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RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

A Comparative Analysis of Market Efficiency of Participation and Deposit Banks in Turkey

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ABSTRACT

This dissertation analyses the efficiency of the Turkish banking sector by comparing the benefits obtained by deposit banks and participation banks operating from deposits/participation funds and loans (interest or profit rates) using econometric models.

Firstly we comparatively examine average interest rates and profit shares by deposit banks and Islamic banks, respectively, using monthly data for the period January 2005-December 2015 using Monte Carlo Simulation. This analysis reveals that deposit banks paid a 0.49 point higher rate of interest for deposits than the profit rates paid by Islamic banks. This difference is statistically significant at conventional significant levels. Secondly, we compare interest and profit rates for the mortgage loans of the two groups of banks for the period June 2010-December 2015 using Monte Carlo simulation. We find that conventional banks offered these loans at a rate of 0.92 points lower than Islamic banks. This difference is also statistically significant at conventional significance levels. For the same period we find that, on average, Islamic banks offered commercial loans at a significantly 0.72 basis points lower rate statistically in comparison to deposit banks. Finally, we compare these groups of banks across return on assets, return on equity and net interest/profit margin using regression analysis for the period January 2005-December 2015. This analysis employs macroeconomic indicators, liquidity indicators, operational expenses, money supply indicators, asset quality indicators as explanatory variables. We find no statistically significant difference in these measures between the two groups of banks.

Keywords: Market efficiency, participation banks, deposits banks

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EXTENDED ABSTRACT

This dissertation analyses the efficiency of the Turkish banking sector by comparing the benefits obtained by deposit banks and participation banks operating from deposits/participation funds and loans (interest or profit rates) using econometric models.

In this study, the average interest rates of deposit banks and the average profit rate of participation banks in Turkey, as well as mortgage rates and commercial loans, are compared with Monte Carlo Simulation (MCS) using monthly data from January 2005 to December 2015. In addition, the margins of return on assets (ROA), return on equity (ROE) and net interest (profit) margin (NIM) were tested with MCS. Finally, in the regression analysis covering the period January 2005-December 2015, ROA, ROE and NIM were used as dependent variables. Gross domestic product (GDP), deposit interest (DI) and consumer price index (CPI) were used as independent macroeconomic indicators. In order to measure the asset quality of banks we chose to use non-performing loans (NPL), cost of risk (CoR), loans to total assets (LTA) and capital adequacy ratio (CAR) indicators. To measure the liquidity we used equity to total assets (ETA), deposit to total asset (DTA) and demand deposits to total deposit (DDTD). As well as macroeconomic indicators, asset quality and liquidity, we chose to use some additional indicators to measure operational expenses and monetary supply.

Our study showed that, for conventional banks, the monthly interest rate on deposits ranged from a minimum of 4.97% to a maximum of 18.40% between 2005 and 2015. The average interest rate on deposits in this period was 11.25% for the same group. Participation banks in the same period ranged from a minimum of 6.03% to a maximum of 19.01% profit rate to participation account holders. Moreover, according to our model result, the average profit rate for participation fund was 10.76% per month. In the 95% confidence interval, the interest rates paid by conventional banking to deposits were 49 basis points higher than the profit rates paid by the participating banks to the customers. The

most important reasons for this are that deposit banks are more likely to benefit from the economies of scale, operational costs are lower, and short-term funds can be valued in the interbank market such as repo.

Conventional banks applied a minimum of 8.79% and a maximum of 11.98% mortgage interest rate on housing loans between June 2010 and December 2015. In this period, the average mortgage interest rate collected from conventional bank loans was 10.11%. In the same period, participation banks' housing financing rates ranged from a minimum of 10.18% to a maximum of 12.87% and the average cost of housing financed by participation banks was 11.03%. When comparing the average of conventional banks and participation banks in this period, participation banks seem to apply the financing rate 92 basis points higher than opponents. The most important reason for this higher ratio in participation banks is that it cannot be refinanced during a period of falling trend. It should also be taken into consideration that some banks may have lower interest rates for loans, but may charge higher commissions or file charges from time to time.

Moreover, according to the Monte Carlo Simulation, the participation banks' average commercial loans were 11.20% while deposit banks were 11.92%. This study showed that participation banks provide financing with 72 bps lower cost than conventional banks. The main reason for this result is that participation banks are adapting later than conventional banks on the fluctuation of interest rate.

In this study, based on 95% confidence level used by Monte Carlo Simulation, it was revealed that the average return on assets (ROA) of conventional banks was 2.11% and that of participation banks 1.99% in the period of 2005-2015. Statistically it could be stated that deposit banks have higher profitability in terms of their asset profitability than participating banks because of the fact that both banks are not located in the common intersection areas when the upper and lower limits are calculated. Furthermore, considering that the standard deviations for both groups are 0.6 and 0.8, it can be claimed that the asset profitability of the Turkish banking sector has followed a steady course during these periods.

In the Monte Carlo Simulation, it seems that the conventional banks did not differ greatly from the participation banks in terms of return on equity (ROE). In the 2005-2015 period, the average of ROE was 19.00% in conventional banks, while it was 18.63% in participation banks. Considering the calculations of the upper and lower bands, it can be seen that deposit banks have higher statistical profitability in terms of ROE compared to participation banks due to neither bank being not located in the common intersection areas.

1. Introduction

In the Islamic world, at the end of the 19th century and at the beginning of the 20th century, the Renaissance movement took off with important personalities such as Cemaleddin Afghani, Muhammed Abduh, Mehmet Akif Ersoy and Elmalı Hamdi Yazır (Bayraktar, Tatar, Arkan, Bekiryazıcı, & Köroğlu, 2016, pp. 133-153). After these writers, further significant personalities emerged in terms of Islamic economic concept. In our work we find that Islamic finance representatives in the modern sense are categorized in generation groups, the first being that of 1960-1980, the second that of 1980-2000, and the third that of Islamic finance writers who appeared after 2000.

Of course, some writers might fall between the first generation and the second generation, while others may be classed as both second generation and third generation. However, overlap between the first and third generations seems to be minimal. In the list of first generation figures the following should be mentioned: Sayyid Kutup (1953), Abul Ala Mevdudi (1996), Muhammed Yusufuddin, Sayyid Bakir Sadır, Ahmed El Neccar, Muhammed Hamidullah (1992), Sabahattin Zaim (2007), Enver İkbal Kureyşi, Nejatullah Sıddıki, Sheikh Mahmut Ahmet , Muhammed Ömer Zubeyr, Monzar Kahaf, Hasanuz Zaman, Anas Zarka, Muhammed Ali Ergari and others.

The second generation of scholars in Islamic finance includes names such as M. Ömer Chapra, Khurshid Ahmad, Fahim Khan, Muhsin Khan, Munevver Ikbal, Hayrettin Karaman, Hamdi Döndüren, Sabri Orman, Taqi Usmani, Yahia Abdul-

Rahman, Muhammad Ayub, Necdet Şensoy, Faruk Beşer, Daud Vicary Abdullah, Servet Bayindir, Sheikh Saleh Kamel and others.

Third generation figures in Islamic finance are represented by Zamir Iqbal, Mehmet Asutay, Abbas Mirakhor, Hamed Hasan Merah, Jaseem Ahmed, Abdus Samad, M. Bashir, Murat Çizakça, Fatih Savaşan, Mehmet Saraç, Omer Faruk Aysan, Mehmet Bulut, Astrid Fionna Harningtyas, Kabir Hassan, Mehmet Fatih Gurkan, Ali Ata, and Thorsen Beck, Demirgüc-Kunt and others. These authors have often used econometric models in their studies of interest-free banking, takaful, investment, fiscal policy, zakat, audit, accounting and banking regulation and supervision. Some of the important studies using statistical data are shared in the literature review section of this paper.

Since there are many inputs and outputs that determine the profitability or productivity of the banking sector, it is difficult to reach an accurate result by performing an efficiency analysis which only looks at a single ratio or branch. For this reason, many ratios must be included at the same time in the academic studies. The problem of input and output uncertainty of banks arises from three situations. The first problem is that banks generally offer services rather than produce physical goods and it is difficult to measure these services. The second problem is that banks use a large number of inputs and outputs. Finally, there are some difficulties in determining the basic functions of banks. The calculation of unit cost of the bank is found by dividing the operating expenses by the deposits or total assets. With these two calculations, it can be determined how much money should be spent to operate 1 TL of assets or deposits. Since the main function of banks is financial intermediation transactions, it is generally considered appropriate to use total assets, deposits and credit items for efficiency measurement.

In this article, we use Monte Carlo Simulation (MCS) and regression analysis to measure both participation and deposit banks in Turkey. During the data creation phase we used 132 months of data covering the period from December 2005 to December 2015. However, for some items for which monthly data could not be provided we used only 67 months of data covering the period from June 2010 to December 2015.

2. Literature Review

Looking at the literature on interest-free finance, it appears that there are many books and articles written on this subject. In this study, many printed books and online sources are examined in detail. Within this scope, data from 85 databases was scanned and thousands of results were achieved. In difficulties to read all results, we focused only on finance, Islamic finance and market efficiency and reviewed hundreds of journals. In the study, not only were online databases utilized but also a large part of the relevant Turkish studies and foreign sources were examined and shown with the references.

The literature sources are generally divided into three groups, namely efficiency measurement methods, ratio analysis, parametric and nonparametric methods. In parametric method, two elements such as ineffective observation and random error of deviations from the efficiency boundary should be separated from each other. For nonparametric methods, the distance to the efficiency limit is measured using linear programming techniques. The most widely used model among the nonparametric methods is Data Envelopment Method developed in 1978 (İnan, 2000).

In order for the banking system to survive, it is expected that the business model will be harmonized with the dynamic market conditions, that all the opportunities of technology will be utilized, and that sustainable growth and profitability will be maintained. Within this system, customer preferences, needs, behavior patterns, and quality service are widespread in the market, and accessibility of financial products with an extensive branch network is required to provide customer loyalty (Chukwudi, 2015).

One important study compares Islamic banking in Bahrain between 1991 and 2001 with the conventional banking sector. Islamic banks in Bahrain have a higher loan and profitability performance than conventional banks. The study concluded that the Islamic banks' share in Bahrain's banking market is very low. While the total asset is 3.27% of the banking sector, the Islamic banks' total profit

corresponds to 9% of the sector's profit. The most important reason for this result is that Islamic banks should not invest in risky areas because they work with higher equity and they should not pursue speculative transactions (Jill, Izzeldin, & Pappas, 2014).

Abdel-Hameed M. Bashir's 1979-1993 study of Sudan's banking sector data demonstrates that growing economies of scale have increased profitability and reduced operational costs. In addition, the same author conducted research using the 1993-1998 data for Bahrain, Kuwait, Qatar, the United Arab Emirates, Turkey, Egypt, Jordan and Sudan. The study showed that higher equity and loan rates for Islamic banks have a positive effect on profitability, that Islamic banks with foreign partners contribute significantly to capital, technology transfer, know-how and profitability, and that direct and indirect taxes negatively affect bank performance (Bashir, 1999).

In a study of Mohammed Ali Al-Oqool and others on the Jordanian economy, it was researched whether Jordanian Islamic banks contributed to economic growth in the 1980-2012 period. The results of the study showed that the development of Islamic Banks in Jordan has not had any effect on economic growth in the short term, but in the long run the development of these banks has proven to have a positive impact on economic and social development (Al-Oqool, Oqab, & Bashayreh, 2014).

Washington and Philedelphia FED banks measured the effectiveness of financial markets using approximately 6,000 commercial bank statements operating in the US between 1990 and 1995. The measurement of effectiveness has no precise measurement system accepted by everybody. However, this study showed that cost, profitability and alternative return opportunities are the most important determining factors for efficiency. The factors that lead to inefficiency are poor production decisions, higher costs, poor auditing and supervision, and lack of full competition market conditions. When the efficiency of banking is evaluated, it is seen that banks with sound equity structure and low non performing loans (NPL) rates are more effective than other banks. In addition, it is

mentioned in the same article that the consolidation banks have higher profitability (Berger & Mester).

A study by Kumar tests multiple variance and automatic variance ratios with MCS for Latin American countries in Mexico, Brazil, Argentina, Chile and Ecuador. The asset prices in the market do not fully reflect all the information. It is not possible to earn excessive profits by using Information disclosed to the public and random behavior (Kumar, 2016).

