Y.H. SANİÇ

METU 2018

CAPITAL ADEQUACY RATIO AND BANK PROFITABILITY IN TURKEY

YUSUF HALİT SANİÇ

JUNE 2018

CAPITAL ADEQUACY RATIO AND BANK PROFITABILITY IN TURKEY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

YUSUF HALİT SANİÇ

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF BUSINESS ADMINISTATION
IN
THE DEPARTMENT OF BUSINESS ADMINISTRATION

JUNE 2018

Approval of the Graduate School of Social Sciences

_____

Prof. Dr. Tülin Gençöz
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Business Administration.

_____

Prof. Dr. Nuray Güner
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Business Administration.

_____

Asst. Prof. Dr. İlkay Şendeniz Yüncü
Supervisor

Examining Committee Members

Assoc. Prof. Dr. Adil Oran (METU, BA) _____

Asst. Prof. Dr. İlkay Şendeniz Yüncü (METU, BA) _____

Assoc. Prof. Dr. Süheyla Özyıldırım (Bilkent Uni., BA) _____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name :

Signature :

ABSTRACT

CAPITAL ADEQUACY RATIO AND BANK PROFITABILITY IN TURKEY

Saniç, Yusuf Halit

MBA., Department of Business Administration

Supervisor : Asst. Prof. Dr. İlkay Şendeniz Yüncü

June 2018, 115 pages

In this study, the following two questions are aimed to be answered. “Is capital adequacy ratio, calculated with risk weighted assets, significant in terms of explaining the bank profitability in Turkey?” and “Are EU macroeconomic variables significant explaining the bank profitability in Turkey?”. In this study, the profitability is measured by using return on assets, return on equity and net interest margin measures. While answering these questions, the banks are examined taking their sizes into account and panel data covering between 2007 and 2016 is used. The results of the study show that, capital adequacy measure that is calculated with risk weighted assets is significant in terms of explaining the variance in ROA and ROE for the Main Banks, in ROA and NIM for the Other Banks, in each dependent variable for the Large Banks and in ROA for Small Banks. There is mostly positive relationship between CAR and profitability measures. Among the macroeconomic control variables, TR inflation rate and EU inflation rate affect the profitability measures negatively while OTT and FX have a positive impact. The dummy variable that represents the nationality has a negative effect on profitability.

Keywords: Capital Adequacy Ratio, Bank Profitability, Panel Data, EU Macroeconomic Control Variables

ÖZ

SERMAYE YETERLİLİK ORANI VE TÜRKİYE'DE BANKA KARLILIĞI

Saniç, Yusuf Halit
Yüksek Lisans, İşletme
Tez Yöneticisi : Asst. Prof. Dr. İlkay Şendeniz Yüncü

Haziran 2018, 115 sayfa

Bu çalışmada, takip eden iki soru cevaplanmaya çalışılmıştır. "Risk ağırlıklı varlıklarla hesaplanan Sermaye Yeterlilik Oranı, banka karlılığını açıklama konusunda anlamlı mıdır?" ve "AB makroekonomik değişkenleri Türkiye'deki banka karlılığını açıklamada anlamlı mıdır?" Karlılık oranı, Aktif Getiri Oranı (ROA), Özsermaye Getiri Oranı (ROE) ve Net Faiz Marjı (NIM) değişkenleriyle ölçülmektedir. Bahsedilen sorular cevaplanırken, bankalar, büyüklükleri göz önünde bulundurularak incelenmiştir. 2007 ve 2016 arasını ele alan panel veri kullanılmıştır. Çalışmanın sonuçları, risk ağırlıklı varlıklarla hesaplanan sermaye yeterlilik oranının, Ana Bankalar'da ROA ve ROE'yi, Diğer Bankalar'da ROA ve NIM'ı, Büyük Bankalar'da tüm bağımlı değişkenleri, Küçük Bankalar'da ise ROA'yı açıklamada istatistiksel olarak anlamlı olduğunu göstermiştir ve bu değişken, banka karlılığı üzerinde pozitif bir etkiye sahiptir. Makroekonomik kontol değişkenlerinden olan TR enflasyon oranı (TR IR) ve EU enflasyon oranı (EU IR) karlılığı negatif etkilerken, ticarete açıklık değişkeni (OTT) ve döviz kuru değişkeninin (FX) karlılığa pozitif bir etkisi vardır. Bankaların milliyetini temsil eden kukla değişkenin ise karlılığa etkisi negatiftir.

Anahtar Kelimeler: Sermaye Yeterlilik Olanı, Bank Karlılığı, Panel Veri, AB Makroekonomik Kontrol Değişkenleri

ACKNOWLEDGMENTS

The author wishes to express his deepest gratitude to his supervisor Asst. Prof. Dr. İlkay Şendeniz Yüncü for her guidance, advice, criticism, encouragements and insight throughout the research.

The author wishes to express his deepest gratitude to his fiancé Başak Şahin for her help, support and encouragement throughout the research.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Banks play an important role in the economy of a country and the welfare of the citizens. The conveyance of savings to capital investments are mostly enabled by banks. Banks act as catalysts or facilitators in the process of meeting the parties who have excess capital to invest and the ones who are in need of capital. While this intermediary role of banks increases the efficiency of the money transaction between parties, it also encourages the investors to invest more and the entrepreneurs to seek out for capital more since the security of the transactions are provided by the banks. Secure transaction environment is especially important for developing countries because strong and secure banking sector attracts more foreign investors which would satisfy the need of capital, thereby would paves the way for the industries to flourish. Not only industries but also trade becomes more vivid and secure thanks to banks allowing trade companies to function easier by providing financing for their operational activities and financial tools like cheques and bills that will expedite both domestic and foreign transactions.

Furthermore, the easy accessibility and security provided by banks tempt households to deposit their money rather than keep cushion of capital, which is particularly desirable and important for developing countries, which have the need of capital. Especially in poor countries, financing the individual consumers allows consumers to purchase durable goods, leading to an increase in the welfare and consumption in the country.

Banks also help the execution of monetary policies that are issued by central bank by following the regulation and requirements. While this role allows the central bank to

apply policies for the well-being of the economy easier, it also gives central bank an opportunity to observe and control the monetary position of the country better.
Therefore, strong banking sector enables money circulation and distribution, security and ease in money transactions, and also helps the execution of monetary policies leading to a dynamism in the economy.

The dictionary definition of "profitability" is "the degree to which a business or activity yields profit or financial gain" or "the situation in which a company, product, etc. is producing a profit" (Cambridge University Press, 2018; Oxford University Press, 2018). Profitability is used to measure the efficiency of producing financial gain. Profitability is the measurement which is partially capable of gauging the operational and financial efficiency of an entity based on the inputs invested/used and outputs benefited. Profitability is the undisputed indicator of strength in any commercial sector. Therefore, throughout the years, many studies are performed, and many efforts are spent in order to increase profitability.

The crucial roles of the banking sector in the economy attracted many researchers to make a research about banking industry and their profitability all over the world (Agbeia, J. & Olufemi, 2015; Akbaş, 2012; Alp, Ban, Demirgüneş & Kılıç, 1997; Alshatti, 2016;, Alper & Anbar, 2011; Ani, Ugwanta, Ezeudu & Ugwuanyi, 2012; Athanasoglou, Delis & Staikouras, 2006; Beckmann, 2007; Belke & Ünal, 2007; Ben Khediri, Ben Ali & Ben-Khedhiri, 2010; Bennaceur & Goaied, 2008; Berger, 1995; Berger & Bouwman, 2013; Dawood, 2014, Demürgüç Kunt, Huzinga, 2000; Dietrich & Wanzenried, 2011; Flamini, McDonald & Schumacher, 2015; Goddard, Molyneux & Wilson, 2004; Görüş & Özgür, 2016; Güneş, 2014; Kedia, 2016; Kosmidou, Tanne & Pasiouras, 2012; Mathuva, 2009; Mirzaei & Mirzaei, 2011; Moussa, 2012; Onaolapo & Adeyefa, 2014; Osborne, Fuertes & Milne; Owoputi, Kayode % Adeyefa, 2014; Özgür & Görüş, 2016; Pervan, Pelivan & Josip, 2015; Reis, Kılıç & Buğan, 2016; Samad, 2015; Staikouras & Wood, 2004; Stovrag, 2017; Topak & Talu, 2017; Tregenna, 2009; Turgut & Ertay, 2016, etc). These studies are mostly tried to give direction or recommendations to the banks in order to increase their efficiency or

profitability by defining the underlying reasons behind profitability and its fluctuations over different time periods and in various geographies. These studies mostly explain or estimate the bank profitability with both macroeconomic variables and internal variables which are mostly the results of the decisions made by the management of the banks.

In Turkey, the banking sector has a considerable size. There are 52 banks with 11,741 branches operating in Turkey by 2016. 34 deposit banks constitute 90% of the asset size in banking sector in Turkey while nearly all of the remaining 10% comes from 13 investment and development banks.

When the last five years are observed, it can be stated that there is a stable growth in the banking sector in Turkey; in the last five years, ending by 31 December 2016, the total deposits of the Turkish banks as a percentage of Turkish GDP has increased from 46% to 58% while the total loans of in the Turkish banking sector as the percentage of Turkish GDP has increased from 51% to 67% within the same period, indicating that Turkish banking sector has grown faster than the GDP of the country.

When the size of the Turkish banking industry is compared with the size of the banking industries in European countries, it can be commented that Turkish banking industry is at the level where it can compete well in Europe. The banking sector in Turkey has the 13th rank in the EU countries according to its assets per GDP in 2015, while it has 11th rank both in deposits per GDP and loan per GDP in EU countries, leaving the rank of equity per GDP to 8th.[1] From these statistics, it can be concluded that Turkish banking sector ranks in the upper half among the banking sectors of EU-28 countries.

The considerable size of the Turkish banking industry also led some researchers to study the dynamics of the bank profitability with different variables and in different time periods (Akbaş, 2012; Alp, Ban, Demirgüneş & Kılıç, 1997; Alper & Anbar,

[1] The Banks Association of Turkey, 2017

2011; Belke & Ünal, 2007; Görüş & Özgür, 2016; Güneş, 2014; Moussa, 2012; Özgür & Görüş, 2016; Reis, Kılıç & Buğan, 2016; Tandoğan & Özyurt, 2013; Topak & Talu, 2017; Turgut & Ertay, 2016 etc.). These articles also try to explicate the dynamics of bank profitability in Turkey with some internal bank specific variables and with/without macroeconomic control variables like the GDP growth rate and inflation rate.

Capital adequacy, which is represented by total equity to total assets ratio (CAR2), is a quite commonly used bank specific variable in previous studies related to bank profitability in Turkey (Akbaş, 2012; Alper & Anbar, 2011; Topak & Talu, 2017 etc.) and in other geographies. The main reason behind the assumption/idea of capital adequacy ratio would have an impact on the bank profitability is that a capitally well managed bank is expected to be more profitable compared to its peers (Dietrich & Wanzenried, 2011; Samad, 2015 etc.). In some other studies (Alshatti, 2016; Mathuva, 2009 etc.), the impact of the capital management on the bank profitability is researched with the internal variable of capital adequacy ratio that is calculated with risk weighted assets (CAR). These studies found CAR to be significant in terms of estimating or explaining bank profitability in the geographies and for the periods that the study has been executed.

However, when the literature related to bank profitability in Turkey studied, it is not possible to encounter a study which attempts to measure or describe bank profitability with variables that include capital adequacy ratio that is calculated with risk weighted assets (CAR). Therefore, in order to fill this gap in the literature, the first objective of this study is to see whether the capital adequacy ratio that is calculated with risk weighted assets is significant in terms of explaining the bank profitability in Turkey and if it is significant to examine how it affects the profitability.

As mentioned before, in some studies, the bank profitability is associated with the macroeconomic control variables like GDP growth rate, interest rate, inflation rate and global crisis (Alper & Anbar, 2011; Dietrich & Wanzenried, 2011; Mirzaei & Mirzaei,

2011; Owoputi, Kayode & Adayefa, 2014 etc.). Inflation rate and GDP growth rate are the most commonly preferred macroeconomic control variables in the bank profitability studies. In some of the studies related to Turkish bank profitability, foreign currency exchange rate is also used as a macroeconomic control variable along with GDP growth rate and inflation rate (e.g. Topak & Talu, 2017).

The main motivation behind using the macroeconomic variable of the foreign currency exchange rate is that banks that are listed in the BIST 100 has a substantial amount of foreign currency liabilities (Topak & Talu, 2017). In addition to this, when the statistics related to the investments and trade between European Union (EU) countries and Turkey are observed, it can be claimed that economy in European Union region has an impact on the economy of Turkey. The recent statistics are as follows:

In the last 10 years' average, (until 2016), 46% of the exports of Turkey are to EU countries and 38.2% of the imports of Turkey are from EU-28 countries.[2] Furthermore, Last 5-years' (until 2016) average of the share of EU-28 countries in FDI is 59.2%[3]. Thus, it is very likely to see a significant relationship between bank profitability in Turkey and the inflation and GDP growth rate in EU region.

Although the economy of EU-28 might have an impact on the Turkish economy, none of the studies that try to define the variables that can explain the bank profitability in Turkey concerns with the macroeconomic variable of EU. Therefore, the second objective of this study is to see whether the EU macroeconomic variable (inflation rate in EU) is significant in terms of explaining the bank profitability in Turkey and if it is significant, how it affects profitability.

In the light of the aforementioned objectives, the data is examined by creating two groupings (explained in Chapter 3 in details). First grouping criterion is whether a

[2] Turkish Statistical Institute, 2017

[3] Central Bank of Turkey, 2017

bank's size is greater than or equal to 100 million TL, and the second one is whether the bank is classified as "large" by Banks Association of Turkey. Then the resulting panel data covering between 2007 and 2016 is analysed by using Fixed Effect Model and it is seen that for Main Banks, CAR is significant when the dependent variable is ROA or ROE and for Other Banks it is significant when the dependent variable is ROA or NIM. For Large Banks, each dependent variable's variance can be explained by CAR and for Small Banks, it can be used to estimate ROA. However, CAR2 is statistically significant when the dependent variable is ROA or NIM for every grouping except for Large Banks. For Large Banks, CAR2 is statistically significant in the models whose dependent variable is ROE. In every model except for the models formed for Small Banks and ROE, capital adequacy measures (CAR and CAR2) have positive impacts on profitability measures.

For Main Banks, it is seen that it CAR has a higher explanatory power than CAR2 has while explaining ROA. In addition, CAR is statistically significant in the model formed with ROE while CAR2 is statistically significant in the models formed with NIM. Thus, it may be better to use CAR while trying to explain ROA and ROE when the Main Banks are considered.

When Other Banks are considered both CAR and CAR2 are statistically significant in the models whose dependent variables are ROA and NIM. However, the explanatory power of the models with CAR2 are higher, thus, CAR2 can be preferred while trying to estimate profitability of the Other Banks.

In the models formed for Large Banks, it is seen that CAR is better at explaining ROA and NIM. Lastly for Small Banks, CAR2 can be preferred since CAR can be used only to explain the variance in ROA and the model which uses CAR2 has a higher explanatory power than the model with CAR.

When the macroeconomic variables are considered, Inflation rate in Turkey (TR IR) and EU (EU IR), OTT and FX are the macroeconomic control variables that can

explain the variance in profitability measures. TR IR and EU IR have a negative impact on the profitability, OTT and FX have a negative relationship with profitability measures. In the study, it is seen that, nationality of banks affects the profitability of the banks, since the direction of the relationship between profitability and DNATIONALITY is negative, it can be interpreted that domestic banks are more profitable than the foreign banks in Turkey.

CHAPTER 2

LITERATURE REVIEW

There is abundant research, which tries to determine bank profitability with independent variables and macroeconomic control variables. (Agbeia, J. & Olufemi, 2015; Akbaş, 2012; Alper & Anbar, 2011; Alshatti, 2016; Ani, Uqwanta, Ezeudu & Ugwuanyi, 2012; Athanasoglou, Delis & Staikouras, 2006; Beckmann, 2008; Ben Khediri, Ben Ali & Ben-Khedhiri, 2010; Bennaceur & Goaied, 2008; Berger, 1995; Beger & Bouwman, 2013; Dawood, 2014; Demirgüç Kunt & Huizinga, 2000; Dietrich & Wanzenried, 2011; Flamini, McDonald & Schumacher, 2015; Goddard, Molyneux & Wilson, 2004; Kedia, 2016; Kosmidou, Tanna & Pasiouras, 2012; Mathuva, 2009; Mirzaei & Mirzaei, 2011; Moussa, 2012; Onaolapo & Adebayo, 2012; Osborne, Fuertes & Milne; Owoputi, Kaode & Adeyefa, 2014; Pervan, Pelivan & Josip, 2015; Reis, Kılıç & Buğan, 2016; Samad, 2015; Staikouras & Wood, 2004; Stovrag, 2017; Topak & Talu, 2017, Tregenna, 2009; Turgut & Ertay, 2016 etc.).

In all studies within the scope of the literature review, similar measures of profitability are preferred and used; the studies practiced a combination that is composed of ROA (return on assets), ROE (return on equity) and NIM (net interest margin) as the proxy of the profitability of banks in many different geographies.

For instance, Ani et al. (2012), Beckmann (2007), Ben Khediri, Ben Ali and Ben-Khedhir (2010), Flamini, McDonald and Schumacher (2015) use only ROA to assess the profitability of the banks while some others like Akbaş (2012), Mirzaei & Mirzaei (2011), Moussa (2012), Mathuva (2009) and Topak & Talu (2017) prefer to accept both ROA and ROE as the indicator of bank profitability. On the other hand, Osborne, Fuertes and Milne (n.a.) selects only the return on equity (ROE) measure to represent profitability.

In some others such as Agbeja, Adelakun & Olufemi's (2015), Bennaceur & Goaied (2008), Owoputi, Olawale & Adeyefa's (2014), Reis, Kılıç & Buğan (2016), Kosmidou, Tanna & Pasiouras's (2012) and Stovrag's (2017) net interest margin is included in the studies as a profitability measure but it is not used as the only profitability measure in any of them.

The estimation studies about bank profitability try to determine the bank profitability either with some internal variables related to banks like liquidity ratios and capital utilization ratios or with internal variables along with some macroeconomic control variables like market capitalization, interest rate, GDP growth rate, inflation rate and population growth rate.

In the literature, one of the most common measures that is used as the bank specific determinant of the bank profitability is the capital adequacy ratio and it is included in the studies of Akbaş (2012), Alper & Anbar (2011), Ani et al. (2012), Athanasoglou et al. (2006), Ben Khediri, Ben Ali & Ben-Khedhiri (2010), Dawood (2014), Dietrich & Wanzenried (2010), Flamini, McDonald and Schumacher (2015) and Goddard et al. (2004), Kosmidou, Tanna and Pasiouras (2012), Mathuva (2009), Moussa (2012), Mirzaei & Mirzaei (2011), Staikouras & Wood (2004). In these papers, capital adequacy ratio is calculated as the ratio of total equity to total assets. However, in some other papers such as Alshatti (2016) and Owoputi, Olawale & Adeyefa (2014) capital adequacy ratio is calculated as the equity to risk weighted assets ratio, which is the definition of Banking Regulation and Supervision Agency (Banking Regulation and Supervision Agency, 2002).

When the results of the studies, which use capital adequacy ratio, are examined, they differ, possibly because the time period of the historical data and the studied geographies vary from study to study. Some results of the studies which use total equity to total assets ratio as capital adequacy measures are as follows. According to Ben Khediri, Ben Ali and Ben-Khedhir (2010), while explaining bank profitability, capital is an important measure. Capital adequacy ratio is also found significant in the

study of Moussa (2012) and it has a negative relationship with profitability. However, capital adequacy ratio is insignificant according to Akbaş (2012). When the studies where the capital adequacy is represented as the equity to risk weighted assets ratio are examined, both in the studies of Alshatti (2016) and Owoputi, Olawale & Adeyefa (2014), capital adequacy ratio has a positive and significant effect on profitability.

