# Influencing factors of Capital Adequacy Ratio of the Deposit Banks: A Panel Regression Analysis for Turkish Banking Sector

**Serhat Yüksel[1] and Mustafa Özsarı[2]**

## Abstract

The aim of this paper is to determine the factors that affect capital adequacy ratio of the deposit banks. For this purpose, 24 deposit banks of Turkey are taken into the consideration. While analyzing similar studies in the literature, 13 different variables are selected that may affect on capital adequacy ratio. Additionally, annual data of these variables for the periods between 2005 and 2016 is evaluated by using panel regression analysis. It is concluded that capital adequacy ratio of the banks is negatively related with economic growth rate and positively related with inflation rate. This shows that in case of economic decline, banks prefer to have higher amount of capital to have a more secured situation. Also, because higher inflation rate increases the uncertainty in the market, it will lead banks to have higher amount of capital. Furthermore, the results also show that there is a negative relationship between net balanced sheet position of the banks and capital adequacy ratio. This means that when banks have open positions, they prefer to increase capital amount. The main reason is that in case of high currency risk, banks opt for having higher amount of capital to minimize this risk.

**Key words:** Banking, Capital Adequacy Ratio, Panel Regression Analysis

**JEL Codes:** C32, G21, G31

[1] **Corresponding Author** İstanbul Medipol University, serhatyuksel@medipol.edu.tr
[2] Dept. of Economics, Konya Food and Agriculture University, mustafa.ozsari@gidatarim.edu.tr

## 1. Introduction

Especially in the last decades, there were some important banking crises in the world, such as in Argentina, Turkey and United States. Because banking sector plays a key role in the economies of the countries, it also affected many different sectors in these countries. Due to these crises, many companies went bankruptcy. Additionally, lots of people lost their jobs as a result of these crises. Consequently, these countries suffered from economic recession for a long time (Oktar and Yüksel, 2015).

This situation showed that the result of banking crises might be very harmful. Therefore, countries aimed to take some actions in order to prevent banking crises in the future. Within this scope, most of the countries created a legal authority that controls banking sector in these countries. Banks make necessary reporting to these authorities on regular periods. This issue is very helpful to understand any problems in the banking sector. Therefore, it will be very easy to solve this problem before it causes a banking crisis (Dinçer et. al., 2017).

Capital adequacy of the banks is a very significant concept which is also controlled by these authorities. Banking crises pointed that if the banks do not have necessary capital amount, it will increase the harmful effects of the crises (Mili et. al., 2016). Owing to this aspect, in Basel standards, it was emphasized that banks should have minimum 8% of capital adequacy ratio that shows necessary amount of capital in comparison to their weighted risks. Regarding the weighted risks of the banks, credit, market and operational risks are taken into the consideration.

Turkey is also a country which suffered from two different banking crises in 1994 and 2000. After these crises, it took very important actions to increase the power of the banking sector. Within this context, Banking Regulatory and Supervisory Agency was founded in 2000 with the aim of controlling risks in Turkish banking sector (Yüksel, 2016), (Dinçer et. al., 2016). This agency established many regulations to achieve this objective. In this regard, it announced that Turkish banks should have minimum 12% capital adequacy ratio.

According to the data of the Bank Association of Turkey, capital adequacy ratio of Turkish banking sector in 2015 was 15.6% while this ratio was 15% in deposit banks. Additionally, this ratio was 14.6% in state and private banks whereas foreign banks have 15.4% of capital adequacy ratio. Odea Bank has the lowest ratio (12.2%) and Deutsche Bank has the highest ratio (20.7%) in this year. Although this ratio is crucial to increase the power of the banks in any risky situation, it also limits banks to give loans in some aspects and this has also negative influence on the profitability.

This paper aims to identify the factors that affect capital adequacy ratio of the deposit banks. Within this scope, 24 deposit banks of Turkey and 13 different variables for the periods between 2005 and 2016 are taken into the consideration. Moreover, panel regression analysis was used to achieve this objective. As a result, it will be possible to understand which factors influence banks to increase this ratio. Hence, this study makes an important contribution to the literature by evaluating an important concept for the banks.

## 2. Literature Review

Some studies, which focused on capital adequacy ratio, are detailed on table 1. Table 1 shows that the studies related to capital adequacy ratio in the literature divide into two different categories. The first category in the literature is related to the analysis of capital adequacy ratio in some different countries. Lihua (2004) analyzed this situation in China and concluded that Chinese banks need to improve themselves with respect to the capital adequacy. In addition to this study, Pasha et. al. (2012) identified that Indian banks are successful regarding capital adequacy. Aydın (2013) also clustered Turkish banks as for capital adequacy. Similar to this study, Karahanoğlu (2015) tried to predict capital adequacy of the participation banks in Turkey. Hassan et. al. (2016) also made an analysis on Turkey and identified that participation banks suffer more than conventional bank when there is a decline in capital adequacy ratio.