In the study of Beck, Demirguc-Kunt and Merrouche, 141 countries including 22 countries where Islamic banking and conventional banking were applied, were examined together. A total of 2,956 banks, 99 of which are Islamic banks, were analyzed by regression analysis for the period 1995-2007. The similarity of some conventional products with sharia-compliance products leads to less than expected differences. Very little difference was found between conventional and Islamic banks in terms of job adaptation, efficiency, asset quality and stability. In many countries Islamic banks are cost-effective compared to conventional banks, while only a few countries have the opposite result. The higher capital requirements of Islamic banks have led to better performance in the last global crisis (Beck, Demirgüç-Kunt, & Merrouche, 2010).

According to a study by Aysan, Dişli and Öztürk, changes in the monetary policy affect the alternative deposit costs and risk perceptions of interest-free bank customers as well as conventional bank customers. Generally speaking, the change in Central Bank of Turkey (CBT) policy interest rates leads to higher deposit outflows in participating banks compared to conventional banks (Aysan, Dişli, & Öztürk, 2015).

In Islamic finance the concept known as Maqasiad Shari'ah ensures that the protection of mind, goods, life, religion and generation is seen as a fundamental human right. In addition to these criteria, the Maqasiad Shari'ah Index has also been published in order to provide human happiness, including wealth, social assets and the environment. In the study, the United Kingdom (UK) was included

in the analysis as well as the 5 countries where bilateral banking is implemented. In the Maqasiad al-Shari'ah performance index of Islamic banks, the general average of countries was found at 30.08%. When viewed in detail, it is found that the highest grade is in Indonesia at 56.8%, Pakistan ranked second with a rate of 34.6%, Malaysia ranked third with a rate of 33.5%, Turkey ranked fourth with a rate of 29.34%, Qatar ranked fifth with a ratio of 23.8% and the UK ranked last with a rate of 11,44% (Asutay & Harnıngtyas, 2015, pp. 55–58).

In the questionnaire on Islamic finance conducted on 86 bank officials from 29 countries, the banking sector and Islamic banking data were compared. In CIBAFI's confidence index, 1 indicates the weakest confidence and 5 displays the highest confidence. According to the survey, the worldwide confidence index for the banking sector was 3.46, while it was 3.64 for Islamic banking in 2016. In the GCC, Middle East, Southeast Asia, South and North Africa regions, the Islamic banking confidence index was generally situated higher than that for conventional banking. While this ratio for conventional banks in Turkey and European countries was found to be 3.33, for the participation banks it amounted to 3.5. The same work concludes that the most important issues for Islamic banking in 2016 are increasing shareholder satisfaction and service quality, developing business models, human resource and customer relations, ensuring sharia compliance standards, risk management and protecting customer rights (CIBAFI, 2016, pp. 24–30).

In Mercan and Yolalan's study the effect of scale economics and bank ownership on bank performance in Turkey was investigated between 1989 and 1998 using Data Envelopment Analysis (DEA) method. The study found that financial liberalization changed the financial intermediation function of the Turkish banking sector, and that the banking sector generally worked in an open position in the 1990s when high dollarization occurred. After the 1994 crisis, the exchange rate risk for the banking sector, sufficient capital requirement, and liquidity risk management became more important, and also the high inflation rates in the 1990s led to an increase in interest margins between deposits and loans (Mercan & Yolalan, 2000).

Between 2002 and 2006, the Turkish banking sector average capital adequacy related positively with lagged capital, economic growth, portfolio risk, return on equity and capital inflow, but correlated negatively with share of deposits. However, asset size and share of deposits are negatively related to capital requirement (Asarkaya & Özcan, 2007).

Hardy's research between 2000 and 2009 covers the participation banks in Turkey, Although government has strong support of Islamic finance, the share of participation banking sector is still small. The research shows that Islamic banking activities became more secure than conventional banking in the global crisis period, and that interest in Islamic banking has increased in the world as well as in Turkey in the last few years. Also, after solving the legal infrastructure problem of the Sukuk market, Turkish Treasury Undersecretary is a good player in the sukuk market (Hardy, 2012).

For the 2005-2010 period,the financial ratios of participation banks and conventional banks were compared using the DEA. This study concluded that participation banks were more effective than commercial banks in this period (Er & Uysal, 2012).

Eleven conventional and four participation banks operating in Turkey between the years 2006 to 2014 were compared, showing there to be an inverse relationship between the non performing loans (NPL) rate and bank efficiency. It was found that there is a positive relationship between bank size and net interest margin in terms of effectiveness. Furthermore, compared to conventional banks, participation banks in Turkey were found to be more effective (Ata & Buğan, 2016).

Effects of market interest rate fluctuation on the profitability of Turkish participation banks were analyzed from June 2005 to June 2016 and it was found that there is a significant relationship between the profitability of the participation banks and interest rate changes. Nevertheless the level of this relationship varied depending on banks' compliance with level of profit-loss sharing principle (Koç, 2018).

Market efficiency is the most important factor affecting whether or not financial actors earn excess earnings. BİST 100 Index return and subindex return were examined by Harvey Linearity Test. The findings show that that excess returns can be obtained using past information in the effective market hypothesis (Malcıoğlu & Aydın, 2016).

In the studies covering the period bewtween 2005 and 2008, the differences between conventional banks and participation banks were examined using t-test and logistic regression methods, and different aspects of the operational activities of both types of banks were found. However, there was no significant difference between the two types of banks, as all banks were subject to almost the same legislation or operating under the same competitive conditions (Parlakkaya & Curuk, 2011).

In 2012 Asutay published the paper "Aspirations of Islamic Moral Economy versus the Realities of Islamic Finance" in which he suggests that Islamic financial institutions should have an Islamic ethics economy that respects ethical principles (Asutay, 2012).

By examining participating banks and conventional banks, it was investigated which banks were more stable during the crisis period. Within the scope of the study, annual financial ratios of banks were examined by trend analysis method for the 2006-2011 period. As a result, it was determined that participation banks were more stable in terms of profitability, liquidity and risk management in the period including the 2008 global economic crisis (Aktaş, 2013).

Interest-free financiers in the first and second generation focused on Islamic financial products, together with the basic principles and philosophy of Islamic finance, generally without using econometric models. However, the third generation of interest-free financiers used efficiency in Islamic banking and comparative analysis with conventional banking using econometric models. Below is a summary of the literature review, mostly of the third generation.

Table 1: Summary of Literature Review

Row	Author	Title	Method	Place/Period	Results	Years
1	Bashir, 1999	Risk and Profitability Measures in Islamic Banks; The Case of Two Sudanese Banks	Panel Data Regression Analysis	Sudan, 1979-1993	* Economies of scale increase profitability. * The operational risk decreases as the scale grows.	1999
2	İnan, 2000	Measurement of Bank Effectiveness and Efficiency in the Banking Sector in Low Inflation Process	Ratio Analysis, Parametric and Non-parametric Techniques	Turkey 1990-2000	* Foreign and private banks are more efficient than public banks. * The liberalization of capital movements has increased the efficiency of the banking system. * Capital inefficiency in Turkish banks has reduced productivity.	2000
3	Mercan and Yolalan, 2000	The Effect of Scale and Mode of Ownership on the Turkish Banking Sector Financial Performance	Data Envelopment Analysis (DEA)	1989-1998	* The macroeconomic environment affects all banks in the same direction. * The financial liberalization that started in 1989 and the 1994 crisis affected the performance of the Turkish Banking Sector. * The performance of foreign and private banks is higher than that of public banks.	2000
4	Boyd, Levine & Smith, 2001	The Impact of Inflation on Financial Sector Performance	Simple Linear Regression	97 Countries, 1960-1995	* Banking and capital markets are inversely related to inflation. * An inflation rate of over 15% causes the performance of the financial sector to decline.	2001
5	Cinci & Tarım, 2000	Performance Measurement in Turkish Bank System	DEA-Malquist TFP Index Application	21 Turkish Banks 1989-1996	* There is oligopoly concentration at high level in the Turkish banking system. * The difference in efficiency between the banks is due to differences in scale effectiveness.	2000
6	Bashir, 2003	Assessing the Performance of Islamic Banks: Some Evidence from Middle East	Regression Analysis	1993-1998	* Foreign banks are more profitable than domestic banks. * Direct and indirect taxes negatively affect performance. * High leverage and loan rates positively affect performance.	2003
7	Hassan & Bashir, 2003	Determinants Of Islamic Banking Profitability	Regression	21 Countries, 1994-2001	* Profitability ratios of Islamic banks are positive with capital, negative relation with loan ratio. * Consumer structure, maturity structure and non-profit/loss sharing determine profitability. * Taxes are effective, reserve requirements are ineffective.	2003
8	Samad, 2004	Performance of Interest-Free Islamic Banks vis-a-vis Interest-Based Conventional Banks of Bahrain	Financial Ratio Analysis Mean and t-test	Bahrain, 1992-2001	* The credit risk of Islamic banks in Bahrain is lower than conventional banks. * There is no significant difference in profitability ratios between Islamic banks and conventional banks. * Islamic banks have higher liquidity because of the shariah risk.	2004
9	Haron, 2004	Determinants of Islamic Bank Profitability	Panel Data Regression	Islami Banks	* Market and scale economics affect profitability. * Current accounts, capital and profit-sharing ratios are the main determinants of profitability.	2004

10	Hassan, 2006	The X-Efficiency in Islamic Banks	Data Envelopment Analysis	21 Countries, 1995-2001	* ROA and ROE are highly correlated to efficiency measurement. * Islamic banks are less effective than conventional banks.	2006
11	Omar & Rahman, 2006	Efficiency of Commercial Banks in Malaysia	Data Envelopment Analysis	Malaysia 11 Banks 2000-2004	* The use of high technology in the banking sector provides long-term competitive advantage to the bank. * The effectiveness of Islamic banks in Malaysia is lower than in conventional banks.	2006
12	Tunay & Silpar, 2006	Profitability Analysis in Turkish Commercial Banking Sector	Regression Analysis	Turkey 34 Banks 1988-2004	* Bank profitability is affected by sectoral, macro-dynamics and bank practices.	2006
					* Inflation rate and macroeconomic indicators such as national income are important explanatory variables in the model.	
13	Asarkaya & Özcan, 2007	Determinants of Capital Structure in Financial Institutions: The Case of Turkey	Generalized Moments Method	Turkey 2002-2006	There is a positive relationship between portfolio risk, economic growth, sector average capital, and capital inflows to capital holdings. * The asset size and share of deposits are negatively related to retained capital.	2007
14	Özgür, 2007	The financial efficiency of participation banks and competitiveness with deposit banks	Data Envelopment Analysis	2001-2005 Turkey	* Low interest rates make it possible for banks to fulfill their intermediary function more effectively. * Participation banks are effective units according to conventional banks.	2007
15	Beck et al., 2010	Islamic vs. Conventional Banking Business Model, Efficiency and Stability	Panel Data Regression	141 Countries, 1995-2007	* There is little difference between Islamic banks and conventional banks in terms of job adaptation, efficiency, asset quality and stability. * Islamic banks in many countries are cost effective compared to conventional banks. * The need for higher capital holdings of Islamic banks helped them to perform better in the last global crisis.	2010
16	Er & Uysal, 2012	Comparative Effectiveness Analysis of Commercial Banks and Participation Banks in Turkey: Assessment of 2005-2010	Data Envelopment Analysis	34 Banks, 2005-2010	* According to the CCR model, 11 banks are active, of which 2 are participation banks. * According to the BBC model, a total of 16 banks are active, of which 3 are participation banks.	2012
17	Al-Oqool, Okab & Bashayreh, 2014	Financial Islamic Banking Development and Economic Growth: A Case Study of Jordan	Granger Causality Test	Jordan 1980-2012	* In the short term, there is no relationship between the development of Islamic Banks and economic growth in Jordan. * In the long run, the development of Islamic Banks in Jordan has a positive impact on economic and social development.	2014