In the studies which aim to find out the determinants of the profitability of banks, macroeconomic variables are considered as control variables. When the studies related to bank profitability are scanned, widely used macroeconomic determinants seem to be GDP growth rate and inflation rate. For example, these macroeconomic determinants can be found in the studies of Alper & Anbar (2011), Ben Khediri, Ben Ali & Ben-Khedhiri (2010), Mirzaei & Mirzaei (2011), Owoputi, Olawale & Adeyefa (2014). Inflation rate is included in the previous studies because of the fact that it represents the monetary policy and when it is in the model, it enables the author to find out the relationship between monetary policy of the country and the profitability of the banks in that country (Mirzaei & Mirzaei, 2011).

GDP growth rate is preferred to be used since it represents the economy of the country as a whole. Rather than its nominal value, real value of the GDP growth rate is used in the studies that aim to figure out the determinants of the bank profitability because this explanatory variable is mostly used with the inflation rate variable, thus, it is better to use inflation adjusted GDP growth rate in the dataset to avoid multi-collinearity.

When the studies which use GDP growth rate and inflation rate as macroeconomic determinants are examined, the results vary, probably because the market dynamics and the time periods covered in the studies are different. According to Mirzaei & Mirzaei (2011) and Owoputi, Olawale & Adeyefa (2014), GDP growth rate is insignificant in terms of explaining the variance of bank profitability, however, in the study of Alper & Anbar (2011), it has a significant and positive relationship with profitability. In the study of Ben Khediri, Ben Ali & Ben-Khedhiri (2010), both GDP growth and inflation rate are significant, and they have positive effects on the

profitability measure. Nevertheless, in Owoputi, Olawale & Adeyefa (2014), inflation rate and profitability measures have negative and statistically significant relationship. The studies related to determination of bank profitability can also be classified into two groups where the first group of studies include the ones that assess or predict the banking profitability in a single country while the others investigate the bank profitability in a geography where a panel of countries is used. In the following part of the literature review, some examples of the studies are summarized individually based on the geographies they focus on.

Some studies which examine bank profitability in a single country are as follows; Agbeia. J & Olufemi (2015), Ani, Ugwanta, Ezeudu & Ugwuanyi (2012), Alshatti (2016), Bennaceur & Goaied (2008), Dawood (2014), Dietrich & Wanzenried (2011), Kedia (2016), Kosmidou, Tanna & Pasiouras (2012), Mathuva (2009), Onalapo & Adebayo (2012), Osborne, Fuertes & Milne, Owoputi, Kayode & Adeyefa (2014), Pervan, Pelivan & Josip (2015), Samad (2015), Stovrag (2017), Tregenna (2009).

Ani et al. (2012) evaluate the bank profitability between 2001 and 2010 in Nigeria with the dependent variable of ROA. In the study where the panel data with 147 data points composed of the inputs of the 15 biggest banks of Nigeria are regressed with pooled ordinary least square model, the main results of the analysis suggest that the higher the capital adequacy ratio and loans and advances to assets are, the more profitable the bank is, while the profitability is not necessarily affected by the size of the banks. The conclusion and the discussion of the study claims that the bank profitability in Nigeria can be explained through the calculations composed of asset and equity related items, safer banks which use more equity are more profitable and, the increase of the asset size of a bank can lead to diseconomies of scale.

Mathuva (2009) intends to see the relationship between bank profitability and equity requirements and equity ratios in the Kenyan banking sector by using balanced panel data of 41 banks between 1998 and 2007. In order to test the relation, the study uses ROA and ROE as dependent variables, while core capital ratio (tier 1 capital to total

assets), equity capital ratio (total equity capital to total assets), total risk based capital to risk weighted assets (the capital adequacy ratio that is calculated based on Basel 1 standards), tier 1 capital to risk weighted assets, cost income ratio (operating expense to operating income, logarithm of total assets, debt to equity ratio and capital adequacy ratio (total debt to total equity) as independent variables. The findings coming from 5 different OLS (pooled ordinary least square) regression analyses show that tier 1 capital to total assets ratio and the tier 1 capital to risk weighted assets ratio are significant and affect the bank profitability positively, meaning the profitability of a Kenyan bank can be increased with a boost in the capital. The study also compares and contrasts the CIR (Cost Income ratio) of the Kenyan banks and the banks in the developed countries and, the conclusion of the comparison explains that the Kenyan banks should be more efficient in order to compete in the global market.

Samad (2015) has made a research about the determinants of bank profitability in Bangladesh. In this country, before 1980s, there was no policy about liberalization, thus, the country had only 4 state-owned banks and 3 foreign banks in the industry. Hence, there was hardly any competition in the banking sector. However, with the liberalization policy, private banks have entered into the sector and as of 2015, there are 52 banks operating in Bangladesh. Although all commercial banks have more or less the same age, while some of them quickly managed to increase their profits, some others had a problem with low profit levels. This study aims to understand the reasons behind the differentiation among the profitability of the banks. The panel dataset includes 43 commercial banks of Bangladesh and covers the period between 2009 and 2011. While return on asset is used as a dependent variable, independent variables are separated into two categories as bank-specific variables and macroeconomic variables. Bank-specific variables represent the liquidity risk, credit risk, operational efficiency, capital efficiency and size of the bank. On the other hand, macroeconomic variables include economic growth (log(GDP)) and inflation rate of Bangladesh. With the help of random effect GLS estimator, a model has been formed. According to the results of the regression model, loan-deposit ratio (bank liquidity), loan loss provision to total assets ratio (credit risk), equity capital to total assets (capital risk) and operating

expenses (bank efficiency) have been found statistically significant. All statistically significant variables, except for operating expenses, have a positive relationship with the profitability measures. This study suggests that, only the bank-specific variables can explain the variance in the bank profitability in Bangladesh.

Dawood (2014) assesses the bank profitability of 23 Pakistani commercial banks between 2009 and 2012. The study tries to estimate the ROA, as the proxy of the bank profitability, with the independent variables of cost efficiency ratio (total costs/total income), liquidity ratio (liquid assets/(customer deposits + short term borrowed fund)), capital adequacy ratio (total equity/ total assets), deposits to assets ratio, natural logarithm of total assets. The findings of the OLS models suggest that if the Pakistani banks are to hold more liquid assets and to increase their capital adequacy, they would become more profitable. The findings also support that the smaller the cost efficiency ratio is, the more profitable a bank is. On the other hand, the study has concluded that size and the deposit of a bank do not necessarily touch profitability.

Another bank profitability estimation study is done by Dietrich & Wanzenried (2010) in which the profitability determinants of banks in Switzerland are observed before and during 2008 crisis. For this purpose, in the paper, the data divided into two time periods where first one includes between 1999 and 2007 and the second one includes the years 2008 and 2009 for 453 commercial banks in Switzerland. In the study, where a large number of such internal (independent) variables as capital adequacy ratio (total equity / total assets), cost income ratio, loan loss provisions over total loans and yearly growth of deposits and, numerous macroeconomic control variables like population growth rate, real GDP growth rate and market capitalization are used, ROAE (return on average equity) and ROAA (return on average assets) are practiced as the proxy of bank profitability. The results of the OLS estimation study show that it is difficult to say strongly that one variable is significant with positive/negative impact in terms of explaining the profitability because the test results for ROAA and ROAE differs greatly. The reasons behind this outcome explained with the statement that the banks that are used in the study were quite different from each other in terms of their size.

However, in the model where ROAA ("main profitability measure" in the study) is used as the dependent variable, the results are as follows; the bank profitability and the capitalization (high capital adequacy ratio) are positively correlated for the both periods, the profitability is affected negatively by cost income ratio only for the before crisis period, the loan loss provisions to total loans are more acutely negative during crisis and banks with higher profitability tends to have lower interest income share only for the period before the crisis.

Tregenna (2009) examines the pre-crisis time period of the US banking industry, and aims to find out the nature of the relationship between market concentration and bank profitability. In order to reach its aim, the study covers the periods between 1994 and 2005 and takes the commercial banks, saving institutions and public commercial banks into account, resulting in a panel data with 644 data points. The profitability is represented by ROA and ROE, while the explanatory variables are index of market concentration, standard concentration method, market share, natural logarithm of the total asset size and other expenses to net income ratio. Furthermore, total capital to total assets, cash and dues to total assets, total invested assets to total assets and price earnings ratio of banks are included in the study as independent variables. Panel data is analysed by using 4 methods (OLS, two-step static GMM, one-step Arrellano-Bond dynamic GMM, two-step Arrellano-Bover/Blundell-Bond dynamic GMM) where the interpretation of the results of the models suggests that market concentration is significant with a positive impact in terms of explaining the bank profitability. Furthermore, operational efficiency variable is significant in some models and insignificant in some others. This finding supports the claim that banks' profitability during the pre-crisis period cannot be explained just by the operational efficiency. As a result, it is suggested that the concentration should be regulated very carefully.

Pervan, Pelivan & Arnerić (2015) study the determinants of profitability of the Croatian banks. They examine the period between 2002 and 2010. Return on asset is preferred as the profitability measure and it is used as the dependent variable in the study. To find out the determinants of profitability measures, some regressors are

selected and they are classified in three categories; bank-specific variables, industry specific variables and macroeconomic variables. While bank size, market share, solvency risk, credit risk, intermediation and operating expenses constitute the bank-specific variables, industry concentration and market growth are the industry specific variables. To take the macroeconomic conditions into account, GDP growth rate and inflation rate of Croatia are utilised as the macroeconomic variables. As a result, an unbalanced panel data with 321 observations are created. Since it is thought that the profitability has a dynamic feature, 1-year lagged dependent variable is added to the study as another regressor. Because of the existence of the lagged dependent variable, the authors preferred to make use of Generalized Method of Moment (GMM) while making panel data analysis. At the end of the analysis, all industry specific variables, all macroeconomic variables and all bank-specific variables except for market share are found statistically significant in terms of explaining the variance of the dependent variable. While lagged dependent variable, bank size, solvency risk, intermediation, industry concentration, market growth, GDP growth rate have a positive impact on bank profitability in Croatia; credit risk, inflation and operating expenses affect ROA negatively. The authors claim that they expect a positive relationship between the size of the Croatian banks, and since the results are parallel with their expectations, Croatian banks seem to benefit from economies of scale. In addition, the study suggests that the increase in the GDP growth rate may be linked to the increase in the consumption of the households of Croatia. Surge in the deposits of the banks coming from the GDP growth rate indirectly raises the profit levels of the banks. The study claims that, rise in the inflation has a negative effect on the budget of households and this is the reason behind the negative relationship between inflation rate and the bank profitability.

Some studies which examine bank profitability in a geography where more than one country exist are as follows; Athanasoglou, Delis & Staikouras (2006), Beckmann (2007), Ben Khediri, Ben Ali & Ben-Khedhiri (2010), Flamini, McDonald & Schumacher (2015), Goddard, Molyneux & Wilson (2004), Mirzaei & Mirzaei (2011).

The bank profitability in Middle Eastern banking sector between 1999 and 2008 is examined in Mirzaei & Mirzaei (2011). In the study, the dependent variables of ROA and ROE as the proxies of bank profitability are tried to be regressed with the independent variables of total assets, costs to income, capital adequacy ratio (equity to total assets), liquid asset ratio (liquid assets to total assets) and loan loss provision to loss ratio and, the macroeconomic control variables of CPI (Consumer Price Index), GDP and population growth rate by using both OLS and GMM. The outcome of this study suggests that capitally strong banks (high capital adequacy ratio) with highly liquid assets (high liquid asset ratio) and high efficiency (low loan loss provision to loss ratio) tend to be more profitable. The banks in the countries with high inflation are more likely to be less profitable. On the other hand, the findings showed that the GDP and population growth rate are insignificant in terms of explaining the bank profitability in Middle East for the related years.

Staikouras & Wood (2004) focus on the bank profitability in the developed countries of Europe. The study covers 137 large banks and 547 small banks in 13 countries in Europe between 1994 and 1998. In the study, the small banks and large banks are examined in different estimation models. The subsidiaries of larger banks in other countries are neither omitted or behaved differently claiming that foreign banks are also exposed to the same market conditions as the domestic banks in a country and the scope of the study is defined as "total banking sector assets in each particular country". To determine the bank profitability both internal independent variables like loan to asset ratio, capital adequacy ratio (total equity to total assets), provisions for loan losses to total loans, gap to asset ratio ((interest sensitive assets – interest sensitive liabilities) / total assets), firm concentration ratio, firm specific market share, natural logarithm of total assets and overheads to total assets and external macroeconomic variables like GDP growth rate, CPI growth rate and interest rates are used in OLS and fixed effect models (depending on the result coming from LR and Hausman Tests). As the proxy of bank profitability, income before tax to total assets is used in order to eliminate any effect of different taxation policies of the countries included in the study. The outcomes of the estimation study propose that as the equity of a bank compared

to its assets grows bigger, a bank becomes more profitable. Furthermore, large banks become more profitable as they get smaller while the asset size of a small bank affects the profitability positively. The GDP growth rates are significant and has a negative impact on the profitability. On the other hand, the study suggests that the market share is insignificant in terms of explaining bank profitability in Europe within the time period of the study.

Another study which examines the determinants of profitability of more than one country belongs to Islam & Nishiyama (2016). They study the commercial banks in South Asian countries (Bangladesh, India, Nepal and Pakistan), while excluding the Islamic banks. The final data is an unbalanced panel data covering between 1997 and 2012. As most of the other studies, ROA is selected as a key profitability measure. Furthermore, ROE is included in the dataset as a second profitability measure. The variance in ROA and ROA are tried to be explained by bank-specific, industry specific and macroeconomic specific regressors along with one period lagged dependent variable. In the study, equity to total assets ratio, non-performing loan ratio, liquidity ratio, cost of fund ratio, productivity ratio, recurring earning power, growth of total deposit, bank size, loan to deposit, interest income to total loan ratio, off-balance sheet income ratio are the bank-specific regressors, while Hirschman-Herfindahl Index is industry specific variable and interest rate, inflation rate and GDP growth rate constitute the macroeconomic variables. To analyse the panel data, Generalized Method of Moment is used. According to the results of the analysis, equity level has a positive and statistically significant effect on profitability, however, another bank-specific variable, liquidity position affects profitability negatively. As expected for the South Asian banking sector, interest rate and GDP growth rate have a negative relationship with the profitability measures. However, on the contrary to the expectations, inflation rate's impact on profitability is found to be negative.

In the study of Flamini, Mcdonald & Schumacher (2009), the aim is to find out the determinants of bank profitability in Sub-Saharan Africa examining the period between 1998 and 2006 for 389 banks in 41 Sub-Saharan Africa countries. The

measure that is used to present the bank profitability is ROA. Since the data has both cross-sections and time series, unbalanced panel data analysis is conducted in the study. 1 year lagged dependent variable is included in the analysis as a regressor leading to a dynamic characteristic. In this study, some bank-specific variables are used along with some macroeconomic variables. While bank-specific determinants include bank size, capital (equity to total assets), credit risk, cost management, activity mix (net interest revenues to other operating income), market power and ownership, macroeconomic variables comprise wealth, cyclical output, inflation, fuel price, nonfuel commodity price and regulatory environment. Due to the dynamic characteristic of the model, GMM is used to analyse the unbalanced panel data. In addition to the GMM, Random Effect Method is also used during the analysis owing to the result of the Hausman test. When the results of the analysis are examined, it is seen that equity, lagged dependent variable, credit risk and size are statistically significant bank-specific variables with a positive impact on ROA, while the activity mix is statistically significant with a negative effect. The positive relationship between bank size and bank profitability suggests that larger banks can benefit from economies of scale. GDP growth rate and inflation rate are the statistically significant macroeconomic variables that have negative relationship with the profitability measure, which means that the policies that leads to a decrease in the inflation rate and maintains the level of GDP growth rate can upsurge the bank profitability of the countries in Sub-Saharan Africa.

Demirgüç & Huizinga (2000) compare and try to estimate the profitability in the banking industry of developed countries and underdeveloped countries between 1990 and 1997. The results of the study indicate that banks in underdeveloped countries are more profitable compared to the banks in developed countries. The research paper puts forward the idea that as the markets become more mature, the credit information becomes more reliable resulting in more accurate estimates of risk and less return.

The studies about the bank profitability in Turkey that are more related to this study are examined more closely. The most recent study regarding the bank profitability in

Turkey is the study of Topak & Talu (2017). They use balanced panel data to analyse the dataset of 10 banks covering between January 2005 and September 2015. The profitability measures in their study are ROA and ROE. They select the proper method for estimating the profitability measures by considering the results of the Hausman test. They use both bank specific variables and macroeconomic control variables. Since the other operating expenses to total operating revenue and the other regressors have multi-collinearity, it is put in a different model. In their study, they find that interest revenue to interest expense ratio, net fees and commissions' revenue to total assets ratio and size of the banks are statistically significant bank specific variables having positive relationship with profitability measures. Other operating expenses to total operating revenue ratio, non-performing loan to total loans ratio and stockholders' equity to total assets ratio are the other bank specific variables but they affect profitability negatively. When looking at the macroeconomic control variables, it is found that, real GDP growth rate and interest have significant and positive relationships with profitability. Last significant regressor is exchange rate and between the profitability measure and the exchange rate, there is a negative relationship.

Reis, Kılıç & Buğan (2016) aim to find out the determinants of the profitability of the commercial banks in Turkey. The study examines the period between 2009 and 2013 and uses a panel data of 14 deposit banks whose shares are traded in BIST. Two dependent variables, ROA and NIM, are regressed by using both internal and external variables. The variables that are in the financial tables are named as internal variables. The economic and legal factors that affect the performance of the financial institutions constitute the external variables. The financial ratios are preferred as regressors in the study since they are not affected by the size of the banks. While leverage ratio, liquidity ratio, operating expense ratio (other operating expenses to total assets), total loans and advances to total deposits ratio are taken as the internal independent variables, the macroeconomic factors selected as external variables are CPI, GDP growth rate and market capitalization. Although it is stated that Pooed Regression Model, Fixed Effect Model and Random Effect Model are the alternatives to make a panel data analysis, since the sample is not chosen randomly, and it covers only the data that belongs to a

specific sector (banking sector), Fixed Effect Model is the preferred method. When the results of the study are examined, it is seen that ROA is negatively affected by the leverage ratio and total loans and advances to total deposits ratio while it is positively affected by market capitalization. The other dependent variable, NIM, on the other hand, is negatively affected by total loans and advances to total deposits ratio, leverage ratio, market capitalization and GDP growth rate. The negative relationship between total loans and advances to total deposits ratio and profitability measures are interpreted as the result of inadequate deposit amounts. In addition, leverage ratio and its negative impact on profitability is parallel with the intuition because the higher the debt of banks are, the lower their profits are. Last but not the least, in the study, GDP growth rate and profitability measures are expected to have positive relationships, because an increase in the GDP growth rate can lead to an increase in the demand of borrowing and thus an increase in the interest income of the banks. However, GDP growth rate is insignificant in terms of explaining ROA, and there is a negative relationship between NIM and GDP growth rate unlike the expectations. In the study it is suggested that, the findings about GDP growth rate may be interpreted as the result of the choice of investors to invest their savings into different areas.

In the study of Moussa (2012), the balanced panel data of 25 banks, covering the periods between 2001 and 2010 is used. While the dependent variables used are ROA and ROE, the regressors are equity to asset ratio (CAR2 in this study), total loans& receivables to total assets ratio, interest income to interest expense ratio, liquid assets to total assets ratio, size, inflation and GDP growth rate. The commercial banks are examined according to category of them (public bank, private bank, foreign bank). By using OLS method, profitability is estimated. As a result of the study, it is found that equity to asset ratio is significant and is has a positive relationship with the profitability measures in most of the models but in the models formed with dummy variables to estimate ROE, although equity to asset ratio is significant, its impact is negative on ROE.