The second category of capital adequacy ratio in the literature is related to the determinants of this ratio. Al-Sabbagh and Magableh (2004) tried to identify the indicators of capital adequacy ratio in Jordan and reached the conclusion that there is a positive relationship between bank size and this ratio. However, Yahaya et. al. (2016) identified the opposite result for Japan. Furthermore, Ho and Hsu (2010) made an analysis to identify the determinants of capital adequacy ratio in Taiwan. They determined that profitability ratios positively affect capital adequacy ratio. Similar to this study, Büyüksalvarci and Abdioglu (2011), Bokhari et. al. (2012), Almazari (2013) and Bateni et. al. (2014) defined the same conclusion in their studies. On the other side, Shingjergji and Hyseni (2015) concluded that the profitability ratios do not have any effect on capital adequacy ratio.

While analyzing similar studies in the literature, it can be seen that there are lots of studies which focused on capital adequacy ratio. Some of these studies analyzed the capital adequacy condition in the countries whereas some other studies tried to identify the influencing factors of capital adequacy ratio. Another important point is that regression analysis method was used in most of these studies. On the other side, it can also be understood that there is a need for a new study which analyzes the determinants of capital adequacy ratio in Turkey.

**Table 1:** Studies Related to Capital Adequacy Ratio

| Author | Method | Scope | Result |
|---|---|---|---|
| Al-Sabbagh and Magableh (2004) | Regression | Jordan | Bank size has a positive influence on capital adequacy ratio. |
| Lihua (2004) | Descriptive Statistics | China | Chinese banks have lower capital adequacy ratios. |
| Bin (2005) | Regression | China | Bank loan has an impact on capital adequacy ratio. |
| Ho and Hsu (2010) | Regression | Taiwan | Profitability ratios positively affect capital adequacy ratio. |
| Jian (2011) | Regression | China | Capital adequacy ratio reflects the efficiency of capital power of the banks. |
| Büyüksalvarci and Abdioglu (2011) | Regression | Turkey | There is a positive relationship between return on asset and capital adequacy ratio. |
| Pasha et. al. (2012) | Descriptive Statistics | India | Indian banks are successful with respect to capital adequacy. |
| Bokhari et. al. (2012) | Regression | Pakistan | Banks with higher return on asset tend to have higher capital adequacy ratio. |

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|---|---|---|---|
| Abusharba et. al. (2013) | Regression | Indonesia | There is a positive relationship between nonperforming loans and capital adequacy ratio. |
| Abba et. al. (2013) | Regression | Nigeria | There is a direct relationship between total loans and capital adequacy ratio. |
| Aydın (2013) | Descriptive Statistics | Turkey | Capital adequacy of Turkish banks is analyzed. |
| Almazari (2013) | Regression | Saudi Arabia | It is defined that return on asset positively affects capital adequacy. |
| Bateni et. al. (2014) | Regression | Iran | Return on equity positively affects capital adequacy ratio. |
| Shingjergji and Hyseni (2015) | Regression | Albania | The profitability ratios do not have any effect, but bank size has a positive influence on capital adequacy ratio. |
| Karahanoğlu (2015) | Descriptive Statistics | Turkey | He tries to predict capital adequacy of the participation banks in Turkey. |
| Abou-El-Sood (2015) | Regression | US | %8 capital adequacy ratio is suitable to minimize the negative effects of financial crisis. |
| Yahaya et. al. (2016) | Regression | Japan | There is a negative relationship between total assets and capital adequacy ratio. |
| Louati et. al. (2016) | Regression | 12 Countries | Interest rate is an important factor that affects capital adequacy ratio. |
| Hassan et. al. (2016) | Scenario Analysis | Turkey | Participation banks suffer more than conventional bank when there is a decline in capital adequacy ratio. |
| Mili et. al. (2016) | Regression | 310 different countries | Regulatory framework affects capital adequacy ratio of the banks. |

**Source:** Authors

## 3. An Application for Turkish Banking Sector

### 3.1. Data and Variables

In this study, 24 deposit banks of Turkey are taken into the consideration. While analyzing similar studies in the literature, 13 different variables are selected that may affect the capital adequacy ratio. Additionally, annual data of these variables for the periods between 2005 and 2016 is used. This data is provided from the Bank Association of Turkey and Turkish Statistical Institutions. The details of independent variables are given on table 2.