18	Saraç & Zeren, 2015	The Dependency of Islamic Bank Rates on Conventional Bank Interest Rates	Regresssion Granger Causality Test Maki Test Johansen Test	Turkey 2002-2013	* According to the Johansen test all participation banks in Turkey are consistent with the Central Bank interest rates significantly. * According to the Maki Test, Bank Asya's profit rate is significantly related with interest rates, but no integration was found with Kuveyt Türk. * According to the Granger Causality Test, the CBRT interest rates determine the profit rates of participation banks.	2015
19	Aysan et al., 2015	Bank Lending Channel in Turkey: Evidence from Islamic and Conventional Banks	Panel Vector Auto Regression	Turkey 2004-2012	Due to changes in CBT policy rates, participation fund holders are more sensitive than conventional banks.	2015
20	Asutay & Harningtyas, 2015	Developing Maqasiad al-Shari'ah Index to Evaluate Social Performance of Islamic Banks: A Conceptual and Empirical Attempt	Maqasiad al-Shari'ah Index*	Indonesia, Pakistan, Malaysia, Turkey, Qatar and the United Kingdom 2008-2012 13 Banks	According to the performance of Islamic banks Maqasiad al-Shari'ah countries score; Indonesia 56.8%, Pakistan 34.6%, Malaysia 33.5%, 29.34% Turkey, Qatar 23.8%, the UK 11.44% and an overall average of 30.08% .	2015
21	Kumar, 2016	Weighted Bootstrap Approach for the Variance Ratio Test: A Test of Market Efficiency	Monte Carlo Simulation (MCS)	Argentina, Brazil, Mexico, Chile and Ecuador	In market efficiency, the use of a weighted preloading approach is more superior than multivariate variance and automatic variance ratios.	2016
22	CIBAFI, 2016	Confidence, Risk and Responsible Business Practices	Global Islamic Bankers' Survey	29 countries 86 Banka	* While the world banking confidence index was 3.46%, the Islamic banking confidence index in the world was found at 3.64%. * While conventional banking confidence index was 3.33% in Turkey, participation banking confidence index was 3.50%.	2016
23	Koç, 2018	Interest Rate Risk in Interest-free Banks An Empirical Research on Turkish Participation Banks	Seemingly Unrelated Regression Model	Turkey 2005-2016	* There is a significant relationship between the profitability of the participation banks and interest rate changes. * The participation banks are exposed to the interest rate risk at different levels which depends on their compliance level of profit-loss sharing principle.	2018

* In general Maqasiad Shari'ah; mind, goods, life, religion, and next generation are under protection. However, the article also added wealth, social assets and environment to the Maqasiad Shari'ah Index.

3. Purpose of the Application

In this study, we used Monte Carlo Simulation and regression analysis which is one of the most widely used models in the market. Using MSC, we compared the costs of deposits and credits for participation and conventional banks in Turkey.

The comparison was made between 2005-2015 using monthly TL interest deposits and the participation banks' monthly TL profit rates.

To our knowledge, this study is the first to be conducted in this area in Turkey. According to the results obtained, when banks fulfill the intermediary function of participation and conventional banks, customers compare deposit interest rates and participation funds rates. The study also shows the way in which the patterns of behavior of the two banks overlap with each other.

Within the scope of regression analysis, net interest margins of conventional and participation banks, return on asset (ROA) and return on equities (ROE) were chosen as dependent variables. There are 16 independent variables some of which are represented macroeconomic indicators, asset quality, profitability, liquidity, money supply, capital structure and operational costs of the banking sector.

4. Monte Carlo Simulation

4.1. Application of Monte Carlo Simulation

Outputs of the model are obtained using assumptions related to hundreds of unmanageable and unknown inputs in the model. A Polish mathematician, Stanislaw Ulam working on the design of nuclear weapons during World War II, first proposed the Monte Carlo Method for the solution of complex integrals encountered in nuclear reaction theories. Metropolis, an academic at the University of Pennsylvania, made Monte Carlo calculations for the first time in a computer environment. The Risk Sim program is a patch program compatible with Microsoft Excel and helps Monte Carlo Simulation to be run (Kwon, 2014, pp. 147–167).

The averages of conventional banks and four participation banks were taken into account and were applied the randcumulative and randbivarnormal functions of MCS for deposits, housing loans and commercial loans. In the first function, it

was found that participation banks have a high correlation relation between themselves and conventional banks. Correlation Coefficient is between $-1 \leq$ Correlation (C) ≤ 1. The negative value means that there is a negative correlation between the data. Zero demonstrates that there is no relation, and if there is a positive correlation, it indicates the existence of a positive relationship. Correlation -1 indicates a 100% negative relationship, +1 indicates a 100% positive relationship.

Monte Carlo Simulation solves a physical phenomenon by using an existing data to use random numbers repeatedly in statistical method. The most important advantage of this method is that it is based on the law of large numbers and the central limit theorem. This method is used today in the modeling of physics, mathematics and interest rates. Monte Carlo Simulation was preferred in this study because it is superior to other non-parametric models.

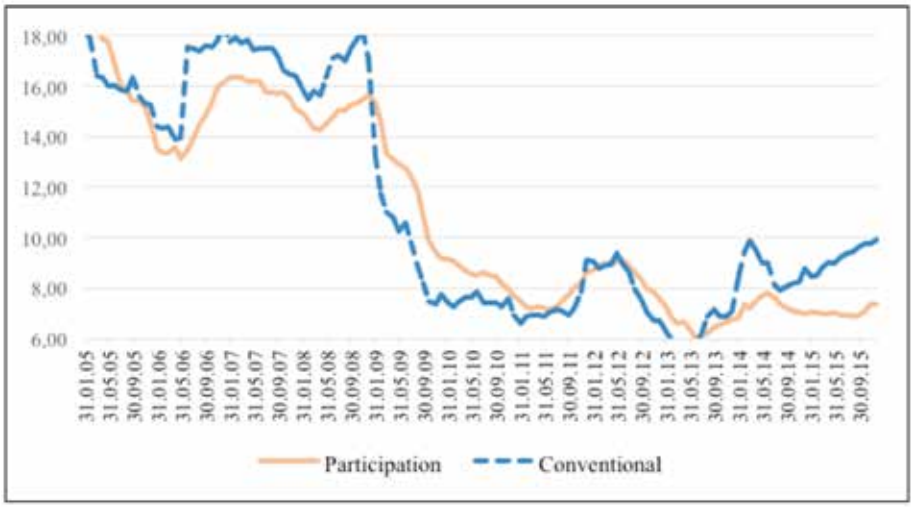
In the second function we use in the Monte Carlo Simulation, the existing data is sorted from lowest to highest, and the data limitation problem is solved by replicating data 5000 times. The result demonstrated the distribution, average and confidence intervals of the interest / profit rates of the deposit / participation funds as well as the interest rates of the housing and commercial loans, and the confidence intervals for the two sectors. In this function, both conventional and participation banks were compared for the efficiency of distribution, average and confidence intervals of the deposits interest / profit rates, and housing and commercial loans.

4.2. Monte Carlo Simulation Results

In this study we used Monte Carlo Simulation (MCS) to compare participation banks with conventional banks which are operating in Turkey. When the MCS was applied, the deposit and participation fund was compared. In this study only the monthly interest rates of the deposit banks and the monthly profit rates of participation banks are compared. However for some banks, three-monthly, six-monthly, and annual deposit / participation funds are close to the monthly interest

/ profit rates, while for other banks this data is excessively high or low causing a reliability problem and deterioration of the average. Moreover, the average maturity of deposits and participation funds in Turkey is around 40 days. In addition, it was found that more than 80% of the deposit / participation funds are monthly. Because of these reasons quarterly, semi-annual and annual deposit / participation fund was limited, and we used only monthly data to maintain data reliability.

Moreover, from March 2014 onwards, in order to mitigate the negative effect of Asia Participation Bank, the data of the bank is not included in the calculation. Profit rates of participation banks operating in Turkey and deposit interest rates paid by banks to customers from 2005 to 2015 are compared in the chart below.

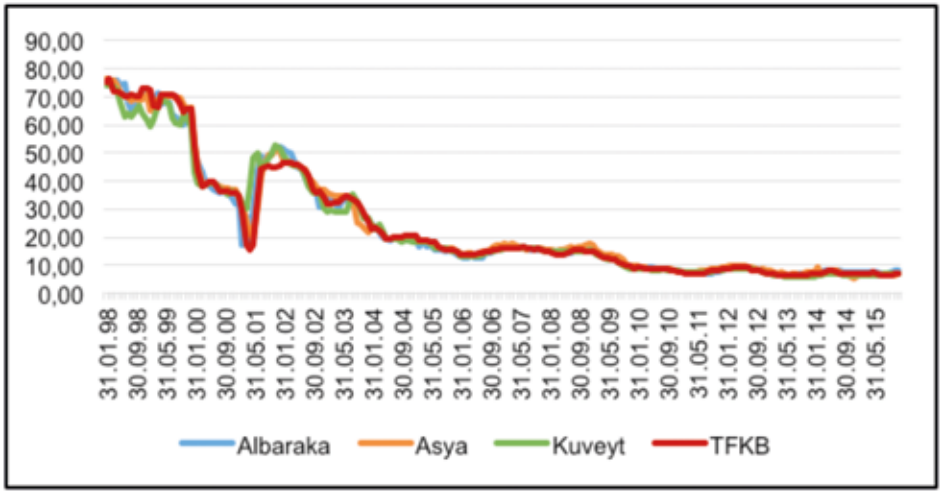


Graphic 1: Turkish Banking Sector Deposit Interest and Profit Rate

Sources: The Banks Assocation of Turkey (BAT), Participation Banks Assocation of Turkey (PBAT), Banking Regulation and Supervision Agency (BRSA)

As can be seen from the above figures, the deposit interest rate of conventional banks operating in Turkey and the profit rates of participation banks also in Turkey are close to each other. In some periods, conventional banks pay higher interest to customers, whereas in some periods, participation banks can distribute

higher profits rates to participation account holders. Conventional banks paid higher deposit interest rates between 2006 and 2008 and after August 2013, while participation banks are seen to distribute higher profits throughout the 2009-2013 global financial crisis. It was found that deposit rates paid by conventional banks are correlated to 93% of the profit rates distributed by participation banks. Covering the period 2005-2015, the profit rates of participation banks operating in Turkey are shown in the chart below.



Graphic 2: Profit Rates Distributed by Participation Banks for Participation Accounts

Source: PBAT

As shown in the above graphic, when the profit rates are compared for participation banks in participation accounts, it is seen that the level of the correlation is 99%. The most important reasons for this are that the number of participating banks is low, their financial products are similar, and they work in the same market.

The types of loans of conventional and participation banks differ in some respects. Despite the use of conventional banks' overdraft accounts and consumer loans, participation banks may use murabahah, mudarabah, musharakah loans or social-purpose loans such as karz-ı hasen that is returned without interest payment at the end of the term. For this reason, it is impossible to compare such types of

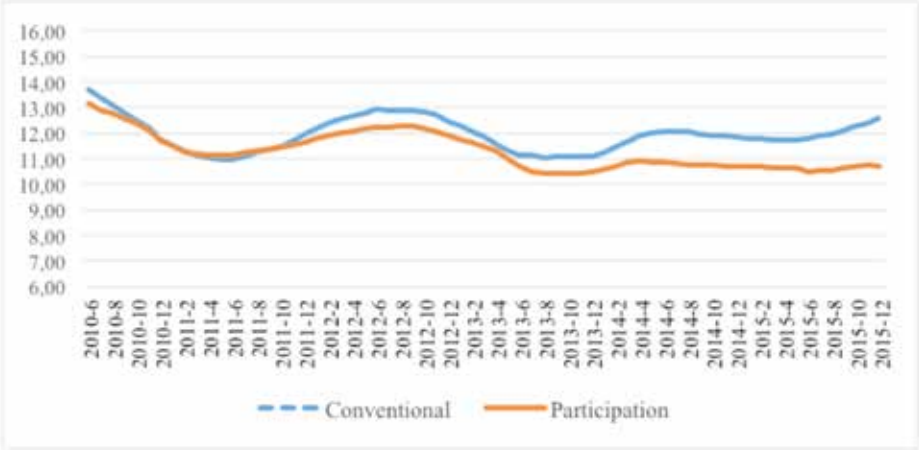
loans. The use of credit cards is valid for both types of banks, but due to the lack of sufficient data and the amount being small for participation banks, this type of credit does not allow comparison. Even though the conventional and participation banks housing loans have some nuance differences, it is comparable for both of banks. Covering the period June 2010 to December 2015, the TL housing loans (mortgage) for participation and conventional banks are compared on the chart below.