The other study about bank profitability in Turkey belongs to Alper & Anbar (2011). In their study, a panel data, including the 10 banks' data in the period between 2002 and 2010 is used. ROA and ROE are the dependent variables. Bank specific regressors are the measures showing the size of the banks, capital adequacy (CAR2 in this study), asset quality, liquidity, deposit ratio, net interest margin and non-interest income to total assets ratio. In addition to the bank specific regressors, macroeconomic control variables are preferred to be used in the models that are formed to estimate profitability. These variables are GDP growth rate, CPI of Turkey and real interest rate. With these regressors, profitability is estimated by using fixed effect model. The results are as follows; asset size and non-interest income to total asset ratio are significant with a positive relationship with profitability. Asset quality and loans to assets ratio are significant but with a negative impact on ROA. Equity to total assets ratio (CAR2 in this study) is not significant. When the macroeconomic regressors are considered, it is seen that, only macroeconomic control variable which is statistically significant is the real interest rate with a positive impact on profitability. GDP growth rate and the CPI are not found significant.

CHAPTER 3

DATA

For this study, all of the commercial banks (34 banks) in Turkey are examined. 26[4] of them which constitute 91% of the asset size in Turkish banking industry in 31 December 2016 are selected (The Banks Association of Turkey, 2017).

1. Adabank A.Ş.
2. Akbank T.A.Ş.
3. Alternatif Bank A.Ş.
4. Anadolubank A.Ş.
5. Arap Türk Bankası A.Ş.
6. Bank Mellat
7. Birleşik Fon Bankası A.Ş.
8. Citibank A.Ş.
9. Denizbank A.Ş.
10. Deutsche Bank A.Ş.
11. Finans Bank A.Ş.
12. Habib Bank Limited
13. HSBC Bank A.Ş.
14. ING Bank A.Ş.
15. JPMorgan Chase Bank N.A.
16. Şekerbank T.A.Ş.
17. Société Générale (SA)
18. Türk Ekonomi Bankası A.Ş.
19. Turkish Bank A.Ş.

[4] Eight of the banks are not considered in the study in order to have a balanced panel dataset

20. Türkiye Cumhuriyeti Ziraat Bankası A.Ş.
21. Türkiye Garanti Bankası A.Ş.
22. Türkiye Halk Bankası A.Ş.
23. Türkiye İş Bankası A.Ş.
24. Türkiye Vakıflar Bankası T.A.O.
25. Turkland Bank A.Ş.
26. Yapı ve Kredi Bankası A.Ş.

The banks are classified according to their sizes by using two criteria and the following datasets are formed (The banks classified as “Large and Medium Banks” by Banks Association of Turkey are also analysed and the results can be seen in Appendix D).

1. Main banks and Other Banks
2. Large banks and Small Banks

Main banks include 9 banks whose asset sizes are greater than or equal to 100 million TL as of December 2017. Other banks are the remaining banks out of 26 commercial banks mentioned above. Main banks are as follows.

1. Akbank T.A.Ş.
2. Finans Bank A.Ş.
3. Türk Ekonomi Bankası A.Ş.
4. Türkiye Cumhuriyeti Ziraat Bankası A.Ş.
5. Türkiye Garanti Bankası A.Ş.
6. Türkiye Halk Bankası A.Ş.
7. Türkiye İş Bankası A.Ş.
8. Türkiye Vakıflar Bankası T.A.O.
9. Yapı ve Kredi Bankası A.Ş.

Large banks include 7 banks which are listed as large banks by Bank Association of Turkey and small banks are the remaining 19 banks out of 26 commercial banks mentioned above. Large banks are as follows.

1. Akbank T.A.Ş.
2. Türkiye Cumhuriyeti Ziraat Bankası A.Ş.
3. Türkiye Garanti Bankası A.Ş.
4. Türkiye Halk Bankası A.Ş.
5. Türkiye İş Bankası A.Ş.
6. Türkiye Vakıflar Bankası T.A.O.
7. Yapı ve Kredi Bankası A.Ş.

The datasets cover ten years long period between December 2007 and December 2016. The reason behind the choice of time period is that; the latest audited yearly financial statements data is available for 31 December 2016 and the data for capital adequacy ratio that is calculated based on the risk assets is available as of 31 December 2007, at earliest. Actually, the capital adequacy ratio, that is calculated with risk weighted assets (at the latest form as described in Basel 3), is regulated and started to be used in 2012 (The Banks Association of Turkey, 2017). However, the Bank Association of Turkey calculates the ratio backwardly for earlier years until 2007. The capital adequacy ratio calculated for the years prior to 2007 does not consider the operational risk as a risk factor, thus, latest available 10 years of data is used.

The required data for each bank for the study is gathered from the yearly statistical reports (only bank) prepared by the Banks Association of Turkey. There are 10 periods (yearly) for each bank. In order to calculate the value of a variable that will be used for a period, for each balance sheet item, the end year values and for each income statement item, yearly values are used.

The definition for panel data and balanced panel data in the literature is as follows. Panel data, also known as longitudinal data, is the data that has micro-units, cross

sections and these units are observed for a certain time period. If the time period that the cross sections are observed is the same for each cross section, the data is called balanced panel data (Hill, Griffiths, & Lim, 2011). In this study, panel data is used since there are both time series and cross sections (different banks) in the dataset. The advantages of using panel data is that when panel data is used, the variables are less collinear. Furthermore, panel data is more efficient and has more degrees of freedom (Baltagi, 2001).

The dependent variable used in the study should reflect the profitability of the banks in Turkey in order to have a solid study. The simplest way to measure profitability is to look at the income statements. However, when the aim is to compare different companies or to see the effectors of profitability, the income statement alone would not be enough. According to Aswath Damodaran (2011), "the simplest and most useful gauge of profitability is relative to the capital employed (return on assets or return on capital) to get a rate of return on investment". Moreover, return on equity is another profitability measure that is important for equity investors. These two profitability ratios are also the most commonly used profitability measures in the studies that are under the scope of the literature review. In addition to return on assets and return on equity, net interest margin is used due to the fact that interests are the main source of income for the banks.

As bank specific independent variables, capital adequacy ratio that is calculated with risk weighted assets (CAR), capital adequacy ratio which is total equity divided by total assets (CAR2) and nationality of the banks (DNATIONALITY) are used to determine bank profitability. Expectations regarding these variables and the findings in the literature review are explained below.

Capital adequacy ratio (CAR) is calculated by dividing the sum of Tier 1 and Tier 2 capital by risk weighted assets of a bank. To clarify CAR, its components are explained separately. Basel I explains the nominator of the ratio, which is the capital types of the banks. There are 2 types of capitals, which are Tier 1 Capital and Tier 2 Capital;

Tier 1 Capital is also known as core capital and it consists of stockholder's equity and disclosed reserves, whereas Tier 2 Capital contains undisclosed reserves along with subordinated debt (Patrick, 2005).

Secondly, the accord covers the denominator of the capital adequacy ratio (CAR) and explains the risk weighting of the bank's assets. To weight the risk of the assets, 4 categories are determined (Balin, 2008).

- Assets having 0% risk (cash, government bonds etc.) : riskless
- Assets having 20% risk (loans to OECD banks etc.) : low risk
- Assets having 50% risk (mortgage loans etc.) : medium risk
- Assets having 100% risk (loans to non-banks etc.) : high risk

These categories are used to calculate the Risk Weighted Assets (RWA). It is calculated with the following formula (Patrick, 2005).
RWA = 0 x (riskless category) + 0.2 x (low risk category) + 0.5 x (medium risk category) + 1.0 x (high risk category)

Proper management of the capital would bring efficiency and profitability in any commercial institution (Dietrich & Wanzenried, 2011). The common sense tells that higher capital adequacy ratio would yield lower rate of returns. Especially when the extension of Du-Pond Formula is considered, it is an easy mathematical conclusion that capital adequacy ratio (CAR2) is inversely related with return on equity (ROE). Furthermore, the investors of less risky asset would expect lower rate of returns, meaning that when the capital adequacy ratio is high, banks should expect lower rate of returns due to high equity capital structure. Therefore, one might think that high capital adequacy ratio would lead to lower rate of return, however, when the prior studies related to bank profitability is reviewed, there are many conclusions claiming that capital adequacy ratio has a positive impact on the bank profitability. Goddard, Molyneux & Wilson (2004) explains this situation with the statement that banks with high capital adequacy ratio are less risky and therefore they can find capital with less

cost, thus the profitability of these banks can be higher compared to their competitors. Thereby, it is difficult to create a hypothesis related to bank profitability and capital adequacy ratio. However, when the recent studies related to bank profitability in Turkey are considered, this study expect to see a positive relationship between bank profitability and capital adequacy ratio. In this study, both CAR and CAR2 is used to have solid results related to bank profitability and comparative analysis between these two variables. This study also expects to see high correlation among these variables. The capital adequacy that is calculated with risk weighted assets are calculated as follows;

In the literature, there are some studies (Azam & Siddiqui, 2012; Tze Sun, Yee Theng & Boom Heng, 2011) that compare the profitability of the domestic banks and the foreign banks. While the study of Tze Sun, Yee Theng & Boom Heng (2011) suggests that the domestic banks in Malaysia are operationally more efficient than the foreign banks in Malaysia. The study of Azam & Siddiqui (2012) about the bank profitability in Pakistan on the other hand, shows that domestic banks are less profitable than the foreign banks in the Pakistan banking sector.

Since 15 banks that are included in this study are foreign and the remaining 11 banks are domestic, the effect of being domestic or foreign is also examined. However, there is not a clear expectation associated with the impact of being foreign or domestic on the bank profitability of the banking sector in Turkey.

As macroeconomic control variables, Turkey's openness to trade (OTT) and the inflation rates in Turkey (TR IR), inflation rate in EU region (EU IR), the dummy variable that represents the nationality of the bank (DNATIONALITY) and change in TRY/Euro exchange rate (FX) are used to determine bank profitability.

Inflation rate can be interpreted as the decrease in the purchasing power of the households and firms in the country, this may result in the increase in default rates and decrease in bank profitability. Hence, seeing a negative relationship between bank

profitability and inflation rate is expected. However, for some studies (Reis, Kılıç & Buğan, 2016; Samad, 2015 etc.), inflation rate is found to have a positive impact on bank profitability. Thus, the research results may deviate from the common sense and it is difficult to set an expectation related to the impact of inflation on the bank profitability in Turkey. For this study, yearly inflation rates of Turkey are taken from the website of Turkish Statistical Institute.

The reason for using the EU inflation rate in EU-28 (European Union countries) (EU IR) region, is explained detailly in the introduction part. The data of this variable is taken from OECD website. Lower rate of return for Turkish Banks is expected when the inflation rate is high in Eurozone. 38.2% of imports of Turkey are from EU countries. Since the imported goods are mostly raw materials, when there is high inflation rate in EU countries, the price increase reflects to the cost of import. Therefore, it would indirectly increase the prices of the final products manufactured and sold in Turkey, which means higher inflation rate in Turkey. Higher inflation rate in EU countries can be interpreted just like an increase in the inflation rate in Turkey and therefore, in this study, negative relationship between EU inflation rate and bank profitability in Turkey is expected.

In addition, to see whether there a significant relation between EU region and profitability in Turkish banking industry, the change in the exchange rate between Turkish Lira and Euro (FX) is used as another macroeconomic control variable. Because of the same reason mentioned for the EU inflation rate, it is expected to see a positive relation between FX and the bank profitability because FX is negatively affected by EU IR. The average foreign exchange rates are taken from the website of Central Bank of Turkey for the related periods and the change in the exchange rate is calculated from this data.

Moreover, when the Turkey's openness to trade with EU improves, it is expected to see an increase in bank profitability in Turkey since the transactions will become

easier. Thus, in this study, it is expected to see a positive relationship between OTT and the profitability measures.

Detailed description of the variables used can be seen in Table 1 and the descriptive statistics of the variables (mean, median, maximum, minimum, standard deviation and number of observations) can be seen in Table 2, 3, 4 and 5.

Table 1: Variable Description Table

Variable	Description	Formula	Data Source
Return on Asset (ROA)	Contribution of an asset to the net income. It is generally used to measure profitability	$\frac{\text{Net Income}}{\text{Total Assets}}$	The Banks Association of Turkey
Return on Equity (ROE)	Contribution of an equity to the net income. It is generally used to measure profitability	$\frac{\text{Net Income}}{\text{Total Equity}}$	The Banks Association of Turkey
Net Interest Margin (NIM)	Average net interest revenue earned from an invested asset (asset with an expected interest revenue). It is also a profitability measure	$\frac{\text{Interest Received} - \text{Interest Paid}}{\text{Invested Assets}}$	The Banks Association of Turkey
Capital Adequacy Ratio (CAR)	The amount of capital that a bank holds as a reserve for the amount of risk that the bank takes	$\frac{\text{Capital (Tier 1 Capital} + \text{Tier 2 Capital)}}{\text{Risk Weighted Assets}}$	The Banks Association of Turkey

Table 1 (cont'd)

Variable	Description	Formula	Data Source
Capital Adequacy Ratio (CAR2)	Average equity amount that the bank has for every asset	$\frac{\text{Total Equity}}{\text{Total Assets}}$	The Banks Association of Turkey
Openness to Trade	Trade openness of a country	$\frac{\text{Imports from EU 28} + \text{Exports to EU 28}}{\text{GDP of Turkey}}$	Turkish Statistical Institute
TR IRs	Yearly inflation rate of Turkey		Turkish Statistical Institute
FX	The annual change in EUR-TRY foreign exchange rate		Central Bank of Turkey
EU IR	Yearly inflation rate of EU-28		Organization for Economic Cooperation and Development
DNATIONALITY	Dummy for bank's nationality	= 0, if bank is domestic = 1 otherwise	Bank websites

Table 2: Descriptive Statistics of Main Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
Mean	0.018	0.162	0.045	0.162	0.112	0.032	0.080	0.066	0.211	0.103
Median	0.017	0.147	0.043	0.157	0.113	0.032	0.080	0.080	0.000	0.099
Maximum	0.034	0.339	0.084	0.254	0.155	0.050	0.100	0.167	1.000	0.191
Minimum	0.008	0.078	0.017	0.128	0.071	0.020	0.040	-0.075	0.000	0.056
Std. Dev.	0.006	0.055	0.012	0.024	0.017	0.009	0.014	0.076	0.410	0.038
Observ.	90	90	90	90	90	90	90	90	90	90

In the Main Banks; ROA is on average 1.8%. It is changing between 0.8% and 3.4% with 0.6% standard deviation. The maximum value of ROA belongs to Türkiye Garanti Bankası A.Ş. in 2007 and minimum value of ROA comes from year 2013 and Denizbank A.Ş. ROE varies with 5.5% standard deviation. While its mean is 16.2%, its minimum and maximum values are 7.8% and 33.9% respectively. While minimum point is 2015 data of Finans Bank A.Ş., maximum point is 2009 data of Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Average of NIM, the last dependent variable, is 4.3% and it has a 1.2% standard deviation. NIM varies between 1.7% and 8.4%. Its maximum value comes from Denizbank A.Ş. in 2009, its minimum value belongs to Yapı ve Kredi Bankası A.Ş. in 2015. Capital adequacy measures (CAR and CAR2) have 16.2% and 11.2% means respectively. While CAR ranges between 12.8% and 25.4%, with a higher standard deviation (2.424%), CAR2 varies between 7.1% and 15.5% with 1.7% standard deviation. Minimum value of CAR comes from Denizbank A.Ş. from year 2013 and maximum value belongs to Türkiye Cumhuriyeti Ziraat Bankası A.Ş. from 2007. The bank with the maximum CAR2 is Akbank T.A.Ş. in 2007 and the bank with minimum CAR2 is Türkiye Cumhuriyeti Ziraat Bankası A.Ş. in 2008. When the macroeconomic control variables of Turkey are examined, it is seen that TR IR is 8.0% on average with minimum value of 6.0% (2012) and maximum value of 10.0% (2011). EU IR, on the other hand, is varying around 3.2% with 0.9% standard deviation. EU IR varies between 2.0% (2009) and 5.0% (2008). FX is around 6.6% with a high standard deviation (7.6%). While its minimum value (-7.5%) belongs to 2010, its maximum value (16.7%) comes from 2011. Last macroeconomic control variable, OTT takes values between 5.6% and 19.1% with a standard deviation of 3.8%. While minimum value of OTT belongs to 2016, in 2007 it reaches its maximum value. Mean of OTT is 10.3%. Since dummy variable is binary, it takes values of 0 or 1. While mean of DNATIONALITY is 21.1%, its standard deviation is close to 41.0%.

Table 3: Descriptive Statistics of Other Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
Mean	0.019	0.068	0.074	0.419	0.277	0.032	0.080	0.066	0.211	0.103
Median	0.014	0.085	0.056	0.196	0.150	0.032	0.080	0.080	0.000	0.099
Maximum	0.125	0.372	0.900	2.129	0.927	0.050	0.100	0.167	1.000	0.191
Minimum	- 0.128	- 0.728	- 0.054	0.102	0.039	0.020	0.060	- 0.075	0.000	0.056
Std. Dev.	0.029	0.128	0.087	0.454	0.257	0.009	0.014	0.075	0.410	0.038
Observ.	170	170	170	170	170	170	170	170	170	170

In the Other Banks, ROA is on average 1.9%. It is changing between -12.8% and 12.5% with 2.9% standard deviation. The maximum value of ROA belongs to JPMorgan Chase Bank N.A. in 2007 and minimum value of ROA comes from year 2016 and Société Générale. ROE varies with 12.8% standard deviation. While its mean is 6.8%, its minimum and maximum values are -72.8% and 37.2% respectively. While minimum point is 2009 data of Société Générale, maximum point is 2011 data of Bank Mellat. Average of NIM, the last dependent variable, is 7.4% and it has a 8.7% standard deviation. NIM varies between -5.4% and 90.0%. Its maximum value comes from Société Générale in 2015, its minimum value belongs to Deutsche Bank A.Ş. in 2007. Capital adequacy measures (CAR and CAR2) have 41.9% and 27.7% means respectively. While CAR ranges between 19.6% and 212.9%, with a higher standard deviation (45.4%), CAR2 varies between 3.9% and 92.7% with 25.7% standard deviation. Minimum value of CAR comes from Société Générale from year 2009 and maximum value belongs to Adabank A.Ş. from 2014. The bank with the maximum CAR2 is JPMorgan Chase Bank N.A. in 2016 and the bank with minimum CAR2 is Société Générale in 2007. When the macroeconomic control variables of Turkey are examined, it is seen that TR IR is 8.0% on average with minimum value of 6.0% (2012) and maximum value of 10.0% (2011). EU IR, on the other hand, is varying around 3.2% with 0.9% standard deviation. EU IR varies between 2.0% (2009) and 5.0% (2008). FX is around 6.6% with a high standard deviation (7.5%). While its minimum value (-7.5%) belongs to 2010, its maximum value (16.7%) comes from 2011. Last macroeconomic control variable, OTT takes values between 5.6% and 19.1% with a standard deviation of 3.8%. While minimum value of OTT belongs to 2016, in 2007 it reaches its maximum value. Mean of OTT is 10.3%. Since dummy variable is binary, it takes values of 0 or 1. While mean of DNATIONALITY is 60.0%, its standard deviation is close to 49.1%.