Table 2 demonstrates that 13 different variables are chosen in this study by analyzing similar studies in the literature. Out of these variables, 8 variables are related to the banks while 5 variables indicate macroeconomic conditions. “Net Balanced Sheet Position” and “FX Assets / FX Liabilities” show the power of the banks in case of any volatility in the market. Because of this situation, it is expected that there should be a negative relationship between these variables and capital adequacy ratios (Yahaya et. al., 2016), (Bokhari et. al., 2012). When the variables of “Total Loans / Total Deposits”,” non-performing loans”, “total assets” and “total loans” are high, this means that banks take higher risk. Thus, there should be positive relationship between these variables and capital adequacy ratio (Bateni et. al., 2014), (Abba et. al., 2013), (Al-Sabbagh and Magableh, 2004), (Almazari, 2013).

On the other side, in the literature, there are different views regarding the relationship between capital adequacy ratio and profitability (Shingjergji and Hyseni, 2015), (Abusharba

et. al., 2013), (Ho and Hsu, 2010). In addition to them, higher unemployment, exchange rate and interest rate refer to the higher risk in the market, there should be positive relationship between capital adequacy ratio and these variables (Yahaya et. al., 2016), (Al-Sabbagh and Magableh, 2004). Nevertheless, there is not a certain relationship between capital adequacy ratio with economic growth and inflation rate (Bokhari et. al. (2012).

**Table 2:** Independent Variables Used in the Study

| Independent Variables | References |
|---|---|
| Net Balanced Sheet Position | Yahaya et. al. (2016), Bokhari et. al. (2012), Aydın (2013) |
| FX Assets / FX Liabilities | Yahaya et. al. (2016), Bokhari et. al. (2012), Al-Sabbagh and Magableh (2004) |
| Total Loans / Total Deposits | Mili et. al. (2016), Yahaya et. al. (2016), Büyüksalvarci and Abdioglu (2011), Bokhari et. al. (2012), Shingjergji and Hyseni (2015), Abusharba et. al. (2013), Abba et. al. (2013), Al-Sabbagh and Magableh (2004) |
| Nonperforming Loans | Mili et. al. (2016), Büyüksalvarci and Abdioglu (2011), Shingjergji and Hyseni (2015), Abusharba et. al. (2013), Ho and Hsu (2010), Almazari (2013) |
| Return on Asset | Mili et. al. (2016), Yahaya et. al. (2016), Büyüksalvarci and Abdioglu (2011), Bokhari et. al. (2012), Shingjergji and Hyseni (2015), Abusharba et. al. (2013), Ho and Hsu (2010), Bateni et. al. (2014), Al-Sabbagh and Magableh (2004), Almazari (2013) |
| Return on Equity | Mili et. al. (2016), Yahaya et. al. (2016), Büyüksalvarci and Abdioglu (2011), Shingjergji and Hyseni (2015), Abusharba et. al. (2013), Ho and Hsu (2010), Bateni et. al. (2014), Almazari (2013) |
| Total Assets | Mili et. al. (2016), Yahaya et. al. (2016), Büyüksalvarci and Abdioglu (2011), Bokhari et. al. (2012), Shingjergji and Hyseni (2015), Ho and Hsu (2010), Bateni et. al. (2014), Abba et. al. (2013), Al-Sabbagh and Magableh (2004), Almazari (2013) |
| Total Loans | Yahaya et. al. (2016), Büyüksalvarci and Abdioglu (2011), Bin (2005), Ho and Hsu (2010), Abba et. al. (2013), Almazari (2013) |
| Economic Growth | Mili et. al. (2016), Yahaya et. al. (2016), Bokhari et. al. (2012), Al-Sabbagh and Magableh (2004) |
| Unemployment Rate | Mili et. al. (2016), Yahaya et. al. (2016) |
| Inflation Rate | Mili et. al. (2016), Yahaya et. al. (2016), Abba et. al. (2013) |
| Exchange Rate | Yahaya et. al. (2016), Al-Sabbagh and Magableh (2004) |
| Interest Rate | Yahaya et. al. (2016), Al-Sabbagh and Magableh (2004) |

**Source:** Authors

### 3.2. Analysis Results

In the first step of the analysis, we controlled whether independent variables are stationary or not. Within this context, Levin-Lin-Chu panel unit root test is used. The results are illustrated on table 3.