Graphic 3: Average Cost of Housing Loans Development

Source: BAT, PBAT, BRSA

As can be seen from the above chart, the housing financing rate of participating banks has been higher than conventional banks' housing loans for the last six years and in some periods they are close to each other. Conventional banks' and participation banks' mortgage rates were found to be correlated with each other at about 76% . TL mortgage loans fluctuate in the 9-12 band for conventional banks while they remain in the 10-13 band for participation banks. It should also be taken into consideration that some banks in housing loans may charge a higher commission fee or file fee from time to time, even though they keep interest rates lower. The lack of non interest fee data makes it difficult to compare conventional and participatory banks. Moreover, when interest rates were in a downward trend, conventional banks' restructuring of housing loans from lower interest rates

led to the increasing of the loan rate and the financing rate gap between the years 2011-2013. The weighted average cost of commercial loans for both types of banks, excluding overdraft accounts, between June 2010 and December 2015 are demonstrated on the graph below.



Graphic 4: Commercial Loans Weighted Average Cost

Source: BAT, PBAT, BRSA, * Asia participation bank' data is not included in the participation banks data.

The commercial credit weighted average cost of conventional and participating banks followed approximately the same trend until March 2013, but the gap was opened later. At the end of 2015, the average of participation banks was 188 base points lower than conventional banks. The most important reasons for this are that participation banks adapted profit rates later than conventional interest rates and used the opportunity to cross-sell to institutional customers. Rates converged until April 2014 due to the fact that conventional banks have the ability to swiftly move during periods when interest rates tend to fall. In periods when interest rates tend to increase, moving faster in conventional banks causes decomposition from participation banks.

In terms of credit distribution of the banking sector, it is seen that the amount of housing loans is considerably below the volume of commercial loans. Although

the cost of mortgage (housing) loans for participating banks is more than conventional banks, but the reverse is observed for commercial loans. 132 months of data were used in MCS to cover the period from January 2005 to December 2015 to compare the deposit and profit rates of conventional and participation banks.

Table 2: Monte Carlo Simulation of Conventional Banking Deposits

RiskSim		**Mean**	**11,25**		**95%**
Date	24.01.2017	St. Dev.	4,32	Upper	**11,37**
Time	5:30:16 PM	Mean St. Error	0,06	Lower	**11,13**
Workbook	Deposit Interest	**Minimum**	**4,97**		
Worksheet	Deposit	First Quartile	7,45		
Output Cell	H135	Median	9,19		
Output Label	Conventional	Third Quartile	16,08		
Seed	1837469264	**Maximum**	**18,40**		
Trials	5000	Skewness	0,42		

As can be seen from the table above, 5,000 trials were done in this simulation and the following results were found. Conventional banks showed interest rates of a minimum of 4.97% and a maximum of 18.4% for deposits between 2005 and 2015. The average interest rate on deposits was 11.25% and 95% confidence interval was found within this range [11,13; 11,37] . The table below shows the MCSof the profit rates which were distributed to participation fund holders during the years 2005-2015.

Table 3: Monte Carlo Simulation of Participation Banking Profit Rate

RiskSim 2.43		**Mean**	**10,76**		**95%**
Date	17.01.2017	St. Dev.	3,86	Upper	**10,87**
Time	7:17:56 PM	Mean St. Error	0,05	Lower	**10,65**
Workbook	Profit/Loss rate	**Minimum**	**6,03**		
Worksheet	Participation fund	First Quartile	7,24		
Output Cell	B135	Median	8,89		
Output Label	Participation	Third Quartile	14,87		
Seed	240039301	**Maximum**	**19,01**		
Trials	5000	Skewness	0,40		

It is observed that the Turkish Participation Banks distributed a minimum of 6.03% and a maximum of 19.01% profit rate to participation account holders between 2005 and 2015. In the same period, base on 95% confidence level found [10,65; 10,87] and the average profit rate was found 10.76%.

Comparing the data of conventional banking and participation banks, there is no intersection in the 95% confidence interval and the interest rates paid by conventional banking to deposits are 49 basis points higher than the profit rate of participation banks to the customers. The most important reasons for this are the fact that deposit banks benefit from the economies of scale, lower operational costs and used short-term funds in areas such as repo. Nonetheless, the minimum-maximum profit rate of participation banks are higher than the minimum-maximum interest rates, which is the result of the application of the profit balancing reserve in participation banks. In addition, participation banks are harmonized later in the interest rate change compared with conventional banking due to the fact that the return of assets is determined at maturity.

Since the mortgage loan is a standard for both the conventional banking sector and participating banks, a comparative analysis was conducted using Monte Carlo Simulation. Nonetheless, there is no possibility for the participation banks to make a healthy comparison because they are new players in the credit card market, there is insufficient data for them and also credit card usage is not great enough to compare with conventional banks. We believe that if we want to make a health comparision between the two sectors, the total balance should be over 5 percent. In addition, some participating banks do not directly use personal finance credits but some of the participating banks use the tawarruk method for this type of loan. It has been seen that such transactions are not sufficiently standardized to make a healthy comparison because some participating banks are not the preferred choice of individual customers and are only used for commercial customers.

In general this study, conducted during the 2005-2015 period, at times encountered some problems in supplying data. Although the loan interest rate data of conventional banking have been available since the 2005 period, the oldest data of participation banks start from June 2010. The most important reason for this is that participation banks must operate under the name of a private financial house before using this title. Another reason is that its structure differs from conventional banks in some aspects. The last reason is that it was exempted from some reports before 2010 and there are no healthy data before this year. For this reason, this study is limited to 67 months, covering the period June 2010-December 2015, in order to compare both sectors in a healthy way. The results of the Monte Carlo Simulation for the conventional banking sector are shown on the following table.

Table 4: Monte Carlo Simulation Analysis of Banking Sector Mortgage Loans

RiskSim 2.43		**Mean**	**10,11**		**95%**
Date	17.01.2017	St. Dev.	0,69	Upper	**10,13**
Time	8:23:20 PM	Mean St. Error	0,01	Lower	**10,09**
Workbook	Conven. mortgage rate	**Minimum**	**8,79**		
Worksheet	Sheet11	First Quartile	9,84		
Output Cell	B74	Median	10,02		
Output Label	Conventional	Third Quartile	10,44		
Seed	1234567	**Maximum**	**11,98**		
Trials	5000	Skewness	0,58		

Due to the constraints mentioned above, the problem of not having sufficient data size was solved by testing Monte Carlo Simulation 5000 times. Accordingly, in the period from June 2010 to December 2015 it was observed that conventional banks apply housing interest rates on mortgage loans at a minimum of 8.79% and a maximum of 11.98%. In the meantime, based on 95% confidence interval the average interest rate collected by conventional banks from home loans was 10.11%. MCSresults for participating banks from the June 2010 to December 2015 period are shown in the following table.

Table 5: Monte Carlo Simulation Analysis of Participation Banks Mortgage Loans

RiskSim		**Mean**	**11,03**		**95%**
Date	17.01.2017	St. Dev.	0,66	Upper	**11,05**
Time	7:42:46 PM	Mean St. Error	0,01	Lower	**11,01**
Workbook	Participation Mortgage rate	**Minimum**	**10,18**		
Worksheet	Konut Kredisi	First Quartile	10,53		
Output Cell	B78	Median	10,87		
Output Label	Participation Bank	Third Quartile	11,56		
Seed	396975350	**Maximum**	**12,87**		
Trials	5000	Skewness	0,73		

As can be seen from Table 5, the financing rate of participation banks' mortgage loans were at a minimum of 10.18% and a maximum of 12.87% between June 2010 and December 2015. In the mentioned period, the average financing cost collected by participating banks from the mortgage loans was 11.03% and 95% confidence interval was found between the [11,01; 11,05] range. In this period, when participation banks are compared with conventional banks, they charged 92 basis points more than their opponents for mortgage loans. The main reason for this is that there is no refinancing for participation banks in the mortgage loans. The MCS analysis results of the banking sector commercial loans are given in the next table.

Table 6: Monte Carlo Simulation Analysis of Banking Sector Commercial Loans

RiskSim		**Mean**	**11,92**		**95%**
Date	42759	St. Dev.	0,65	Upper	**11,93**
Time	0,779398148	Mean St. Error	0,01	Lower	**11,90**
Workbook	Commer. Loan rate	**Minimum**	**10,94**		
Worksheet	Commercial loan	First Quartile	11,32		
Output Cell	C72	Median	11,87		
Output Label	Conventional	Third Quartile	12,39		
Seed	1692770687	**Maximum**	**13,69**		
Trials	5000	Skewness	0,33		

As can be seen from the above table, the commercial interest rates of the commercial banks were 11.92% per month and the standard deviation was 0.65

percent. The commercial loan interest rate was at a minimum of 10.94% and a maximum of 13.69% for this period. In the simulation analysis, the distribution shows a right skewed characteristic distribution. The MCS analysis results of the participation banks for commercial loans are given on the table below.

Table 7: Monte Carlo Simulation Analysis of Participation Banks Commercial Loans

RiskSim		**Mean**	**11,20**		**95%**
Date	24.01.2017	St. Dev.	0,66	Upper	**11,22**
Time	7:28:19 PM	Mean St. Error	0,01	Lower	**11,18**
Workbook	Commer. Loan rate	**Minimum**	**10,41**		
Worksheet	Commercial loan	First Quartile	10,72		
Output Cell	I71	Median	10,86		
Output Label	Katılım Bankaları	Third Quartile	11,66		
Seed	532020211	**Maximum**	**13,16**		
Trials	5000	Skewness	0,87		

As can be seen from the table above, the MCS over a period of 67 months from June 2010 to December 2015 found that participation banks' average commercial loans were at 11.20% and standard deviation at 0.66 percent. When comparing participation banks with conventional banks, we find that participation bank financing rate was 72 base points lower than their opponents. The main reason for this is that conventional banks with excess funds can use these on the overnight market or overdraft loans, whereas participation banks only follow these amounts in terms of cash equivalents. Moreover, the fact that the minimum and maximum rates are relatively low compared to conventional banks is due to conventional banks being able to move more quickly against the increases and decreases in interest rates. As a result, in our country where interest / profit rate volatility is high in the market, it is expected that SME companies should prefer the participation banks more than conventional banks in terms of cost.

Monte Carlo Simulation results for participation and conventional banks' return on equity (ROE) using the 132-month period covering January 2005-December 2015 are shown in the following table.

Table 8: MCS Analysis of the Return on Equity of Conventional and Participation Banks

Monte Carlo Simulation (MCS)		**Conventional ROE**			**Participation ROE**		
RiskSim	Mean	**19,00**		**95%**	**18,63**		**95%**
13.02.2017	St. Dev.	**0,054**	**Upper**	**19,15**	**0,073**	**Upper**	**18,83**
4:49:40 PM	Mean St. Error	**0,001**	**Lower**	**18,85**	0,001	**Lower**	18,43
Conventional-Participation	**Minimum**	**8,7**			**8,5**		
ROE	First Quartile	15,2			12,5		
B137	Median	18,4			16,9		
TBS ROE	Third Quartile	23,7			25,0		
2016393457	**Maximum**	**29,4**			**36,8**		
5000	Skewness	0,104			0,503		

For the group of conventional and participation banks in the 95% confidence interval, it is understood that when the MCS is run, the ROE is higher for conventional banks than for participating banks, but it does not differ too much. The average profitability ROE for the period between 2005 and 2015 was 19% for conventional banks and [18,85;19,15] as lower and upper bands. In the participation banks this ratio is shown as an average of 18.63% and [18,43; 18,83] as lower and upper bands. The calculations made using the formulas in the table below indicate that there is not a common intersection area for both bank groups and therefore it is understood that the conventional banks have a higher ROE than participation banks. At the 95% confidence interval, the following formula is used in determining the upper and lower bands.

Table 9: Lower and Upper Band Calculation Formula

Upper Bound =	Mean+1.96*Mean St. Error
Lower Bound =	Mean-1.96*Mean St. Error

Monte Carlo Simulation results for participation and conventional banks' return on assets (ROA) using the 132-month period covering January 2005-December 2015 are shown in the following table.