Table 4: Descriptive Statistics for Large Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
Mean	0.018	0.168	0.042	0.163	0.110	0.032	0.080	0.066	0.043	0.103
Median	0.017	0.152	0.042	0.155	0.110	0.032	0.080	0.080	0.000	0.099
Maximum	0.034	0.339	0.060	0.254	0.155	0.050	0.100	0.167	1.000	0.191
Minimum	0.008	0.081	0.019	0.131	0.071	0.020	0.060	-0.075	0.000	0.056
Std. Dev.	0.006	0.057	0.008	0.026	0.018	0.009	0.014	0.076	0.204	0.038
Observ.	70	70	70	70	70	70	70	70	70	70

For Large Banks, ROA is on average 1.8%. It is changing between 0.8% and 3.4% with 0.6% standard deviation. The maximum value of ROA belongs to Türkiye Garanti Bankası A.Ş. in 2007 and minimum value of ROA comes from year 2015 and Yapı ve Kredi Bankası A.Ş. ROE varies with 5.7% standard deviation. While its mean is 16.8%, its minimum and maximum values are 8.1% and 33.9% respectively. While minimum point is 2015 data of Yapı ve Kredi Bankası A.Ş., maximum point is 2009 data of Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Average of NIM, the last dependent variable, is 4.2% and it has a 1.0% standard deviation. NIM varies between 1.9% and 6.0%. Its maximum value comes from Türkiye İş Bankası A.Ş. in 2009, its minimum value belongs to Türkiye Vakıflat Bankası T.A.O. in 2015. Capital adequacy measures (CAR and CAR2) have 16.3% and 11.0% means respectively. While CAR ranges between 13.1% and 25.4%, with a higher standard deviation (2.6%), CAR2 varies between 7.1% and 15.5% with 1.7% standard deviation. Minimum value of CAR comes from Türkiye Halk Bankası A.Ş. from year 2016 and maximum value belongs to Türkiye Cumhuriyeti Ziraat Bankası A.Ş. from 2007. The bank with the maximum CAR2 is Akbank T.A.Ş. in 2007 and the bank with minimum CAR2 is Türkiye Cumhuriyeti Ziraat Bankası A.Ş. in 2008. When the macroeconomic control variables of Turkey are examined, it is seen that TR IR is 8.0% on average with minimum value of 6.0% (2012) and maximum value of 10.0% (2011). EU IR, on the other hand, is varying around 3.2% with 0.9% standard deviation. EU IR varies between 2.0% (2009) and 5.0% (2008). FX is around 6.6% with a high standard deviation (7.6%). While its minimum value (-7.5%) belongs to 2010, its maximum value (16.7%) comes from 2011. Last macroeconomic control variable, OTT takes values between 5.6% and 19.1% with a standard deviation of 3.8%. While minimum value of OTT belongs to 2016, in 2007 it reaches its maximum value. Mean of OTT is 10.3%. Since dummy variable is binary, it takes values of 0 or 1. While mean of DNATIONALITY is 4.3%, its standard deviation is close to 20.4%.

Table 5: Descriptive Statistics for Small Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
Mean	0.015	0.083	0.062	0.392	0.210	0.031	0.080	0.066	0.617	0.103
Median	0.014	0.096	0.048	0.185	0.126	0.032	0.080	0.080	1.000	0.099
Maximum	0.080	0.372	0.900	2.129	0.851	0.050	0.100	0.167	1.000	0.191
Minimum	-0.128	-0.728	-0.054	0.102	0.039	0.020	0.060	-0.075	0.000	0.056
Std. Dev.	0.020	0.132	0.076	0.437	0.205	0.008	0.014	0.075	0.487	0.038
Observ.	190	190	190	190	190	190	190	190	190	190

For Small Banks, ROA is on average 1.5%. It is changing between -12.8% and 8.0% with 2.0% standard deviation. The maximum value of ROA belongs to JPMorgan Chase Bank N.A. in 2012 and minimum value of ROA comes from year 2016 and Société Générale. ROE varies with 13.2% standard deviation. While its mean is 8.3%, its minimum and maximum values are -72.8% and 37.2% respectively. While minimum point is 2009 data of Société Générale, maximum point is 2011 data of Bank Mellat. Average of NIM, the last dependent variable, is 6.2% and it has 8.2% standard deviation. NIM varies between -5.4% and 90.0%. Its maximum value comes from Société Générale in 2015, its minimum value belongs to Deutsche Bank A.Ş. in 2007. Capital adequacy measures (CAR and CAR2) have 39.2% and 21.0% means respectively. While CAR ranges between 10.2% and 212.9%, with a higher standard deviation (43.7%), CAR2 varies between 3.9% and 85.1% with 20.5% standard deviation. Minimum value of CAR comes from Société Générale from year 2009 and maximum value belongs to Adabank A.Ş. from 2014. The bank with the maximum CAR2 is Turkish Bank A.Ş. in 2016 and the bank with minimum CAR2 is Société Générale in 2007. When the macroeconomic control variables of Turkey are examined, it is seen that TR IR is 8.0% on average with minimum value of 6.0% (2012) and maximum value of 10.0% (2011). EU IR, on the other hand, is varying around 3.2% with 0.9% standard deviation. EU IR varies between 2.0% (2009) and 5.0% (2008). FX is around 6.6% with a high standard deviation (7.5%). While its minimum value (-7.5%) belongs to 2010, its maximum value (16.7%) comes from 2011. Last macroeconomic control variable, OTT takes values between 5.6% and 19.1% with a standard deviation of 3.8%. While minimum value of OTT belongs to 2016, in 2007 it reaches its maximum value. Mean of OTT is 10.3%. Since dummy variable is binary, it takes values of 0 or 1. While mean of DNATIONALITY is 62.1%, its standard deviation is close to 48.6 %.

CHAPTER 4

METHODOLOGY

In the study, the aim is to see the relationship of capital adequacy ratios, some bank-specific ratios and some macroeconomic variables with the bank profitability of the commercial banks in Turkey. While ROA, ROE and NIM are used as dependent variables, capital adequacy ratios (CAR and CAR2) are used as bank-specific independent variables. For the macroeconomic control variables, openness to trade (OTT), change in the TRY-EUR foreign exchange rate (FX), the inflation rate in Turkey (TR IR), the inflation rate in EU region (EU IR) are included in the study. Moreover, a dummy variable (DNATIONALITY) is added to the dataset to see if the profitability is affected by the fact that the bank is foreign or domestic.

Before forming the models, correlation matrices of 4 datasets (Main Banks, Other Banks, Large Banks and Small Banks) are examined to see the relationships of the variables and to check whether there is multi-collinearity between the independent variables (see in Table 6, 7, 8 and 9);

Table 6: Correlation Matrix of Main Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
ROA	1.000	0.861	0.362	0.590	0.335	0.092	-0.299	-0.279	-0.223	0.558
ROE		1.000	0.253	0.483	-0.170	0.158	-0.132	-0.172	-0.264	0.524
NIM			1.000	0.265	0.193	0.060	-0.317	-0.044	0.430	0.349
CAR				1.000	0.336	-0.024	-0.272	-0.188	-0.083	0.292
CAR2					1.000	-0.088	-0.350	-0.237	0.058	0.085
EU IR						1.000	0.374	-0.105	-0.102	0.557
TR IR							1.000	0.517	0.058	0.042
FX								1.000	0.090	-0.335
DNATION.									1.000	-0.178
OTT										1.000

Table 7: Correlation Matrix of Other Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
ROA	1.000	0.578	0.206	0.390	0.562	0.057	0.036	-0.052	0.051	0.186
ROE		1.000	-0.050	0.007	0.015	0.082	-0.035	-0.040	-0.098	0.085
NIM			1.000	0.218	0.275	-0.038	-0.015	-0.023	0.110	-0.027
CAR				1.000	0.850	-0.015	0.009	-0.001	-0.101	0.008
CAR2					1.000	-0.007	-0.043	-0.016	-0.077	0.033
EU IR						1.000	0.374	-0.105	-0.059	0.557
TR IR							1.000	0.517	-0.008	0.042
FX								1.000	0.032	-0.335
DNATIONALITY									1.000	-0.082
OTT										1.000

Table 8: Correlation Matrix of Large Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
ROA	1.000	0.842	0.568	0.670	0.171	0.083	-0.337	-0.328	-0.121	0.590
ROE		1.000	0.437	0.537	-0.276	0.262	-0.148	-0.203	-0.158	0.542
NIM			1.000	0.454	0.015	0.061	-0.409	-0.056	-0.042	0.421
CAR				1.000	0.155	-0.011	-0.312	-0.265	-0.066	0.411
CAR2					1.000	-0.115	-0.271	-0.168	0.147	0.028
EU IR						1.000	0.374	-0.105	-0.177	0.557
TR IR							1.000	0.517	0.100	0.042
FX								1.000	0.091	-0.335
DNATION.									1.000	-0.214
OTT										1.000

Table 9: Correlation Matrix of Small Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
ROA	1.000	0.701	0.052	0.189	0.309	0.070	-0.064	-0.074	0.096	0.190
ROE		1.000	-0.137	0.057	-0.100	0.118	-0.041	-0.047	-0.075	0.159
NIM			1.000	0.000	0.197	-0.067	-0.033	-0.003	0.041	0.066
CAR				1.000	0.104	-0.014	0.009	0.000	-0.118	0.007
CAR2					1.000	-0.035	-0.033	0.011	0.001	-0.023
EU IR						1.000	0.374	-0.105	-0.067	0.557
TR IR							1.000	0.515	-0.002	0.046
FX								1.000	0.068	-0.335
DNATION.									1.000	-0.112
OTT										1.000

When the correlation matrices are examined, it can be said that all of the variables are suitable for testing and there is not any multi-collinearity problem with the independent variables chosen except for CAR and CAR2. Since multi-collinearity problem makes the model biased (Topak & Talu, 2017), CAR and CAR2 cannot be used in the same model. However, since both CAR and CAR2 represent the capital adequacy of a bank, they are planned to be put into different models regardless of the multi-collinearity. As a result, 2 different models for each dependent variable and each bank dataset, adding up to 24 models have been formed. However, in order to be sure that there is no multi-collinearity, the variance inflation factors of the variables in the final models have been checked and the results can be seen in Appendix C. Since none of the values are above 5 (Wooldridge, 2013), multi-collinearity suspicion has been eliminated.

In the similar studies, data is regressed by using different methods. While some of the authors like Ani et al. (2012), Staikouras & Wood (2004) choses to make a pooled regression, some others like and Goddard et al. (2004), Mirzaei & Mirzaei (2011) and Osborne, Fuertes and Milne (n.a.) use Generalized Method of Moments (GMM) to find out the determinants of profitability. The other methods used to make an estimation are Fixed Effect and Random Effect Models, the selection among the two methods is made with the help of Hausman test (Akbaş, 2012; Kosmidou, Tanna & Pasiouras, 2012; Owoputi, Kayode & Adeyefa, 2014).

According to Gujarati (2006), in the fixed effect model, each individual is assumed to differ from each other for some features and hence in the fixed effect model regression, the intercept term can vary among the cross-sections (as cited in Owuputi, Kayode, & Adeyefa, 2014). Thus, there is a cross-section effect which is treated as a random variable which can be correlated with the independent variables. (Alper & Anbar, 2011). However, in the random effect model, cross sections have a common intercept value (Owoputi, Kayode, & Adeyefa, 2014). In addition, random effects estimator is better at taking individual effect into consideration. The intercept term in the random effect model includes the differences in the cross sections (Hill, Griffiths, & Lim, 2011). Hence, random effect model should be preferred when it is thought that there

is no correlation between independent variable and cross-section effect (Owoputi, Kayode, & Adeyefa, 2014). The results of the LR Test can be seen in Table 10, 11, 12 and 13.

To figure out whether there is an individual effect in the datasets, Likelihood Ratio (LR) test is used. The following hypothesis is tested.

H_0: There is not any individual effect.

H_1: There exists an individual effect.

Table 10: LR Test Results of Main Banks

	Probability
Model 1	0.009
Model 2	0.000
Model 3	0.000
Model 4	0.000
Model 5	0.000
Model 6	0.000

Table 11: LR Test Results of Other Banks

	Probability
Model 7	0.000
Model 8	0.000
Model 9	0.000
Model 10	0.000
Model 11	0.000
Model 12	0.000

Table 12: LR Test Results of Large Banks

	Probability
Model 13	0.002
Model 14	0.000
Model 15	0.000
Model 16	0.000
Model 17	0.000
Model 18	0.001

Table 13: LR Test Results of Small Banks

	Probability
Model 19	0.000
Model 20	0.000
Model 21	0.000
Model 22	0.000
Model 23	0.000
Model 24	0.000

According to the LR test results, in each model, there is an individual effect. Thus, fixed effects estimator or random effects estimator should be used based on the characteristics of the individual effect.

Hausman test is conducted to see whether the individual effect is fixed or random. With Hausman test, the coefficients estimated with random effects estimator and the coefficients estimated with the fixed effect estimators can be compared to each other (Hill, Griffiths, & Lim, 2011). Hausman test is a hypothesis test with the following hypothesis (Gujarati & Porter, 2009) and the results of the test can be seen in Table 14.

H_0: Random effect model is appropriate

H_1: Fixed effect model is appropriate

Table 14: Hausman Test Results

Model	Dependent Variable	Statistic	p value
1	ROA	0.000	1.000
2	ROA	0.000	1.000
3	ROE	0.000	1.000
4	ROE	0.000	1.000
5	NIM	0.000	1.000
6	NIM	0.000	1.000
7	ROA	0.000	1.000
8	ROA	0.000	1.000
9	ROE	0.000	1.000
10	ROE	0.000	1.000
11	NIM	0.000	1.000
12	NIM	0.000	1.000
13	ROA	0.000	1.000
14	ROA	0.000	1.000
15	ROE	0.000	1.000
16	ROE	0.000	1.000
17	NIM	0.000	1.000
18	NIM	0.000	1.000
19	ROA	0.000	1.000
20	ROA	0.000	1.000

Table 14 (cont'd)

Model	Dependent Variable	Statistic	p value
21	ROE	0.000	1.000
22	ROE	0.000	1.000
23	NIM	0.000	1.000
24	NIM	0.000	1.000

Cross section test variance is invalid. Hausman Statistic set to zero.

The results of the Hausman Test are inconclusive for the models. Thus, the results of the test cannot be used to choose between random effect model and fixed effect model. Hence, the following information is used to choose between random effect estimator and fixed effect estimator.

When a correlation does not exist between the error terms of the model and the explanatory variables, both random effects and the fixed effects estimators can give consistent estimates (Hill, Griffiths, & Lim, 2011). The correlation between error terms and the explanatory variables are checked and there is no correlation found in any of the 24 models (see Appendix B).

Furthermore, fixed effects estimator can be used regardless of the true model, because when the underlying model is either random or fixed, the fixed effects estimator gives consistent estimations. However, random effects estimator cannot be used when the underlying model is fixed, due to the fact that the random effect estimator gives inconsistent results with the true fixed effect model. (Gujarati & Porter, 2009). As a result, in order to have consistent results, fixed effect model is decided to be used while forming the models with ROA, ROE and NIM.

Panel data models have some underlying assumptions that there is no multi-collinearity, error terms are homoscedastic and there is no serial correlation (Tatoğlu,

2012). Therefore, before going further with the results of the analyses, homoscedasticity and autocorrelation assumptions are checked.

Homoscedasticity means that having equal variance in the disturbance terms. Since having no heteroscedasticity means that it is possible to find other estimators having smaller variances, the estimator becomes inefficient when heteroscedasticity exists. Autocorrelation is the dependence of the disturbance of an observation to the disturbance terms of the other observations (Doughtery, 2001). To see whether there is autocorrelation or not, results of the Durbin-Watson test are used. On the other hand, for heteroscedasticity, Breusch-Pagan Lagrange Multiplier test is preferred. The results of these tests can be seen in Table 15, 16, 17, 18, 19, 20, 21, 22 and 23. Breusch-Pagan Lagrange Multiplier (LM) test is a hypothesis test with the following H_0 and H_1.

H_0: There is no heteroscedasticity.
H_1: There is heteroscedasticity.

Results of the Durbin Watson test are not close to 2, thus, there is an autocorrelation problem in the data. Since the data includes time series, it was expected to see an autocorrelation in the data. However, the serial correlation seems low, considering the values of Durbin Watson statistics.

When the results of the Breusch-Pagan LM test are examined, it is seen that all models have p values less than 0.05, which means that for all of them, the null hypothesis is rejected. Therefore, it can be said that there is also heteroscedasticity problem. (Test results related with the panel data regression assumptions about the error term (exogeneity and zero conditional mean assumptions) can be seen in Appendix A and Appendix B).

To sum up, in the dataset of the models, there exist autocorrelation and heteroscedasticity. Although they are the assumptions for panel data models, since their lacking causes nothing but the loss of efficiency in the data (Topak & Talu, 2017),

the estimation results can be used. Furthermore, according to Berry & Feldman (1985), when there are heteroscedasticity and autocorrelation problems, the estimator is still unbiased, and the resulting estimations are accurate regardless of autocorrelation and heteroscedasticity.

In the light of the aforementioned tests, the regression equation and the details regarding the models are created;

$$Y_{it} = \beta_{i0} + \beta_1 * X1_{it} + \beta_2 * X2_{it} + \beta_3 * X3_{it} + \beta_4 * X4_{it} + \beta_5 * X5_{it} + \beta_6 * X6_{it}$$

where Y_{it} is ROA and β_{i0} is the constant term for each bank i, for model 1, 2, 7, 8, 13, 14 and 19 and 20,

for model 1, 7, 13 and 19;

$X1_{it}$ is the independent variable CAR

and $X2_{it}$, $X3_{it}$, $X4_{it}$ and $X5_{it}$ are control variables TR IR, EU IR, FX, OTT

and $X6_{it}$ is the dummy variables DNATIONALITY,

for model 2, 8, 14 and 20;

$X1_{it}$ is the independent variable CAR2

and $X2_{it}$, $X3_{it}$, $X4_{it}$ and $X5_{it}$ are control variables TR IR, EU IR, FX, OTT

and $X6_{it}$ is the dummy variables DNATIONALITY,

where Y_{it} is ROE and β_{i0} is the constant term for each bank i, for models 3, 4, 9, 10, 15 ,16, 21 and 22,

for model 3, 9, 15 and 21;

$X1_{it}$ is the independent variable CAR

and $X2_{it}$, $X3_{it}$, $X4_{it}$ and $X5_{it}$ are control variables TR IR, EU IR, FX, OTT

and $X6_{it}$ is the dummy variables DNATIONALITY,

for model 4, 10, 16 and 22;

$X1_{it}$ is the independent variable CAR2

and $X2_{it}$, $X3_{it}$, $X4_{it}$ and $X5_{it}$ are control variables TR IR, EU IR, FX, OTT

and $X6_{it}$ is the dummy variables DNATIONALITY,

where Y_{it} is NIM and β_{i0} is the constant term for each bank i, for models 5, 6, 11, 12, 17, 18, 23 and 24,

for model 5, 11, 17 and 23;

$X1_{it}$ is the independent variable CAR

and $X2_{it}$, $X3_{it}$, $X4_{it}$ and $X5_{it}$ are control variables TR IR, EU IR, FX, OTT

and $X6_{it}$ is the dummy variables DNATIONALITY,

for model 6, 12, 18 and 24;

$X1_{it}$ is the independent variable CAR

and $X2_{it}$, $X3_{it}$, $X4_{it}$ and $X5_{it}$ are control variables TR IR, EU IR, FX, OTT

and $X6_{it}$ is the dummy variables DNATIONALITY.

CHAPTER 5

FINDINGS

5.1. Main Banks and Other Banks

For Main Banks, by using Fixed Effect Model, 2 models for each dependent variable have been formed and all final models are statistically significant with 99% confidence level. The results of the models can be seen in Table 15, 16 and 17

Model 1 has 61.0% Adjusted R^2 value and it has three significant variables; CAR, TR IR and OTT. The only bank specific variable, CAR has a positive relationship with profitability. As in some other studies (Dietrich & Wanzenried, 2011; Samad, 2015 etc.), the positive relationship between CAR and ROA can be interpreted as that the capitally well-managed banks are expected to be more profitable. TR IR is found statistically significant with a negative impact on ROA. This result is parallel with the findings of some studies about bank profitability (Flamini, Mcdonald & Schumacher, 2009; Islam & Nishiyama, 2016 etc.). On the other hand, OTT has a positive impact on ROA which is parallel with the expectations.

In model 2, while the dependent variable is ROA, bank specific variable is CAR2. The model's explanatory power is 59.1%. As in model 1, capital adequacy measure is statistically significant with a positive impact on ROA. In addition, inflation rate measures are found statistically significant and both TR IR and EU IR have a negative relationship with the profitability measure. Last statistically significant independent variable is OTT and as in model 1, it has a positive effect on ROA.

