & Ftiti (2015), Yağcılar & Demir (2015) |

*Sources:* Authors

Similar to this situation, there should also be positive relationship between the volatility of exchange rate and interest rate with credit risk since these variables increase the fragility of the economy (Khemraj & Pasha, 2009; Misra & Dhal, 2010; Louzis et. al., 2012; Farhan et. al., 2012; Curak et. al., 2013; Chaibi and Ftiti, 2015; Homburg et. al., 2016).

## 6. EMPIRICAL RESULTS AND DISCUSSION

We made panel logit analysis to determine the factors that increase the credit risk of Azerbaijani banks. In the first step of the analysis, a control was made to understand whether variables are stationary or not. Within this context, Levin, Lin and Chu (2002) unit root tests was performed to reach this objective. The details of these tests were given in Table 3.

The probability values of these tests give information about the stationary properties of the variables. Considering the null hypothesis, which states the non-stationarity of the variable, if the probability values are less than 0.05, it can be concluded that the variable is stationary. As it can be seen from Table 5, the probability values of only 6 variables (NPL, ROE, Inflation, Unemployment Rate, GDP Growth and Deposit Interest Rate)[1] are less than 0.05. Therefore, it was identified that these 6 variables are stationary at level, being integrated of order zero, I(0) whereas other 5 variables (Total Assets, Total Loans, Total Expense, Capital Adequacy Ratio and Exchange Rate) are not. These 5 variables are stationary at first difference, being integrated of order one, I(1). Owing to this condition, the first difference of these 5 variables and level forms of the stationary 6 variables are used in the analysis.

Table 3

Unit Root Test Results

| **Variables** | | **Levin, Lin and Chu** | |
|---|---|---|---|
| | **Probability (Level Case)** | **Probability (First Difference Case)** | **Result** |
| NPL | 0.0000 | - | I(0) |
| Total Assets | 0.9653 | 0.0000 | I(1) |
| Capital Adequacy Ratio | 0.0926 | 0.0000 | I(1) |
| ROE | 0.0000 | - | I(0) |
| Total Loans | 0.9924 | 0.0004 | I(1) |
| Total Expense | 0.9836 | 0.0000 | I(1) |
| Inflation | 0.0133 | - | I(0) |
| GDP Growth | 0.0000 | - | I(0) |
| Unemployment Rate | 0.0000 | - | I(0) |
| Exchange Rate | 0.9923 | 0.0000 | I(1) |
| Deposit Interest Rate | 0.0000 | - | I(0) |

*Source*: Authors.

The optimal lag structure is determined by Schwarz's Information Criteria.

After performing unit root tests, an analysis was made by using 10 explanatory variables to understand the relationship between dependent and independent variables. However, we had to eliminate 4 of them (Return on Equity, Total Loans, Total Expense, Inflation Rate) due to the multicollinearity problem. The results of this analysis are given in Table 4.

[1] Yüksel et al. (2018) also found Inflation and Unemployment Rate variables to be I(0) as a result of Phillips-Perron (PP) and Augmented Dickey Fuller (ADF) test.

Table 4

Logit Results

| Variables | Coefficient | Significance Value |
|---|---|---|
| **Capital Adequacy Ratio** | **-0.069** | **0.097** |
| **Unemployment Rate** | **4.869** | **0.037** |
| **Interest Rate** | **-1.355** | **0.070** |
| GDP Growth Rate | 0.250 | 0.174 |
| Exchange Rate | 0.561 | 0.883 |
| **Total Assets** | **-2.096** | **0.020** |
| Nagelkerke $R^2 = 0.311$<br>Number of Observation: 60<br>Dependent Variable: Credit Risk | | |

*Source:* Authors

As it can be seen from Table 3, significant values of 4 independent variables are less than "0.1". This situation shows that these variables are statistically significant. Because the coefficient of the capital adequacy ratio is negative (-0.069), there is a negative relationship between this variable and credit risk. Capital adequacy ratio indicates the capacity of the bank in order to manage the problems, such as credit risk (Moyer, 1990). Therefore, when this ratio increases, banks give fewer loans to the customers. Owing to this aspect, banks become more selective to give loans (Berger & DeYoung, 1997; Adayemi, 2011; Gezu, 2014).

Additionally, it was also determined that unemployment rate is an important variable that affects credit risk in Azerbaijan. Since the coefficient of this variable is positive (4.869), it was identified that high unemployment rate increases the credit risk. The main reason behind this situation is that when the unemployment rate is high, people cannot pay their credit debt to the banks. Because of this issue, credit risk of the banks goes up (Louzis et. al., 2012; Vogiazas & Nikolaidou, 2011; Farhan et. al., 2012; Mileris, 2012; Skarica, 2014; Klein, 2013; Makri et. al., 2014; Konstantakis et. al., 2016).

Moreover, the negative coefficient (-1.355) of interest rate gives information that there is an inverse relationship between this variable and credit risk. In other words, it can be said that because low-interest rate decreases the net interest margin of the banks, it will also raise credit risk of these banks (Khemraj & Pasha, 2009; Misra & Dhal, 2010; Louzis et. al., 2012; Curak et. al., 2013; Chaibi & Ftiti, 2015).

Finally, it was also defined that the amount of total assets influences credit risk. Negative coefficient (-2.096) means that high amount of total assets decreases the credit risk. This situation is contrary to the results of many studies. It gives information that banks with high size are more successful to find more qualified customers regarding giving loans (Boudriga et. al., 2009; Siddiqui et. al., 2012; Yağcılar & Demir, 2015).

## 7. CONCLUSION

In this study, we tried to determine the factors that increase credit risk of banks. Within this scope, 10 biggest banks of Azerbaijan with respect to the asset size were analyzed. In order to achieve this objective, 10 explanatory variables were used. Furthermore, annual data for the periods between 2010 and 2015 was tested by using panel logit method.

As a result of the analysis, it was determined that 4 independent variables affect credit risk of Azerbaijani banks. It was identified that there is a negative relationship between capital adequacy ratio and credit risk because the coefficient of this variable is negative (-0.069). This situation shows that banks, which

have high capital adequacy ratio, are more selective to give loans. Berger and DeYoung (1997), Boudriga et. al. (2009), Maggi and Guida (2011) and Adayemi (2011) also reached the same conclusion in their studies.

In addition to capital adequacy ratio, it was also concluded that there is a positive relationship between unemployment rate and credit risk. This result gives information that when the unemployment rate is high, people cannot pay their credit debt to the banks. Owing to this problem, credit risk of the bank's increases. This aspect is similar to the result of the main studies in the literature (Mileris, 2012; Messai & Jouini, 2013; Skarica, 2014; Klein, 2013; Castro, 2013; Chaibi & Ftiti, 2015; Konstantakis et. al., 2016).

Moreover, it was analyzed that low-interest rate increases credit risk of Azerbaijani banks. Because any decrease in interest rate leads to decline in net interest margin, this situation causes credit risk to increase. Additionally, it was also determined that high amount of total assets decreases the credit risk. This situation explains that banks with high size are more successful to find more qualified customers. Boudriga et. al. (2009), Karim et. al. (2010), Greenidge and Grosvenor (2010), Misra and Dhal (2010), Louzis et. al. (2012) and Curak et. al. (2013) emphasized the same conclusion in their studies.

In conclusion, by making this analysis, we identified the significant factors that increase the credit risk of Azerbaijani banks. According to these results, it can be said that Azerbaijani banks should increase capital adequacy ratio and total assets by giving loans to qualified customers in order to decrease credit risk. In addition to this situation, there should be a decrease in the unemployment rate and increase in interest rate so as to prevent the credit risk problem.

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