Table 10: MCS Analysis of the Return on Assets of Conventional and Participation Banks

Monte Carlo Simulation		Conventional ROA			Participation ROA		
RiskSim	**Mean**	**2,11**		**95%**	**1,99**		**95%**
16.02.2017	St. Dev.	**0,60**	Upper	**2,13**	**0,77**	Upper	**2,01**
11:27:42 AM	Mean St. Error	0,01	Lower	**2,10**	0,01	Lower	**1,96**
Conventional-Participation	Minimum	0,89			0,76		
ROA	First Quartile	**1,72**			**1,27**		
B137	Median	2,11			2,04		
Return on Assets	Third Quartile	2,60			2,65		
367106916	Maximum	**3,77**			**3,52**		
5000	Skewness	-0,1173			1,52		

When we used Monte Carlo Simulation for the two groups, we found that conventional banks have a higher return on assets (ROA) statistically than the participation group in the 95% confidence interval. Indeed, the average ROA of conventional and participation banks from 2005 to 2015 is 2.11% and 1.99% respectively. It is understood that deposit banks have a statistically higher ROA than participation banks, because the calculation of the upper and lower limits does not take place in the common intersection areas of both banks. Furthermore, considering that the standard deviation for both groups is 0.6 and 0.8 percent in terms of the analyzed periods, it is understood that the asset profitability of the Turkish banking sector has followed a stable path.

Table 11: MCS of the Net Interest Margin of Conventional and Participation Banks

Monte Carlo Simulation		Conventional NIM			Participation NIM		
RiskSim	**Mean**	**4,36**		**95%**	**4,43**		**95%**
16.02.2017	**St. Dev.**	**0,78**	Upper	**4,39**	**0,99**	Upper	**4,45**
3:31:26 PM	Mean St. Error	0,01	Lower	**4,34**	0,01	Lower	**4,40**
Deposit- Participation Fund	Minimum	**3,02**			**3,02**		
NIM	First Quartile	3,50			3,53		
C140	Median	4,45			4,13		
Convnetional NIM	Third Quartile	4,85			5,37		
532318587	Maximum	**6,02**			**7,17**		
5000	Skewness	0,1330			0,1983		

Looking at the Monte Carlo Simulation for the conventional and participation banks groups at the 95% confidence interval for the period 2005-2015, it is understood that the participation banks have a higher margin than conventional banks in terms of the net interest margin (net profit margin – NIM) . The average of net profit margin was 4.43% for participation banks and the upper and lower bands were [4.40; 4.45] range. The average NIM in conventional banks was 4.36 and the lower and upper bands were between [4.34; 4.39] range. The fact that there are no common intersection areas for the two bank groups in the amounts between the upper and lower bands, and the fact that even the lowest band in the participation bank is relatively higher than the conventional banks, indicates that the participation banks have a statistically higher NIM. As a result, conventional banks have a higher ROE and ROA than participating banks, whereas NIM is the opposite.

5. Regression Analysis And Hypothesis Tests

When the regression analysis was performed, the panel data method was used to measure the efficiency of both conventional and participation banks by using monthly data for the period 2005-2015. Profitability was shown as a dependent variable in the regression model; while the independent variable items were taken into consideration as liquidity, leverage, asset quality, operational cost, capital adequacy and macroeconomic developments. In this study, we used three independent variables, which are return on equity (ROE), return on assets (ROA) and net interest margin (NIM) for conventional banks. For participation banks, models were established with three independent variables ROE, ROA and and net profit margin (NIM). The net interest margin, which is the most important factor in the profitability of the banks, is expressed in terms of the net profit margin (NIM) in the participation banks. To make the study meaningful, we used standardization, recalculation and proportioning methods. The variables and definitions used in the regression model are given on the following table.

Table 12: Data Set Used in Analysis (2005-2015 Period)

Queue No	Variables	Definitions
1	NIM	Net Interest (Profit) Margin
2	ROA	Return on Assets (Net Profit/Total Assets)
3	ROE	Return on Equity (Net Profit/Equities)
4	CAR	Capital Adequacy Ratio
5	TLTD	Total Loans / Total Deposits
6	ETA	Equity/Total Assets
7	GDP ((Pt-Pt-1)/Pt)*100	Gross Domestic Product
8	LTA	Loans / Total Assets
9	DTA	Deposits / Total Assets
10	M2D	Monetary Base / Deposits
11	NPL	Non-Performing Loans
12	CoR (Cost of Risk)	Provisions/Total Loans
13	PBL	Personnel and Branches to Loans
14	PBD	Personnel and Branches to Deposits
15	PBTA	Personnel and Branches to Total Assets
16	DI	Deposit Interest
17	DDTD	Demand Deposits / Total Deposits

In the regression analysis, NIM, ROA and ROE were used as dependent variables. Macroeconomic indicators such as gross domestic product (GDP), deposit interest (DI) and consumer price index (CPI) were used as independent variables. In order to measure the asset quality of banks we prefered non-performing loans (NPL), cost of risk (CoR), loans to total assets (LTA) and capital adequacy ratio (CAR) indicators. To measure money supply, we chose M2 to deposits (M2D). To measure liquidity deposit to total asset (DTA), demand deposits to total deposit (DDTD) and equity to total assets (ETA) were used. In addition, to measure the efficiency of operational expenditures, the ratio of the personnel and branch to total asset (PBTA), personnel and branch to loans (PBL) and personnel and branch to deposits (PBD) were used as independent variables in the econometric analysis. Macroeconomic indicators, asset quality, liquidity, operational expenses, monetary base and independent variables indicators are given in the following summary table.

Table 13: Independent and Dependent Variables

Dependent Variables	Macroeconomic Indicators	Asset Quality	Liquidity	Operational Cost	Monetary Base
Net Interest (Profit) Margin (NIM)	Consumer price index (CPI)	Loans to Total Assets	Loans to Total Assets	Personnels and Branches to Loans	Monetary Base to Deposits
Return on Assets (ROA)	GDP	NPL	Demand Deposits to Total Deposits	Personnels and Branches to Deposits	-
Return on Equity (ROE)	Deposit Interest (DI)	Provisions to Total Loans (CoR)	Equity to Total Assets	Personnels and Branches to Assets	-
-	-	Capital Adequacy Ratio (CAR)	-	-	-

It is expected that there will be a strong and meaningful relationship between dependent and independent variables in the regression analysis result. Detailed explanations of the regression model are on the following pages.

5.1. Dependent and Independent Variables of Regression Model

Three different regression models for NIM, ROA and ROE dependent variables were created using the 132 monthly data for the period 2005-2015 in order to measure market efficiency of participation banks and conventional banks.

a) $ROA_t = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8X8 + \beta8X8 + \beta9X9 + \beta10X10 + \beta11X11 + \beta12X12 + \beta13X13 + \beta14X14 + \sigma ROA_{(t-1)} + \gamma D + \mu_t$

b) $ROE_t = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8X8 + \beta8X8 + \beta9X9 + \beta10X10 + \beta11X11 + \beta12X12 + \beta13X13 + \beta14X14 + \sigma ROE_{(t-1)} + \gamma D + \mu_t$

c) $NIM_t = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8X8 + \beta8X8 + \beta9X9 + \beta10X10 + \beta11X11 + \beta12X12 + \beta13X13 + \beta14X14 + \sigma NIM_{(t-1)} + \gamma D + \mu_t$

Shadow variable (D) is the dummy variable. The dummy value for deposit banks is given as "0" and for participation banks it is "1". Thus, an attempt was made to understand whether or not there is a performance difference between the two types of banks. Since the model is set up dynamically, ROA_{t-1} is included in the model together with the σ coefficient. Symbols in the model represent;

β0: Constant for the model
β1- β14: Coefficients of independent variables
X1-X14: Values of Independent Variables,
σ: coefficient for the dynamic variable
γ: coefficient for the dummy variable
μ: vector for the error term

5.2. Banking Sector Regression Analysis Results

In the estimation of panel regression models a two-step process was followed for participation and deposit banks. In the first stage, the reference model containing all variables was estimated and, in the next step, the variables producing the estimates of meaningless coefficients were searched one by one to reach the models with the most significant coefficient values. Significant F values of 1%, 5%, and 10% indicate high overall meaningful results of the models. In order to be able to take into account the dynamic effects on profitability performance over time, the first delay of the dependent variable is used in the models. In this respect, it was tested with the Durbin-Watson test to see whether it was an autocorrelation problem or not. The results of this test show that there is no autocorrelation problem in all models. Furthermore, it was observed that the coefficient estimates of the models are significantly consistent and meaningful.

Macroeconomic indicators are often a function of inflation, interest rate and national income. The CPI rates and GDP were been reported in the regression analysis results because the deposit interest is an indirect component and the model outcomes are not meaningful. The results of the regression analysis for NIM, ROA and ROE dependent variables are included in the following explanation.

5.2.1. Net Interest (Profit) Margin e-views Results

Panel regression analysis results of the conventional and participation banks are shown in the following table.

Dependent Variable: D(NIM)
Method: Panel Least Squares
Date: 03/21/17 Time: 20:32
Sample (adjusted): 2005M03 2015M12
Periods included: 130
Cross-sections included: 2
Total panel (balanced) observations: 260
White period standard errors & covariance (d.f. corrected)

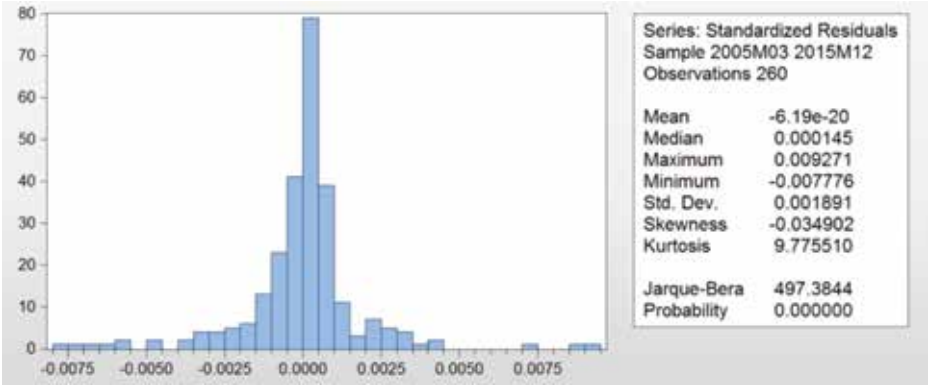
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000165	1.76E-05	-9.398926	0.0000
D(CAR)	0.009921	0.008223	1.206391	0.2288
D(TLTD)	0.002595	0.000357	7.261248	0.0000
D(NPL)	0.098062	0.091140	1.075945	0.2830
D(M2D)	0.010213	0.005708	1.789253	0.0748
D(CoR)	-0.190699	0.024722	-7.713862	0.0000
D(PBTA)	0.012524	0.004779	2.620441	0.0093
D(PBD)	-0.006601	0.001832	-3.602677	0.0004
D(ETA)	0.038459	0.022765	1.689395	0.0924
D(DTA)	-0.010652	0.004588	-2.321802	0.0211
D(LTA)	0.001102	0.000138	8.003003	0.0000
PARTIC.	-7.36E-05	4.60E-05	-1.598920	0.1111
D(PARTICCAR)	0.032497	0.009632	3.373679	0.0009

R-squared	0.104468	Mean dependent var	-0.000178
Adjusted R-squared	0.060960	S.D. dependent var	0.001998
S.E. of regression	0.001936	Akaike info criterion	-9.607702
Sum squared resid	0.000926	Schwarz criterion	-9.429668
Log likelihood	1262.001	Hannan-Quinn criter.	-9.536130
F-statistic	2.401144	Durbin-Watson stat	2.079960
Prob(F-statistic)	0.005922		

When profitability is measured by NIM, there no difference between participation and conventional banks. As the share of deposits in total assets increases, the net interest margin decreases. On the other hand, as the share of loans in assets increases, net interest margins of banks are positively affected. This situation increases the profit generating capacity of the loans. If the deposit interest is high, the net interest margin is also increased. There is a meaningful and positive relationship between both of them. Provisions reserved for the NPL are

shown as cost of risk, which is high, causing the bank to deteriorate asset quality and lose money. There is a negative correlation between the NIM and the cost of risk (CoR). Net interest margin has positive relationship with PBTA and an inverse relationship of PBD. A positive and significant relationship was found in the 90% confidence interval amoung net interest margin, M2D and ETA.