Table 15: Model 1 and 2 where Yit is ROA (Main Banks)

Variables	**(1)**	**(2)**
CAR	0.081***	
	(0.021)	
CAR2		0.128***
		(0.038)
TR IR	-0.092**	-0.082**
	(0.038)	(0.045)
EU IR	-0.081	-0.106*
	(0.61)	(0.062)
FX	0.006	0.009
	(0.007)	(0.007)
OTT	0.086***	0.101***
	(0.014)	(0.014)
DNATIONALITY	-0.000	-0.000
	(0.002)	(0.002)
Adjusted R^2	0.610	0.591
Durbin-Watson stat	1.355	1.275
Breusch-Pagan p value	0.000	0.000
Number of Obs.	90	90

Model 3 and model 4's dependent variable is ROE. While model 3 has 59.1% Adjusted R^2 value, model 4's explanatory power is 55.1%. OTT is found statistically significant in both of the models with a positive effect on the profitability measure. While in model 1, capital adequacy measure (CAR) is statistically significant with a positive impact, in model 3, TR IR is statistically significant with a negative impact.

In the last two models (model 5 and model 6), NIM is tried to be estimated. In the fifth model, CAR is used as a bank specific variable. When macroeconomic control

variables are examined, it is seen that TR IR, FX and OTT are statistically significant. While FX and OTT have a positive impact on NIM, TR IR affects NIM negatively and these 2 models have higher Adjusted R^2 values (73.7% and 75.0% respectively) than the first four models. In the 6th model, CAR2 is used and it is statistically significant with a positive impact. In the macroeconomic control variables, TR IR, FX and OTT are statistically significant. FX and OTT have a positive impact on NIM, whereas TR IR affects NIM negatively.

Table 16: Model 3 and 4 where Yit is ROE (Main Banks)

Variables	**(3)**	**(4)**
CAR	0.609***	
	(0.201)	
CAR2		-0.487
		(0.382)
TR IR	-0.403	-0.866**
	(0.372)	(0.403)
EU IR	-0.528	-0.800
	(0.598)	(0.622)
FX	0.074	0.084
	(0.065)	(0.068)
OTT	0.779***	0.956***
	(0.141)	(0.138)
DNATIONALITY	0.000	-0.002
	(0.018)	(0.019)
Adjusted R^2	0.591	0.551
Durbin-Watson stat	1.275	1.131
Breush-Pagan p value	0.000	0.000
Number of Obs.	90	90

Table 17: Model 5 and 6 where Yit is NIM (Main Banks)

Variables	**(5)**	**(6)**
CAR	0.051	
	(0.035)	
CAR2		0.154**
		(0.062)
TR IR	-0.457***	-0.424***
	(0.065)	(0.065)
EU IR	0.082	0.071
	(0.104)	(0.101)
FX	0.066***	0.068***
	(0.011)	(0.011)
OTT	0.140***	0.146***
	(0.024)	(0.022)
DNATIONALITY	-0.001	-0.002
	(0.003)	(0.003)
Adjusted R^2	0.737	0.750
Durbin-Watson stat	1.202	1.348
Breusch-Pagan p value	0.000	0.000
Number of Obs.	90	90

For Other Banks, 2 models for each dependent variable have been formed by using Fixed Effect Model. All final models are statistically significant with 99% confidence level. The results of the models are presented in Table 18, 19 and 20.

In model 7, CAR and OTT are statistically significant variables. This model explains 58.5% of the variance of ROA. As in the previously mentioned models, both CAR and OTT have positive impacts on ROA. Explanatory power of model 8 is greater than model 7 (63.3%) and in this model, bank specific variable is CAR2. CAR2 is

statistically significant in terms of explaining ROA with a coefficient whose sign is positive. Moreover, OTT is statistically significant and again affects ROA positively.

ROE is the regressor in model 9 and model 10. While model 9 include CAR, model 10 has CAR2 as a capital adequacy measure. The two models' Adjusted R^2 values are close to each other (39.8% and 40.2% respectively). However, in these models, only the intercept term is statistically significant, and all of the independent variables are statistically insignificant.

Table 18: Model 7 and 8 where Yit is ROA (Other Banks)

Variables	**(7)**	**(8)**
CAR	0.040***	
	(0.013)	
CAR2		0.065***
		(0.012)
TR IR	-0.146	-0.041
	(0.138)	(0.129)
EU IR	-0.064	-0.129
	(0.229)	(0.213)
FX	0.021	0.011
	(0.025)	(0.023)
OTT	0.166***	0.157
	(0.050)	(0.047)
DNATIONALITY	0.003	0.004
	(0.010)	(0.009)
Adjusted R^2	0.585	0.633
Durbin-Watson stat	1.438	1.386
Breusch- Pagan p value		
Number of Obs.	170	170

Table 19: Model 9 and 10 where Yit is ROE (Other Banks)

Variables	**(9)**	**(10)**
CAR	-0.056	
	(0.071)	
CAR2		-0.088
		(0.068)
TR IR	-0.725	-0.870
	(0.138)	(0.731)
EU IR	1.199	1.293
	(1.219)	(1.205)
FX	0.048	0.061
	(0.133)	(0.132)
OTT	0.163	0.0175
	(0.265)	(0.264)
DNATIONALITY	-0.022	-0.023
	(0.052)	(0.051)
Adjusted R^2	0.398	0.403
Durbin-Watson stat	1.074	1.072
Breusch-Pagan p value	0.000	0.000
Number of Obs.	170	170

Model 11 and model 12 tries to explain the variance in NIM, while model 11 uses CAR, model 12 uses CAR2 as a bank specific variable. These models have 73.7% and 75% Adjusted R^2 values respectively. In both models TR IR, FX and OTT are statistically significant, and these variables except for TR IR have a positive impact on NIM. In addition, in model 12, CAR2 is statistically significant with a positive relationship with the profitability measure.

Table 20: Model 11 and 12 where Yit is NIM (Other Banks)

Variables	**(11)**	**(12)**
CAR	0.051	
	(0.035)	
CAR2		0.154**
		(0.062)
TR IR	-0.457***	-0.424***
	(0.065)	(0.065)
EU IR	0.082	0.071
	(0.104)	(0.101)
FX	0.066***	0.068***
	(0.011)	(0.011)
OTT	0.140***	0.146***
	(0.024)	(0.022)
DNATIONALITY	-0.001	-0.002
	(0.003)	(0.003)
Adjusted R^2	0.737	0.750
Durbin-Watson stat	1.202	1.348
Breusch-Pagan p value	0.000	0.000
Number of Obs.	90	90

5.2 Large Banks and Small Banks

Second classification mentioned above is the use of the definition of Banks Association of Turkey. 9 banks which are defined as large banks and the remaining 17 banks are used to form models for 3 dependent variables. As a result, 12 models have been formed (6 models for Large Banks and 6 models for Small Banks).

Model 13 and Model 14 have ROA as the dependent variable. The difference between Model 13 and 14 is the capital adequacy measures used as a bank-specific independent

variable. While Model 13 explains 67.7% of the variance of ROA, Model 14's explanatory power is lower with 61.3%. In model 13, the capital adequacy measure (CAR) is found statistically significant with a positive impact on profitability while it is insignificant in model 14. Moreover, TR IR and OTT are found statistically significant, however, while TR IR and ROA have a negative relationship, OTT has a positive effect on ROA. In addition, in model 14, EU IR is statistically significant with a negative impact. There is not any conflict between the signs of the independent variables and the expectations formed in the beginning of this study.

Table 21: Model 13 and 14 where Yit is ROA (Large Banks)

Variables	**(13)**	**(14)**
CAR	0.076***	
	(0.022)	
CAR2		0.012
		(0.041)
TR IR	-0.085**	-0.229***
	(0.039)	(0.043)
EU IR	-0.093	-0.140**
	(0.063)	(0.068)
FX	0.003	0.005
	(0.007)	(0.007)
OTT	0.080***	0.108***
	(0.016)	(0.015)
DNATIONALITY	-0.003	-0.003
	(0.002)	(0.003)
Adjusted R^2	0.677	0.613
Durbin-Watson stat	1.284	1.185

Table 21 (cont'd)

Variables	**(13)**	**(14)**
Breusch-Pagan p value	0.000	0.000
Number of Obs.	70	70

Model 15 and 16 are formed to explain the variance in ROE. While CAR is used in Model 15, CAR2 is preferred to represent the capital adequacy in Model 16. When the Adjusted R^2 values are compared, it is seen that, model 15 has a lower explanatory power than model 16 (60.5% and 63.1% respectively). In model 15, CAR has a positive impact but in model 16, capital adequacy measure (CAR2) is statistically significant with a negative effect. OTT is the other significant independent variable having a positive relationship with the profitability measure in model 15. In model 16, on the other hand, TR IR is statistically significant with a negative impact along with OTT with a positive impact. The effects of the significant variables on ROE are parallel with their impacts on ROA. Since ROA and ROE are similar measures, the fact that significant variables have similar impacts on ROA and ROE is not an unexpected result.

Table 22: Model 15 and 16 where Yit is ROE (Large Banks)

Variables	**(15)**	**(16)**
CAR	0.590**	
	(0.253)	
CAR2		-1.169***
		(0.407)
TR IR	-0.326	-1.010**
	(0.440)	(0.427)
EU IR	-0.586	-1.100
	(0.711)	(0.672)

Table 22 (cont'd)

Variables	**(15)**	**(16)**
FX	0.055	0.056
	(0.075)	(0.073)
OTT	0.743***	1.010***
	(0.176)	(0.144)
DNATIONALITY	-0.027	-0.019
	(0.026)	(0.026)
Adjusted R^2	0.605	0.631
Durbin-Watson stat	1.134	1.061
Breusch-Pagan p value	0.000	0.000
Number of Obs.	70	70

Table 23: Model 17 and 18 where Yit is NIM (Large Banks)

Variables	**(17)**	**(18)**
CAR	0.060*	
	(0.033)	
CAR2		0.050
		(0.056)
TR IR	-0.397***	-0.412***
	(0.057)	(0.058)
EU IR	0.117	0.084
	(0.092)	(0.092)
FX	0.056***	0.057***
	(0.010)	(0.010)
OTT	0.108***	0.129***
	(0.023)	(0.020)

Table 23 (cont'd)

Variables	**(17)**	**(18)**
DNATIONALITY	0.006*	0.006
	(0.003)	(0.004)
Adjusted R^2	0.657	0.642
Durbin-Watson stat	1.531	1.597
Breusch-Pagan p value	0.000	0.000
Number of Obs.	70	70

When the models whose dependent variables are NIM (Model 17 and Model 18) are examined, it is seen that Adjusted R^2 values of these two models are 65.7% and 64.2% respectively. In Model 17, CAR is statistically significant with a positive impact on NIM. Other statistically significant independent variables are TR IR, FX, OTT and DNATIONALITY. While FX and OTT have a positive relationship with NIM, TR IR and DNATIONALITY affect the profitability negatively. DNATIONALITY has a negative impact on NIM, which means that the fact that the bank is foreign decreases the profitability. This result is in line with the result of the study of Tze Sun, Yee Theng & Boom Heng (2011). In their study, they claim that domestic banks are more efficient than foreign banks. Model 18 have the same significant variables with model 17 except for capital adequacy measure and DNATIONALITY. While FX and OTT affect NIM positively, TR IR has a negative impact on NIM.

When the models formed for Small Banks by using Fixed Effect Model are examined, there is an obvious decrease in the explanatory powers of the models. The expectation about the low Adjusted R^2 values is the main reason behind the use of Main Banks.

The banks in the Small Banks classification include small-scaled banks and thus, it is natural to see low Adjusted R^2 values.

Table 24: Model 19 and 20 where Yit is ROA (Small Banks)

Variables	**(19)**	**(20)**
CAR	0.022**	
	(0.010)	
CAR2		0.029**
		(0.013)
TR IR	-0.148	-0.121
	(0.101)	(0.101)
EU IR	0.018	-0.010
	0.168	(0.167)
FX	0.013	0.012
	(0.018)	(0.018)
OTT	0.109***	0.119***
	(0.037)	(0.037)
DNATIONALITY	0.001	0.002
	(0.006)	(0.006)
Adjusted R^2	0.528	0.463
Durbin-Watson stat	1.459	1.458
Breusch-Pagan p value	0.000	0.000
Number of Obs.	190	190

Model 19 and model 20 try to explain the variance in ROA, however, model 19's explanatory power is 46.0%. The only significant independent variables are CAR and OTT and they have a positive impact on ROA. Therefore, when a country's trade openness improves, it can be commented that the bank profitability of that country increases. Model 20's Adjusted R^2 value (46.3%) is slightly higher than model 19. The

significant variables in this model are CAR2 and OTT. As in all other models, they have a positive impact on ROA.

Table 25: Model 21 and 22 where Yit is ROE (Small Banks)

Variables	**(21)**	**(22)**
CAR	-0.001	
	(0.071)	
CAR2		-0.263***
		(0.081)
TR IR	-1.111	-1.192*
	(0.695)	0.674
EU IR	1.456	1.331
	(1.155)	(1.115)
FX	0.122	0.118
	(0.126)	(0.123)
OTT	0.470*	0.442*
	0.254	0.246
DNATIONALITY	-0.002	-0.008
	(0.041)	(0.040)
Adjusted R^2	0.423	0.454
Durbin-Watson stat	1.023	1.067
Breusch-Pagan p value	0.000	0.000
Number of Obs.	190	190

Model 21 and model 22 have ROE as dependent variable. While model 21 has 42.3% Adjusted R^2, model 22's Adjusted R^2 is 45.4%. In model 21, only statistically significant variable is OTT with a positive effect, while in model 22, CAR2 and OTT are found statistically significant and there is a positive relationship between OTT and the profitability measure but CAR2 has a negative impact on ROE. The difference

between the explanatory powers of the two models may be the result of the significant CAR2 variable in model 22.

In models where NIM is tried to be regressed, have the lowest Adjusted R^2 values. In model 23, there is not any statistically significant variable except for the intercept term and in model 24, CAR2 is found statistically significant with a positive relationship with NIM.

Table 26: Model 23 and 24 where Yit is NIM (Small Banks)

Variables	**(21)**	**(22)**
CAR	0.044	
	0.050	
CAR2		0.170***
		(0.060)
TR IR	-0.066	0.020
	(0.484)	(0.472)
EU IR	-0.264	-0.257
	(0.804)	(0.781)
FX	-0.016	-0.016
	(0.088)	(0.086)
OTT	-0.148	-0.118
	(0.177)	(0.172)
DNATIONALITY	-0.023	-0.019
	(0.029)	(0.028)
Adjusted R^2	0.171	0.076

Table 26 (cont'd)

Variables	**(21)**	**(22)**
Durbin-Watson stat	1.612	1.612
Breusch-Pagan p value	0.000	0.000
Number of Obs.	190	190

CHAPTER 6

CONCLUSION

In this study, the main objective was to find out whether there is a significant relationship between Capital adequacy ratio (CAR) and bank profitability in Turkey and to learn more about the nature and the direction of the relationship. Moreover, in the studies within the scope of the literature review, there was not any study that tries to explain the bank profitability in Turkey with the macroeconomic variables of EU region, thus, to figure out the relationship between EU macroeconomic variables and bank profitability was also an aim for this study.

The banks are divided into different datasets considering their sizes. First analysis include Main Banks and Other Banks and second analysis uses the definition of Banks Association of Turkey and covers the Large Banks and Small Banks. The data covering between 2007 and 2016 of 26 commercial banks of Tukey is used. 3 dependent variables (ROA, ROE, NIM) along with 7 independent variables (CAR, CAR2, TR IR, EU IR, FX, OTT, DNATIONALITY) were selected. Panel data is analysed by using fixed effect model or random effect model chosen based on the result of the Hausman test.

6.1 Main Banks and Other Banks

When the models formed with Main Banks are examined, it is seen that CAR is statistically significant in the models with dependent variable ROA and ROE and it has a positive impact on profitability. In addition, capital adequacy measure calculated with risk weighted assets, CAR2 is statistically significant in all models except for the model whose dependent variable is ROE. It also has a positive relationship with the profitability measures. In addition, looking at the significance levels and Adjusted R^2

values, it can be said that, CAR is better than CAR2 at explaining the variance of ROA. In addition, while explaining ROE, CAR is the capital adequacy measure that can be used. In the light of these results, it can be said that CAR is an important measure for the Main Banks in Turkey because of its significant and positive impact on profitability, when ROA and ROE is considered as the profitability measure. In other case, when the dependent variable is NIM, it seems better to use CAR2 as the capital adequacy measure.

The significance and the effects of macroeconomic control variables (TR IR, EU IR, FX and OTT) are also examined. TR IR is statistically significant in terms of explaining all three profitability measures and its effect on these measures are negative. Unlike the expectations, EU IR is not found statistically significant in any of the models except for model 2. FX variable which represents the exchange rate is statistically significant in explaining the variance of NIM. The result regarding OTT is highly consistent among the models and OTT is an independent variable that can be used to estimate ROA, ROE and NIM and it is obvious that there is a positive relationship between OTT and the dependent variables.

DNATIONALITY is the dummy variable included in the study to see the effect of the nationality of the banks on the bank profitability in Turkey. However, DNATIONALITY is not a statistically significant variable when Main Banks are considered.

In the models formed for Other Banks, both CAR and CAR2 have positive and statistically significant impacts on ROA and NIM. OTT, on the other hand, is statistically significant in terms of explaining ROA and its effect on ROA is also positive. The remaining variables do not have a significant impact on bank profitability. When model 7 and model 8 are compared whose dependent variables is ROA, it can be seen that, they have the same significant variables (capital adequacy measures and OTT) with positive impacts. Since model 7's explanatory power is less than model 8, while trying to explain the variance in ROA, CAR2 may be preferred.

However, CAR2 cannot be used to explain the variance in ROE or NIM.

6.2 Large Banks and Small Banks

In the models that belong to large banks, CAR is statistically significant in each model and it affects profitability positively except for the models with the dependent variable ROE. CAR2 also has positive impact and it can be used to explain the variance in ROE. Among the macroeconomic control variables, TR IR and OTT is statistically significant in terms of explaining ROA, ROE and NIM. However, the signs of their coefficients are different. While TR IR has a negative impact on profitability in the models where it is statistically significant, OTT affects profitability measures positively. Furthermore, FX and DNATIONALITY are found statistically significant when the dependent variable is NIM and just in the expectations, FX has a positive impact on NIM. However, DNATIONALITY affects NIM negatively, which shows that domestic banks among Other Banks may be more profitable.

In the models formed for Small Banks, CAR2 is statistically significant with a positive impact on the profitability measures except for the model whose dependent variable is ROE. However, CAR is only significant when explaining ROA, but it has a lower explanatory power than the model with CAR2. Hence, it is better to prefer CAR2 when dealing with Small Banks. however, when the explanatory powers of the models are considered, it does not matter much between choosing CAR2 over CAR in the models. TR IR and OTT can explain the variance in ROA and ROE.

As it can be inferred from the models, the choice between CAR and CAR2 depends on the class of the bank in addition to the dependent variable and but they have a negative impact on profitability regardless of the class and the dependent variable. Moreover, in most of the models, OTT and TR IR are the macroeconomic variables that are statistically significant and consistent. OTT has a positive relationship with profitability measures which shows that the relationships between EU affect the bank profitability in Turkey. TR IR affects the measures negatively. In some of the models,

EU IR, DNATIONALITY and FX are statistically significant. EU IR and DNATIONALITY have negative impacts, whereas FX have a positive impact on bank profitability. When these results are compared with the aforementioned expectations, it can be said that, results and expectations are parallel and thus the reasoning behind the expectations is likely to hold.

REFERENCES

Acaravcı, S. K., & Çalım, A. E. (2013). Turkish Banking Sector's Profitability Factors. *International Journal of Economics and Financial Issues, 3*(1), 27-41.

Agbeia, O., J., A. O., & Olufemi, F. I. (2015). Capital Adequacy Ratio and Bank Profitability in Nigeria: A Linear Approach. *International Journal of Novel Research in Marketing Management and Economics*, 91-99.