Table 3 shows that 10 variables are stationary on their level values because probability values are less than 0.05. However, it is also identified that 3 variables have unit roots since their probability variables are higher than 0.05. Therefore, the first differences of these variables are used in the analysis. In panel regression analysis, fixed affect is used since the probability of Hausman test is less than 0.05. This result suggests that there may be a systematic difference in the coefficients. Hence, fixed-effects should be preferred in the analysis.

**Table 3:** Levin-Lin-Chu Panel Unit Root Test Results

| Independent Variables | p-Value | p-Value (First Difference) |
|---|---|---|
| Net Balanced Sheet Position | 1.0000 | 0.0000 |
| FX Assets / FX Liabilities | 0.0011 | - |
| Total Loans / Total Deposits | 0.0000 | - |
| Nonperforming Loans | 0.0017 | - |
| Return on Asset | 0.0000 | - |
| Return on Equity | 0.9872 | 0.0000 |
| Total Assets | 0.0000 | - |
| Total Loans | 0.9578 | 0.0000 |
| Economic Growth | 0.0000 | - |
| Unemployment Rate | 0.0000 | - |
| Inflation Rate | 0.0000 | - |
| Exchange Rate | 0.0000 | - |
| Interest Rate | 0.0000 | - |

**Source:** Authors

The results of panel regression analysis are demonstrated on table 4. Table 4 shows that the variables of "Total Loans / Total Deposits", "Return on Equity", "Total Assets", "Total Loans", "Unemployment Rate" and "Interest Rate" have to be eliminated from the analysis due to the multicollinearity problem. It is seen that 4 different independent variables affect capital adequacy ratio because their probability values are less than 0.05. It is concluded that capital adequacy ratio of the banks is negatively related with economic growth rate. This shows that in case of economic decline, banks prefer to have higher amount of capital. The main reason behind this situation is that these banks prefer to have a more secured situation in such a bad situation. Bokhari et. al. (2012), Al-Sabbagh and Magableh (2004) reached the same conclusion.

**Table 4:** Panel Regression Analysis Results

| Independent Variables | p-Value |
|---|---|
| Net Balanced Sheet Position | -0.0322***<br>(0.00350) |
| FX Assets / FX Liabilities | -0.0784*<br>(0.0428) |
| Nonperforming Loans | 0.286<br>(0.251) |
| Return on Asset | 0.182<br>(0.339) |
| Economic Growth | -7.599**<br>(2.839) |
| Inflation Rate | 1.253**<br>(0.592) |
| Exchange Rate | -5.202<br>(3.036) |
| Constant | 18.35***<br>(5.045) |

**Source:** Authors

Another result is that there is a positive relationship between capital adequacy ratio and inflation rate. Because higher inflation rate increases the uncertainty in the market, it will lead banks to have higher amount of capital. Yahaya et. al. (2016), Abba et. al. (2013) also underlined this situation in the literature. In addition to these variables, the results also show that there is an indirect relationship between capital adequacy ratio and net balanced sheet position of the banks. This shows that banks prefer to increase capital amount while they have open positions. In other words, when banks are subject to high currency risk, they opt for having higher amount of capital to minimize this risk. Bokhari et. al. (2012) and Aydın (2013) also identified this situation in their studies.

## 4. Conclusion

In this study, it is aimed to define the determinants of capital adequacy ratio of the deposit banks. Within this framework, 24 deposit banks of Turkey are taken into the consideration. Moreover, 13 different variables are selected by analyzing similar studies in the literature. The data of these variables for the periods between 2005 and 2016 is used in the analysis. Furthermore, this data is analyzed by using panel regression analysis so as to achieve this objective.

According to the results of this analysis, it is identified that there is a negative relationship between capital adequacy ratio and economic growth. This shows that when the economy of the country is improved, Turkish banks prefer to have lower capital adequacy ratio because they feel themselves in a safer condition. On the other side, it is also defined that inflation rate positively influences capital adequacy ratio. In case of high inflation, banks' expectations about future are negative, so they increase their capital amounts.

Other significant determinants of capital adequacy ratio are "Net Balanced Sheet Position" and "FX Assets / FX Liabilities". According to the results, there is an indirect relationship between these variables and capital adequacy ratio. When these variables are higher, their sensitivity to market risk is lower because they demonstrate the power of the banks. Thus, these results show that in case of high market risks, banks prefer to have higher capital amounts to save themselves against these risks.

This study analyzed the influencing factors of capital adequacy ratio in Turkey. Therefore, it is thought that this study makes a significant contribution to the literature by analyzing an important concept for banking sectors. On the other hand, it can also be said that a new study, which focuses on the determinants of capital adequacy ratio by considering many different countries, will also be beneficial to the literature.

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