There was no significant relationship between net interest margin and macroeconomic indicators, GDP, CPI and deposit interest (DI). Furthermore, there is no significant correlation between the banks' NPL ratio and NIM. In case of high risk, banks also expect high returns. Indeed , while the interest rates on credit cards are highest among the loan types (24%), they are realized by the TDO (7%).

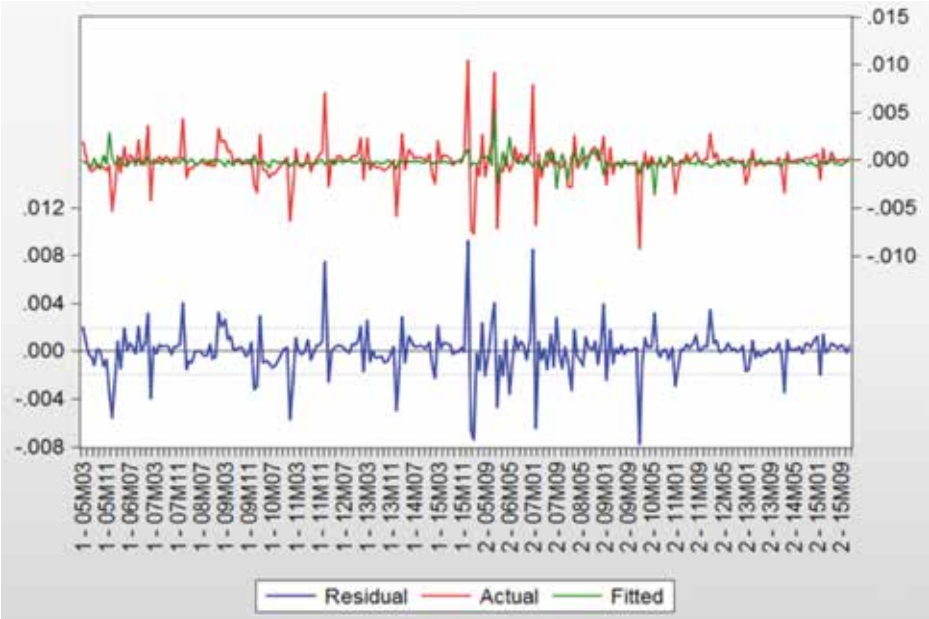


Graphic 5:Net Interest / Profit Margin Normal Distribution
View-Residual Diagnostic

Looking at the above chart, it is understood that the NIM has normal distribution. When model results are compared with actual values, it is seen that the model result converges to a large extent. Therefore, it can be assumed that these values are within the confidence interval.

Standard errors were subjected to serial correlation correction. As can be understood from the figure above, actual and fitted values are close to each other.

Negative correlation is expected between CAR and NIM variables because a bank with a higher CAR uses less credit for a certain amount of deposits and has



Graphic 6: NIM Actual, Residual and Fitted Values

a lower loan income. A positive relationship is expected amoung CAR with ROA and ROE because high ROE and ROA ratios will increase profits as it allows profits to be added to capital. The high NPL is expected to have a negative impact on NIM, ROA and ROE because when NPL rates increase, return of loan and the profits will lead to negative effect. When we consider CoR, it is expected that the increase will suppress the profitability and it will adversely affect ROA and ROE. Under normal circumstances, it is expected that the increase TLTD will raise the cost of resources when we consider the level of savings and its components in our country. The increase in resource costs will have a negative impact on NIM, ROA and ROE due to maturity mismatch. However, the fact that TLTD has been at the level of 120% for many years in our country, and the increase of 90-180 day marketable securities as an alternative source of deposits, limits the negative effect of NIM.

There is a high positive correlation between GDP growth and loan growth in Turkey. In addition, if loan growth and asset quality is high, the amount of delayed

receivables is limited. Therefore, in periods when the monetary policy is not tightening, it is expected that GDP growth will positively affect the profitability of the sector. On the other hand, tightening monetary policies put pressure on NIM as it accelerates the cost of deposits due to maturity mismatch. When CPI is taken into consideration, it is expected that the increase in the share of inflation-indexed government securities within the securities portfolio will lead to an increase in the inflation-related upward trends. However, Turkey's domestic debt rollover ratio has been declining in recent years and the lack of weight of inflation-indexed government bonds limits the impact of inflation on NIM.

Given the size of assets and deposits per capita, the increase in the these ratios has a rising impact on the cost of resources on deposits and financial gain on the loans. Therefore, it is expected that deposits increase per personnel will be negative on NIM, ROA and ROE, but the increase in assets per staff will have a positive effect on NIM, ROA and ROE. The rising equity enables the increase of costless resources and the high level of the risk capacity of the bank, enabling both the growth of the bank and the lower cost of operation.

5.2.2. Return on Equity e-views Results

The panel regression results obtained by using the return on equity as a dependent variable in the conventional and participation banks are demonstrated in the following table.

Dependent Variable: D(ROE)
Method: Panel Least Squares
Date: 03/21/17 Time: 20:11
Sample (adjusted): 2005M03 2015M12
Periods included: 130
Cross-sections included: 2
Total panel (balanced) observations: 260
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001318	7.74E-05	17.02581	0.0000
D(CAR)	0.874227	0.023356	37.43097	0.0000
D(TLTD)	-0.122823	0.062749	-1.957360	0.0514
D(NPL)	-0.813035	0.194849	-4.172650	0.0000
D(M2D)	-0.038302	0.017433	-2.197054	0.0289

D(PBL)	-0.033272	0.010240	-3.249253	0.0013
D(PBTA)	0.152610	0.016775	9.097593	0.0000
D(ETA)	0.796274	0.026726	29.79409	0.0000
PARTIC.	-0.002215	0.000339	-6.529155	0.0000
D(PARTICCAR)	0.541513	0.112661	4.806574	0.0000

R-squared	0.296741	Mean dependent var	-0.001209
Adjusted R-squared	0.259577	S.D. dependent var	0.021361
S.E. of regression	0.018380	Akaike info criterion	-5.102714
Sum squared resid	0.083109	Schwarz criterion	-4.910985
Log likelihood	677.3528	Hannan-Quinn criter.	-5.025636
F-statistic	7.984633	Durbin-Watson stat	2.301813
Prob(F-statistic)	0.000000		

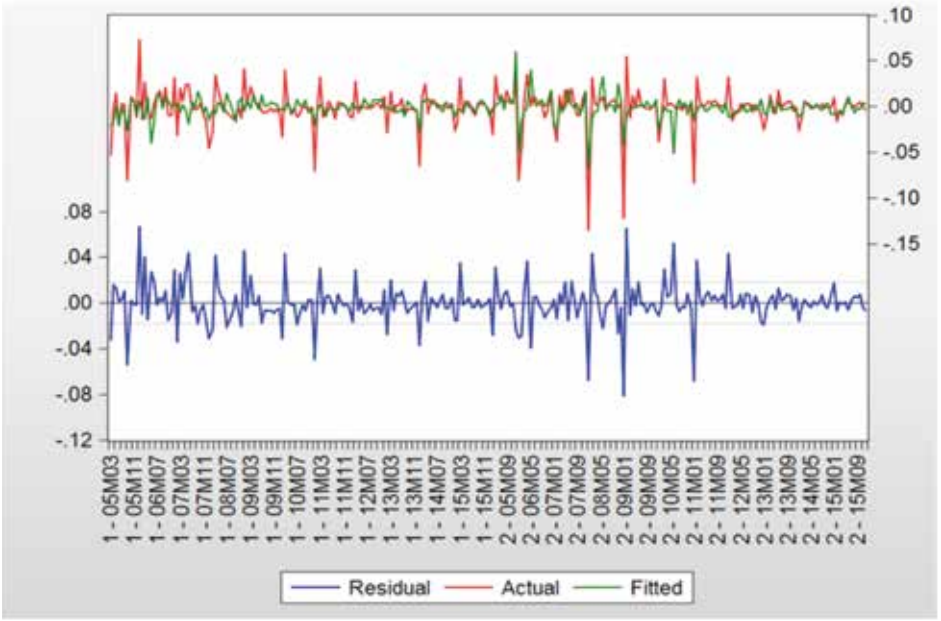
Under the condition of P being less than 1%, 5% and 10%, no significant relationship was found between return on equity and CPI, GDP, LTA, DTA, CoR, PBD, DI and DDTD. On the other hand, there is a significant relationship between ROE and CAR, TLTD, NPL, M2D, PBL, ETA PARTIC. and PARTICCAR.

There is a significant relationship between ROE and CAR. A one-point increase in the CAR was associated with a 0.87 point increase in ROE of deposit banks, while it was associated with an increase of 1.41 points in the ROE of participation banks. In other words, in the participation banks the relationship between CAR and ROE is stronger than that in conventional banks.

As expected, there was a negative correlation between ROE and NPL. A one-point increase in the NPL ratio of deposit and participation banks is associated with a decrease of 0.81 points in ROE.

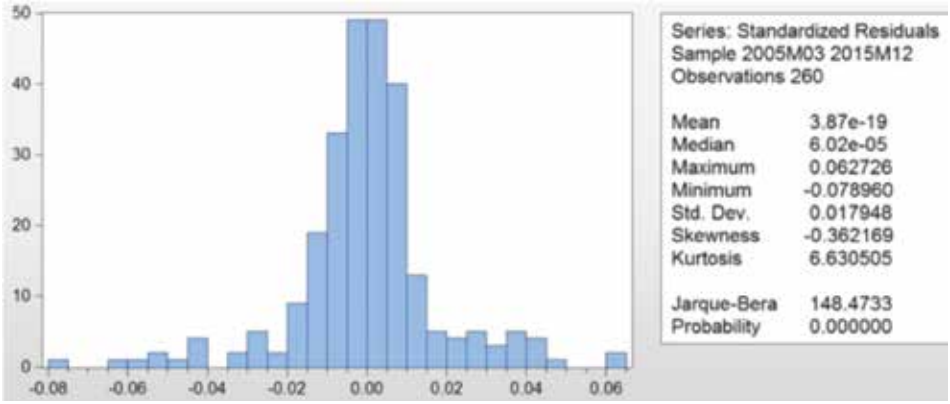
On the other hand, a positive relationship between equity and profitability was expected. According to the model result, a one-point increase in ETA ratio of deposit and participation banks was associated with an increase of 0.79 percentage points in ROE.

In the chart below, when model results are compared with actual and fitted values, it is seen that they are close to each other on a large scale. Therefore, it can be assumed that these values are within the confidence interval.



Graphic 7: ROE Actual, Residual and Fitted Values

Looking at the below chart, it is understood that the return on equity has normal distribution. When model results are compared with actual values, it is understood that the model result converges to a large extent.



Graphic 8: ROE of Conventional and Participation Banks Normal Distribution

5.2.3. Return on Equity e-views Results

The panel regression results obtained using the return on assets as a dependent variable in the conventional and participation banks are demonstrated on the following table.