Akbaş, H. E. (2012). *Derminants Of Bank Profitability: An Investigation On Turkish Banking Sector.* Istanbul: Yıldız Techincal University.

Alp, A., Ban, Ü., Demirgüneş, K., & Kılıç, S. (1997). Internal Determinants of Profitability in Turkish Banking Sector. *The ISE Review, 12*(46), 2-13.

Alper, D., & Anbar, A. (2011). Bank Specific and Macroeconomic Determinants of Commercial Bank Profitability: Empirical Evidence from Turkey. *Business and Economics Research Journal*, 147.

Alshatti, A. S. (2016). Determinants of banks' profitability- the Case of Jordan. *Investment Management and Financial Innovations*, 84-91.

Ani, W. U., Ugwanta, D. O., Ezeudu, I. J., & Ugwuanyi, G. O. (2012). An empirical assessment of the determinants of bank profitability in Nigeria: Bank characteristics panel evidence. *Journal of Accounting and Taxation*, 38-43.

Aras, O. N. (2010). Effects of the Global Economic Crisis on Turkish Banking Sector. *International Journal of Economic Crisis on Turkish Banking Sector, 2*(1), 113-120.

Athanasoglou, P., Delis, M., & Staikouras, C. (2006). *DETERMINANTS OF BANK PROFITABILITY IN THE SOUTH EASTERN EUROPEAN REGION.* Munich Personal RePEc Archive.

Azam, M., & Siddiqui, S. (2012). Domestic and Foreign Banks' Profitability: Differences and Their Determinants. *International Journal of Economics and Financial Issues, 2*(1), 33-40.

Balin, B. J. (2008). *Basel I, Basel II, and Emerging Markets: A Nontechnical Analysis* . Washington DC: The Johns Hopkins University School of Advanced International Studies (SAIS).

Baltagi, B. H. (2001). *Econometric Analysis of Panel Data.* Chichester: John Wiley & Sons.

Banking Regulation and Supervision Agency. (2002, 01 31). *www.bddk.org.tr*. Retrieved from https://www.bddk.org.tr/WebSitesi/turkce/Mevzuat/Bankacilik_Kanununa_Iliskin_Duzenlemeler/1848ucuncu_kusak_sermaye_aciklama.pdf

Beckmann, R. (2007). *Profitability of Western European Banking Systems: Panel Evidence on Structural and Cyclical Determinants.* Frankfurt: Deutsche Bundesbank Eurosystem.

Belke, M., & Ünal, E. A. (2007). Determinants of Bank Profitability: Evidence from Listed and Non-Listed Banks in Turkey. *Journal of Economics Finance and Accounting*, *4*(4), 404-416.

Ben Khediri, K., Ben Ali, M. S., & Ben-Khedhiri, H. (2010). 7-Bank-specific, Industry-specific and Macroeconomic Determinants of African Islamic Banks' Profitability. *International Journal of Business Science and Applied Management*, 39-56.

Bennaceur, S., & Goaied, M. (2008, April). The Determinants of Commercial Bank Interest Margin and Profitability: Evidence from Tunisia. *Frontiers in Finance and Economics, 5*(1), 106-130.

Berger, A. N. (1995). The Relationship between Capital and Earnings in Banking. *Journal of Money, Credit, and Banking*, 432-456.

Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises? . *Journal of Financial Economics*, 146-176.

Berry, W., & Feldman, S. (1985). *Multiple Regression in Practice.* Sage Publications.

Cambridge University Press. (2018, March 22). *Profitability meaning in Cambridge Dictionary*. Retrieved from Cambridge dictionay: https://dictionary.cambridge.org/dictionary/english/profitability

Central Bank of Turkey. (2017). *www.tcmb.gov.tr*.

Damodaran, A. (2011). *The Little Book of Valuation: How to Value a Company, Pick a Stock and Profit.* Wiley.

Dawood, U. (2014). Factors impacting profitability of commercial banks in Pakistan for the period of (2009-2012). *International Journal of Scientific and Research Publications*, 1-7.

Demirgüç Kunt, A., & Huizinga, H. (2000). Financial Structure and Bank Profitability. *Policy Research Working Paper Series 2430*. Retrieved from https://ideas.repec.org/p/wbk/wbrwps/2430.html

Dietrich, A., & Wanzenried, G. (2011, July). Determinants of bank profitability before and during crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money, 21*(3), 307-327.

Doughtery, C. (2001). *Introduction to Econometrics* . Oxford University Press.

Flamini, V., McDonald, C., & Schumacher, L. (2015). *The Determinants of Commercial Bank Profitability in Sub-Saharan Africa.* International Monetary Fund.

Goddard, J., Molyneux, P., & Wilson, J. O. (2004). *THE PROFITABILITY OF EUROPEAN BANKS: A CROSS-SECTIONAL AND DYNAMIC PANEL ANALYSIS.* Oxford: Blackwell Publishing Ltd and The Victoria University of Manchester.

Görüş, M. S., & Özgür, Ö. (2016). Determinants of Islamic Bank Profitability in Turkey: Bank Specific Factor Analysis. *The Sakarya Journal of Economics,* 1-13.

Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics* . The McGraw-Hill Companies, Inc. .

Güneş, N. (2014). Profitability in Turkish Banking Sector: Panel Data Analysis (The period 1990-1999). *Journal of Economic and Social Thought, 1*(1), 15-26.

Hill, R. C., Griffiths, W. E., & Lim, G. C. (2011). *Principles of Econometrics.* John Wiley & Sons, Inc. .

Kedia, N. (2016). Determinants of Profitability of Indian Public Sector Banks. *IRA-INTERNATIONAL JOURNAL OF MANAGEMENT & SOCIAL SCIENCES*.

Kimmel, P. D., Weygandt, J. J., & Kieso, D. E. (2013). *Financial Accounting* (7 ed.). John Wile & Sons Pte Ltd.

Kosmidou, K., Tanna, S., & Pasiouras, F. (2012). *Determinants of profitability of domestic UK commercial banks: panel evidence from the period 1995-2002.* Coventry: Economics, finance and accounting applied research working paper series no. RP08.

Mathuva, D. (2009). Capital Adequacy, Cost Income Ratio and the Performance of Commercial Banks: The Kenyan Scenario. *The International Journal of Applied Economics and Finance* , 35-47.

Mirzaei, A., & Mirzaei, Z. (2011). Bank-sprcific and Macroeconomic Determinants of Profitability in Middle Eastern Banking. *Iranian Economic Review*, 101-128.

Moussa, M. M. (2012). *Bank-specific and Macroeconomic Determinants of Bank Profitability: Case of Turkey.* Gazimağusa: Eastern Mediterranean University.

Onaolapo, A. A., & Adebayo, E. O. (2012). Effect of Capital Adequacy on the Profitability of the Nigerian Banking Sector. *Journal of Money, Investment and Banking*, 61-72.

Organization for Economic Cooperation and Development. (2018). *www.oecd.org*.

Osborne, M., Fuertes, A.-M., & Milne, A. (n.d.). *Capital and profitability in banking: Evidence from US banks.*

Owoputi, J. A., Kayode, F. O., & Adeyefa, F. A. (2014). Bank Specific, Industry Specific and Macroeconomic Determinants of Bank Profitability in Nigeria. *European Scientific Journal*, 415.

Oxford University Press. (2018, March 22). *profitability | Definition of profitability in English by Oxford Dictionaries*. Retrieved from Oxford Living Dictionaries: https://en.oxforddictionaries.com/definition/profitability

Özgür, Ö., & Görüş, M. S. (2016). Determinants of Deposit Bank Profitability: Evidence from Turkey. *Journal of Applied Economics and Business Research, 6*(3), 218-231.

Patrick, V. R. (2005). *The impact of the 1988 Basel Accord on banks' capital ratios and credit risk-taking: an international study.* Brussels: European Centre for Advanced Research in Economics and Statistics (ECARES), Université Libre de Bruxelles.

Pervan, M., Pelivan, I., & Josip, A. (2015). Profit Persistence and Determinants of Bank Profitability in Croatia. *Economic Research, 28*(1), 284-298.

Reis, G. Ş., Kılıç, Y., & Buğan, M. F. (2016). Factors that Affect Bank Profitability: The Case of Turkey. *The Journal of Accounting and Finance*, 21-36.

Samad, A. (2015). Determinants of Bank Profitability: Emprical Evidence from Bangladesh Commercial Banks. *International Journal of Financial Reseach, 6*(3), 173-179.

Staikouras, C. K., & Wood, G. E. (2004, January). The Determinants of European Bank Profitability. *International Journal of economics and Business Research, 3*(6), 57-68. doi:10.19030/iber.v3i6.3699

Stovrag, A. (2017). *Capital requirements and bank profitability A comparison between the large Swedish banks and niche banks.* Jönköping University International Business School.

Tandoğan, D., & Özyurt, H. (2013). *Bankacılık Sektörünün Ekonomik Büyüme ve Sürdürülebilir Ekonomik Kalkınma Üzerine Etkisi: Türkiye Ekonomisi Üzerine Nedensellik Testleri (1981-2009).* Istanbul: Marmara University.

Tatoğlu, F. Y. (2012). *Panel Veri Ekonometrisi.* İstanbul: Beta Yayın Evi.

The Banks Association of Turkey. (2017). *www.tbb.org.tr*.

Topak, M. S., & Talu, N. H. (2017). Bank Specific and Macroeconomic Determinants of Bank Profitability: Evidence from Turkey. *International Journal of Economic and Financial Issues*, 577.

Tregenna, F. (2009). The Fat Years: The Structure and Profitability of the US banking sector in the pre-crisis period. *Cambridge Journal of Economics, 33*(4), 609-632.

Turgut, A., & Ertay, H. i. (2016). *Effects of Banking Sector on Economic Growth: Casual Analysis on Turkey.* Aksaray: Aksaray University.

Turkish Statistical Institute. (2017). *www.tuik.gov.tr*.

Tze Sun, O., Yee Theng, L., & Boom Heng, T. (2011). A Comparison on Efficiency of Domestic and Foreign Banks in Malaysia: A DEA Approach. *Business Management Dynamics, 1*(4), 33-49.

Wooldridge, J. M. (2013). *Introductory Econometrics: A Modern Approach.* Michigan: South Western Cengage Learning.

APPENDICES

A. ZERO CONDITIONAL MEAN ASSUMPTION CHECK

Table 27: Zero Conditional Mean Assumption Check

	Mean of Residuals
Model 1	-0.000
Model 2	0.000
Model 3	-0.000
Model 4	-0.000
Model 5	0.000
Model 6	0.000
Model 7	-0.000
Model 8	-0.000
Model 9	-0.000
Model 10	-0.000
Model 11	0.000
Model 12	0.000
Model 13	-0.000
Model 14	-0.000
Model 15	-0.000
Model 16	0.000
Model 17	0.000
Model 18	0.000
Model 19	-0.000
Model 20	-0.000

Table 27 (cont'd)

	Mean of Residuals
Model 21	-0.000
Model 22	-0.000
Model 23	0.000
Model 24	0.000

B. EXOGENEITY ASSUMPTION CHECK

Table 28: Exogeneity Assumption Check of Model 1

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.024	-0.272	-0.188	-0.083	0.292	0.000
EU IR		1.000	0.374	-0.105	-0.102	0.557	0.000
TR IR			1.000	0.517	0.058	0.042	0.000
FX				1.000	0.09	-0.335	0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 29: Exogeneity Assumption Check of Model 2

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.088	-0.35	-0.237	0.058	0.085	-0.000
EU IR		1.000	0.374	-0.105	-0.102	0.557	0.000
TR IR			1.000	0.517	0.058	0.042	0.000
FX				1.000	0.090	-0.335	-0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 30: Exogeneity Assumption Check of Model 3

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.024	-0.272	-0.188	-0.083	0.292	0.000
EU IR		1.000	0.374	-0.105	-0.102	0.557	0.000
TR IR			1.000	0.517	0.058	0.042	0.000
FX				1.000	0.090	-0.335	0.000
DNATION.					1.000	-0.178	0.000
OTT						1.000	-0.000
RESID							1.000

Table 31: Exogeneity Assumption Check for Model 4

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.088	-0.35	-0.237	0.058	0.085	-0.000
EU IR		1.000	0.374	-0.105	-0.102	0.557	-0.000
TR IR			1.000	0.517	0.058	0.042	-0.000
FX				1.000	0.090	-0.335	-0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 32: Exogeneity Assumption Check of Model 5

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.024	-0.272	-0.188	-0.083	0.292	-0.000
EU IR		1.000	0.374	-0.105	-0.102	0.557	-0.000
TR IR			1.000	0.517	0.058	0.042	0.000
FX				1.000	0.090	-0.335	-0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 33: Exogeneity Assumption Check of Model 6

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.088	-0.350	-0.237	0.058	0.085	-0.000
EU IR		1.000	0.374	-0.105	-0.102	0.557	-0.000
TR IR			1.000	0.517	0.058	0.042	-0.000
FX				1.000	0.090	-0.335	-0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 34: Exogeneity Assumption Check of Model 7

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.015	0.009	-0.001	-0.101	0.008	0.000
EU IR		1.000	0.374	-0.105	-0.059	0.557	0.000
TR IR			1.000	0.517	-0.008	0.042	0.000
FX				1.000	0.032	-0.335	0.000
DNATION.					1.000	-0.082	0.000
OTT						1.000	0.000
RESID							1.000

Table 35: Exogeneity Assumption Check of Model 8

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.007	-0.043	-0.016	-0.077	0.033	0.000
EU IR		1.000	0.374	-0.105	-0.059	0.557	0.000
TR IR			1.000	0.517	-0.008	0.042	0.000
FX				1.000	0.032	-0.335	0.000
DNATION.					1.000	-0.082	0.000
OTT						1.000	0.000
RESID							1.000

Table 36: Exogeneity Assumption Check of Model 9

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.015	0.009	-0.001	-0.101	0.008	0.000
EU IR		1.000	0.374	-0.105	-0.059	0.557	-0.000
TR IR			1.000	0.517	-0.008	0.042	0.000
FX				1.000	0.032	-0.335	-0.000
DNATION.					1.000	-0.082	0.000
OTT						1.000	0.000
RESID							1.000

Table 37: Exogeneity Assumption Check for Model 10

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.007	-0.043	-0.016	-0.077	0.033	0.000
EU IR		1.000	0.374	-0.105	-0.059	0.557	-0.000
TR IR			1.000	0.517	-0.008	0.042	0.000
FX				1.000	0.032	-0.335	-0.000
DNATION.					1.000	-0.082	0.000
OTT						1.000	0.000
RESID							1.000

Table 38: Exogeneity Assumption Check of Model 11

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.015	0.009	-0.001	-0.101	0.008	-0.000
EU IR		1.000	0.374	-0.105	-0.059	0.557	-0.000
TR IR			1.000	0.517	-0.008	0.042	-0.000
FX				1.000	0.032	-0.335	-0.000
DNATION.					1.000	-0.082	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 39: Exogeneity Assumption Check of Model 12

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.007	-0.043	-0.016	-0.077	0.033	-0.000
EU IR		1.000	0.374	-0.105	-0.059	0.557	-0.000
TR IR			1.000	0.517	-0.008	0.042	0.000
FX				1.000	0.032	-0.335	0.000
DNATION.					1.000	-0.082	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 40: Exogeneity Assumption Check of Model 13

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.011	-0.312	-0.265	-0.066	0.411	-0.000
EU IR		1.000	0.374	-0.105	-0.177	0.557	-0.000
TR IR			1.000	0.517	0.100	0.042	-0.000
FX				1.000	0.091	-0.335	0.000
DNATION.					1.000	-0.214	0.000
OTT						1.000	-0.000
RESID							1.000

Table 41: Exogeneity Assumption Check of Model 14

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.115	-0.271	-0.168	0.147	0.028	-0.000
EU IR		1.000	0.374	-0.105	-0.177	0.557	0.000
TR IR			1.000	0.517	0.100	0.042	0.000
FX				1.000	0.091	-0.335	-0.000
DNATION.					1.000	-0.214	0.000
OTT						1.000	-0.000
RESID							1.000

Table 42: Exogeneity Assumption Check of Model 15

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.011	-0.312	-0.265	-0.066	0.411	0.000
EU IR		1.000	0.374	-0.105	-0.177	0.557	0.000
TR IR			1.000	0.517	0.100	0.042	0.000
FX				1.000	0.091	-0.335	0.000
DNATION.					1.000	-0.214	0.000
OTT						1.000	0.000
RESID							1.000

Table 43: Exogeneity Assumption Check of Model 16

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.115	-0.271	-0.168	0.147	0.028	-0.000
EU IR		1.000	0.374	-0.105	-0.177	0.557	0.000
TR IR			1.000	0.517	0.100	0.042	0.000
FX				1.000	0.091	-0.335	-0.000
DNATION.					1.000	-0.214	0.000
OTT						1.000	-0.000
RESID							1.000

Table 44: Exogeneity Assumption Check of Model 17

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.011	-0.312	-0.265	-0.066	0.411	-0.000
EU IR		1.000	0.374	-0.105	-0.177	0.557	0.000
TR IR			1.000	0.517	0.100	0.042	0.000
FX				1.000	0.091	-0.335	-0.000
DNATION.					1.000	-0.214	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 45: Exogeneity Assumption Check of Model 18

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.115	-0.271	-0.168	0.147	0.028	-0.000
EU IR		1.000	0.374	-0.105	-0.177	0.557	0.000
TR IR			1.000	0.517	0.100	0.042	0.000
FX				1.000	0.091	-0.335	-0.000
DNATION.					1.000	-0.214	0.000
OTT						1.000	-0.000
RESID							1.000

Table 46: Exogeneity Assumption Check of Model 19

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.014	0.009	0.000	-0.118	0.007	0.000
EU IR		1.000	0.374	-0.105	-0.067	0.557	0.000
TR IR			1.000	0.515	-0.002	0.046	0.000
FX				1.000	0.068	-0.335	-0.000
DNATION.					1.000	-0.112	0.000
OTT						1.000	0.000
RESID							1.000

Table 47: Exogeneity Assumption Check of Model 20

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.035	-0.033	0.011	0.001	-0.023	0.000
EU IR		1.000	0.374	-0.105	-0.067	0.557	0.000
TR IR			1.000	0.515	-0.002	0.046	0.000
FX				1.000	0.068	-0.335	0.000
DNATION.					1.000	-0.112	0.000
OTT						1.000	0.000
RESID							1.000

Table 48: Exogeneity Assumption Check of Model 21

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.014	0.009	0.000	-0.118	0.007	0.000
EU IR		1.000	0.374	-0.105	-0.067	0.557	0.000
TR IR			1.000	0.515	-0.002	0.046	0.000
FX				1.000	0.068	-0.335	-0.000
DNATION.					1.000	-0.112	0.000
OTT						1.000	0.000
RESID							1.000

Table 49: Exogeneity Assumption Check of Model 22

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.035	-0.033	0.011	0.001	-0.023	0.000
EU IR		1.000	0.374	-0.105	-0.067	0.557	0.000
TR IR			1.000	0.515	-0.002	0.046	0.000
FX				1.000	0.068	-0.335	-0.000
DNATION.					1.000	-0.112	0.000
OTT						1.000	0.000
RESID							1.000

Table 50: Exogeneity Assumption Check of Model 23

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.014	0.009	0.000	-0.118	0.007	-0.000
EU IR		1.000	0.374	-0.105	-0.067	0.557	-0.000
TR IR			1.000	0.515	-0.002	0.046	-0.000
FX				1.000	0.068	-0.335	-0.000
DNATION.					1.000	-0.112	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 51: Exogeneity Assumption Check of Model 24

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.035	-0.033	0.011	0.001	-0.023	-0.000
EU IR		1.000	0.374	-0.105	-0.067	0.557	-0.000
TR IR			1.000	0.515	-0.002	0.046	-0.000
FX				1.000	0.068	-0.335	-0.000
DNATION.					1.000	-0.112	-0.000
OTT						1.000	-0.000
RESID							1.000

C. VARIANCE INFLATION FACTORS

Table 52: Variance Inflation Factors

Model	(1-3-5)	(2-4-6)	(7-9-11)	(8-10-12)	(13-15-17)	(14-16-18)	(19-21-23)	(20-22-24)
CAR	1.311		1.021		1.686		1.017	
CAR2		1.341		1.020		1.236		1.013
TR IR	1.986	2.121	1.846	1.847	2.080	2.086	1.835	1.827
EU IR	1.867	1.836	1.859	1.828	1.980	1.886	1.846	1.823
FX	1.719	1.715	1.712	1.714	1.727	1.725	1.710	1.709
OTT	1.999	1.757	1.699	1.698	2.355	1.685	1.724	1.716
DNATION.	1.142	1.141	1.077	1.076	1.122	1.134	1.098	1.100

D. LARGE AND MEDIUM BANKS

Table 53: Descriptive Statistics of Large and Medium Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
Mean	0.016	0.139	0.047	0.160	0.111	0.032	0.080	0.066	0.308	0.103
Median	0.153	0.135	0.045	0.154	0.110	0.032	0.080	0.080	0.000	0.099
Maximum	0.034	0.339	0.098	0.254	0.180	0.050	0.100	0.167	1.000	0.191
Minimum	-0.015	-0.157	0.017	0.126	0.071	0.020	0.060	0.075	0.000	0.056
Std. Dev.	0.008	0.071	0.014	0.023	0.019	0.009	0.014	0.076	0.464	0.038
Observations	120	120	120	120	120	120	120	120	120	120

Table 54: Correlation Matrix of Large and Medium Banks

	ROA	ROE	NIM	CAR	CAR2	EU IR	TR IR	FX	DNATION.	OTT
ROA	1.000	0.924	0.159	0.403	0.389	0.102	-0.222	-0.223	-0.384	0.456
ROE		1.000	0.045	0.329	0.040	0.145	-0.120	-0.159	-0.454	0.429
NIM			1.000	0.159	0.389	0.068	-0.286	-0.054	0.452	0.341
CAR				1.000	0.281	-0.064	-0.206	-0.125	-0.074	0.180
CAR2					1.000	-0.029	-0.297	-0.195	0.121	0.142
EU IR						1.000	0.374	-0.105	-0.110	0.557
TR IR							1.000	0.511	0.013	0.042
FX								1.000	0.078	-0.335
DNATION.									1.000	-0.178
OTT										1.000

Table 55: Model 1 and 2 where Yit is ROA (Large and Medium Banks)

Variables	**(1)**	**(2)**
CAR	0.050**	
	(0.023)	
CAR2		0.181***
		(0.027)
TR IR	-0.117***	-0.057
	(0.042)	(0.037)
EU IR	-0.071	-0.093
	(0.068)	(0.058)
FX	0.007	0.007
	(0.007)	(0.006)
OTT	0.001	0.000
	(0.002)	(0.002)
DNATIONALITY	0.104***	0.096***
	(0.016)	(0.013)
Adjusted R^2	0.617	0.720
Durbin-Watson stat	0.837	1.173
Breusch-Pagan p value	0.000	0.000
Number of Obs.	120	120

Table 56: Model 3 and 4 where Yit is ROE (Large and Medium Banks)

Variables	**(3)**	**(4)**
CAR	0.333	
	(0.206)	
CAR2		0.553*
		(0.285)
TR IR	-0.712*	-0.583
	(0.373)	(0.384)
EU IR	-0.393	-0.530
	(0.613)	(0.604)
FX	0.074	0.077
	(0.067)	(0.066)
OTT	0.008	0.005
	(0.018)	(0.018)
DNATIONALITY	0.903***	0.912***
	(0.140)	(0.137)
Adjusted R^2	0.652	0.656
Durbin-Watson stat	0.930	0.979
Breusch-Pagan p value	0.000	0.000
Number of Obs.	120	120

Table 57: Model 5 and 6 where Yit is NIM (Large and Medium Banks)

Variables	**(5)**	**(6)**
CAR	0.064	
	(0.041)	
CAR2		0.327***
		(0.048)
TR IR	-0.473***	-0.356***
	(0.074)	(0.064)
EU IR	0.091	0.062
	(0.122)	(0.101)
FX	0.066***	0.065***
	(0.013)	(0.011)
OTT	0.002	0.000
	(0.004)	(0.003)
DNATIONALITY	0.160***	0.142***
	(0.028)	(0.023)
Adjusted R^2	0.625	0.737
Durbin-Watson stat	1.209	1.633
Breusch-Pagan p value	0.000	0.000
Number of Obs.	120	120

Table 58: Exogeneity Assumption Check of Large and Medium Banks (Model 1)

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.064	-0.206	-0.125	-0.074	0.180	0.000
EU IR		1.000	0.374	-0.105	-0.110	0.557	0.000
TR IR			1.000	0.511	0.013	0.042	0.000
FX				1.000	0.078	-0.335	-0.000
DNATION.					1.000	-0.178	0.000
OTT						1.000	0.000
RESID							1.000

Table 59: Exogeneity Assumption Check of Large and Medium Banks (Model 2)

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.029	-0.297	-0.195	0.121	0.142	0.000
EU IR		1.000	0.374	-0.105	-0.110	0.557	0.000
TR IR			1.000	0.511	0.013	0.042	0.000
FX				1.000	0.078	-0.335	0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	0.000
RESID							1.000

Table 60: Exogeneity Assumption Check of Large and Medium Banks (Model 3)

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.064	-0.206	-0.125	-0.074	0.180	0.000
EU IR		1.000	0.374	-0.105	-0.110	0.557	0.000
TR IR			1.000	0.511	0.013	0.042	0.000
FX				1.000	0.078	-0.335	0.000
DNATION.					1.000	-0.178	0.000
OTT						1.000	-0.000
RESID							1.000

Table 61: Exogeneity Assumption Check of Large and Medium Banks (Model 4)

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.029	-0.297	-0.195	0.121	0.142	0.000
EU IR		1.000	0.374	-0.105	-0.110	0.557	0.000
TR IR			1.000	0.511	0.013	0.042	0.000
FX				1.000	0.078	-0.335	-0.000
DNATION.					1.000	-0.178	-0.000
OTT						1.000	-0.000
RESID							1.000

Table 62: Exogeneity Assumption Check of Large and Medium Banks (Model 5)

	CAR	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR	1.000	-0.064	-0.206	-0.125	-0.074	0.180	-0.000
EU IR		1.000	0.374	-0.105	-0.110	0.557	-0.000
TR IR			1.000	0.511	0.013	0.042	-0.000
FX				1.000	0.078	-0.335	-0.000
DNATION.					1.000	-0.178	0.000
OTT						1.000	-0.000
RESID							1.000

Table 63: Exogeneity Assumption Check of Large and Medium Banks (Model 6)

	CAR2	EU IR	TR IR	FX	DNATION.	OTT	RESID
CAR2	1.000	-0.029	-0.297	-0.195	0.121	0.142	-0.000
EU IR		1.000	0.374	-0.105	-0.110	0.557	-0.000
TR IR			1.000	0.511	0.013	0.042	-0.000
FX				1.000	0.078	-0.335	-0.000
DNATION.					1.000	-0.178	0.000
OTT						1.000	-0.000
RESID							1.000

Table 64: LR Test Results of Large and Medium Banks

	Probability
Model 1	0.000
Model 2	0.000
Model 3	0.000
Model 4	0.000
Model 5	0.001
Model 6	0.000

Table 65: Zero Conditional Mean Assumption Check of Large and Medium Banks

	Mean of Residuals
Model 1	-0.000
Model 2	0.000
Model 3	-0.000
Model 4	-0.000
Model 5	0.000
Model 6	0.000

Table 66: Variance Inflation Factors of Large and Medium Banks

Model	(1-3-5)	(2-4-6)
CAR	1.311	
CAR2		1.341
TR IR	1.986	2.121
EU IR	1.867	1.836
FX	1.719	1.715

Table 66 (cont'd)

Model	(1-3-5)	(2-4-6)
OTT	1.999	1.757
DNATIONALITY	1.142	1.141

E. TURKISH SUMMARY/ TÜRKÇE ÖZET

Bankalar bir ülkenin ekonomisinde ve halkının refahında önemli rol oynar. Bankalar birikimlerin yatırımlara dönüşmesinde ve sermaye ihtiyacı olan kurumlar ile sermaye fazlası olan bireyler ve kurumların bir araya getirilmesinde katalizör rolü oynar. Bankalar sadece paranın akışını kolaylaştırmazlar; aynı zamanda bu para akışının güvenliğini sağlarlar. Böylelikle yatırımcıları daha fazla yatırım yapmaya, girişimcileri daha fazla sermaye armaya teşvik ederken, endüstrinin gelişmesini, ekonominin büyümesini ve ülkenin refahının artmasında yardımcı olurlar. Güçlü bir ekonomi ve güvenli bankacılık sitemi ise uluslararası ticaretin gelişmesini sağlar.

Güvenilir para akışının sağlanması ve güçlü bankacılığın sağlanması özellikle gelişmekte olan ülkeler için önemlidir çünkü güvenilir ortam yastık altı sermayenin azalmasını ve bankalar sağladığı araçlar sayesinde dar gelirli ailelerin beyaz eşya gibi yüksek taahhüt gerektiren ihtiyaçlarını gidermelerini kolaylaştıracaktır. Böylelikle piyasada dolanan paranın artmasının yanı sıra tüketim ve vatandaşların refahının da artması sağlanacaktır.

Bankalar hangi ülkede yerleşirlerse yerleşsinler, merkez bankası tarafından konulmuş belli başlı kanunlara ve düzenlemelere tabidirler. Merkez bankasının ülke çapında uygulamak istediği politika ve düzenlemeleri hayata geçirmesinde en büyük etmen bankalardır. Diğer bir değişle bankalar para piyasalarının ve ekonominin kararlılığının sağlanmasında ve dinamikliğini korumasında merkez bankasına yardımcı olurlar.

Sonuç olarak bankalar bir ülkenin kalkınması, ekonominin büyümesi ve halkının refahını arttırılmasında etkilidir. Bu sebepten bankaların durumu ve karlılıkları da sadece bankaları değil ekonomiyi ve halkı da ilgilendirir. Karlılık literatürde finansal faydaların ölçeri olarak tanımlanmaktadır ve hangi alanda olursa olsun bir kuruluşun en önemli güç göstergesidir.

Birçok araştırmacı bankaların ekonomideki önemi düşünerek ve her gün daha da rekabetçi hale gelen piyasalar göz önünde bulundurarak banka karlılığını hedefleri haline getirmiştir. Bu araştırmacılar, çalışmalarında, farklı coğrafya ve zaman aralıklarını mercekleri altına alarak bankaların karlılıklarını farklı banka ile ilgili ve makroekonomik değişkenler ile açıklamaya ve tanımlamaya çalışmışlardır. Bu çalışmaların çoğunluğu bankaların karlılıklarının ne kadarının banka yönetimleri tarafından verilen kararlardan ve ne kadarının küresel veya ülke özelindeki değişkenler ve dinamiklerden kaynakladığını araştırmışlardır.

Türk banka sektörünün oldukça gelişmiş bir yapısı vardır. 2016 itibariyle Türkiye'de toplamda 52 banka 12 bine yakın şube ile hizmet vermektedir. Türkiye banka sektöründe bulunan varlıkların %90'nın teşkil eden 34 mevduat bankası bulunmaktadır. Son 5 yılda bankaların vermiş olduğu mevduatlar Türkiye gayri milli hasılasının %58'ine ulaşırken, krediler ise Türkiye gayri hasılasının %67'sine ulaşmıştır. Avrupa Birliği ülkeleri ile kıyaslandığında Türkiye banka endüstrisinin varlıkları ve Öz sermayesi orta üst sıralarda yer almaktadır.

Türkiye banka sektörünün büyüklüğü de dünyada olduğu gibi birçok araştırmacının ilgisini çekmiş ve onlar da bankaların karlılığını birçok farklı değişken ile farklı dönemlerde açıklamaya çalışmışlardır. Bu çalışmalarda en sık kullanılan banka değişkenlerinden biri de sermaye yeterlilik oranıdır ve bu oran Türkiye'ye ait bankalar ile ilgili olan makalelerin hepsinde öz sermaye/varlıklar olarak hesaplanmıştır. Bu oranın kullanılmasında yatan ana fikirlerden bir tanesi sermayesini iyi yöneten bir bankanın veya kuruluşun karlılığını ve operasyonel verimliliğini arttıracağı yönündeki varsayımdır. Fakat Türkiye bankaları ile ilgili karlılık çalışmalarında Basel 3 ile birlikte gelen ve risk ağırlıklı varlıklar kullanılarak hesaplanan sermaye yeterlilik oranının banka karlılığı üzerinde etkisini inceleyen bir makale bulunmamaktadır. Bu sebepten, literatürdeki bu boşluğu kapatmak adına bu çalışmanın birinci amacı risk ağırlıklı varlıklar ile hesaplanan sermaye yeterlilik oranının Türkiye banka karlılığı üzerindeki etkisi incelemek olacaktır.

Daha önce de bahsedildiği üzere birçok makalede banka karlılığını açıklamak ve tanımlamak için makroekonomik değişkenlerin karlılık üzerindeki etkisi incelenmiştir. Gayri milli hasıladaki büyüme enflasyon banka karlılık analizlerinde en sık kullanılan makroekonomik değişkenlerdir. Hakeza Türkiye banka karlılığını açıklamak amaçlı yazılan makalelerde de en sık kullanılan makroekonomik değişkenler bunlardır.

Son 10 yılda (2007-2016) ihracat yapılan ülkeler incelendiğinde AB-28 ülkelerine yapılan ihracatın ortalamada toplam ihracatın %46'sını oluşturmaktadır. Son 10 yılda (2007-2016) ithalatın yapıldığı ülkeler incelendiğinde AB-28 ülkelerinden yapılan ithalatın ortalamada toplam ithalatın %38'ini oluşturmaktadır. Bu istatistikler göz önünde bulundurulduğunda ve literatür tarandığında AB-28 ülkelerinin Türkiye ekonomisi üzerinde büyük bir etkisinin olduğu söylenebilir. Uluslararası ticarette gerçekleşen neredeyse bütün para akışının bankalar üzerinden yapıldığı düşünüldüğünde, EU-28 ülkelerinin makroekonomik değişkenlerinin ve Türkiye ile bu ülkeler arasındaki alışverişin Türkiye banka karlılığını etkilemesi beklenmektedir. Türkiye banka karlılığı ile ilgili literatür incelendiğinde bu yönde kullanılan tek değişkenin kur olduğu gözlenmiş ve bu konuda literatürde bir boşluk olduğu saptanmıştır. Bu sebepten, literatürdeki bu boşluğu kapatmak adına bu çalışmanın ikinci AB-28 makroekonomik değişkenlerinin ve bu ülkelerin Türkiye ile olan ilişkilerinin Türkiye banka karlılığı üzerindeki etkisi incelemek olacaktır.

Sonuç olarak, bu çalışmanın birinci araştırma sorusu "Risk ağırlıklı varlıklar ile hesaplanan sermaye yeterlilik oranın Türkiye banka karlılığı üzerinde önemli bir etkisi bulunmakta mıdır? Eğer bulunuyor ise bu etki pozitif mi yoksa negatif midir?" ve ikinci araştırma sorusu "AB-28 ülkelerinin makroekonomik değişkenlerinin Türkiye banka karlılığı üzerinde önemli bir etkisi bulunmakta mıdır? Eğer bulunuyor ise bu etki pozitif mi yoksa negatif midir?" olacaktır.

Bu çalışma için, Türkiye'deki 34 banka incelenmiş ve Aralık 2016 itibariyle bankacılık sektöründeki aktif büyüklüğün %91'ini oluşturan 26 adet banka çalışmaya dahil edilmiştir. Bu bankalar iki farklı yöntem kullanılarak sınıflandırılmıştır. Birinci

yöntemde, aktif büyüklüğü 100 milyon TL' ye eşit veya bu tutarın üzerinde olan 9 banka "Ana Bankalar" olarak isimlendirilirken; geriye kalan 20 banka "Diğer Bankalar" olarak isimlendirilmiştir. Diğer sınıflandırma yönteminde ise, Türkiye Bankalar Birliği'nin sıralamasına göre büyük ölçekli banka kategorisinde olan 7 banka, "Büyük Bankalar" olarak incelenmiştir. Geriye kalan 19 banka ise "Küçük Bankalar" kategorisinde ele alınmıştır (Tezin ana konusu olmasa da, Türkiye Bankalar Birliği'nin büyük ve orta ölçekli olarak tanımladığı 12 banka için farklı bir veri seti oluşturulmuş ve analizler bu set için de tekrar edilmiştir ve sonuçlar tezin ek kısmında sunulmuştur).

Çalışmadaki veri seti Aralık 2007 ve Aralık 2016 arasındaki 10 yıllık dönemi kapsamaktadır. Bankalara ait ihtiyaç duyulan veri, Türkiye Bankalar Birliği tarafından hazırlanan bankaların yıllık finansal raporları çalışmasından alınmıştır. Bilançoya ait değişkenler için yıl sonu değerleri kullanılırken, gelir tablosuna ait değişkenler için yıllık değerler kullanılmıştır. Veride farklı bankalara ait zaman serileri bulunduğu için panel veri kullanılmıştır.

Banka karlılığının incelendiği çalışmada, literatürde de oldukça tercih edilmiş, önemli karlılık ölçütleri, bağımlı değişken olarak kullanılmıştır. Bu bağımlı değişkenler Aktif Getiri Oranı, Özkaynak Getiri Oranı ve Net Faiz Marjı'dır. Aktif Getiri Oranı (ROA), net gelirin toplam aktiflere oranıyken, Özkaynak Getiri Oranı (ROE), net gelirin toplam özkaynağa oranıdır. Net Faiz Marjı (NIM) ise, net faiz gelirinin faiz getiren aktiflere bölünmesiyle hesaplanmaktadır. Bankaya özel bağımsız değişkenlerden biri, araştırma sorularından olan ve risk ağırlıklı varlıklar kullanılarak hesaplanan sermaye yeterlilik oranı (CAR) değişkenidir. Bunun yanında, literatürde sermaye yeterliliğini ölçmek için sıkça kullanılan, toplam özkaynağın toplam aktife bölünmesiyle bulunan sermaye yeterlilik oranı (CAR2) da, çalışmanın sağlamlığını ölçebilmek ve risk ağırlıklı varlıklarla hesaplanan sermaye yeterlilik oranı ile ilgili daha fazla fikir edinebilmek için çalışmaya dahil edilmiştir.

CAR, bankanın ana sermaye ve katkı sermaye toplamının risk ağırlıklı varlıklara bölünmesiyle hesaplanmaktadır. Bu oranın yüksek olması, bankanın daha az risk taşıdığını ve daha az maliyetle borçlanabileceğini göstermektedir. Bu nedenle, CAR ve karlılık arasında pozitif bir ilişki olması beklenmektedir. Literatürde, Türkiye'deki banka karlılığı belirleyicileri ile ilgili yapılmış ve CAR2'yi bağımsız değişken olarak kullanmış çalışmaların sonuçları doğrultusunda da banka karlılığı ve CAR2 arasında da pozitif bir ilişki beklenmektedir. Yine literatür taramasının ışığında, yerli ve yabancı bankaların farklılaşabildiği görüldüğünden ve veri setinde yer alan 15 banka yabancı olduğundan, bankaların milliyetlerini gösteren bir kukla değişken tanımlanmış (DNATIONALITY) ve yine bağımsız değişken olarak çalışmaya dahil edilmiştir. Ancak, yine literatürdeki makalelerin farklılaşan sonuçlarından dolayı bu değişkenin karlılık üzerindeki etkisinin yönü ile ilgili net bir beklenti oluşmamıştır. Diğer bir bağımsız değişken kategorisi ise makroekonomik kontrol değişkenleridir.