Dependent Variable: D(ROA)
Method: Panel Least Squares
Date: 03/21/17 Time: 20:03
Sample (adjusted): 2005M03 2015M12
Periods included: 130
Cross-sections included: 2
Total panel (balanced) observations: 260
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.02E-05	5.18E-05	1.742357	0.0827
D(CAR)	0.091683	0.010857	8.444572	0.0000
D(NPL)	-0.127340	0.062890	-2.024798	0.0440
D(PBTA)	0.019924	0.001053	18.91831	0.0000
D(PBD)	-0.003557	0.000365	-9.746149	0.0000
D(DI)	-0.026751	0.013753	-1.945144	0.0529
D(ETA)	0.077687	0.008480	9.160864	0.0000
PARTIC.	-0.000263	1.70E-05	-15.45585	0.0000
D(PARTICCAR)	0.042055	0.011137	3.776040	0.0002

R-squared	0.284902	Mean dependent var	-0.000157
Adjusted R-squared	0.256183	S.D. dependent var	0.002317
S.E. of regression	0.001998	Akaike info criterion	-9.551484
Sum squared resid	0.000994	Schwarz criterion	-9.400840
Log likelihood	1252.693	Hannan-Quinn criter.	-9.490923
F-statistic	9.920392	Durbin-Watson stat	2.488832
Prob(F-statistic)	0.000000		

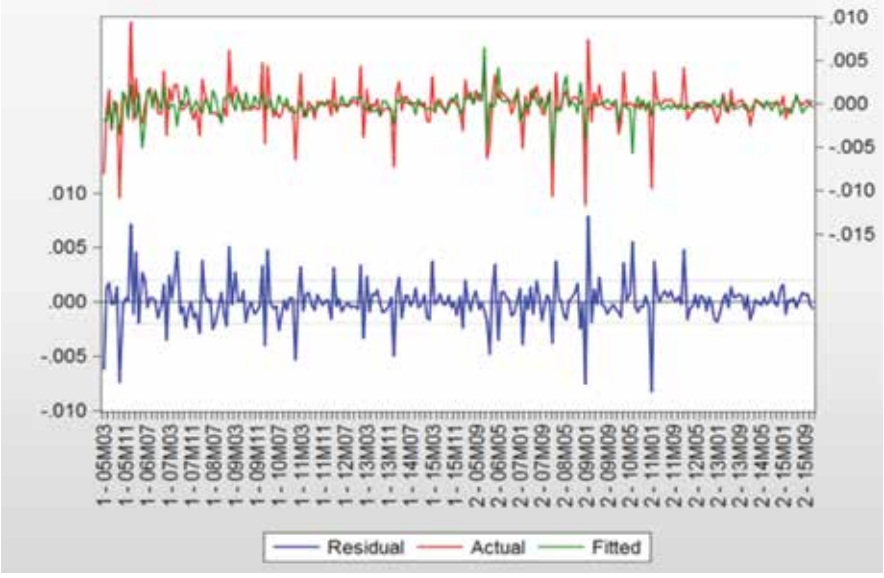
Under the condition of P being less than 1%, 5% and 10%, no significant relationship was found between return on equity and CPI, GDP, LTA, TLTD, DTA, CoR, M2D, PBD, PBL, and DDTD. On the other hand, there is a significant relationship between ROE and CAR, NPL, PBTA, PBD, DI, ETA PARTIC. and PARTICCAR.

There is a significant relationship between ROA and SYR. A one-point increase in the CAR was associated with a 0.09 point increase in ROA of deposit banks, while it was associated with an increase of 0.13 points in the ROA of participation banks. In other words, in the participation banks the relationship between CAR and ROA is stronger than that in conventional banks.

As expected, there was a negative correlation between ROA and NPL. A one-point increase in the NPL ratio of deposit and participation banks was associated with a decrease of 0.13 points in ROA. In addition, a one-point increase in ETA of deposit and participation banks was associated with an increase of 0.08 percentage points in ROA.

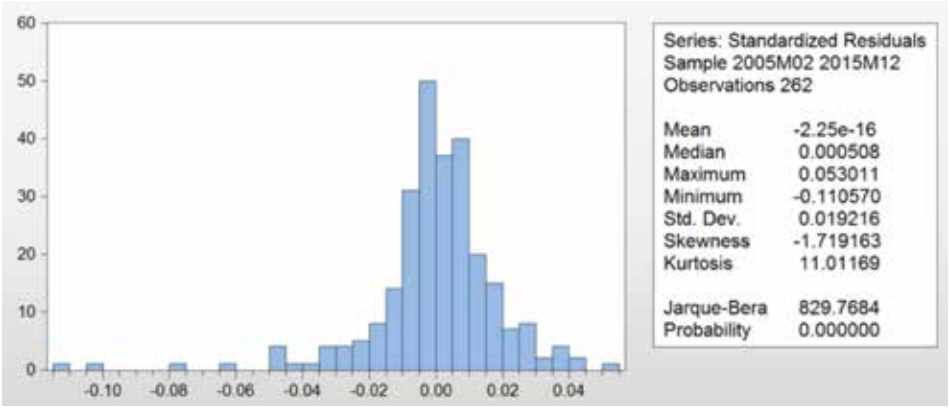
An interesting finding is the negative relationship between the increase in deposit interest and ROA. Under normal conditions, as deposit interest increases, it is expected that there will be a positive relationship with ROA. The profitability of the bank is not only determined the deposit interest. The margin between loan interest rates and deposit interest rates essentially indicates the profitability of the banks. Also, non-interest commission income and operation cost are the main items that determine bank revenues.

When the ROA is analyzed in terms of model results, it is seen that when the actual values are compared, the model result converges to the actual values to a great extent. Therefore, it can be accepted that these values are within the confidence interval.



Graphic 9: ROA Actual, Residual and Fitted Values

Looking at the following chart, it is understood that the return on assets has normal distribution. When model results are compared with actual values, it is understood that the model result converges to a large extent.



Graphic 10: ROA of Conventional and Participation Banks Normal Distribution

In our econometric studies the results demonstrate that the findings of the Monte Carlo Simulation and Regression Analysis methods show a huge overlap with those of the literature. Our studies are in keeping with the work of Beck and Demirgüç-Kunt in that Islamic banks and deposit banks do not show significant changes in terms of job orientation and asset quality. We found in MCS the same result as Hassan claimed, namely that Islamic banks in terms of return on equity and return on assets are less effective than conventional banks. In addition, this study partially agrees with the findings of Samad's work in that there is no significant difference in the profitability and liquidity of Islamic banks and conventional banks. On the other hand, unlike Ersan's study on Turkey, we could not prove in our research that participation banks are more efficient than conventional banks.

6. Conclusion

In this study, the average interest rates of deposit banks and the average profit rate of participation banks, mortgage rate and commercial loans are compared using Monte Carlo Simulation taking monthly data from January 2005 to

December 2015. In addition, the margins of return on assets (ROA), return on equity (ROE) and net interest (profit) margin (NIM) were tested using this simulation. Finally, in the regression analysis covering the period January 2005-December 2015, ROA, ROE and NIM were used as dependent variables. Independent macroeconomic indicators such as gross domestic product (GDP), deposit interest (DI) and consumer price index (CPI) were used. In order to measure the asset quality of banks we preferred non-performing loans (NPL), cost of risk (CoR), loans to total assets (LTA) and capital adequacy ratio (CAR) indicators. To measure liquidity we used equity to total assets (ETA), deposit to total asset (DTA) and demand deposits to total deposit (DDTD). As well as macroeconomic indicators, asset quality and liquidity, we preferred some additional indicators to measure operational expenses and monetary supply.

In our study only the monthly interest rates of deposit banks and the monthly profit rates of participation banks are contrasted. It was found that approximately 80% of the deposit or participation funds are monthly. The remaining 20% of deposits consists of demand deposits or special current accounts.The average maturity of deposits and participation funds in Turkey is around 40 days. For some banks, quarterly, semi-annual, and annual deposit or participation funds are limited and the interest rate is close to the monthly deposits rate. For these reasons three monthly , six monthly and annual deposits or participation funds were not used in our data. Furthermore , from March 2014 onwards, in order to mitigate the negative effect of Asia Participating Bank, the data of that bank is not included in the calculation.

It is observed that conventional banks' monthly interest rate on deposits were at a minimum of 4.97% and a maximum of 18.40% between 2005 2015. The average interest rate on deposits in this period was 11.25% for the same group. Participation banks in the same period seemed to distribute a minimum of 6.03% and a maximum of 19.01% profit rate to participation account holders. Moreover, according to our model result, the average profit rate for the participation fund was 10.76% per month. In the 95% confidence interval, the interest rates paid by conventional banking to deposits were 49 basis points higher than the profit rates

paid by the participating banks to the customers. The most important reason for this is that deposit banks are more likely to benefit from the economies of scale, operational costs are lower, and short-term funds can be valued in the interbank market such as repo. Nonetheless, the minimum and maximum profit rates of participation banks are higher than conventional banks' interest rate, which is the result of the application of the profit balancing reserve in the participation banks.

Conventional banks applied a minimum of 8.79% and a maximum of 11.98% of mortgage interest for the housing loan between June 2010 and December 2015. In the mentioned period, the average mortgage interest rate collected from conventional bank loans was 10.11%. For the same period, participation banks' housing financing rates were at a minimum of 10.18% and a maximum of 12.87%. For these periods, the average cost of housing financed by participation banks was 11.03%. When the average of the conventional banks and the participation banks are compared for this period, participation banks seem to apply the financing rate at 92 basis points higher than their opponents. The most important reason for this higher ratio in participation banks is that it cannot be refinanced during the period of falling trend. It should also be taken into consideration that some banks may lower interest rates for loans, but may charge higher commissions or file charges from time to time. A separate academic work should be undertaken in order to reach a definite conclusion in this regard.

On the other hand, according to the Monte Carlo Simulation, the participation banks' average commercial loans were 11.20% while those of deposit banks were 11.92%. It is seen in this study that participation banks provide financing with 72 bps lower cost than conventional banks. The main reason for this is that participation banks adapt later than conventional banks on the fluctuation of interest rates.

The net profit margin of the Islamic banking sector in the world was 0.91% in 2013, while in 2008 it was 1.51%. While the average of conventional banks net interest margin was 4.36%, the average net profit margin share of participation was 4.44% in the period covering the years 2005-2015 in Turkey. However, it is

noteworthy that these rates in our country are quite high when compared with the world interest/profit margins, and it should be kept in mind that this situation is related to general interest, inflation level and macroeconomic conditions.

In this study, based on 95% confidence interval in MCS, it can be understood that the average profitability of conventional banks is 2.11% and that of participation banks 1.99% in the period 2005-2015. It could be stated that deposit banks have higher profitability statistically in terms of their asset profitability than participating banks because of the fact that both banks are not located in the common intersection areas when the upper and lower limits are calculated. On the other hand, considering that the standard deviation for both groups is 0.6 and 0.8, it can be claimed that the asset profitability of the Turkish banking sector has followed a steady course over the period.

In the Monte Carlo Simulation, it is clear that the conventional banks did not differ too much from the participation banks in terms of return on equity (ROE). In the 2005-2015 period, the average ROE was 19% in conventional banks, while it was 18.63% in participation banks. Considering the calculations of the upper and lower bands, it can be seen that deposit banks have higher statistical profitability in terms of ROE compared to participation banks because of the fact that both banks are not located in the common intersection areas.

In the regression analysis, when profitability was measured by NIM, there was no statistically significant difference between participation and conventional banks. There was no significant relationship between the NIM and the macroeconomic indicators such as GDP, CPI and deposit interest rates. Furthermore, there was no significant relationship between one of the indicators of asset quality NIM and NPL rate. As expected, there was a negative relationship between the provision for loan and the NIM. However, a positive relationsip between NIM and staff and assets per branch was found; there was a negative relationship among NIM and personnel and deposits per branch. A positive and significant relationship was found in the 90% confidence interval among NIM and the M2M and ETA.

In terms of ROA, no significant difference was found between participation banks and conventional banks. There was no significant relationship between ROA and CPI, GDP, LTD, TLTD, DTA, CoR, M2D, PBL, and DDTD. However, there was a significant relationship between CAR, NPL, PBTA, PBD, DI, ETA, PARTIC and PARTICCAR. A one-point increase in the CAR was associated with 0.09 point increase in the ROA of deposit banks, while there was a 0.13 point increase in the ROA of participation banks. That is, the relationship between CAR and ROA was stronger in participation banks than deposit banks. A one-point increase in the NPL of conventional and participation banks was associated with a reduction of 0.13 points in the ROA. In addition, a one-point increase in the ETA of deposit and participation banks was associated with an increase of 0.08 percentage points in ROA.

There is a significant relationship between ROE and CAR for both participation and deposit banks. A one point increase in the CAR was associated with a 0.87 point increase in ROE of deposit banks, while it was related with an increase of 1.41 points in the ROE of participation banks. In sum, the relationship between CAR and ROE was stronger in participation banks than conventional banks. A one-point increase in the NPL of deposit and participation banks was associated with a decrease of 0.81 points in ROE. In addition, as a result of the model, a one-point increase in the ETA of deposit and participation banks was associated with an increase of 0.79 percentage points in ROE.

As a result, in the Monte Carlo Simulation study, it was found that deposit banks statistically have 0.49 points higher return (interest or profit rate) than participation banks. Moreover, as a result of the analysis, it was observed that deposit banks provided mortgage loans with a 0.92 point lower cost than opponents, which is a stastically significant level. On the other hand, when comparing the interest and profit rates obtained from commercial loans, it has been proven that participation banks rate is statistically lower than conventional banks 72 base points. Therefore, it is expected that SME companies should prefer participation banks more than conventional banks in terms of cost.

This study attempted to measure the efficiency of participation and deposit banks using monthly data in Turkish Lira. This work could be improved in various ways. First of all, it is possible to use effective interest rates and profit rates for both bank groups by taking into account commissions and expenses. Moreover, given the fact that the dollarization of Turkey is about 40%, it will be appropriate to carry out these studies in foreign currency terms in the forthcoming periods.

Ultimately, according to the econometric data we used in this study, we could not find a statistically significant difference between deposit banks and participation banks in terms of market efficiency. However, in the theoretical studies in the literature, Islamic banking is based on the idea that such a differentiation should be made due to the principle of profit/loss sharing. There will be a difference between participation and conventional banks in the case of the development of Islamic financial products which do not mimic conventional banking instruments.

References

Aktaş, M. (2013). Stability of the participation banking sector against the economic crisis in Turkey. *International Journal of Economics and Financial Issues, 3*(1), 180–189.

Al-Oqool, M. A., Okab, R., & Bashayreh, M. (2014). Financial Islamic banking development and economic growth: A case study of Jordan. *International Journal of Economics and Finance, 6*(3), 72–79.

Asarkaya, Y., & Özcan, S. (2007). Determinants of capital structure in financial institutions: The case of Turkey. *Bankacılık ve Finansal Piyasalar Dergisi,* 1, 91–109.

Asutay, M. (2012). Conceptualising and locating the social failure of Islamic finance: Aspirations of Islamic moral economy vs the realities of Islamic finance. *Asian and African Area Studies,* 11(2), 93–113.

Asutay, M., & Harningtyas, A. F. (2015). Developing maqasiad al-shari'ah index to evaluate social performance of Islamic banks: A Conceptual and empirical attempt. *Journal of Islamic Economics, Banking and Finance, 1*(1), 5–64.

Ata, H. A., & Buğan, M. F. (2016). Factors affecting the efficiency of Islamic and conventional banks in Turkey. *Journal of Islamic Economics, Banking and Finance,* 12(1), 90–95.

Ateş, H., & Bektaş, M. (2016). *İslam ekonomisi ve finansı, İslam ve kalkınma: İnançsal, tarihsel ve teorik temeller üzerine bir değerlendirme.* İstanbul, Turkey: Umuttepe Yayıncılık.

Aysan, A. F., Dişli, M., & Öztürk, H. (2015). Bank lending channel in Turkey: Evidence from Islamic and conventional banks. Ankara, Turkey, Türkiye Cumhuriyeti Merkez Bankası.

Bashir, A. M. (1999). Risk and profitability measures in Islamic banks; The case of two Sudanese banks. *Islamic Economic Studies, 6*(2), 1–24.

Bashir, A. M. (2003). Assessing the Performance of Islamic banks: Some evidence from Middle East. *Islamic Economic Studies, 11*(1), 32–57.

Bateman, M. (2014). The rise and fall of Muhammad Yunus and the microcredit model. *International Development Studies,* 1, 1–36.

Bayraktar, M., Tatar, B., Arkan, A., Bekiryazıcı, E., & Köroğlu, B. (2016). İslam düşünce tarihi. Eskişehir, Turkey: Anadolu Üniversitesi.

Beck, T., Demirgüç-Kunt, A., & Merrouche, O. (2010). Islamic vs. Conventional banking business model, efficiency and stability. *Journal of Banking and Finance, 37*(2), 433–447.

Boyd, J. H., Levine, R., & Smith, B. D. (2001). The Impact of inflation on financial sector performance. *Journal of Monetary Economics,* 47(2), 221–248.

CIBAFI. (2016). *Global Islamic Bankers' Survey, Confidence, Risk and Responsible Business Practices,* Bahrain: CIBAFI.

Cinci, S., & Tarım, A. (2000). Türk banka sisteminde performans ölçümü DEA-Malquist TFP Endeksi uygulaması. *Türkiye Bankalar Birliği, Araştırma Tebliğleri Serisi, 1*, 1–34.

Civan, M. (2015, Ekim). *Yapay sinir ağı ile katilim bankalarinda kar payinin tahmin edilmesi: Türkiye uygulaması.* 19. Finans Sempozyumu'nda sunulan bildiri. Çorum, Turkey.

Çetin, A. (2013). Türkiye'de teminat mektupları: Uygulamalar ve hukuki sorunlar [Letter of guarantees in Turkey: Applications and legal problems]. *Finansal Araştırmalar ve Çalışmalar Dergisi, 5*(9), 67–92.

Er, B., & Uysal, M. (2012). Türkiye'deki ticari bankalar ve katılım bankalarının karşılaştırmalı etkinlik analizi: 2005-2010 dönemi değerlendirmesi. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 26*(3–4), 365–384.

Hardy, L. (2012). The evolution of participation banking in Turkey. Al Nakhlah Online Journal on Southwest Asia and Islamic Civilization. Winter, 1–15.

Haron, S. (2004). Determinants of Islamic bank profitability. *Global Journal of Finance and Economics, 1*(1), 11–33.

Hassan, K. H., & Bashir, A. M. (2003). Determinants of Islamic banking profitability. *Islamic Economic Studiesi, 11*(1), 31 –57.

Hassan, K. M. (2006). The X-efficiency in Islamic banks. *Islamic Economic Studies, 13*(2), 50–78.

İnan, E. A. (2000). Banka etkinliğinin ölçülmesi ve düşük enflasyon sürecinde bankacilikta etkinlik. *Türkiye Bankacılar Birliği Bankacılar Dergisi, 34,* 82–96.

Jill, J., Izzeldin, M., & Pappas, V. (2014). A comparison of performance of Islamic and conventional banks, 2004–2009. *Journal of Economic Behavior & Organization, 103,* 93–107.

Kassim, S. H., Majid, M. S. A., & Yusof, R. M. (2009). İmpact of monetary policy on the conventional and Islamic banks in a dual banking system: Evidence from Malaysia. *Journal of Economic Cooperation and Development, 30*(1), 41–58.

Kaya, Y. T. (2001). *Türk bankacilik sisteminde net faiz marjinin modellenmesi, çalişma raporlari.* Mali Sektör Politikaları Dairesi. Retrieved from https://www.bddk.org.tr/Websitesi/turkce/Raporlar/Calisma_Raporlari/12672001-4.pdf

Khan, M. S. & Mirakhor, A. (1992). *Theotetical studies in Islamic banking and finance. Iran:* İslamic Publications Iternational.

Koç, İ. (2018). Interest rate risk in interest-free banks an empirical research on Turkish participation banks. *Turkish Journal of Islamic Economics, 5*(1), 89–117.

Kumar, D. (2016). Weighted Bootstrap Approach for the Variance Ratio Test. *Theoretical Economics Letters, 6,* 426-431.

Kwon, H. D. (2014). *Simulation and risk analysis.* New York, NY: The McGraw Hill Companies.

Malcıoğlu, G., & Aydın, M. (2016). Borsa İstanbul'da piyasa etkinliğinin analizi: Harvey Doğrusallık Testi [Analysis of market efficiency at Borsa İstanbul: Harvey Linearity Test]. *Journal of Accounting, Finance and Auditing Studies, 2*(1), 112–123.

Mercan, M., & Yolalan, R. (2000). The effect of scale and mode of ownership on the Turkish banking sector financial performance. *The ISE Review, 4*(15), 1–25.

Moukahal, W. (Summer 2011). *The bank industry in the UAE. A Middle East Point of View,* 16–19.

Omar, M. A., Rahman, A. R. A.Yusof, R. M., Majid, M. S. A., & Rasid, M. (2006). Efficiency of Commercial Banks in Malaysia. *Asian Academy of Management Journal of Accounting and Finance, 2*(2), 19–42.

Özgür, E. (2007). *Katılım bankalarının finansal etkinliği ve mevduat bankaları ile rekabet edebilirliği.* (Doktora Tezi). Afyon Kocatepe Üniversitesi Sosyal Bilimler Enstitüsü, Afyonkarahisar.

Parlakkaya, R., & Curuk, S. A. (2011). Using financial ratios to distinguish between participation and conventional banks: A case study of Turkey. *Ege Academic Review, 11*(3), 397–405.

Samad, A. (2004). Performance of interest-free Islamic banks vis-a-vis interested-based conventional banks of Bahrain. *IIUM Journal of Economics and Management, 12*(2), 1–15.

Saraç, M., & Zeren, F. (2015). The dependency of Islamic bank rates on conventional bank interest rates: Furder evidence from Turkey. *Applied Economics, 47*(7), 669–679.

Tunay, K. B., & Silpar, M. (2006). *Türkiye ticari bankacılık sektöründe karlılığa dayalı performans analizi.* İstanbul, Turkey: Türkiye Bankalar Birliği.

List of Appendix

Appendix 1: NIM e-wiews Test Results

Estimation Command:
LS(COV=PERWHITE) D(NIM) C D(CAR) D(TLTD) D(NPL) D(M2D) D(CoR) D(PBTA) D(PBD) D(ETA) D(DTA) D(LTA) PARTIC D(PARTICCAR)

Estimation Equation:
D(NIM) = C(1) + C(2)*D(CAR) + C(3)*D(TLTD) + C(4)*D(NPL) + C(5)*D(M2D) + C(6)*D(CoR) + C(7)*D(PBTA) + C(8)*D(PBD) + C(9)*D(ETA) + C(10)*D(DTA) + C(11)*D(LTA) + C(12)* PARTIC+ C(13)*D(PARTICCAR)

Substituted Coefficients:
D(NIM) = -0.000165235187659 + 0.0099205110239*D(CAR) + 0.00259532626539*D(TLTD) + 0.0980621029013*D(NPL) + 0.0102131270122*D(M2D) - 0.190698511188*D(CoR) + 0.0125241081438*D(PBTA) - 0.00660079120123*D(PBD) + 0.0384593385442*D(ETA) - 0.0106521468136*D(DTA) + 0.00110163949438*D(LTA) - 7.35755808758e-05* PARTIC+ 0.0324966936179*D(PARTICCAR)

Appendix 2: ROA e-wiews Test Results

Estimation Command:
LS ROE C CAR CoR PBL PBTA DI DDTD DTA ROE1 PARTIC PARTICCAR

Estimation Equation:
ROE = C(1) + C(2)*CAR + C(3)*CoR + C(4)*PBL + C(5)*PBTA + C(6)*DI + C(7)*DDTD + C(8)*DTA + C(9)*ROE1 + C(10)* PARTIC+ C(11)* PARTICCAR

Substituted Coefficients:
ROE = -0.329606270832 + 0.659229701857*CAR + 1.0018492452*CoR - 0.0515239062002*PBL + 0.130783050021*PBTA + 0.198124181647*DI + 0.328799602961*DDTD + 0.201563762193*DTA + 0.700625611348*ROE1 + 0.0941553877316* PARTIC - 0.547875289268* PARTICCAR

Appendix 3: ROE e-wiews Test Results

Estimation Command:
LS D(ROE) C D(CAR) D(TLTD) D(NPL) D(M2D) D(CoR) D(PBL) D(PBTA) D(PBD) D(DI) D(ETA) D(DDTD) D(DTA) D(LTA) PARTIC D(PARTICCAR)

Estimation Equation:
D(ROE) = C(1) + C(2)*D(CAR) + C(3)*D(TLTD) + C(4)*D(NPL) + C(5)*D(M2D) + C(6)*D(CoR) + C(7)*D(PBL) + C(8)*D(PBTA) + C(9)*D(PBD) + C(10)*D(DI) + C(11)*D(ETA) + C(12)*D(DDTD) + C(13)*D(DTA) + C(14)*D(LTA) + C(15)* PARTIC + C(16)*D(PARTICCAR)

Substituted Coefficients:
D(ROE) = 0.000245921865719 + 1.0114307583*D(CAR) - 0.0907452221036*D(TLTD) - 0.555561929962*D(NPL) - 0.0245474487795*D(M2D) - 0.504727537807*D(CoR) - 0.0450793613132*D(PBL) + 0.17770798659*D(PBTA) + 0.000309743344156*D(PBD) - 0.116193094091*D(DI) + 0.708873953175*D(ETA) + 0.29743512889*D(DDTD) - 0.105603916179*D(DTA) + 0.0266355171489*D(LTA) - 0.00220609032405* PARTIC + 0.439350750712*D(PARTICCAR)