Kullanılan makroekonomik kontrol değişkenlerinden ilki, Türkiye'nin Avrupa ile ticarete açıklığını gösteren ve Avrupa Birliği ülkelerine yapılan ihracatlar ve Avrupa Birliği'nden yapılan ithalatların toplamının Türkiye Gayrisafi Yurtiçi Hasılası'ndaki payı olan ticarete açıklık (OTT) değişkenidir. Değişkeni hesaplarken kullanılan veri Türkiye İstatistik Kurumu'ndan alınmıştır. Bu değişkenin artışının aradaki işlemleri kolaylaştırması beklendiğinden, banka karlılığını olumlu yönde etkilemesi beklenmektedir.

Avrupa Birliği ile ilişkili olan diğer makroekonomik kontrol değişkeni, Avrupa Birliği Enflasyon Oranı'dır (EU IR) ve verisi Ekonomik Kalkınma ve İşbirliği Örgütü'nün (OECD) sitesinden alınmıştır. Türkiye'nin ithalatları incelendiğinde, 2016 Aralık itibariyle Türkiye'nin ithalatının %38.2'sinin Avrupa Birliği ülkelerinden olduğu görülmektedir. İthal edilen ürünlerin çoğu ham madde olduğundan, Avrupa Birliği'ndeki enflasyon artışı dolaylı olarak Türkiye'de üretilen ürünlerin de fiyatlarının artmasına sebep olmaktadır. Bu nedenle, EU IR ile banka karlılığı arasında negatif yönlü bir ilişki beklenmektedir.

Avrupa Birliği ile ilişkilerin Türkiye'deki bankaların karlılığını nasıl etkileyeceğini anlamak için kullanılan son değişken ise TRY/EUR döviz kurudur (FX). Kur verisi Türkiye Cumhuriyeti Merkez Bankası'nın sitesinden alınmıştır. Döviz kuru, EU IR değişkeninden negatif yönde etkilendiğinden, FX ve banka karlılığı göstergeleri arasında pozitif yönde bir ilişki beklenmektedir.

Türkiye ile ilgili makroekonomik kontrol değişkeni ise, verisi Türkiye İstatistik Kurumu'ndan temin edilen Türkiye Enflasyon Oranı'dır (TR IR). Enflasyon oranındaki artış, hane halkının satın alma gücündeki düşüş olarak yorumlanabilir. Bu düşüş, kredilerdeki temerrüt oranlarını arttırabileceğinden, banka karlılığını düşürmesi beklenmektedir. Yani enflasyon oranının banka karlılığı üzerinde olumsuz bir etkisi olacağı öngörülmektedir.

Değişkenler hakkında daha fazla bilgi sahibi olabilmek için daha önce bahsedilen sınıflandırma kullanılarak, Ana Bankalar ile Diğer Bankalar ve Büyük Bankalar ve Küçük Bankalar'ın betimleyici istatistikleri analiz edilmiştir.

Bahsedilen değişkenlerle modeller kurulmadan önce, Ana Bankalar, Diğer Bankalar, Büyük Bankalar ve Küçük Bankalar için değişkenlerin korelasyonları incelenmiştir. Korelasyon matrislerinin incelenmesindeki sebeplerden biri, değişkenler arasındaki ilişkileri daha iyi anlayabilmekken bir diğeri de bağımsız değişkenler arasında çoklu doğrusal bağlantı problemi olup olmadığını kontrol etmektir. Çünkü çoklu doğrusal bağlantı problemi, kurulan modelin tahmin edicisini yanlı hale getirmektedir. Korelasyon matrislerine bakıldığında, yalnızca CAR ve CAR2 değişkenleri arasında yüksek korelasyon olduğu tespit edilmiştir. Ancak, bu değişkenlerin ikisi de sermaye yeterliliği göstergesi olduklarından zaten farklı modellerde kullanılmaları önceden planlanmıştır. CAR ve CAR2 farklı modellerde olduğu sürece çoklu doğrusal bağlantı problemi beklenmemiştir. Bu nedenle, Ana Bankalar, Diğer Bankalar, Büyük Bankalar ve Küçük Bankalar için olmak üzere, CAR ve CAR2 için ayrı ayrı ve her bağımlı değişken için toplamda 24 model kurulmuştur. Çoklu doğrusal bağlantı sorunu olmadığından emin olmak için, kurulan her modelde varyans büyütme faktörleri

hesaplanmıştır. Hiçbir değer 5'ten büyük olmadığından çoklu doğrusal bağlantı şüphesi ortadan kalkmıştır. Modellere ait varyans enflasyon faktörleri ek kısmında sunulmuştur.

Literatür incelendiğinde, panel veri analizi için karma regresyon, genelleştirilmiş moment metodu, sabit etki modeli ve tesadüfi etki modeli gibi yöntemler kullanıldığı görülmüştür. Modeller tahmin yapma amacıyla kullanılmayacağından, karma regresyon, sabit etki modeli ve tesadüfi etki modeli arasından uygun olan yönteminin seçilmesi gerekmiştir. Veride bireysel etki olmaması durumunda kullanılacak en ideal yöntem, tüm bankaları aynı kabul edecek olan karma regresyon yöntemidir. Veri setinde bireysel etki olup olmadığını anlamak için Ana Bankalar, Diğer Bankalar, Büyük Bankalar ve Küçük Bankalar için ayrı ayrı olabilirlik oranı testi yapılmıştır. Olabilirlik oranı testi bir hipotez testidir. Bu testte, sıfır hipotezi, verinin bireysel etki içermediğiyken, alternatif hipotez veride bireysel etki olduğudur. Modellerin olabilirlik oranı test sonuçlarına bakıldığında, tüm modeller için p değerlerinin 0.05'ten küçük geldiği görülmüştür; bu da sıfır hipotezinin reddedildiğini gösterir. Yani, tüm sınıflarda, veride bireysel etki vardır, ve bu nedenle, analizde karma regresyon yöntemini kullanmak uygun değildir.

Olabilirlik oranı testi sonuçlarından sonra, sabit etki modeli ve tesadüfi etki modeli arasından tercih yapılması gerekmiştir. Hangi yöntemin daha uygun olduğu, verideki bireysel etkinin sabit olup olmayışına bağlıdır. Bireysel etkinin sabit veya tesadüfi olduğu kanısına varabilmek için ise Hausman testinden faydalanılmıştır. Olabilirlik oranı testi gibi, Hausman testi de bir hipotez testidir. Sıfır hipotezi, tesadüfi etki modelinin uygun olduğuyken alternatif hipotez, sabit etki teriminin uygun olduğudur. Buna karşın, test uygulandığı tüm modellerde sonuçsuz kalmıştır. Dolayısı ile sabit etki modeli ve tesadüfi etki modeli arasından tercih yapabilmek için çeşitli bilgilerden yararlanılmıştır. Bunlardan ilki, modeldeki hata terimleri ile bağımsız değişkenler arasında korelasyon olmadığı durumda hem sabit etki modelinin hem de tesadüfi etki modelinin tutarlı sonuçlar verebildiğidir (modellerdeki hata terimleri ve bağımsız değişkenler arasındaki korelasyona bakılmış, ve yüksek korelasyon tespit

edilmemiştir, bu analizden tekrar bahsedilecektir). Kullanılan diğer bilgi de, sabit etki modelinin, gerçek modeldeki etkiden bağımsız olarak tutarlı sonuçlar verebildiği, ancak, tesadüfi etki modelinin, gerçek model sabit etki modeliyken tutarsız sonuçlar verdiğidir. Bahsedilen iki bilgiden yola çıkılarak, panel veri analizinde sabit etki modeli kullanılmaya karar verilmiştir.

Panel veri, bazı temel varsayımlara sahiptir. Bu varsayımlar, çoklu doğrusal bağlantının olmayışı hata terimlerinin eşvaryanslı olması ve oto korelasyon olmayışıdır. Sonuçlar kısmına geçilmeden önce bu varsayımlar kontrol edilmiştir. Hata terimlerinin eşvaryanslı olmayışı, daha küçük varyansa sahip başka bir tahmin edici bulunabileceği anlamı taşıdığından, tahmin edici verimsiz hale gelmektedir. Oto korelasyon ise, bir gözlemin hata teriminin diğer gözlemlerin hata terimlerine bağımlı olması anlamına gelmektedir. Modellerde oto korelasyon olup olmadığını anlayabilmek adına Durbin-Watson testi kullanılmıştır. Durbin-Watson testi sonuçları 2'ye yakın olmadığından oto korelasyon problemi olduğu söylenebilir. Veri, zaman serisi içerdiğinden oto korelasyon olması beklenen bir sonuçtur. Ancak, Durbin-Watson test sonuçlarına bakıldığında, oto korelasyonun düşük seviyede olduğu görülmektedir.

Eşvaryanslılık varsayımını kontrol etmek için ise Breusch-Pagan Lagrange çarpanı kullanılmıştır. Breusch-Pagan Lagrange çarpanı testi de bir hipotez testidir. Sıfır hipotezi hata terimlerinin eşvaryanslı olduğudur. Dolayısıyla alternatif hipotezi hata terimlerinin değişen varyanslı olduğudur. Breusch-Pagan Lagrange çarpanı testinde, tüm modellerin 0.05'ten düşük bir p değerine sahip olduğu görülmüştür. Bu nedenle sıfır hipotezi reddedilmiştir. Modellerde hata terimleri değişken varyanslıdır (Bu varsayımların yanı sıra, hata terimleri ile ilgili varsayımlar (dışsallık ve sıfır ortalama varsayımları) da kontrol edilmiştir ve ek kısmında sonuçları sunulmuştur).

Sonuç olarak, modellerin veri setinde oto korelasyon olmaması ve hata terimlerinin eşvaryanslı olması gerekliliği varsayımlarını ihlal edildiği tespit edilmiştir. Ancak bu varsayımların ihlali yalnızca verim kaybına yol açmaktadır. Değişken varyans ve oto

korelasyon bulunması durumunda tahmin edici, yansız olma özelliğini kaybetmemektedir. Dolayısıyla modellerin bu şekilde kullanılmasına karar verilmiştir. Bahsedilen testlerin ışığında oluşturulan regresyon modeli aşağıdaki gibidir.

$$Y_{it}=\beta_{i0} + \beta_1 \times X1_{it} + \beta_2 \times X2_{it} + \beta_3 \times X3_{it} + \beta_4 \times X4_{it} + \beta_5 \times X5_{it} + \beta_6 \times X6_{it}$$

Y_{it} bağımlı değişkeni, β_{i0} ise i bankasına ait sabit terimi göstermektedir. Y_{it} modellere göre ROA, ROE veya NIM değişkenini gösterir. $X1_{it}$ modellere göre CAR veya CAR2 değişkenlerini temsil ederken, $X2_{it}$, $X3_{it}$, $X4_{it}$, $X5_{it}$ sırasıyla TR IR, EU IR, FX ve OTT değişkenlerini göstermektedir. $X6_{it}$ ise kukla değişken olan DNATIONALITY'yi temsil etmektedir.

Model 1, 2, 7, 8, 13, 14, 19 ve 20'de Y_{it}, ROA değişkenidir. Bu modellerden 1, 7, 13 ve 19'da $X1_{it}$ bağımsız değişkeni CAR iken geri kalan modellerde CAR2'dir. Model 3, 4, 9, 10, 15, 16, 21 ve 22'de Y_{it}, ROE değişkenidir. Bu modellerden 3, 9, 15 ve 21'de $X1_{it}$ bağımsız değişkeni CAR iken geri kalan modellerde CAR2'dir. Model 5, 6, 11, 12, 17, 18, 23 ve 24'te Y_{it}, ROA değişkenidir. Bu modellerden 5, 11, 17 ve 23'te $X1_{it}$ bağımsız değişkeni CAR iken geri kalan modellerde CAR2'dir.

Ana Bankalar için sabit etki modeli kullanılarak ve her bağımlı değişken için 2 farklı model kurulmuştur. Elde edilen modeller %99 güven aralığında istatistiksel olarak anlamlıdır. 1. modelin ayarlanmış R^2 değeri %61'dir ve bu modelde 3 değişken istatistiksel olarak anlamlı bulunmuştur. Anlamlı bulunan değişkenler CAR, TR IR ve OTT değişkenleridir. CAR değişkeninin banka karlılığına pozitif bir etkisi olduğu görülmektedir. TR IR değişkeni ise ROA'yı negatif etkilemektedir. OTT ve ROA arasında da pozitif bir ilişki olduğu görülmüştür. İstatistiksel olarak anlamlı çıkan değişkenlerin katsayılarının yönlerinin beklentilerle paralel olduğu görülmüştür.

2. modelin de bağımlı değişkeni ROA'dır. Bankaya özgü değişkeni ise CAR2'dir. Modelin açıklama gücü %59.1'dir ve 1. modelde olduğu gibi, sermaye yeterlilik göstergesi olan değişken istatistiksel olarak anlamlıdır ve ROA üzerinde pozitif bir

etkisi vardır. Enflasyon oranı değişkenleri (TR IR, EU IR) de istatistiksel olarak anlamlı bulunmuştur ve karlılığı negatif etkilemektedir. Bu modeldeki istatistiksel olarak anlamlı son değişken ise OTT'dir ve OTT'nin ROA üzerinde pozitif bir etkisi olduğu görülmektedir.

3. ve 4. model'in bağımlı değişkeni ROE'dir. 3. modelin açıklama gücü %59.1 iken 4. modelin ayarlanmış R^2 değeri %55.1'dir. OTT değişkeni her iki modelde de pozitif bir etki ile istatistiksel olarak anlamlı bulunmuştur. Model 1'de CAR istatistiksel olarak anlamlıdır ve ROE ile olumlu yönde bir ilişkisi vardır. Model 3'te ise TR IR istatistiksel olarak anlamlıdır ve karlılığı negatif etkilemektedir.

Son 2 modelde NIM açıklanmaya çalışılmıştır. Bankaya özgü değişken olarak CAR'ın kullanıldığı 5. modelde TR IR, FX ve OTT istatistiksel olarak anlamlıdır. FX ve OTT karlılığı pozitif etkilerken, TR IR negatif etkilemektedir. Bu iki modelin, ilk dört modele göre daha yüksek açıklama gücüne sahip olduğu görülmektedir. 5. modelin ayarlanmış R^2 değeri %73.7 iken, 6. modelin açıklama gücünün %75 olduğu görülmektedir. 6. modelde kullanılan bankaya özgü değişken, CAR2, istatistiksel olarak anlamlı bulunmuştur. Makroekonomik kontrol değişkenlerinden TR IR karlılığı negatif etkilerken, FX ve OTT'nin NIM üzerinde pozitif bir etkiye sahip oldukları görülmüştür.

Diğer Bankalar için sabit etki modeli kullanılarak kurulan modellere bakıldığında, modellerin %99 güven aralığında istatistiksel olarak anlamlı oldukları görülmektedir. Model 7'de istatistiksel olarak anlamlı olan değişkenler CAR ve OTT'dir. Bu model, ROA'daki varyansın %58.5'ini açıklamaktadır. 8. modelin açıklama gücü %63.36 olup 7. modele göre daha yüksektir ve bu modeldeki bankaya özgü bağımsız değişken olan CAR2, ROA'yı açıklamada istatistiksel olarak anlamlıdır ve pozitif bir katsayıya sahiptir. OTT de aynı şekilde ROA ile pozitif yönlü bir ilişkiye sahiptir.

9. ve 10. modelde kullanılan bağımlı değişken ROE'dir. İki modelin ayarlanmış R^2 değerleri sırasıyla %39.8 ve %40.2 olduğundan birbirlerine oldukça yakın oldukları

görülmektedir. Ancak, bu modellerde yalnızca sabit terim istatistiksel olarak anlamlı bulunmuştur. 11. ve 12. modeller NIM'ı açıklamaya çalışmaktadır. 11. modelde FX, OTT ve TR IR istatistiksel olarak anlamlıdır. FX ve OTT değişkenlerinin karlılıkla pozitif ilişkileri olduğu görülmektedir. TR IR ise karlılığı negatif etkilemektedir. 12. modelde de bu değişkenler istatistiksel olarak anlamlıdır ve etkileri de 11. modelle aynı yönlüdür. Bu değişkenlere ek olarak, CAR2 değişkeni de istatistiksel olarak anlamlıdır ve değişkenin katsayısı pozitiftir. Modellerin açıklama güçleri sırasıyla %73.7 ve %75'tir.

Büyük Bankalar için kurulan modeller incelendiğinde 13. ve 14. modellerin bağımlı değişkeni ROA'dır ve modellerin ayarlanmış R^2 değerleri sırasıyla %67.7 ve %61.3'tür. CAR, 13. modelde, karlılık üzerinde pozitif bir etkiyle istatistiksel olarak anlamlıdır. İki modelde de TR IR ve OTT istatistiksel olarak anlamlı bulunmuşken diğer modellerde de olduğu gibi, karlılığı TR IR negatif etkilerken OTT pozitif etkilemektedir.

15. ve 16. modellere bakıldığında 15. modelin açıklama gücünün daha düşük olduğu görülmektedir (sırasıyla %60.5 ve %63.1). İki modelde de sermaye yeterlilik göstergesi olan değişkenler istatistiksel olarak anlamlı olmasına rağmen 15. modelde CAR pozitif bir etkiye sahipken, 16. modelde CAR2'nin karlılık üzerinde negatif bir etkisi vardır. İki modelde de anlamlı olan diğer değişken OTT'dir ve bu değişkenin ROE üzerinde pozitif bir etkisi vardır.

17. ve 18. modellerde sermaye yeterlilik göstergeli istatistiksel olarak anlamlı bulunmamıştır. TR IR, FX ve OTT iki modelde de anlamı olan değişkenlerdir. Aynı zamanda 17. modelde DNATIONALITY değişkeni istatistiksel olarak anlamlıdır. TR IR dışında anlamlı bulunan tüm değişkenler banka karlılığını olumlu yönde etkilemektedir. Modellerin ayarlanmış R^2 değerleri sırasıyla %65.7ve %64.2'dir.

Küçük Bankalar için kurulan modellerin ayarlanmış R^2 değerlerinin diğer banka sınıflarına ait modellere göre düşük olduğu görülmektedir. 19. ve 20. modellerde CAR,

CAR2 ve OTT değişkenleri pozitif etkiyle istatistiksel olarak anlamlıdır. Hem 21 hem de 22. modelde istatistiksel olarak anlamlı olan değişken OTT'dir. 22. modelde aynı zamanda CAR2'nin de pozitif bir katsayıyla istatistiksel olarak anlamlı olduğu görülmektedir. Son iki modelden de yalnızca 22. modelde CAR2 değişkeni istatistiksel olarak anlamlı bulunmuştur ve NIM ile pozitif bir ilişkiye sahiptir.

Çalışmanın sonucu, CAR'ın Ana Bankalar'da ROA ve ROE'yi, Diğer Bankalar'da ise ROA ve NIM'ı; Büyük Bankalar'da tüm bağımlı değişkenleri, Küçük Bankalar'da ise ROA'yı açıklamada istatistiksel olarak anlamlı olduğunu göstermiştir ve bu değişken banka karlılığı üzerinde olumlu bir etkiye sahiptir. Makroekonomik kontrol değişkenlerinden TR IR ve EU IR karlılığı negatif etkilerken, OTT ve FX değişkenlerinin banka karlılığına olumlu bir etkisi olduğu görülmektedir. Bankaların milliyetini temsil edem kukla değişkenin ise karlılığa etkisi negatiftir.

F. TEZ FOTOKOPİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	
Sosyal Bilimler Enstitüsü	X
Uygulamalı Matematik Enstitüsü	
Enformatik Enstitüsü	
Deniz Bilimleri Enstitüsü	

YAZARIN

Soyadı : Saniç
Adı : Yusuf Halit
Bölümü : İşletme

TEZİN ADI (İngilizce) : Capital Adequacy Ratio and Bank Profitability in Turkey

TEZİN TÜRÜ : Yüksek Lisans [X] Doktora [ ]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. [X]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. [X]
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. [ ]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: