T.C.

OKAN UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

THE IMPACT OF NON-INTEREST INCOME AND MACROECONOMIC FACTORS ON BANKS' PROFITABILITIES AND DEPOSITS

Hüseyin ÇETİN

PhD.Dissertation

BUSINESS

ADVISOR

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STATEMENT OF ORIGINALITY

I declare that all of the steps in my PhD. thesis are original.

Hüseyin Çetin

07.12.2015

PREFACE

Due to the globalization, financial system is vulnerable to financial risks. In recent years, Turkish banking sector has been growing fast. Since Turkey is emerging country, Turkish financial market is too volatile. Global interest rates had been diminishing. For that reason, net interest margins diminished in Turkish banking industry. Therefore, non-interest income component had more significance compare to the past. In that thesis, non-interest income impact on global banks and Turkish banks' profits will be scrutinized. In addition to that, macroeconomical factors will be discussed. In macroeconomics factors, mainly OPEC oil price and USD/TL parity impact on Turkish bank' deposits will be discussed. In recent years, there is too much volatility on USD/TL parity and that circumstance had serious repercussion on private sector of Turkey. Banking sector development is crucial for Turkey's manufacturing sector development. Thus, it is better to investigate the systematic risk factors of Turkish banking sector. USD/TL parity is very critical for Turkish banking sector. Not only American dollar has significant impact on Turkish banking sector, but also American dollar has significant impact on most of the countries in the world. In addition, OPEC oil prices have significant impact on world economy. In the literature, mainly Islamic banks relations with oil prices was unearthed. Nevertheless, there is gap about the impact of OPEC oil price impact on countries that do not have oil reserves. Since Turkey has huge portfolio investments from oil reserved countries, the impact of OPEC oil prices on Turkish banks will be discussed. Moreover, other macroeconomical factors such as interest rates, inflation rates, net interest margins correlations with Turkish banks' profits will also be discussed. In addition, that thesis indicates that golden ratio techniques can be applied for financial research. Architectural techniques can be used as interdisciplinary tool for financial research.

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ÖZET

Bu çalışmada faiz dışı gelirlerin ve makroekonomik faktörlerin bankaların risk indikatörlerine etkileri kapsamlı bir şekilde yer almaktadır. Araştırma sonuçlarına göre, dünya genelinde, faiz dışı gelirin bankaların aktif getiri oranlarına pozitif ve anlamlı derecede etkide bulundukları görülmektedir. Benzer etki, G7 ülkeleri için de görülmektedir. Buna ek olarak, faiz dışı gelirler, Türkiye'deki bankaların gelirlerini pozitif ve anlamlı şekilde arttırmaktadır. Türkiye'deki bankaların gelirlerine bakıldığında kesikli şekilde altın oran davranışı sergiledikleri görülmektedir. Türkiye'deki bankaların gelirlerinin altın oran davranışları ile Avustralya'daki Sydney Opera Evi'nin altın oran davranışı benzerlik göstermektedir. Bu benzerlik Elliot dalga teorisine dayanmaktadır. Bu durum Türkiye'deki bankaların faiz dışı gelirlerinden kaynaklanmaktadır. Makroekonomik faktörler analiz edildiğinde, 1980-2010 yılları arasında, Amerikan Doları/TL paritesinin Türkiye'deki bankalarının mevduatlarını anlamlı ve pozitif bir şekilde etkilediği gözlemlenmektedir. 2021 yılına kadar tahmin yapıldığı zaman, Amerikan Doları /TL paritesinin tahmin gücünü kaybettiği, OPEC petrol fiyatlarının 2021 yılına kadar Türkiye'deki mevduat artışını tahmin edebileceği gözlemlenmektedir. Buna ek olarak, 2002-2014 yılları arasında Amerikan Doları/TL paritesine pozitif şok uygulandığı zaman, 16 Türk bankası içinden 12 bankanın mevduatlarının geçici şekilde düşüş yaşadığı gözlemlenmektedir. Türkiye'deki mevduatlar genellikle 1 aylık mevduat faizine bağlıdır. Türkiye'deki bankalar kısa sureli mevduat topladıkları için, uzun vadeli kredi vermekte zorluk yaşayabilmektedirler. İlerde petrol fiyatlarının artma olasılığılıyla beraber, Türkiye'deki bankaların daha uzun sureli kredi verebilecekleri beklenmektedir. Amerikan Doları/TL paritesinin volatilesi, Türkiye'deki bankaların likidite yeterliliklerini kısa sureyle düşürmektedir. Pozitif şoklardan sonra bankalar kısa zaman içinde volatile şoklarına karşı direnç göstermektedirler. Türkiye'deki bankaların gelirleri ve topladıkları mevduatlar, Amerikan Doları/TL paritesinin ve OPEC petrol fiyatlarının yanında diğer makroekonomik indikatörlerle de anlamı derecede ilişkileri vardır.

Anahtar Kelimeler: Amerikan Doları/TL paritesi, OPEC petrol fiyatları, faiz dışı gelirler, aktif getiri oranı, altın oran, likidite yeterliliği, mevduatlar.

ABSTRACT

In that thesis, the impact of non-interest income and macroeconomic factors on banks' risk indicators will be scrutinized. According to research results, non-interest income has positive and significant impact on banks' ROA ratios. The same impact is observed for G7 countries. In addition, non-interest income has positive and significant impact on Turkish banks' profits. When Turkish banks' profits analyzed, there is discrete golden ratio behaviour. There is similarity between Turkish banks' profits' golden ratio behaviour and Sydney Opera House' golden ratio behaviour. That resemblance depends upon Elliot Wave Theory. That circumstance derived from Turkish banks' non-interest income. When macroeconomical factors were analyzed, USD/TL parity and OPEC oil prices have significant impact on Turkish banks' deposits between the period of 1980-2010. When out-of sample forecasting is implemented until 2021, USD/TL parity lost its forecasting power; OPEC oil price can forecast Turkish banks' deposits.When positive shock is implemented on USD/TL parity within the years of 2002-2014, 12 banks' deposits(out of 16 Turkish banks) plummetes temporarily. Turkish banks' deposits are mainly dependent upon 1 month deposit rate. Since Turkish banks can collect short term deposits, it is challenging to give long term loans. It is expected that increased OPEC oil price can enable Turkish banks' to give long term loans. USD/TL parity' volatility plummetes Turkish banks' liquidity adequacies for short-term. After positive volatile shocks, Turkish banks' liquidity adequacies are resistant to volatility shocks. Beside USD/TL parity and OPEC oil price, Turkish banks' profits and deposits are significantly related with other macroeconomic indicators.

Keywords: USD/TL parity, OPEC oil price, non-interest income, ROA ratios, golden ratio, liquidity adequacy, deposits

ABBREVATIONS

ARDL   **:** Autoregressive Distributed Lag Model

BVAR   **:** Bayesian Vector Autoregression

CAR   **:** Capital Adequacy Rate

CPI   **:** Consumer Price Index

C-VaR   **:** Credit Value at Risk

GDP   **:** Gross Domestic Product

GMM   **:** Generalized Method of Moments

GMM-TSLS   **:** Generalized Method of Moments- Two Stage Least Square

HP   **:** Hodrick-Prescott

OLS   **:** Ordinary Least Square

OPEC   **:** Organization of Petroleum Exporting Countries

RMSE   **:** Root Mean Square Error

ROA   **:** Return on Assets

ROE   **:** Return on Equities

SDROA   **:** Standard Deviation of Return on Assets

VaR   **:** Value at Risk

VAR   **:** Vector Autoregression

VEC   **:** Vector Error Correction

VECM   **:** Vector Error Correction Model

FIGURE LIST PAGE

PART 1

1. INTRODUCTION

Banking is a significant component of any economy and banking has significant intermediary function to stimulate any economy. Banks are important source of funds for any stakeholder. Banks have been lending to diverse sectors. According to Turkey central bank' database, individual credits accounting for 25% of total credits. Mortgage credits have 10,4% proportion. Car credits have 0.9% proportion. Other individual credits have 9,7% proportion. Credit cards have 4,1% proportion in banking finance. Moreover, wholesale, and retail industries have 13,3% proportion in banking finance. In addition, construction sectors have 7,0% proportion in banking industry total credits. Latest data (February 2013) were retrieved.

Compare to past, advanced financial econometric techniques has been applied to financial companies (Alexander, 2004). Financial risk management explained by the Basel Committee (2001) by four components: Credit, Market, Operational and other risks. By constructing risk models and utilizing data, those risks can be thwarted by senior management (Alexander, 2004). Because of deregulation, money flows led more intensified global markets (Sverrisson and Van Dijk, 2000). Systematic risk is asset value differentiation corresponding with systematic factors. It is sometimes defined as market risk, which is not precise (Alexander, 2004). By its structure, this risk can be prevented; nevertheless can not be wiped out virtually. Systematic risk can be defined as undiversifiable risk. Operational, business and systematic risks have been more crucial for the owners of the high asset sized banking corporations, whose main objective is to diversify international resources in effective way (Alexander, 2004). Market risks and credit risks were most significant risks compare to other risks by financial econometric research. Nonetheless, crucial risk perceptions have been converting (Alexander, 2004).

Adrian and Shin (2008) indicated that financial market collapse and depreciation of financial instruments influenced the balance sheets of financial market members.

Within last 30 years, non-interest income component of banks have been more important globally (Gürbüz,Yanık, Ayturk, 2013). Due to the systematic risks of finance, from the beginning of 2000's, global interest rates diminished. Due to that

circumstance, many banks in the world increased their non-interest income across the world. Since non-interest income is direct result of systematic risk, the impact of non-interest impacts on banks' ROA ratios and profits will be scrutinized.

In that thesis, market risks and non-interest income of banks will be main the focus. By using secondary data, research epistemology will be based upon econometrical techniques. By analyzing past simulations, recommendations will be given for future.

1.1. Research Plan:

In that thesis, there are two important components. First component is non-interest income and second component is macroeconomical components. In the non-interest income section, the impact of non-interest income on banks' profits and ROA ratios will be measured. In part 3, general macroeconomical variables' correlation with Turkish commercial banks' risk indicators will be measured. In addition, the impact of macroeconomical factors on Turkish commercial banks' net income will also be measured. In addition, in part 3, USD/TL parity and OPEC oil prices will be used as main macroeconomical variables. USD/TL parity and Opec oil price impact on Turkish commercial banks' deposits will be scrutinized. Out of sampling analysis for Turkish banks' deposits until 2021 wil be implemented.

Research Questions: For non-interest income, research questions are given.

1) For 205 countries' banks', did non-interest income have positive significant impact on banks' ROA ratios?

2) Was there a significant relation between low', medium', high income countries' non-interest income and ROA ratios between 1999-2013?

3) Did Turkish banks' non-interest income components have significant positive impact on Turkish bank's profits between the period of December 2002- July 2015?

4) Did G7 countries' non-interest income have significant and positive impact on G7 countries' banks' ROA ratios within the period of 1999-2013 and was there a long term relationship between G7 countries' banks' non-interest income and ROA ratios?

Research Questions: For macroeconomical variables, research questions are given.

1) Were Turkey's inflation rates, GDP and interest rates, net interest margins significantly correlated with Turkish banks' ROA ratios between 1999-2013?

2) Did USD/TL parity have significant positive impact on Turkey's commercial banks' deposits for the periods of 1970-2010 and 1980-2010?

3) Did OPEC oil prices have significant positive impact on Turkey's commercial banks' deposits for the periods of 1970-2010 and 1980-2010?

4) Can USD/TL parity forecast the changes of Turkish commercial banks' deposits from 1980 and 2021?

5) Can OPEC oil price forecast the changes of Turkish commercial banks' deposits from 1980-2021?

6) If there is one standard deviation positive shock of USD/TL parity, what will be the responses of 16 Turkish commercial deposits?

7) If there is one standard deviation positive shock of OPEC oil price, what will be the responses of 16 Turkish commercial banks' deposits?

8) Will there be long term relationship between Turkish commercial banks' deposits and USD/TL parity?

9) Did macroeconomical variables such as USD/TL parity, Turkey's interest rates, euribor rates have significant impact on Turkish commercial banks' net income between December 2002- September 2014?

10) What will be the values of Turkish commercial banks' deposits growth rates if there are different scenarios of OPEC oil prices and USD/TL parities between the period of 1980-2010?

11) Will there be long term equilibrium between USD/TL parity and Turkish banks' net income?

12) What will be the response of Turkish banks' liqudity adequacies and equities during the positive shock of USD/TL parity?

13) Did USD/TL parity and OPEC oil price have significant impact on Turkey's banking crises between 1980-2010?

1.2. Data Collection:

In that thesis, research was conducted with secondary data. 16 commercial banks' deposits and net income was retrieved from Turkish Banking Association' Database. Global Financial Development Database was used for Turkish banks's aggregate deposits, 205 countries' non-interest income, ROA ratios. In addition, Turkey's GDP, inflation rates, net interest margins were retrieved from Global Financial Development Database. Moreover, Turkey's monthly deposits rates were retrieved from Turkey Central Bank' database. In addition, Turkish banks' non-interest income and net income was retrieved from BDDK' database. In addition, Turkey's interest rates were retrieved from St.Louis Federal Reserve Database.

1.3. Research Methods:

Advance econometrical, statistical methods and calculus will be used to conduct the research. Ordinary Least Square, Break-Ordinary Least Square, Generalized Method of Moments, Cross Sectional Regression, Vector Autoregression, Bayesian Impulse Response Analysis, Granger Causality Analysis, Johansen Cointegration Test, Vector Error Correction Model, Spearman correlation matrix, Pearson correlation matrix, Robust MM regression analysis, DOLS method, ARDL model, Johansen Fisher Panel Cointegration Method, Panel EGLS method, TAR Model, Hodrick-Prescott Filter, Hierarchical Cluster Analysis, Markov Regime Switching model, Multidimensional Scaling Analysis, Logit Analysis will be applied. In addition, Polynomial Scenario Analysis and Gradient Analysis will also be conducted.

1.4. Hypothesis Tests

A) Hypotheses for Non-Interest Income Section

Hypothesis 1: For 205 countries, non-interest income had significant positive impact on banks' ROA ratios in 2011.

Hypothesis 2: 205 countries' banks' ROA ratios were significantly and positively correlated with 205 countries' non-interest income between the years of 2005-2011.

Hypothesis 3: There was a positive significant correlation between banks' non-interest income and banks' ROA ratios between 1999 -2013.

Hypothesis 3a: There was a positive significant correlation between high income countries banks' non-interest income and ROA ratios between 1999-2013.

Hypothesis 3b: There was a positive significant correlation between medium income countries banks' non-interest income and ROA ratios between 1999-2013.

Hypothesis 3c: There is a positive significant correlation between low income countries banks' non-interest income and ROA ratios between 1999-2013.

Hypothesis 4: Non-interest income had positive significant impact on G7 countries' ROA ratios within the period of 1999-2013 and there is long term relationship between G7 countries' non-interest income and ROA ratios. In addition, there is long term impact of non-interest income on G7 countries' ROA ratios.

Hypothesis 5: Non-interest income of Turkish banks' had positive significant impact on Turkish banks' profits between December 2002- July 2015.

B) Hypotheses for Macroeconomical Factors

Hypothesis 6: Between the period of 1999 and 2013, Turkish banks' ROA ratios were significantly and negatively correlated with Turkey's net interest margins.

Hypothesis 7: Between the period of 1999 and 2013, Turkish banks' ROA ratios were significantly and positively correlated with Turkey's GDP.

Hypothesis 8: Between the period of 1999-2013, Turkish banks' ROA ratios were negatively and significantly correlated with Turkey's interest rates.

Hypothesis 9: Between the period of 1999-2013, Turkish banks' ROA ratios were negatively and significantly correlated with Turkey's inflation rates.

Hypothesis 10: Macroeconomical factors had significant impacts on 16 commercial banks' net income between the period of December 2002- September 2014.

Hypothesis 10a: USD/TL parity had significant impacts on Turkish banks' net income between the period of December 2002- September 2014.

Hypothesis 10b: Fed interest rate had significant impact on Turkish banks' net income between December 2002-September 2014.

Hypothesis 10c: Turkey's interest rates had significant impact on Turkish banks' net income between December 2002- September 2014.

Hypothesis 10d: Euribor which is borrowing rate between European banks had significant impact on Turkish banks' net income between the period of December 2002-September 2014.

Hypothesis 11: When one standard deviation shock given to 1 month, 3 months, 6 months, 12 months deposits, 1 month interest rate shocks is the highest contributor for Turkish banks' deposits' augmentation.

Hypothesis 12: USD/TL parity had significant positive impact on the change of Turkish banks' total deposits.

Hypothesis 12a: USD/TL parity was the significant predictor of Turkish banks' deposits between 1970 and 2010.

Hypothesis 12b: USD/TL parity had significant positive impact on the change of Turkish banks' deposits between 1980 and 2010.

Hypothesis 13: USD/TL parity shock decreased Turkish banks' deposits between the period of December 2002-September 2014.

Hypothesis 14: Opec oil prices had significant positive impact on Turkish banks' total deposits and are significant preditor of Turkish banks' deposits.

Hypothesis 14a: Opec oil prices are significant predictor of Turkish banks' deposits between 1970-2010.

Hypothesis 14b: Opec oil prices had significant impact on Turkish banks' deposits between 1980 and 2010.

Hypothesis 15: Opec oil price shocks significantly increased Turkish banks' deposits.

Hypothesis 15a: Opec oil price shocks increased Turkish banks' deposits between 1970 and 2010.

Hypothesis 15b: Opec oil price shocks significantly increased Turkish banks' deposits between 1980 and 2010.

Hypothesis 15c: Opec oil price shocks increased Turkish commercial banks' deposits between December 2002-September 2014.

Hypothesis 16: There is long term relationship between Turkish commercial banks' net income and USD/TL parity.

Hypothesis 17: There is long term relationship between Turkish commercial banks' net income and USA' federal reserve rates.

Hypothesis 18: There is long term relationship between Turkish banks' net income and euribor rates.

Hypothesis 19: There is long term relationship between Turkish banks' net income and Turkey's interest rates.

Hypothesis 20: USD/TL parity can forecast the Turkish banks' deposits between 1980 and 2021.

Hypothesis 21: OPEC oil prices can forecast the Turkish banks' deposits between 1980 and 2021.

Hypothesis 22: When positive shock implemented on USD/TL parity, Turkish banks' liqudity adequacies and equities plummetes between April 2007- February 2015.

Hypothesis 23: USD/TL parity and OPEC oil prices had significant impact on Turkey's banking crises between 1980-2010.

PART 2

THE CORRELATION BETWEEN NON-INTEREST INCOME AND BANKS' ROA RATIOS & THE IMPACT OF NON-INTEREST INCOME ON BANKS' PROFITS AND ROA RATIOS

2.1. Literature Review

DeYoung and Rice (2004) unearthed a inverse relation between non-interest income and U.S. banks' profits between 1989-2011.

Mercieca et al. (2007) researched about the small capitalized European banks by taking into account income diversification. Inverse relation was diagnosed between non-interest revenue and profits of 755 European small banks for the time span of 1997 – 2003.

Baele et. al. (2007) unearthed a positive relation between European banks' revenue diversification and the market's anticipation on future European banks' net income between the years of 1989-2004.

Lepetit et. al. (2008), unearthed a positive correlation between non-interest income and banks default risk in European banking sector.

Stiroh (2004) observed the relation by utilizing the U.S. banks' data. He unearthed a positive relation between non-interest income and bank default risk indicating that income diversification augmented the default probability between 1970s and 2011.

Chiorazzo et. al. (2008) researched the correlation between income diversification and net income of Italian banks. It was indicated that income diversification could augment Italian banks' returns and that correlation was more prevelant at big-asset sized banks between 1993-2003.

By applying System-Generalized Method of Moment methodology, Gurbuz, Yanık, Ayturk (2013) indicated that non-interest income augmentation significantly rose risk adjusted Turkish banks' profits on assets and risk adjusted profits on equity between the years of 2005-2011.

Sanya and Wolfe (2011) unearthed that income diversification had a positive impact on profits of emerging market banks.

Alper and Anbar (2011) analysed the specific determinants of the banks in Turkey between the time span of 2002 to 2010. They indicated that non-interest income had a positive and significant effect on bank profitability in Turkey.

Busch and Kick (2009) unearthed that higher fee-based income augmented German globalized banks' profits between the period of 1995-2007.

2.2. Non-Interest Revenue Components

Table 2. 1. Types of Non-Interest Revenues

1)**Individual Credits**	1.a)Filing fee
	1.b)Expertise payment
2)**Deposits**	2.a) Account maintenance fee
	2.b) Money withdrawal fee
3)**Money Transfer**	3.a)Electronic fund transfer payment
	3.b) Money order fee
	3.c) Swift fee
4) **Credit Card**	4.a) Annual membership fee
	4.b) Additional card annual membership fee
	4.c) Credit Card Renewal fee
	4.d) Cash Advance Fee
5) **Others**	5.a) Safe Deposit Fee
	5.b) Promotional service fee
	5.c) Bill payment fee
	5.d)Archival research
	5.e) Account query fee
	5.f) Payment to public instutions
	5.g) Payment to third person
	5.h) Subject to approval notice fee

Table 2.1 indicates some of the non-interest income section of Turkish banks. At 2014, BDDK enacted new regulation about Turkish banks' non-interest income fees. BDDK removed some of the non-interest fees. It can be indicated that, due to lower interest spread and high operating expenses, Turkish banks had many types of income

generating service fee. It can be argued that Turkish bank's non-interest income components increased Turkish banks' profits via using non-risky financial instruments.

2.3. Theoretical Framework

Theoretical framework will be based upon **systematic risk theory**. International interest rates such as federal reserve rate, libor, euribor diminished fast. It can be argued that due to the narrowed interest rates , it can be mentioned that, banking sector increased their non-interest income revenues fast.

2.4. Data Descriptions

Independent variables

1) **Turkish banks' Non-Interest Income:** That variable is taken from the BDDK' database. The variable represents Turkish banks' aggregate non-interest income.

2) **Non-Interest Income:** That variable was retrieved from Global Financial Development Database. 205 countries' banks' non-interest income was collected cross-sectionally.

3) **Commercial Loans:** Turkish banks' commercial loans were utilized as control variable. Data were retrieved from BDDK' database.

4) **Personal Loans:** Turkish banks' personal loans were utilized as control variable. Data were retrieved from BDDK' database.

5) **Cost to Income:** That variable were used as control variable. Data were retrieved from Global Financial Development Database.

6) **Credit to Deposits:** That variable were used as control variable. Data were retrieved from Global Financial Development Database.

7) **Banks' Z Scores:** That variable indicates the risk score of the banks. Data were retrieved from Global Financial Development Database. Data were used as control variable.

8) **Private Credits:** That variable represents the special credits that are mainly given to companies. Data were retrieved from Global Financial Development Database. Data were used as control variable.

Dependent variables

9) **Turkish Banks' Profits:** That variable was retrieved from BDDK' database. The variable represents Turkish banks' aggregate profits.

10) **ROA Ratios:** That variable equals to net income/asset. 205 countries cross sectional ROA ratio data were retrieved from Global Financial Development Database. The variable represents each country banks' profitability.

2.5. The Correlation Between Banks' Non-Interest Income and ROA Ratios

2.5.1. The Correlation Between 205 countries Banks' Non-Interest Income and ROA Ratios

Pearson correlation analysis was conducted between 205 countries banks' ROA ratios and non-interest income. Annual data were collected. The time period is 2005-2011.

Table 2. 2. The correlation between 205 countries banks' non-interest income and ROA ratios

Correlation	Correlation coefficient	P value
ROA-NONINT 2005	,324	0,00
ROA-NONINT 2006	,339	0,00
ROA-NONINT 2007	,323	0,00
ROA-NONINT 2008	-,103	,129
ROA-NONINT 2009	,006	,925
ROA-NONINT 2010	,178	0,0009
ROA-NONINT 2011	,301	0,00

According to Table 2.2, it can be indicated that before global financial crisis (2008), there was significant positive correlation between 205 countries bank's ROA ratios and non-interest income. At 2008 and 2009, there were no correlations between 205

countries banks' ROA ratios and non-interest income. At 2010 and 2011, there were significant positive correlations between 205 countries banks' ROA ratios and non-interest income. It can be mentioned that after global financial crisis, interest rate spreads diminished worldwide. In order to increase profit margins, banks increased their non-interest income.

2.5.2. Neighbouring Analysis

Neighbouring Analysis was implemented to unearth the relationship between banks' non-interest income, cost/income ratio , ROA ratios within different cases. At first case, training sample is 155. At second case, training sample 132. Time period is 2005-2011.

Table 2. 3 Case Processing Summary

Case Processing Summary

		N	Percent
Sample	Training	155	75,6%
	Holdout	50	24,4%
Valid		205	100,0%
Excluded		0	
Total		205	

Figure 2. 1. Neighbouring Analysis First Scenario

Select points to use as focal records
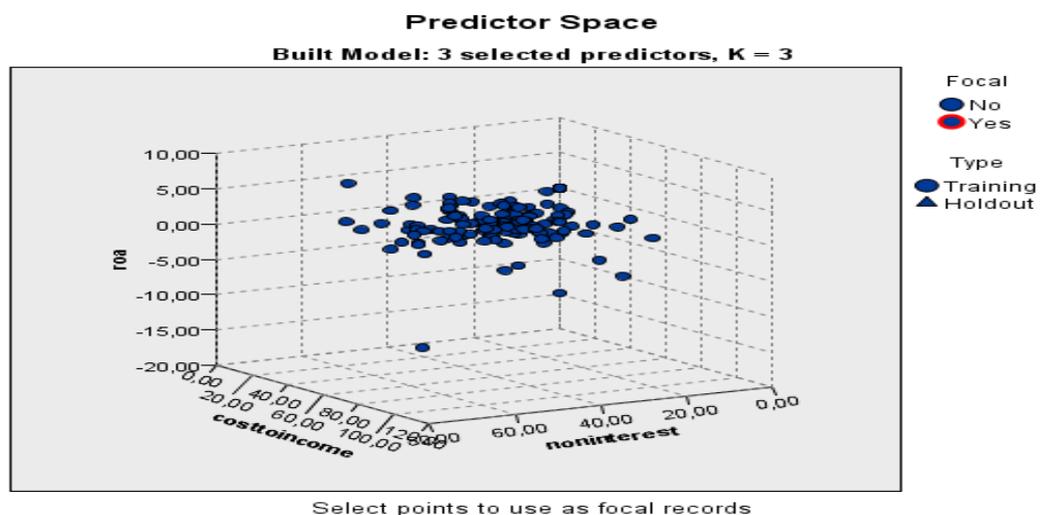
Table 2. 4. Case Processing Summary

Case Processing Summary

		N	Percent
Sample	Training	132	64,4%
	Holdout	73	35,6%
Valid		205	100,0%
Excluded		0	
Total		205	

Figure 2. 2. Neighbouring Analysis Second Scenario
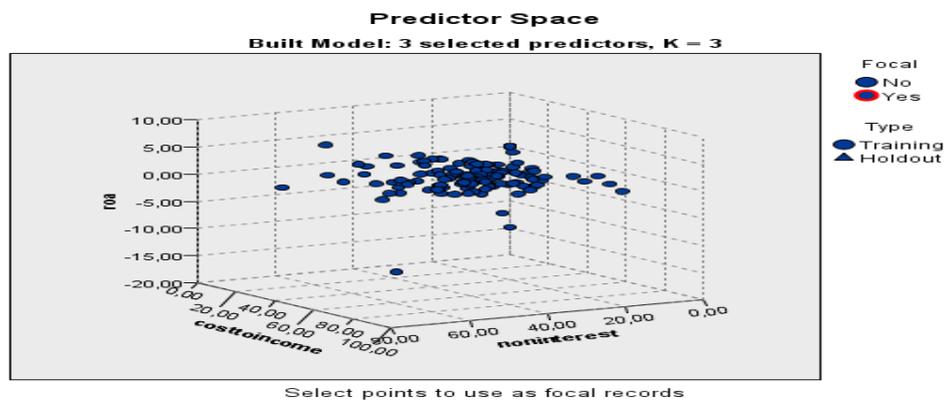
At both cases, relationship structure did not change. When linear line drawn from non-interest income origin point, banks' ROA ratios are increasing within the period of 2005-2011. That finding shows that non-interest income became critical tool to compensate the losses which are derived from increased banking costs globally.

2.5.3. The Correlation Between Low, Medium and High Income Countries' Non-Interest Income and ROA Ratios

According to Spearman correlation analysis (Table 2.5), high income countries' ROA ratios were positively and significantly correlated with non-interest income between the period of 1999-2013. In addition to that, there is no significant result for middle and low income countries between the period of 1999-2013.

Table 2. 5. The Correlation Between Low, Medium and High Income Countries' Non-Interest Income and ROA Ratios

Correlations	Correlation Degree	P value
Low income	,107	,704
Medium income	-,104	,713
High income	,646**	,009

$*$ Correlation is significant at the 0.01 level (2-tailed).

2.6. The Impact of Non-Interest Income on Banks' ROA Ratios

2.6.1. The Impact of Non-Interest Income on 205 Countries Banks' ROA Ratios

For the year of 2011, 205 countries data were collected. Non-interest income impact on banks' ROA ratios were measured for 205 countries' cross sectional dataset. Cross sectional regression method was used in SPSS software.

Table 2. 6. ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	156,434	5	31,287	16,860	,000[b]
	Residual	367,432	198	1,856		
	Total	523,866	203			

a. Dependent Variable: bankroa
b. Predictors: (Constant), zscore, privatecredit, noninterestincome, credittodep, costoincome

According to ANOVA' result (Table 2.6), since p value equals to 0,0; regression analysis can be done.

Table 2. 7. Regression

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	,642	,251		2,553	,011
Costoincome	-,022	,005	-,327	-4,354	,000
Credittodep	,003	,001	,143	2,158	,032
Noninterestin	,040	,006	,461	6,129	,000
Privatecredit	-,011	,002	-,342	-5,158	,000
Zscore	,038	,009	,257	4,136	,000

The regression result given at Table 2.7.

$$Y = C + A1* \text{ COST/INCOME} + A2* \text{ CREDIT/ DEPOSITS} + A3* \text{ NONINTEREST}$$
$$\text{INCOMES} + A4*\text{PRIVATE CREDITS/GDP} + A5* \text{ Z Score} + u_t$$

Cost to income , credit to deposits, private credits and z scores were used as control variables. It was found that for 205 countries' banks', non-interest income had significant positive impact banks' ROA ratios in 2011. Non-interest income's p value was found as 0.0.

2.6.2. The Impact of Non-Interest Income on G7 Countries' Banks' ROA Ratios

In that section panel data analysis will be done. Before embarking Panel EGLS model, Hausman test was applied to find the random or fixed effect.

Table 2. 8. Hausman Test
Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.906239	1	0.3411

According to Hausman Test(Table 2.8), random effect was found for G7 countries' panel data set. After conducting Hausman Test, Panel EGLS method was implemented.

Table 2. 9. Panel EGLS

Dependent Variable: ROA

Method: Panel EGLS (Cross-section random effects)

Date: 11/21/15   Time: 12:52

Sample: 1999 2013

Periods included: 15

Cross-sections included: 7

Total panel (balanced) observations: 105

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.193762	0.277675	0.697801	0.4869
NONINTERESTINCOME	0.010583	0.005767	1.835183	0.0694

According to Panel EGLS test (Table 2.9), non-interest income had significant positive impact on G7 countries' banks' ROA ratios between the period of 1999-2013. In addition to that, according to Table 2.10, when Italy is excluded from G7 countries' panel data set, non-interest income' p value is less than 0.05. Random effect was not lost.

Table 2. 10. Panel EGLS
Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 11/30/15   Time: 02:30
Sample: 1999 2013
Periods included: 15
Cross-sections included: 6
Total panel (balanced) observations: 90
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.118504	0.312806	0.378842	0.7057
NONINTEREST	0.012890	0.006394	2.015970	0.0469

Effects Specification			S.D.	Rho
Cross-section random			0.220016	0.1848
Idiosyncratic random			0.462117	0.8152

Weighted Statistics				
R-squared	0.044512	Mean dependent var		0.340628
Adjusted R-squared	0.033654	S.D. dependent var		0.468061
S.E. of regression	0.460117	Sum squared resid		18.63030
F-statistic	4.099536	Durbin-Watson stat		1.370054
Prob(F-statistic)	0.045926			

Unweighted Statistics				
R-squared	0.103479	Mean dependent var		0.714518
Sum squared resid	21.65236	Durbin-Watson stat		1.191848

2.6.2.1. Unit Root Test

Before embarking Johansen Fisher Panel Cointegration test and Dynamic DOLS model, series have to be at same order. Therefore, unit root analyses was conducted. According to unit root analyses, series are integrated at same order. Series are not stationary at I(0). Series can be stationary at I(1). Therefore, Johansen Fisher Panel Cointegration test and Dynamic DOLS model can be implemented.

Table 2. 11. Unit Root Test of Turkish banks' non-interest income

Panel unit root test: Summary

Series: NONINTEREST

Date: 11/30/15 Time: 13:28

Sample: 1999 2013

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.35923	0.0870	7	91
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.75267	0.2258	7	91
ADF - Fisher Chi-square	16.4714	0.2854	7	91
PP - Fisher Chi-square	23.1359	0.0581	7	98

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Table 2. 12. First difference transformation Turkish Banks' Non-Interest Income

Panel unit root test: Summary

Series: D(NONINTEREST)

Date: 11/30/15   Time: 13:30

Sample: 1999 2013

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.94487	0.0000	7	84
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.77873	0.0001	7	84
ADF - Fisher Chi-square	39.9443	0.0003	7	84
PP - Fisher Chi-square	91.1123	0.0000	7	91

Table 2. 13. Unit Root Test of Turkish Banks' ROA Ratios

Panel unit root test: Summary

Series: ROA

Date: 11/30/15   Time: 13:36

Sample: 1999 2013

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.76145	0.0029	7	91
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.77683	0.0378	7	91
ADF - Fisher Chi-square	23.5093	0.0525	7	91
PP - Fisher Chi-square	26.9673	0.0194	7	98

** Probabilities for Fisher tests are computed using an asymptotic Chi
   -square distribution. All other tests assume asymptotic normality

Table 2. 14. First difference transformation of Turkish Banks' ROA Ratios

Panel unit root test: Summary

Series: D(ROA)

Date: 11/30/15   Time: 21:17

Sample: 1999 2013

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-Sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.28690	0.0005	7	84
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.06977	0.0000	7	84
ADF - Fisher Chi-square	42.1797	0.0001	7	84
PP - Fisher Chi-square	90.4019	0.0000	7	91

** Probabilities for Fisher tests are computed using an asymptotic Chi
    -square distribution. All other tests assume asymptotic normality.

2.6.2.2. Johansen Fisher Panel Cointegration

According Johansen Fisher Panel Cointegration Test, there is long term relationship between G7 countries' non-interest income and ROA ratios. Among G7 panel dataset, it has been found that Germany' and USA' banks non-interest income and ROA ratios are cointegrated (Table 2.15).

Table 2. 15. Johansen Fisher Panel Cointegration

Series: NONINTEREST ROA

Date: 11/30/15   Time: 02:09

Sample: 1999 2013

Included observations: 105

Trend assumption: No deterministic trend

Lags interval (in first differences): 1 1

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	32.13	0.0038	33.95	0.0021
At most 1	8.863	0.8397	8.863	0.8397

Individual cross section results

Cross Section	Trace Test Statistics	Prob.**	Max-Eign Test Statistics	Prob.**
Hypothesis of no cointegration				
France	5.0342	0.5628	4.7982	0.5062
Germany	13.7256	0.0289	13.6715	0.0182
Canada	11.4364	0.0700	10.3487	0.0710
USA	15.4354	0.0146	15.0040	0.0104
UK	10.3458	0.1048	7.9942	0.1748
Italy	5.8665	0.4525	5.7148	0.3833
Japan	9.6625	0.1340	9.6516	0.0934
Hypothesis of at most 1 cointegration relationship				
France	0.2359	0.6855	0.2359	0.6855
Germany	0.0540	0.8489	0.0540	0.8489
Canada	1.0877	0.3455	1.0877	0.3455
USA	0.4314	0.5747	0.4314	0.5747
UK	2.3516	0.1478	2.3516	0.1478
Italy	0.1517	0.7476	0.1517	0.7476
Japan	0.0109	0.9321	0.0109	0.9321

**MacKinnon-Haug-Michelis (1999) p-values

2.6.2.3. Panel Dynamic Least Square(DOLS)

   According to DOLS method with lags 2 and leads 1, non-interest income has long term positive impact on G7 countries' banks' ROA ratios.

Table 2. 16. Panel Dynamic Least Square(DOLS)

Dependent Variable: ROA

Method: Panel Dynamic Least Squares (DOLS)

Date: 11/30/15   Time: 14:11

Sample (adjusted): 2002 2012

Periods included: 11

Cross-sections included: 7

Total panel (balanced) observations: 77

Panel method: Pooled estimation

Fixed leads and lags specification (lead=1, lag=2)

Coefficient covariance computed using default method

Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for

   coefficient covariances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NONINTEREST	0.016024	0.001558	10.28273	0.0000
R-squared	0.502568	Mean dependent var		0.676192
Adjusted R-squared	0.076197	S.D. dependent var		0.521642
S.E. of regression	0.501375	Sum squared resid		14.07709
Long-run variance	0.254767			

2.6.2.4. Multidimensional Scaling of G7 countries

Figure 2. 3. Euclidean Distance Model
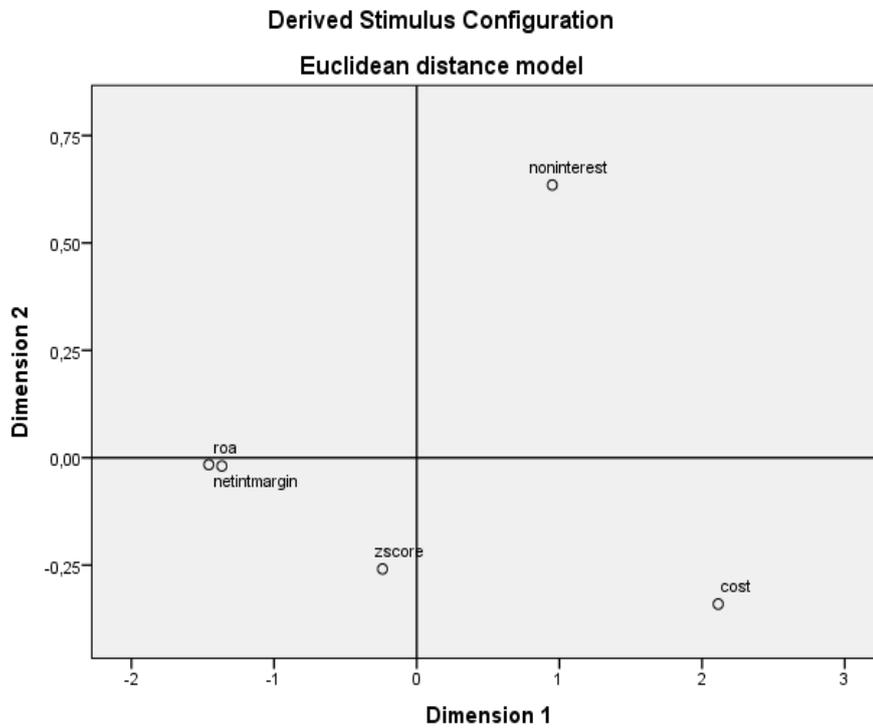
Figure 2. 4. Scatterplot of Linear Fit
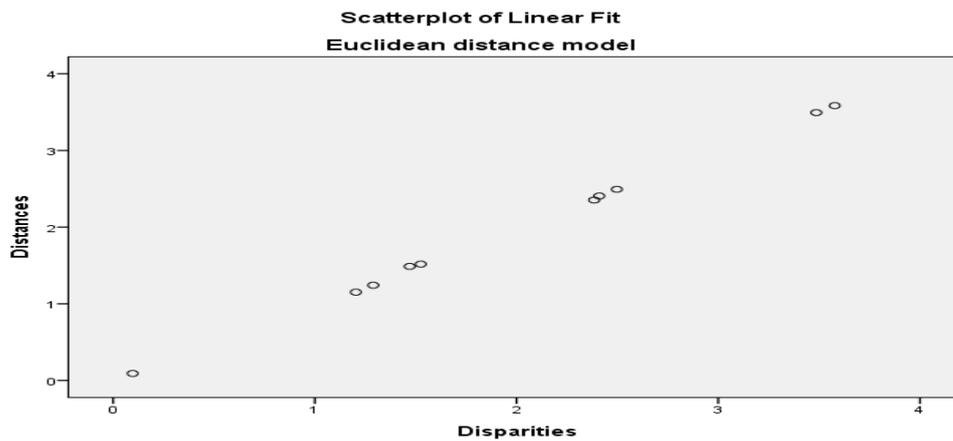
Multidimensional Scaling Analysis was conducted for G7 countries. According to Euclidean Distance Model (Figure 2.3), G7 countries' net interest margins and ROA ratios are closely related. It can be indicated that, diminishing net interest margins led G7 countries' banks' ROA ratios to plummet. Therefore, non-interest income of G7

countries diminished the losses that derived from narrowed net interest margins of G7 countries. In addition, scatter plot of linear fit (Figure 2.4) indicates that forecasts are close to real values. Because there is linear relationship between disparities and distances. Moreover, stress test was also implemented and stress test assumptions are validated with 3 iterations. Therefore, multidimensional scale analysis' prerequisities are validated.

2.7. The Impact of Non-Interest Income on Turkish Banks' Profits

2.7.1. Hodrick-Prescott Filter Analysis of Turkish Banks' Non-Interest Income

Figure 2. 5. Hodrick-Prescott Filter
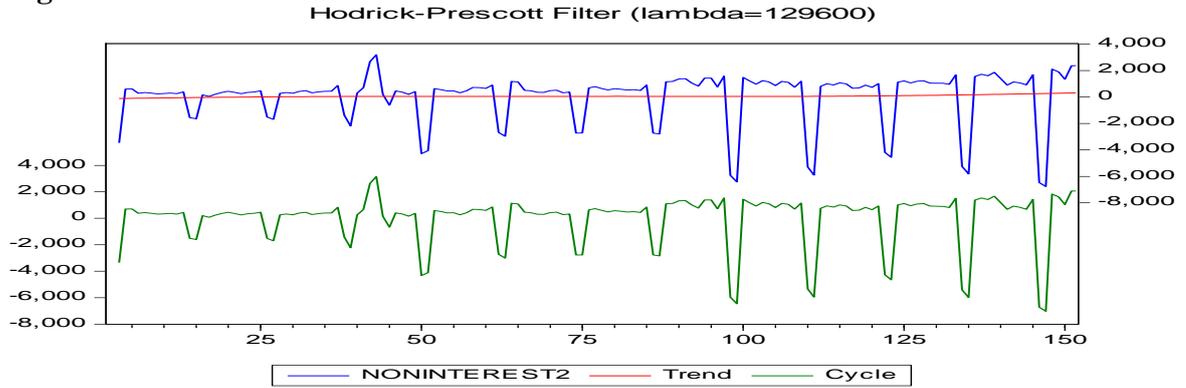
Hodrick Prescott Filter was applied to I(2) series. Since montly data were used, lambda was choosen as 129600. It has been found that, non-interest income of Turkish banks rose fast. Fast increase was evident at latest periods.

2.7.2. Constant Markov Probability Analysis

It can be indicated that when Turkish banks' non-interest income rises, there is %88.1342 probability that non-interest income is positive. In addition, there is %11.8658 probability that Turkish banks' non-interest income component is negative. In addition, when Turkish banks' non-interest income is in crisis period, there is %100 probability that there will be rise in Turkish banks' non-interest income.

Table 2. 17. Transition Matrices Constant Markov Transition Probabilities

Sample (adjusted): 6 152

Included observations: 147 after

adjustments

P(i, k) = P(s(t) = k | s(t-1) = i)

		1	2
All periods	1	0.881342	0.118658
	2	1.000000	7.05E-09

2.7.3. Robust MM TEST

In that section, Robust MM test will be used. Hat Matrix (Figure 2.6) was implemented. It was manifested that outlier points of Turkish banks' non-interest income and Turkish banks' profits increased. Thus, Robust MM test was applied to eliminate outlier point of the datasets. Time span will be December 2002- July 2015.

Figure 2. 6. Hat Matrix
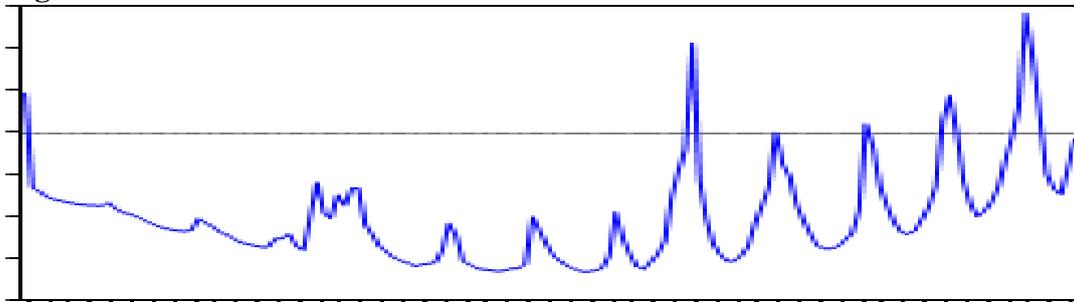
Robust MM-test (Table 2.18) was implemented. It was found that Turkish banks' non-interest income had positive significant impact on Turkish banks' net income for the period of December 2002- July 2015.

Table 2. 18. Robust Regression MM Test

Dependent Variable: D(NETINCOME)

Method: Robust Least Squares

Date: 11/08/15   Time: 22:42

Sample (adjusted): 2003M01 2015M07

Included observations: 151 after adjustments

Method: MM-estimation

S settings: tuning=2.937, breakdown=0.25, trials=200, subsmpl=2,
    refine=2, compare=5

M settings: weight=Bisquare, tuning=3.44

Random number generator: rng=kn, seed=1290843916

Huber Type II Standard Errors & Covariance

D(NONINT)	1.154984	0.105898	10.90657	0.0000

Rw-squared	0.522603	Adjust Rw-squared	0.522603
Akaike info criterion	127.3039	Schwarz criterion	135.4159
Deviance	66730560	Scale	729.5345
Rn-squared statistic	118.9532	Prob(Rn-squared stat.)	0.000000

S.E. of regression	3332.191	Sum squared resid	1.65E+09

2.7.4. OLS Break Regression Test

Table 2. 19. OLS BREAK
Dependent Variable: D(NETPROFIT)
Method: Least Squares with Breaks
Date: 09/06/15   Time: 17:16
Sample (adjusted): 2003M01 2015M07
Included observations: 151 after adjustments
Break type: Bai-Perron tests of 1 to M globally determined breaks
Break selection: Unweighted max-F (UDmax), Trimming 0.15, Max. Breaks
    5, Sig. level 0.05
Breaks: 2004M11, 2007M02, 2009M02, 2010M12, 2012M10
White heteroskedasticity-consistent standard errors & covariances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
2003M01 - 2004M10 -- 22 obs				
D(NONINTERESTINCOME)	1.304486	0.499646	2.610820	0.0100
2004M11 - 2007M01 -- 27 obs				
D(NONINTERESTINCOME)	1.974946	0.374234	5.277303	0.0000
2007M02 - 2009M01 -- 24 obs				
D(NONINTERESTINCOME)	3.958759	0.141621	27.95326	0.0000
2009M02 - 2010M11 -- 22 obs				
D(NONINTERESTINCOME)	4.698081	0.488411	9.619120	0.0000
2010M12 - 2012M09 -- 22 obs				
D(NONINTERESTINCOME)	2.888287	0.033496	86.22773	0.0000
2012M10 - 2015M07 -- 34 obs				
D(NONINTERESTINCOME)	3.681043	0.206729	17.80612	0.0000
Non-Breaking Variables				
C	111.2256	97.78519	1.137449	0.2573
D(PERSONALLOAN)	0.106140	0.028861	3.677628	0.0003
D(COMMERCIALCREDIT)	-0.266887	0.055675	-4.793651	0.0000
R-squared	0.960151	Mean dependent var		82.43046
Adjusted R-squared	0.957906	S.D. dependent var		4773.082
S.E. of regression	979.2793	Akaike info criterion		16.66926
Sum squared resid	1.36E+08	Schwarz criterion		16.84910
Log likelihood	-1249.529	Hannan-Quinn criter.		16.74232
F-statistic	427.6865	Durbin-Watson stat		1.637597

Coefficient-covariance matrix was choosen as HAC. The Kernel was Quadratic
Spectral. Bandwith was choosen as Andrews. For break selection, Global L breaks &

none with unweighted max was used. Turkish bank's personal loans and commercial credits were used as non-breaking variables. According to OLS-Break Regression Test (Table 2.19), non-interest income had significant positive impact on Turkish commercial banks' net income for all breaks of December 2002- July 2015.

2.7.5. TAR Model

According to TAR Model (Table 2.20), for 5 Turkish banks' profits thresholds, Turkish banks' non-interest income had positive significant impact on Turkish banks' profits between the period of December 2002- July 2015. It can be indicated that when Turkish banks' profit rose, coefficient value did not rise similarly. At midst points of Turkish banks' profits, non-interest income' coefficients value are more than the highest threshold value of Turkish banks' profits.

Table 2. 20. TAR MODEL
Dependent Variable: D(PROFIT)
Method: Threshold Regression
Date: 11/28/15   Time: 18:10
Sample (adjusted): 5 152
Included observations: 148 after adjustments
Threshold type: Bai-Perron tests of 1 to M globally determined thresholds
Threshold variable: D(PROFIT(-3))
Threshold selection: Sequential evaluation, Trimming 0.15, , Sig. level 0.05
Threshold values used: 363, 822, 1275, 1704, 1950

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PROFIT(-3)) < 363 -- 23 obs				
D(NONINTEREST)	2.763780	0.582807	4.742189	0.0000
363 <= D(PROFIT(-3)) < 822 -- 22 obs				
D(NONINTEREST)	3.388105	0.257915	13.13653	0.0000
822 <= D(PROFIT(-3)) < 1275 -- 26 obs				
D(NONINTEREST)	1.934428	0.193712	9.986124	0.0000
1275 <= D(PROFIT(-3)) < 1704 -- 30 obs				
D(NONINTEREST)	4.389583	0.198993	22.05893	0.0000
1704 <= D(PROFIT(-3)) < 1950 -- 22 obs				
D(NONINTEREST)	2.850959	0.108696	26.22875	0.0000
1950 <= D(PROFIT(-3)) -- 25 obs				
D(NONINTEREST)	3.369795	0.092946	36.25528	0.0000
R-squared	0.951445	Mean dependent var		99.33784
Adjusted R-squared	0.949735	S.D. dependent var		4815.447
S.E. of regression	1079.614	Akaike info criterion		16.84629
Sum squared resid	1.66E+08	Schwarz criterion		16.96780
Log likelihood	-1240.625	Hannan-Quinn criter.		16.89566
Durbin-Watson stat	1.806993			

2.7.6. Granger Causality Analysis

Granger causality Test (Table 2.21) was implemented for the same time period. With optimal lag length of 1, there is bidirectional relationship between Turkish banks' non-interest income and profits. Not only there is bidirectional relationship for lag 1, but also there are bidirectional relationships between Turkish banks' non-interest income and profits up to 12 lags. Therefore, Turkish banks' non-interest income can be used to forecast Turkish banks' profits.

Table 2. 21. Granger Causality Test

Null hypothesis	Observations	P value	Decision
Non-interest income does not Granger cause profits	150	0.008	Null hypothesis rejected
Net income does not Granger non-interest profits	150	0.022	Null hypothesis rejected

2.7.7. Bayesian Impulse Response Analysis

Bayesian VAR analysis was implemented for the relationship between Turkish banks' non-interest income and profits. Litterman/ Minnesota method was applied with Diagonal VAR estimate. Tightness lambda was adjusted to 1. Figure 2.7. indicates Bayesian Impulse response analysis' result. It has been found that one standard deviation shock of Turkish banks' non-interest income plummeted Turkish banks' profits between the period of December 2002-July 2015. It can be argued that, at some intervals, negative non-interest income abnormalities had serious repercussions on Turkish banks' profits. Non-interest income abnormalities last approximately within 3 months. That result derived from BDDK strict regulation of Turkish banks' non-interest income. Strict regulations can lead Turkish banks' to lose profit for the short term. With advocates advices, management board of Turkish banks' implemented similar non-interest income components with different names. Therefore, banks increased their non-interest income fast. In addition, banks also rolled out different non-interest revenue

components within the scope of BDDK regulations. It can be mentioned that, banks can not linearly increase their non-interest income. Because there is regulation restrictions.

Figure 2. 7. Bayesian Impulse Response Analysis

Response of D(NETPROFIT) to Cholesky
One S.D. D(NONINTEREST) Innovation
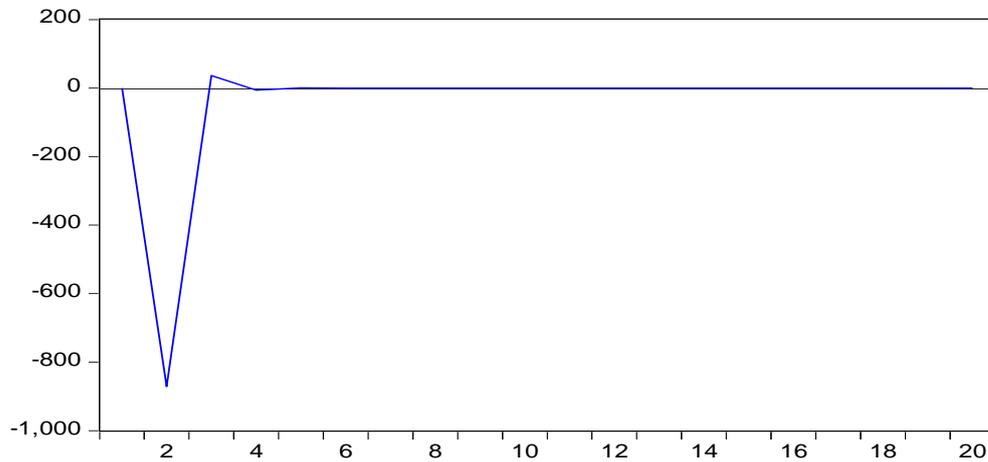
2.7.8. ARDL MODEL

ARDL model was implemented to discern the long term relationship between Turkish banks' non-interest income and profits. In ARDL model, data can be non-stationary. Raw data can be used to measure the long term relationship. Before applying ARDL Bounds test, optimal ARDL model was unearthed. Due to the lowest AIC score, ARDL(1,1) was choosen as optimal model. After choosing optimal ARDL model, ARDL bounds test was applied.

Figure 2. 8. Optimal ARDL Model Selection

Akaike Information Criteria
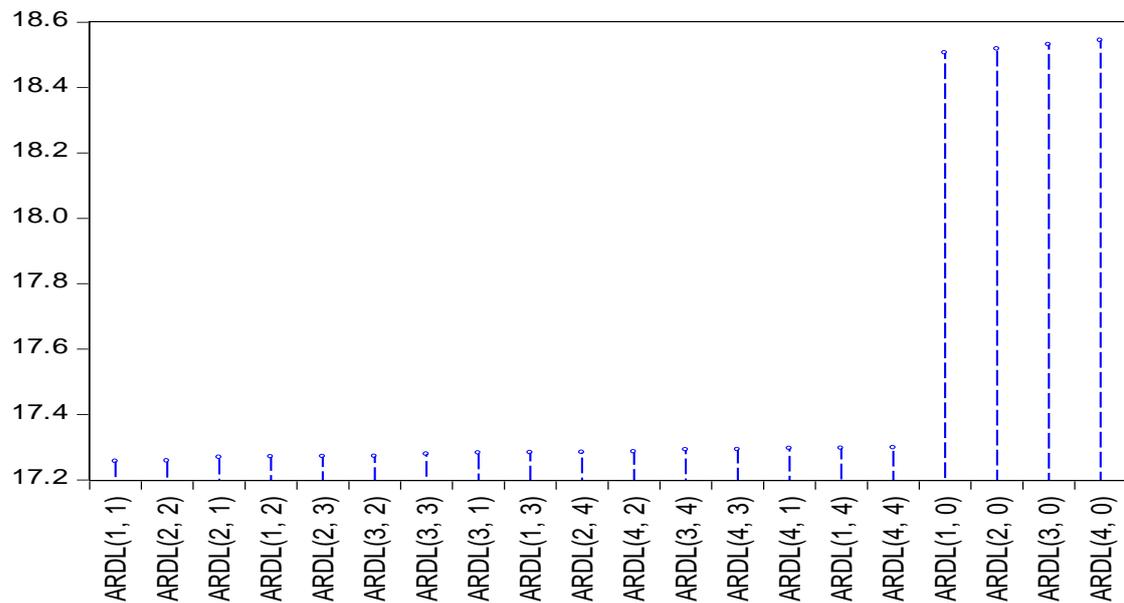
Table 2. 22. ARDL BOUNDS TEST

Date: 11/29/15   Time: 20:36

Sample: 2 152

Included observations: 151

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	7.194781	1

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.44	3.28
5%	3.15	4.11
2.5%	3.88	4.92
1%	4.81	6.02

According to ARDL Bounds Test, F statistics value surpasses the thresholds of the critical ARDL Value Bounds. Since ARDL Bounds Test is satisfactory, ARDL cointegrating and long run form analysis (Table 2.23) was implemented for final step.

Table 2. 23. ARDL Cointegrating Test

ARDL Cointegrating And Long Run Form
Dependent Variable: NETINCOME
Selected Model: ARDL(1, 1)
Date: 11/29/15   Time: 20:37
Sample: 1 152
Included observations: 151

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NONINTEREST)	3.068974	0.081927	37.460003	0.0000
CointEq(-1)	-0.158445	0.042059	-3.767174	0.0002

Cointeq = NETINCOME - (3.0335*NONINTEREST)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
NONINTEREST	3.033506	0.227137	13.355372	0.0000

According to ARDL cointegrating and long run form analysis, it can be indicated that non-interest income will have long term positive significant impact on Turkish banks' profits. Cointegrating equations coefficient sign is negative and its p value is less than 0.05. It can be indicated that there is long term relationship Turkish banks' non-interest income and profits.

2.8. Hierarchical Cluster Analysis of G7 countries and Turkey's non-interest income and ROA ratios

Hierarchical Cluster Analysis (Figure 2.9) was implemented for G7 countries and Turkey's non-interest income and ROA ratios within the period of 1999-2013. It has been found that Germany, Italy, France, USA is in same cluster. Turkey is in different cluster and Japan is in different cluster. UK and Canada is in same cluster. For Japan, non-interest income proportion is the least among the dataset. Since Japan's non-interest income proportion is low, Japanese banks' ROA ratios are much lesser than other countries banks' ROA ratios. UK and Canada's has the highest non-interest income proportion; but UK and Canada' non-interest income proportion has been diminishing. Although, Turkey's non-interest income proportions are much lesser than many

countries non-interest income proportions in G7 data set, Turkey's ROA ratios are much more than other countries in the dataset. Therefore, Turkey is in different cluster.

Figure 2. 9. Dendogram
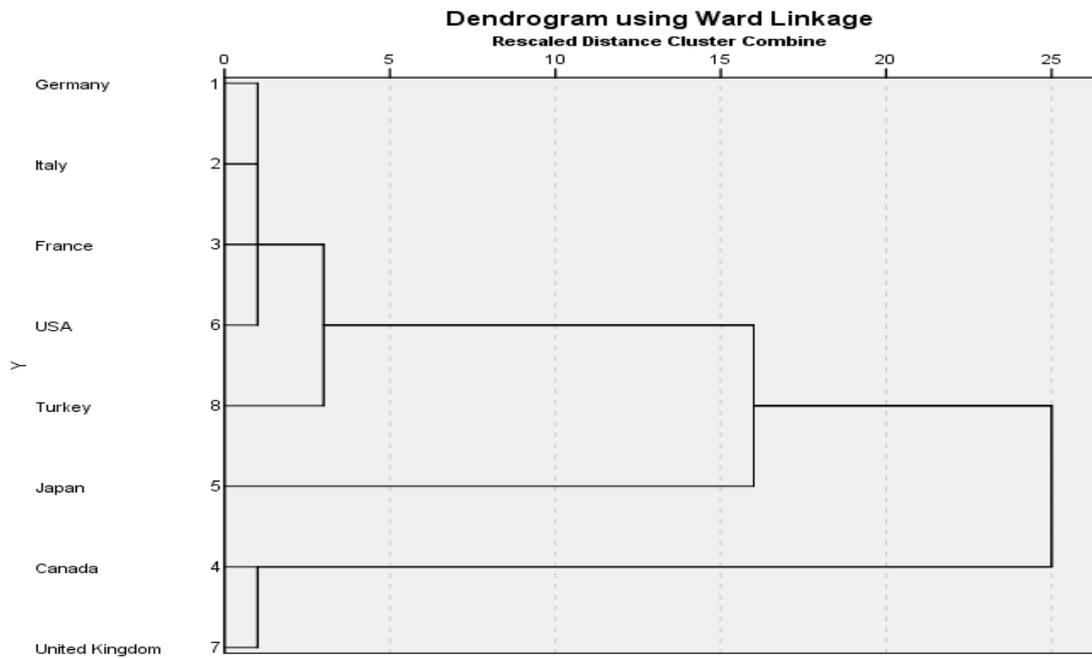
2.9. Hypotheses Confirmation

Table 2. 24. Hypothesis confirmation table

Hypothesis 1: For 205 countries, non-interest income had significant positive impact on banks' ROA ratios in 2011.	**Hypothesis 1 is confirmed**.
Hypothesis 2: 205 countries' banks' ROA ratios were significantly and positively correlated with 205 countries' non-interest income between the years of 2005-2011.	**Hypothesis 2 is partially confirmed. There is no signficant correlation at global financial crisis period(2008-2009).**
Hypothesis 3a: There was a positive significant correlation between high income countries' banks' non-interest income and ROA ratios between 1999-2013.	**Hypothesis 3a is confirmed.**
Hypothesis 3b: There was a positive significant correlation between medium income countries' banks' non-interest income and ROA ratios between 1999-2013.	**Hypothesis 3b is not confirmed.**
Hypothesis 3c: There was a positive significant correlation between low income countries' banks' non-interest income and ROA ratios between 1999-2013.	**Hypothesis 3c is not confirmed.**
Hypothesis 4: Non-interest income had positive significant impact on G7 countries' ROA ratios between 1999-2013 and there is long term positive significant impact of G7 countries' banks' non-interest income on G7 countries' banks' ROA ratios.	**Hypothesis 4 is confirmed.**
Hypothesis 5: The impact of non-interest income had positive and significant impact on Turkish banks' profits between the period of December 2002-July 2015.	**Hypothesis 5 is confirmed.**

Except low income and medium income countries' hypotheses, all other hypotheses are confirmed.

2.10. Literature Confirmation

Table 2. 25. Literature Confirmation

Deyoung and Rice(2004)	1989-2011	Inverse correlation between non-interest income and risk adjusted financial performance of U.S.banks.	There is no similarity with thesis research result.
Stiroh(2004)	1970-2011	Positive correlation between non-interest income and bank default risk.	There is no similarity with thesis research result.
Lepetit(2008)	1996-2002	Positive correlation between non-interest income and bank insolvency risk in Europe.	There is no similarity with thesis research result.
Chiorazzo(2008)	1993-2003	Positive correlation between income diversification and profitability of Italian banks(1993-2003).	There is similarity with thesis research result.
Busch, Kick(2009)	1995-2007	Higher fee-based income could augment risk adjusted returns of German universal banks.	There is similarity with thesis research result.

It can be indicated that research results of thesis corresponds with finance literature.

2.11. Golden Ratio Analysis Of Turkish Banks' Non-Interest Income And Profits & A Special Case: A Proof Of Elliot Wave Theory Existence At Sydney Opera House' Golden Ratio Trends

2.11.1. Elliot Wave Theory

Elliot wave theory was implemented for Golden Ratio Analysis. In Elliot wave theory, there are higher highs and higher lows. That means there are resistant and support points. In finance, discrete Fibonacci series can be detected. Suppose there are three numbers. In Fibonacci series, sum of first two numbers is equal to last number. Fibonacci series are used in Elliot wave theory. Waves are used to detect golden ratio behavior. In Elliot wave theory, there are impulse waves and corrective waves. As can be seen in Figure 2.10, until wave 5, there are impulse waves and after wave 5, there are corrective waves.

Figure 2. 10. Elliot Wave Graph
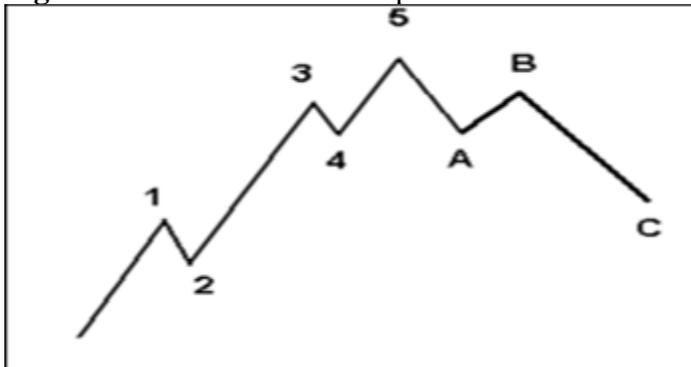
2.11.2. Golden Ratio Analysis on Turkish Banks' Net Income

Figure 2.11. indicates the golden ratio structure. Golden ratio can be found in plants and in design of buildings and many more concepts in nature.

Figure 2. 11. Golden Ratio Structure
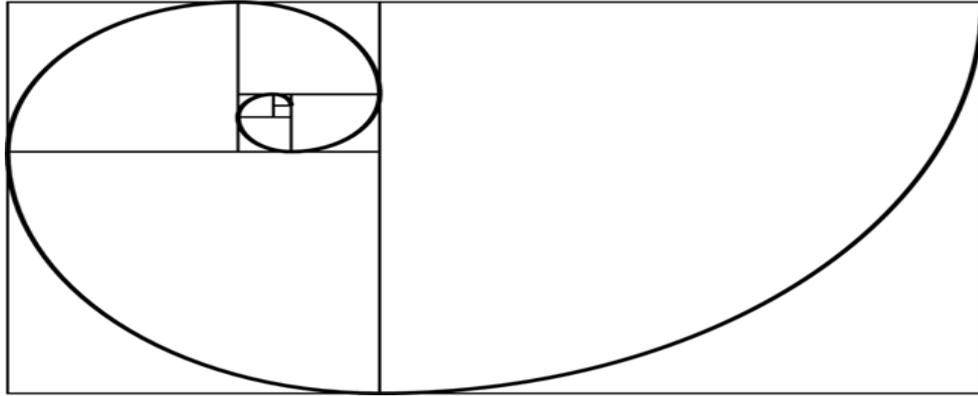
Figure 2. 12. Turkish Banks' Net Income
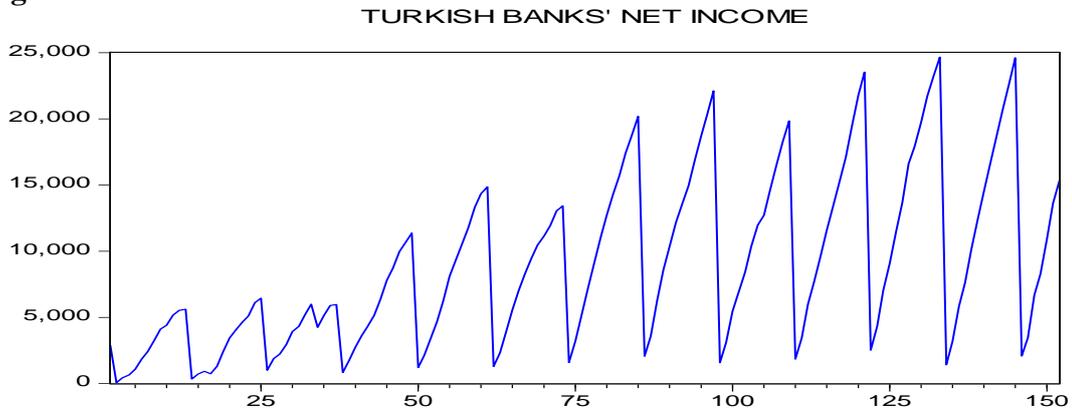
Golden ratio analysis was applied for the period of December 2002- July 2015. It can be interpreted that at some breaks, due to negativity and slight increase of Turkish banks's profits at first 75 months (Figure 2.12.), Turkish banks rose their profits fast by increasing their non-interest income fast. According to Figure V, Fibonacci behaviours and Elliot wave theory can be observed between 60 th and 105 th months. In addition, other Fibonacci behaviour can be observed after 100 months. Moreover, radar plot analysis of Turkish banks' profits and non-interest income had implemented. In web spider graph (Figure 2.13), golden ratio behaviours of series are clearly transperant. Moreover, it can be clearly seen that, Turkish banks' net income is mainly dependant upon non-interest income. It can be indicated that Turkish banks' profits discrete golden ratio behaviours mainly derived from the Turkish banks' non-interest income.

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Figure 2. 13. Radar Plot Graph
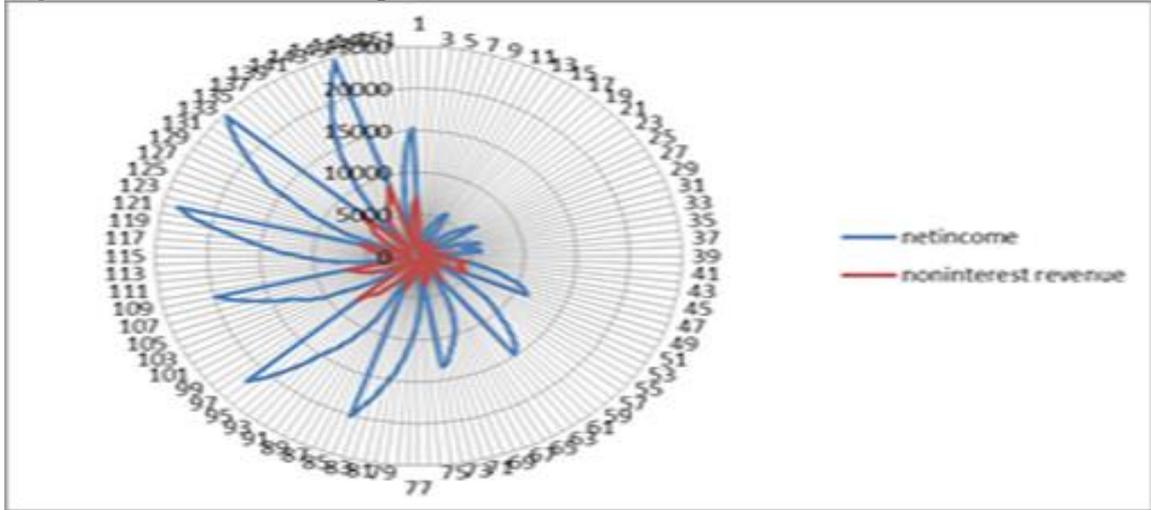
2.11.3. Sydney Opera House' Golden Ratio Trend

Turkish banks' non-interest income and profits have similar golden ratio structure with Sydney Opera House' golden ratio. Golden ratio technique had significant role for Sydney Opera House' design. When left consecutive three sharp surfaces of Sydney Opera House (Figure 2.14.) is analyzed from bottom to top, it can be clearly seen that golden ratio technique was used with "leaned Z trend". In addition, after surface three , there is sudden decrease. First three surfaces from left have impulsive behavior and last surface has corrective behaviour. It can be indicated that Sydney Opera House' architectural technique corresponds with Elliot Wave theory. Similar trends have been found in Turkish banks'profits.

In order to unearth Elliot wave theory at Sydney Opera House, the origin is starting point. The origin point is the ground of Sydney Opera House. Linear line can be drawn from origin point. At sharp surfaces, there is non-linear trend, but when non-linear lines and linear lines intersect, "leaned Z" golden ratio behavior is more evident. When linear drawing is implemented on the non-linear sharp surfaces of Sydney Opera House, Elliot Wave Theory is confirmed. In addition to that, when the minimum point of first surface (from left) is connected with the maximum point of second surface and when minimum point of second surface is connected with maximum point of third surface and when minimum point of third surface is connected with upper part of fourth surface, Elliot wave theory is more evident. It can be indicated that Turkish banks' and Sydney

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Opera House' golden ratio behavior is similar. That result derived from the non-stable movement of Turkish banks' non-interest income.

Figure 2. 14. SYDNEY OPERA HOUSE

Sydney Opera House
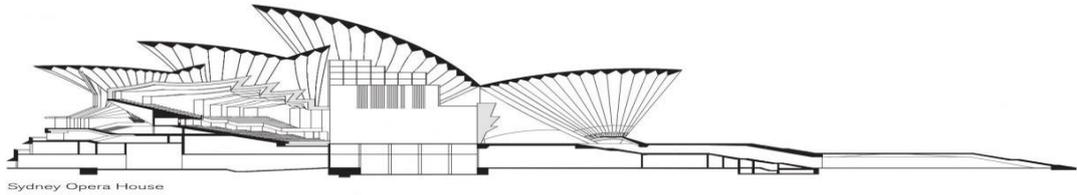
Source: Sydney Living House

PART 3

THE CORRELATION BETWEEN MACROECONOMIC INDICATORS AND TURKISH BANKS' ROA RATIOS & THE IMPACT OF MACROECONOMIC INDICATORS ON TURKISH BANKS' DEPOSITS, PROFITS AND OTHER RISK INDICATORS

3.1. Literature Review

Gul, S. , Irshad, F. and Zaman, K. (2011) researched about the influences of macroeconomical variables on Pakistan banks' profits for the time interval of 2005-2009. Macroeconomical independent variables were determined as GDP, inflation and stock market capitalization. It was found that macroeconomical factors had an important impact on profitability.

By utilizing a balanced panel dataset of Turkish commercial banks over the period of 1990-2005, the analysis showed that ROA ratios were associated with inflation (Atasoy, 2007).

Increased integration of the financial industry has augmented the contagion influence that is fundamental to systematic risk (Rochet and Tirole, 1996).

Athanasoglou, Brissimis, and Delis (2008) unearthed a crucial positive impact of inflation and real interest rate on Greek banks' profits between the periods of 1985-2001.

Banks are fundamentally able to convert interest rates if inflation augments. That circumstance can increase banks' profits(Poghosyan, Hesse, 2009).

Naceur (2003) analyzed the Tunisian banking sector profitability. Result indicated that there was no significant influence of GDP change and inflation rate on 10 high asset sized Tunisian deposit banks.

Mamatzakis and Remoundos (2003) indicated that there was no crucial relation of real interest rate and consumer price index with ROA and ROE of 17 Greek banks within the period of 1989-2000.

Staikouras and Wood (2004) analyzed the net income of European banks for the period of 1994-1998. By applying OLS and fixed effects methodology, they mentioned that interest rate had a crucial positive but augmentation of GDP had crucial negative impact on European banks' ROA ratio.

Goddard, Molyneux and Wilson (2004) analyzed the net income of 583 European Union banks. They found that GDP growth had positive important influence on 583 European Union banks' net income.

Pasiouras & Kosmidou (2007) analysed the commercial banks in 15 Eurozone countries. It has been manifested that macroeconomic conditions are related with ROA between the years 1995-2011.

Ghazali (2008) indicated that GDP and inflation significantly increased the revenue of 60 Islamic banks for 6 years.

Aburime (2008) analyzed the ROA ratio of Nigerian banks with 1255 observations of 154 banks. Aburime (2008) indicated that real interest rate and inflation had a important correlation with Nigerian bank's profits within the period of 1980-2006.

Vong and Chan (2009) observed the five high asset sized banks of Macao. It was unearthed that there was statistically significant influence of inflation on ROA ratios of high asset sized banks of Macao. It was shown that GDP and interest rate showed no influence on five high asset sized banks of Macao between the periods of 1993-2007.

Flamini, McDonald, and Schumacher (2009) indicated that within the time period of 1998-2006, GDP growth had positive crucial influence on banks' credit augmentation in 389 banks in Sub-Saharan Africa.

Ramlall (2009) analysed Taiwanese banking firms and manifested a adverse impact of GDP and real interest rate on Taiwanese banks' profitability between the periods of March 2002-December 2007.

Krakah and Ameyaw, Sallberg (2010) examined the determinants of the net income of deposits banks in Ghana. Results from the study manifested that the ROA of the banks has been very volatile with the banks that have negative profits during some periods within the two decade under study. The study also manifested that annual rate of inflation is crucial determinant of banks' profitability in Ghana.

Alper and Anbar (2011) analysed the macroeconomical components of the banks' profits at Turkey between the time span of 2002 to 2010. Alper and Anbar (2011) indicated that real interest rate influenced the Turkish' banks profits positively.

If the bank fully anticipates the inflation rate, then it can be indicated that banks can adjust its interest rates in order to augment their incomes faster than their outlays and thefore higher markups can exist in banking sector (Perry,1992).

Saksonova and Solovjova (2011) found that GDP growth had significant positive influence on 5 biggest asset sized Latvian banks' profits, and inflation had negative influence on 5 biggest asset sized Latvian banks' profits.

Safarli and Gumush (2012) did a research to indicate the internal & external systematic risks that effect the Azerbaijan banking sector. CAMELS' techqiue was utilized to unearth the banks' performance. Moreover, panel data regression analysis was applied to manifest the determinants of banks earnings. They unearthed that inflation and GDP had negative relationship with Azerbaijan banks' profitability within the period of 2003-2008.

Atif, Shafique, and Razi (2012) used Pakistan exchange rates volatility as dependent variable. It was unearthed that interest rate, inflation, current account deficit and GDP is strongly significantly related with exchange volatility between 2001-2011.

Marcucci and Quagliariello (2008) did a research about the volatile behavior of the distress rates of Italian bank borrowers over the last two decades and indicated that the default rates followed a volatile pattern. The distress rates plummeted in good macroeconomic times and augmented during economic downturns.

Uhde and Heimeshoff (2009) indicated that national banking market concentration has adverse negative influnce on European banks' z score.

By using 18000 annual observations, Delis, Kouretas (2011) indicated a inverse correlation between banks' risks and interest rates. Thus, a low-interest-rate financial environment virtually augments risk-related banks' assets and convert Eurozone bank' portfolios toward a more risky position in the period of 2001-2008.

By applying OLS and GARCH model, Kasman, Vardar, Tunc (2011) indicated that interest rate and exchange rate changes had crucial negative impact on Turkish banks' stock return. It was also indicated that interest rate and exchange rate volatilities are significant components of Turkish banks' stock return volatility.

3.2. Systematic Risk Theory

In finance literature, there are systematic risk and non-systematic risks. Non-systematic risk is diversifiable. Nevertheless, systematic risk is not diversifiable. Macreconomical variables are part of systematic risk theory. Macreconomical variables can augment Turkish banks' profits. In addition, macroeconomical variable may have serious repercussions and can create tail risks for Turkish banks' profits.

3.3. Data Descriptions

A) Independent Variables

1) **Turkish Banks' Z Score:** That variable indicates the risk score of Turkish banks. That variable was retrieved from Global Financial Development Database.

2) **Turkey's Net Interest Rate Margin:** Net interest margin represent the difference between banks' interest income and banks interest payment to depositors. That variable was retrieved from Global Financial Development Database.

3) **Turkey's CPI:** That variable indicates Consumer Price Index. That variable was retrieved from Global Financial Development Database.

4) **Turkey's Interest Rate:** That variable was retrieved from Global Financial Development Database.

5) **Turkey's GDP :** Turkey's GDP was retrieved from Global Financial Development database. It is the representation of (Consumption+ Investment+ Goverment Expenditure + Export-Import)

6) **Turkey's Monthly Deposits Rates (1, 3, 6, 12 months):** That variable was retrieved from Turkish Central Bank Database. It was just used with Turkish commercial banks' deposits.

7) **Euribor:** Euribor is the reference interest rate that is determined by European Union Central Bank. That variable was retrieved from St.Louis Federal Reserve Database.

8) Federal Reserve Rate: Federal reserve is global interest interest which is determined by the USA' Federal Reserve. That variable was retrieved from St.Louis Federal Reserve Database.

9) USD/TL Parity: USD/TL parity was retrieved from St.Louis Federal Reserve Database.

B) Dependent Variables

1) ROA Ratio: That variable represent Net Income/ Asset. Turkey's ROA ratios were retrieved from Global Financial Development Database. That variable is used with Turkey's GDP, interest rates, net interest margin, Z score. The variable was retrieved from Global Financial Development Database.

2) Turkish Banks' Net Income: That variable was used with USD/TL parity, euribor rates, Turkey's interest rates. The variable was retrieved from Turkey Banking Association Database.

3) Turkish Commercial Banks' Deposits: That variable was used with Turkish banks' monthly deposit rates. Data were retrieved from Turkey Banking Association Database.

3.4. The Correlation Between Macrovariables and Turkish Banks' ROA ratios

It has been known that, due to the systematic risk, Turkey's interest rate diminished since 2002. During 1990's and beginning of 2000's interest rates were around %58. At 2001 crisis, interest rates peaked to %7000. After 2001 banking crisis, Turkey had "V" type economic growth, interest rates diminished.

Table 3. 1. Correlations

Correlations

			Roa	Zscore	İntmargin
Spearman's rho	Roa	Correlation Coefficient	1,000	,889[**]	,482
		Sig. (2-tailed)	.	,000	,069**
		N	15	15	15
	Zscore	Correlation Coefficient	,889[**]	1,000	,354
		Sig. (2-tailed)	,000	.	,196
		N	15	15	15
	İntmargin	Correlation Coefficient	,482	,354	1,000
		Sig. (2-tailed)	,069	,196	.
		N	15	15	15

According to Table 3.1' results, Turkish banks' ROA ratios are significantly and negatively correlated with Turkey's net interest rate margins between 1999 and 2013. It can be indicated that narrowed interest rates margins have important contribution for Turkish banks' ROA ratios. Moreover, it can be argued that, due to the narrowed net interest margins, Turkish banks' have been increasing non-interest income fast to compensate the losses which were derived from narrowed interest rate margins.

Table 3. 2. Correlations

			Zscore	Roa	Cpı	Gdp	İnt
Spearman's rho	Zscore	Correlation Coefficient	1,000	,890[**]	,390	,363	-,404
		Sig. (2-tailed)	.	,000	,188	,223	,171
		N	13	13	13	13	13
	Roa	Correlation Coefficient	,890[**]	1,000	,247	,176	-,294
		Sig. (2-tailed)	,000	.	,415	,566	,329
		N	13	13	13	13	13
	Cpı	Correlation Coefficient	,390	,247	1,000	,940[**]	-,966[**]
		Sig. (2-tailed)	,188	,415	.	,000	,000
		N	13	13	13	13	13
	Gdp	Correlation Coefficient	,363	,176	,940[**]	1,000	-,889[**]
		Sig. (2-tailed)	,223	,566	,000	.	,000
		N	13	13	13	13	13
	İnt	Correlation Coefficient	-,404	-,294	-,966[**]	-,889[**]	1,000
		Sig. (2-tailed)	,171	,329	,000	,000	.
		N	13	13	13	13	13

According to (Table 3.2) results, Turkey's interest rates, GDP and inflation did not have significant correlation with Turkish banks' ROA ratios between the period of 1999-2013. As it was mentioned in previous part, non-interest income and diminished net interest margins led Turkish banks' profits to increase.

3.5. The Impact of Macrovariables on Turkish Banks' Profits

16 Turkish commercial banks's total incomes was retrieved and macroeconomical factors was retrieved to form hypotheses for 16 banks. In that section, the impact of macroeconomical factors on Turkey's commercial banks' net income will be measured. Data span will be December 2002- September 2014. Quarterly data were used. Thus, 4 lags will be used. Hierarchical Multiple Linear Regression analysis will be applied.

Table 3. 3. Hierarchical Multiple Linear Regression Analysis

	Vakıflar	Akbank	Isbank	Burgan	Arapturk	Anadolu	Seker	Turkish
int-2							(+)	
int-3					(-)			
int-4	(+)							
Eur				(+)				
eur-1			(-)					
eur-3		(-)						
eur-4					(+)	(+)	(+)	
tlus-1								(-)
tlus-3				(+)	(+)			
tlus-4				(+)	(+)	(+)		

In **Table 3.3** , int represents Turkey's interest rates. Eur represents euribor which is European Union banks's borrowings interest rate. Tlus represents United States Dollar- Turkish lira parity. Numbers near variables represent lag number. Since quarter data were used, lag numbers were used up to 4 lags. (+) represents positive significant coefficient. (-) represents negative significant coefficient. Since there is no finding, other 8 banks were not placed into the **Table 3.3.** Dependent variables are 16 Turkish commercial bank's net income. Independent variables are Turkey's interest rates, Euribor rates and USD/TL parity. Data were normally distributed. There is no heteroskedasticity problem. All OLS regression assumptions are validated.

The results of hierarchical multiple linear regression test findings are as follows.
Vakıfbank: Fourth lag of Turkey's interest rate increased Vakıfbank' net income significantly between December 2002-September 2014.
Akbank: When third lag of euribor decreases, Akbank' net income increases. It can be indicated that interest rates diminished at European Union financial markets, therefore Akbank had lower cost of syndication credit. According to interest rate parity theory, Turkish lira will depreciate against Euro. Because Turkish lira interest rate is more than Euro interest rate. When Turkish lira depreciated against foreign currencies, Turkish central bank increased interest rates to stimulate capital flows to Turkish economy. When EU interest rate declines, Akbank had low cost of credit. That caused Akbank's profit margins to increase between December 2002- September 2014.

Is Bank: When first lag of Euribor diminishes, Isbank'profit increased. Because Isbank had lower cost of credit. That circumstance increased Is Bank' profit margins between December 2002-September 2014.

Burgan Bank: When Euribor increased, Burgan Bank' profits rised. Third lag and fourth lag of USD/TL parity had significant positive impact on Burgan Bank' net income between December 2002-September 2014.

Arapturk Bank: Third lag of interest rate increase had negative significant impact on Arapturk Bank' net income. Fourth lag of euribor had significant positive impact on Arapturk Bank's net income between December 2002-September 2014.

Anadolu Bank: Increased 4 th lag of Euribor rate and USD/TL parity had significant positive impact on Anadolubank's net income between December 2002-September2014.

Seker Bank: Turkey' second lag interest rate had significant postive impact on Sekerbank's net income. Moreover, fourth lag of euribor had positive significant impact on Sekerbank's total income between December 2002-September 2014.

Turkish Bank: First lag of USD/TL parity had significant negative impact on Turkish bank' net income between December 2002-September 2014.

3.6. Responses of Turkish Commercial Banks' Deposits During Monthly Deposit Rates Shocks

3.6.1. National Income Accounting Theory

In national income accounting, equation is given like that.

Income = consumption + import + savings   **(1)**

Output = consumption + export + investment   **(2)**

Income = output   **(3)**

Investment-Saving=Import-Export   **(4)**

Since Turkey's import rates are higher than export rates, investment rates are higher than saving rates. For that reason, state and household is in debt burden. Turkish households do not have sustainable savings on banks. With respect to that equation, it can be indicated that 1 month deposit interest rate contributes Turkish commercial bank's deposits more than the 3, 6, 12 months' interest rates contribution on Turkish commercial banks' deposits.

3.6.2. Impulse Response Analysis

Banks in Turkey have 1 month, 3 months, 6 months, 12 months time deposit packages for their customers. Since interest rates are dynamic, customer deposits will change fast and banks can not force their customers to withdraw their deposits after predetermined time. In the methodology section, impulse response analysis will be applied to find the highest monthly time deposit contributor to 16 commercial banks total deposits.

Impulse Response Analysis was conducted to unearth the highest monthly deposit rate contributor for 16 commercial bank's deposits. BVAR analysis conducted. Optimal lag length for 16 commercial banks is 1. Time span is December 2002-September 2014.

(^{1}) Monthly deposits rates were retrieved from Turkey Central Bank' Database.

Table 3. 4. Impulse Response Analysis

Monthly deposits rates comparison	Highest deposit contributor(interest rate)
Akbank	1 month
Anadolubank	1 month
Alternatifbank	1 month
Turkey Ekonomi Bank	1 month
Garantibank	1 month
Turkishbank	1 month
Sekerbank	1 month
Tekstilbank	3 month
Vakıfbank	1 month
Burganbank	1 month
ArabTurkbank	1 month
Isbank	1 month
ING	1 month
Denizbank	1 month
Finansbank	3 month
HSBC	1 month

According to Table 3.4, one month deposits rate is highest contributor for 14 Turkish commercial banks.

Figure 3. 1. Akbank-BVAR

Response of D(AKBANK) to Cholesky
One S.D. Innovations
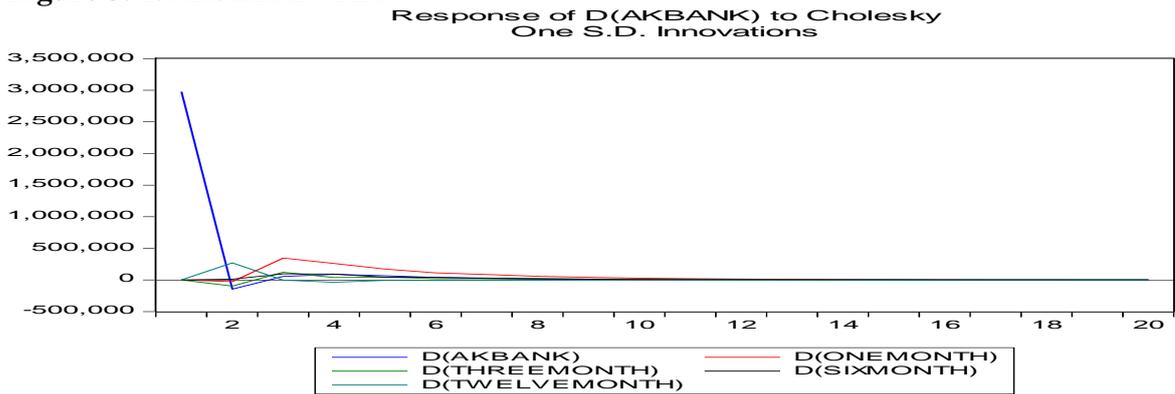
According to impulse response analysis (Figure 3.1), between December 2002-September 2014, one month interest rate is highest contributor for Akbank's deposits.

Figure 3. 2. Alternatifbank-BVAR

Response of D(ALTERNAT) to Cholesky
One S.D. Innovations
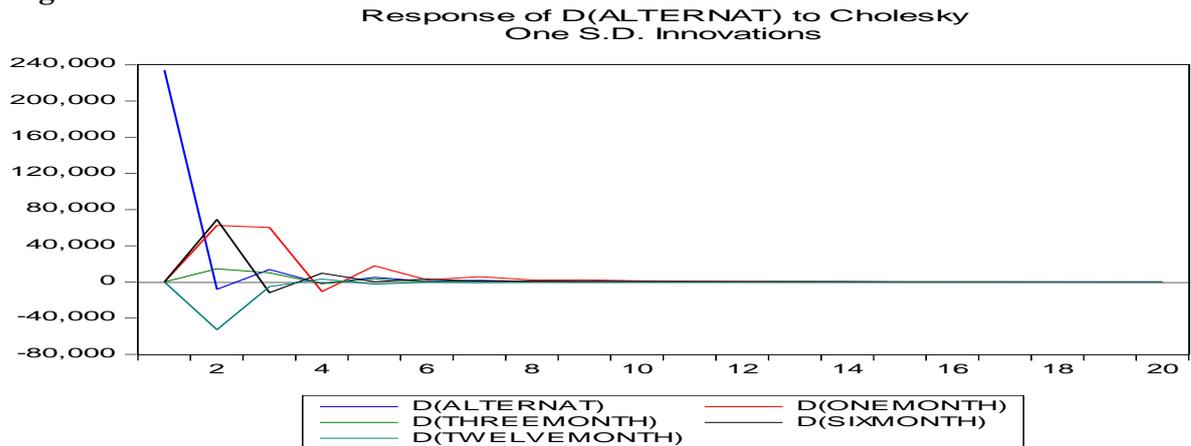
According to impulse response analysis (Figure 3.2), between December 2002-September 2014, 1 month interest rate is the highest contributor for Alternatif Bank's deposits.

Figure 3. 3. Anadolubank-BVAR

Response of D(ANADOLUB) to Cholesky
One S.D. Innovations
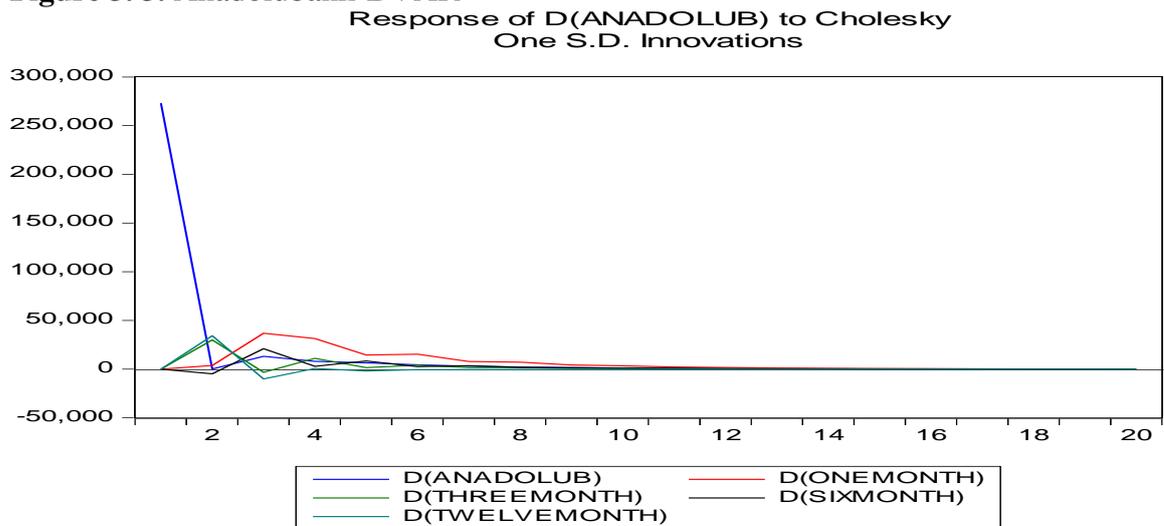
According to impulse response analysis (Figure 3.3), between December 2002-September 2014, one month interest rate is the highest contributor for Anadolu Bank's deposits.

Figure 3. 4. Arabturkbank-BVAR

Response of D(ARAPTURK) to Cholesky
One S.D. Innovations
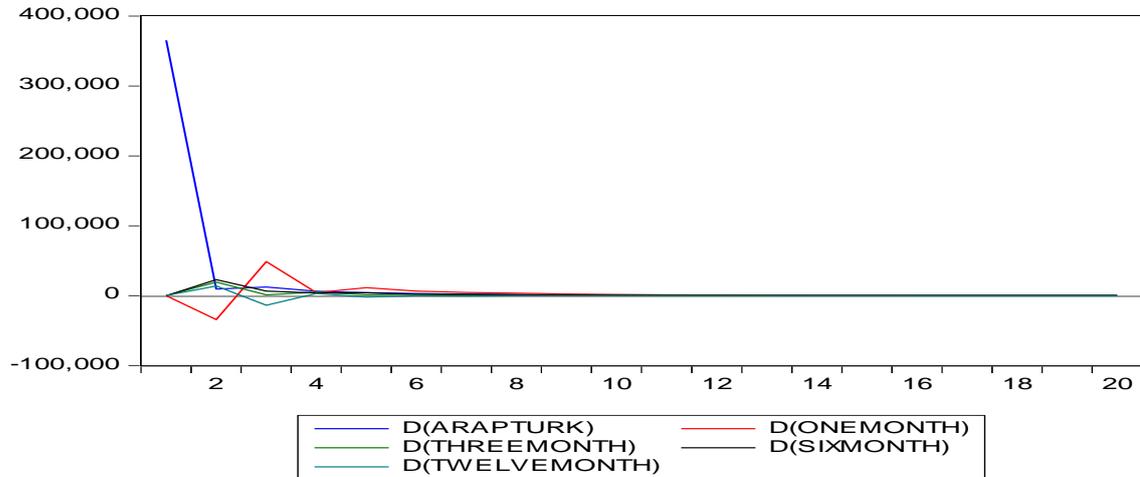
According to impulse response analysis (Figure 3.4), between December 2002-September 2014, one month interest rate is highest contributor to ArabTurk Bank's deposits.

Figure 3. 5. Burganbank-BVAR

Response of D(BURGANBA) to Cholesky
One S.D. Innovations
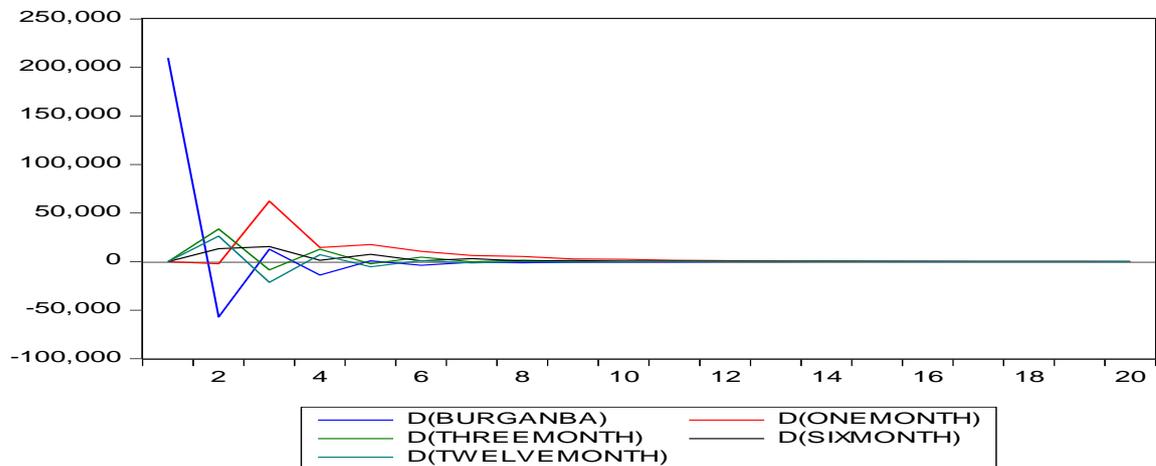
According to impulse response analysis (Figure 3.5), between December 2002-September 2014, one month interest rate is the highest contributor for Burgan Bank's deposits.

Figure 3. 6. Finansbank-BVAR

Accumulated Response of D(FINANSBA) to Cholesky
One S.D. Innovations
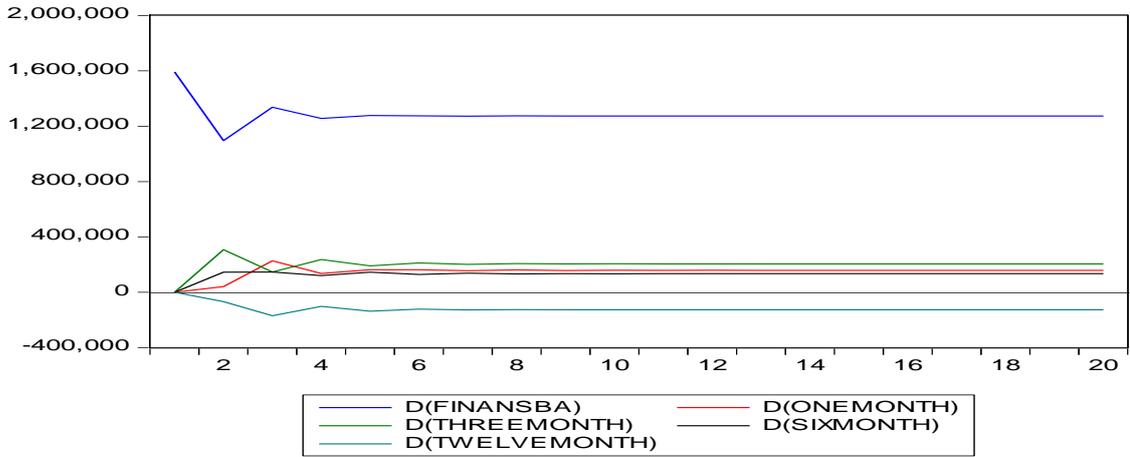
According to impulse response analysis (Figure 3.6), between December 2002-September 2014, three month deposit interest rate is the highest contributor for Finans Bank's deposits.

Figure 3. 7. Garantibank-BVAR

Response of D(GARANTIB) to Cholesky
One S.D. Innovations
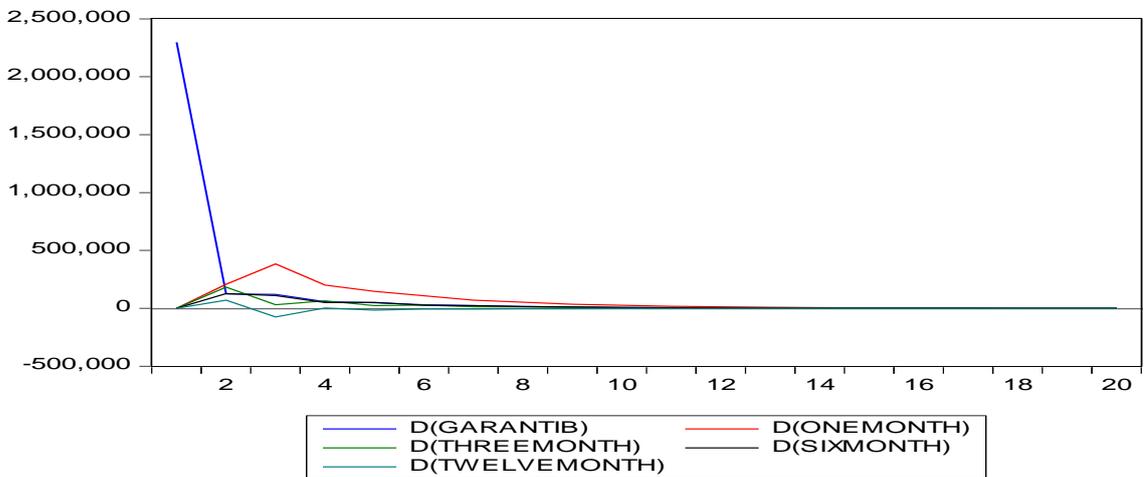
According to impulse response analysis (Figure 3.7), between December 2002-September 2014, one month interest rate is the highest contributor to Garanti Bank's deposits.

Figure 3. 8. HSBC-BVAR

Response of D(HSBCBANK) to Cholesky
One S.D. Innovations
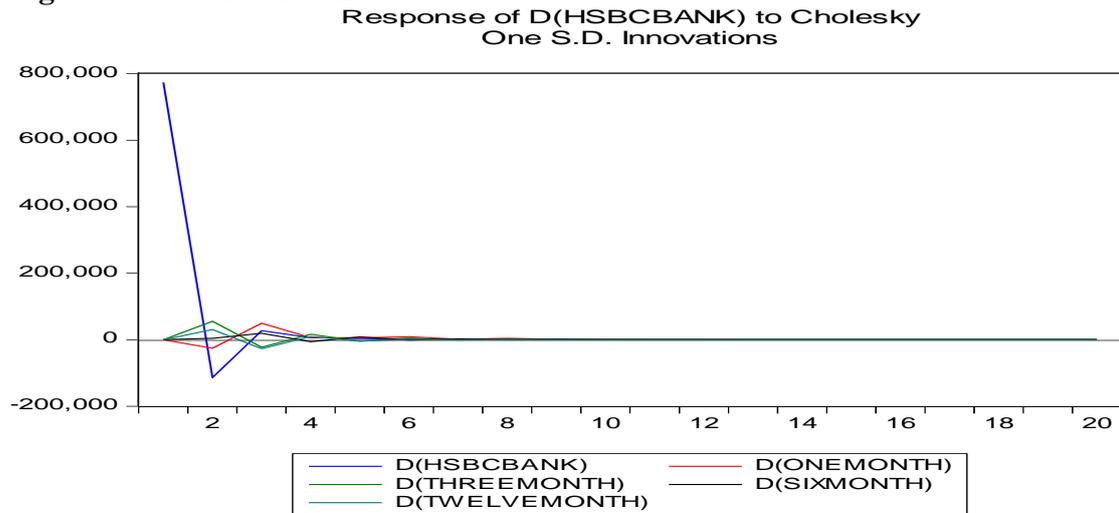
According to impulse response analysis (Figure 3.8), between December 2002-September 2014, one month interest rate is the highest contributor for HSBC bank's deposits.

Figure 3. 9. ING-BVAR

Accumulated Response of D(ING) to Cholesky
One S.D. Innovations
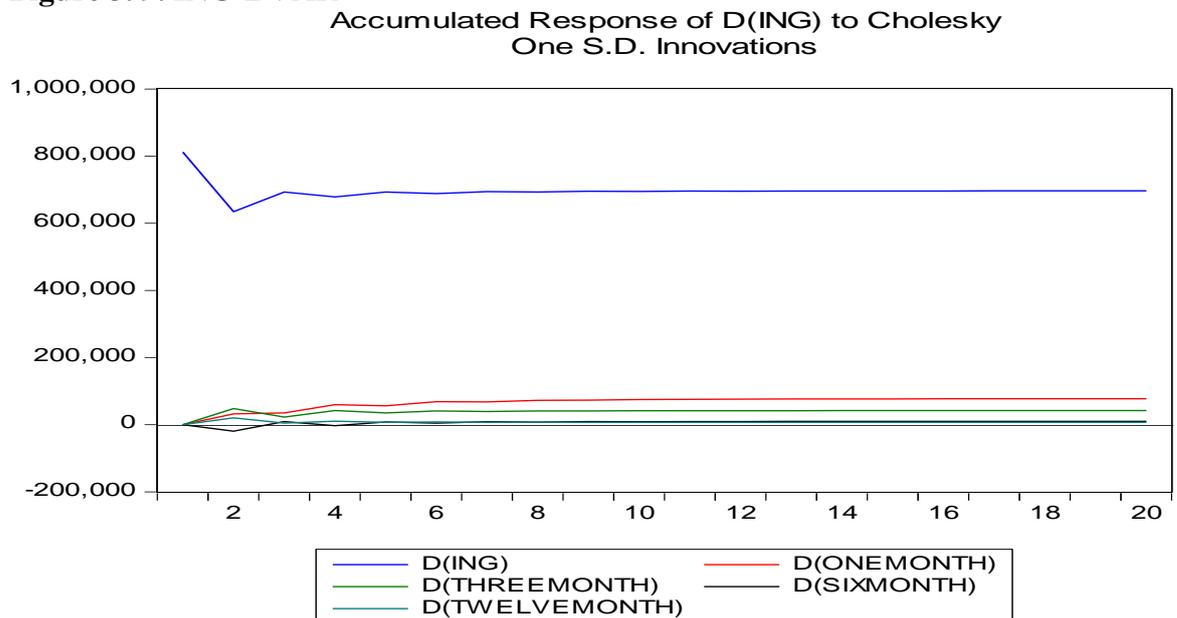
According to impulse response analysis (Figure 3.9), between December 2002-September 2014, one month interest rate is the highest contributor for ING's banks deposits.

Figure 3. 10. Isbank-BVAR

Response of D(ISBANKAS) to Cholesky
One S.D. Innovations
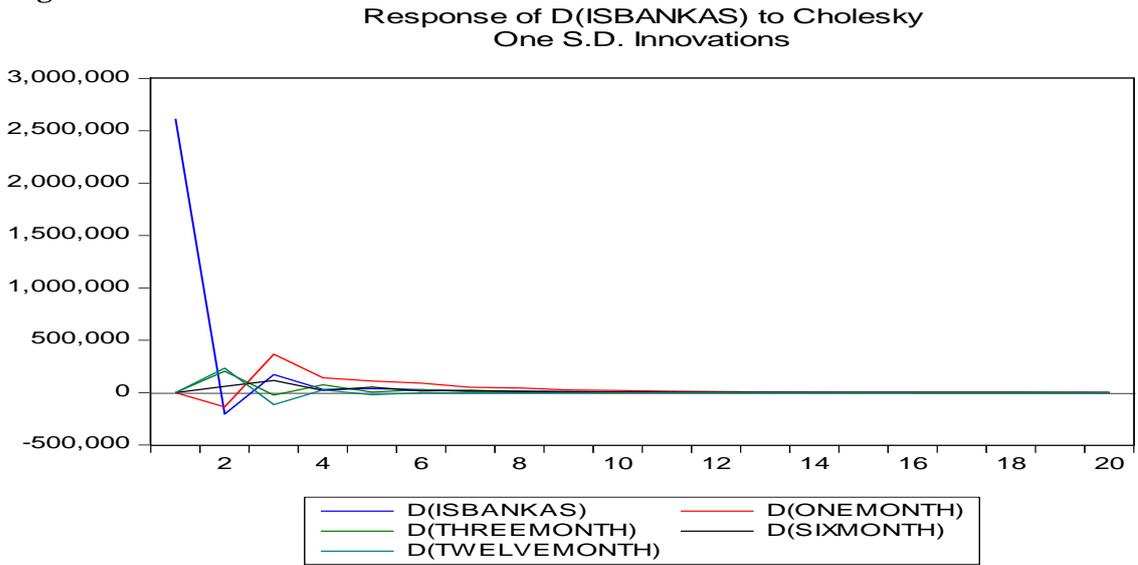
According to impulse response analysis (Figure 3.10), between December 2002-September 2014, one month interest rate is the highest contributor for Is Bank's deposits.

Figure 3. 11. Sekerbank-BVAR

Response of D(SEKERBAN) to Cholesky
One S.D. Innovations
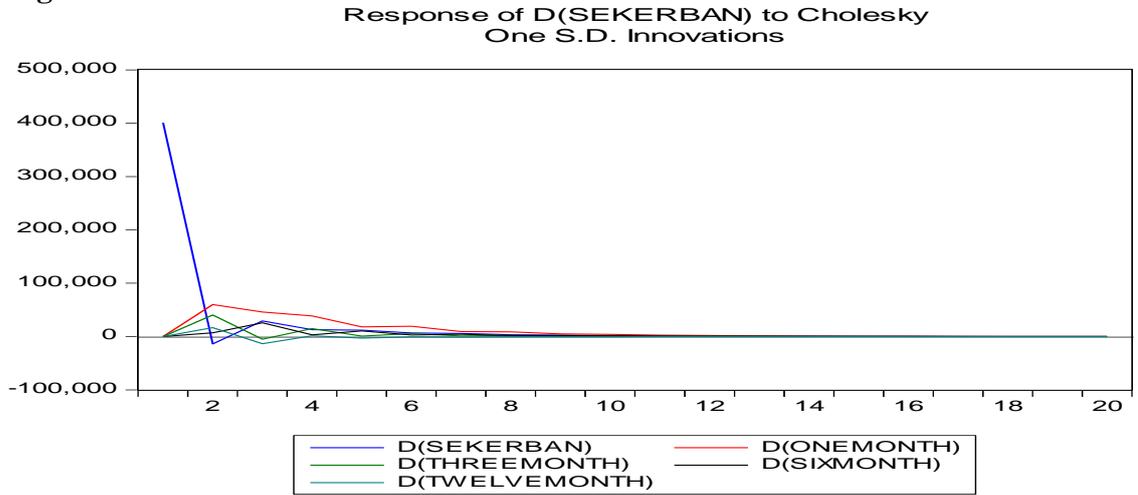
According to impulse response analysis (Figure 3.11), between December 2002-September 2014, one month interest rate is the highest contributor for Sekerbank's deposits.

Figure 3. 12. Turkeconomybank-BVAR

Accumulated Response of D(TURKEKON) to Cholesky
One S.D. Innovations
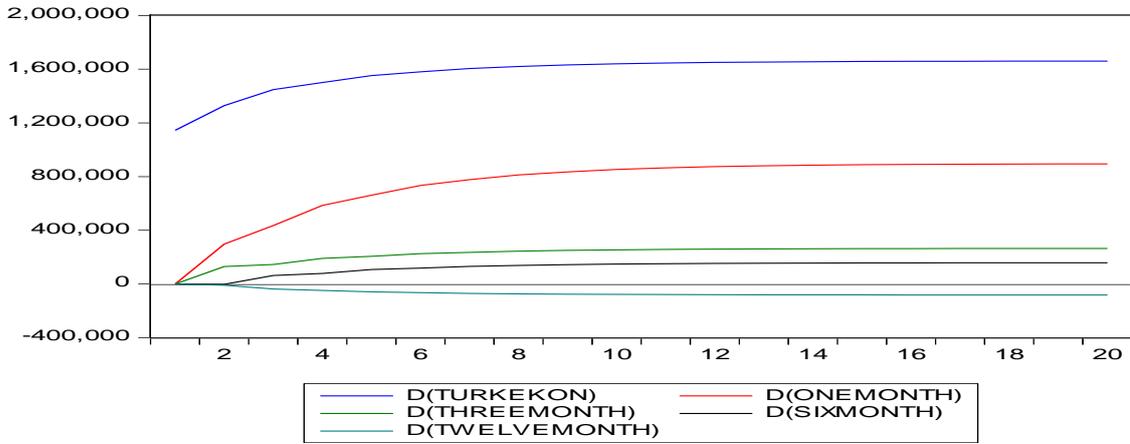
According to impulse response analysis (Figure 3.12), between December 2002-
September 2014, one month interest rate is the highest contributor for Turkey Ekonomi
Bank' deposits.

Figure 3. 13. Turkishbank-BVAR

Response of D(TURKISHB) to Cholesky
One S.D. Innovations
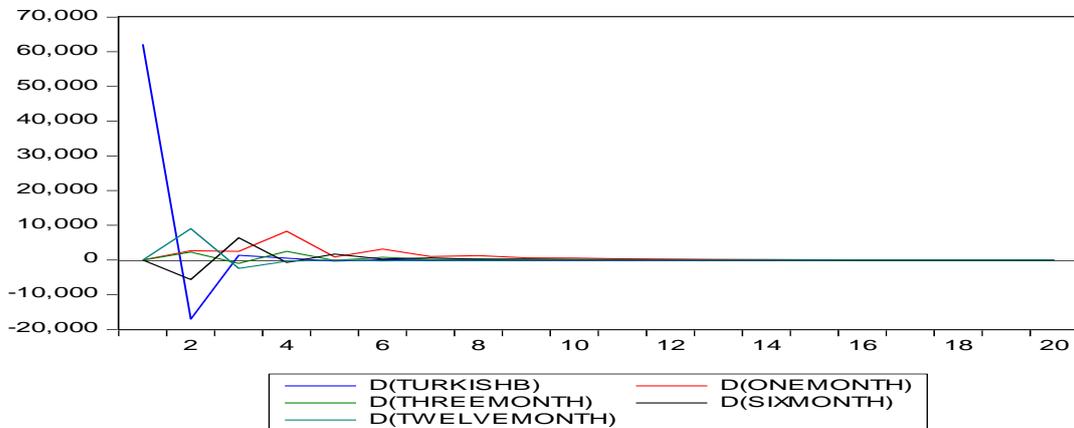
According to impulse response analysis (Figure 3.13), between December 2002-
September 2014, one month interest rate is the highest contributor for Turkish Bank's
deposits.

Figure 3. 14. Tekstilbank- BVAR

Accumulated Response of D(TEKSTILB) to Cholesky
One S.D. Innovations
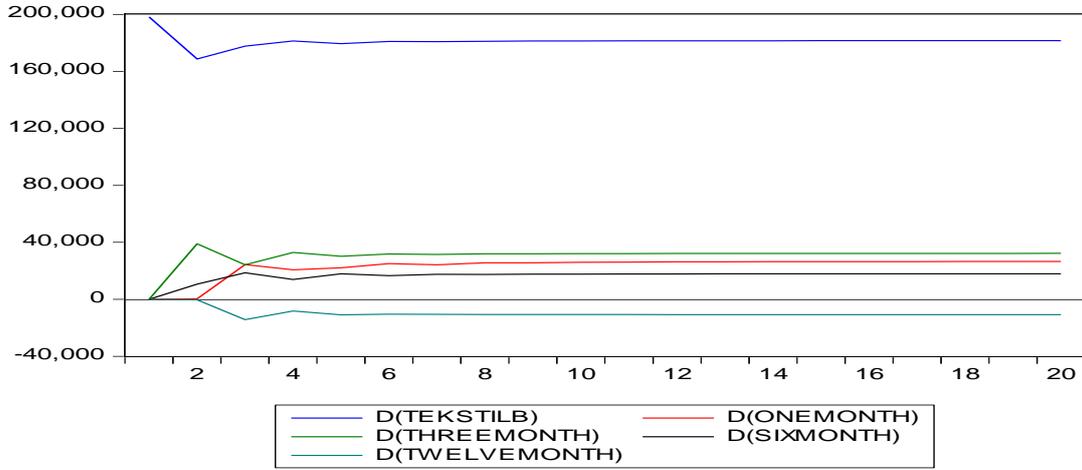
According to impulse response analysis (Figure 3.14), between December 2002-September 2014, three month interest rate is the highest contributor to Tekstil Bank's deposits.

Figure 3. 15. Vakıflarbank-BVAR

Response of D(VAKIFLAR) to Cholesky
One S.D. Innovations
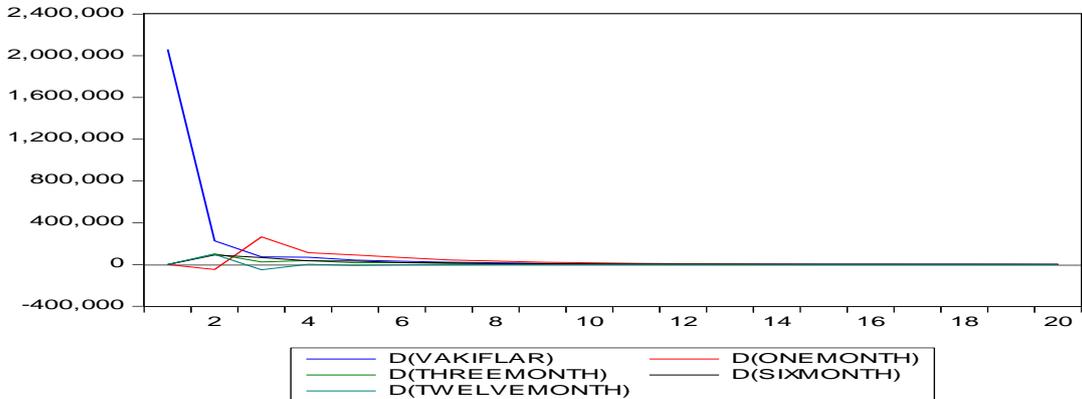
According to impulse response analysis (Figure 3.15), between December 2002-September 2014, one month interest rate is the highest contributor for Vakıflar's Bank deposits.

Figure 3. 16. Denizbank-BVAR

Response of D(DENIZBAN) to Cholesky
One S.D. Innovations
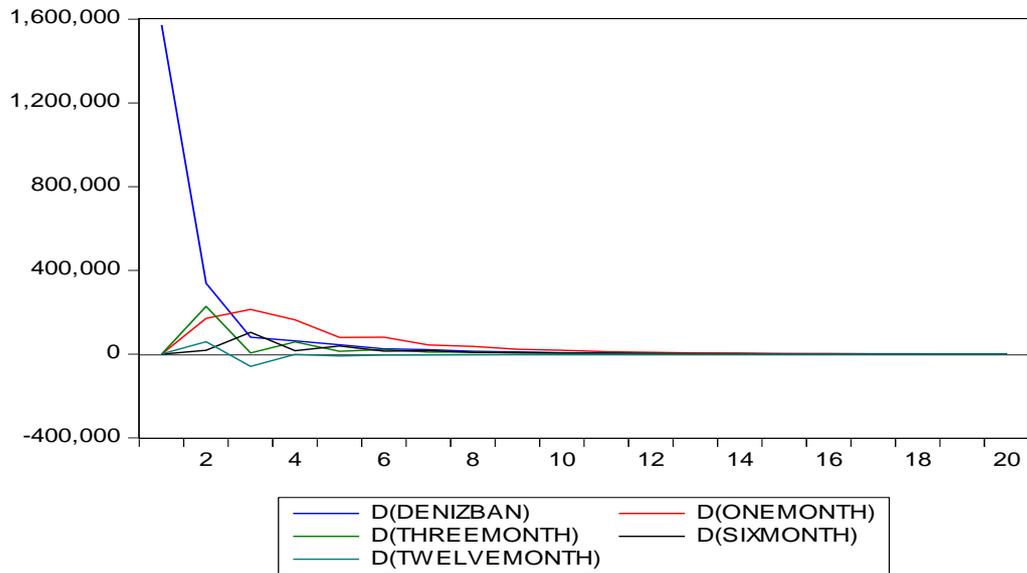
According to impulse response analysis (Figure 3.16), between December 2002-September 2014, one month interest rate is highest contributor for Denizbank's deposits.

3.7. Hypotheses Confirmation Table

Table 3. 5. Hypotheses Confirmation Table

Hypothesis 6: Between the period of 1999 and 2013, Turkish banks' ROA ratios are significantly and negatively correlated with Turkey's interest rate margins.	Hypothesis 6 is confirmed.
Hypothesis 7: Between the period of 1999 and 2013, Turkish banks' ROA ratios are significantly and positively correlated with Turkey's GDP.	Hypothesis 7 is not confirmed.
Hypothesis 8: Between the period of 1999-2013, Turkish banks' ROA ratios are negatively and significantly correlated with Turkey's interest rates.	Hypothesis 8 is not confirmed.
Hypothesis 9: Between the period of 1999-2013, Turkish banks' ROA ratios are negatively and significantly correlated with Turkey's inflation.	Hypothesis 9 is not confirmed.
Hypothesis 10: Macroeconomical factors had significant impacts on 16 commercial banks' net income between December 2002-September 2014.	Hypothesis 10 is partially confirmed.
Hypothesis 10a: USD/TL parity had significant positive impacts on Turkish banks' net income between December 2002- September 2014.	Hypothesis 10a is confirmed for 3 banks.
Hypothesis 10b: Fed interest rate had significant impact on Turkish Banks' net income between December 2002-September 2014.	Hypothesis 10b is not confirmed.
Hypothesis 10c: Turkey's interest rates had significant impact on Turkish Banks' net income between December 2002- September 2014.	Hypothesis 10c is confirmed for 3 banks.
Hypothesis 10d: Euribor rates had significant impact on Turkish Banks' net income between December 2002-September 2014.	Hypothesis 10d is confirmed for 6 banks.
Hypothesis 11: When one standard deviation shock given to 1 month, 3 months, 6 months, 12 months deposits, 1 month interest rate shocks is the highest contributor for Turkish banks' deposits' augmentation.	Hypothesis 11 is confirmed for 14 banks and is not confirmed for two banks.

3.8. Literature Confirmation

Table 3. 6. Literature Confirmation

Athanasoglou, Brissimis, Delis(2005)	With GMM Estimator, it can be indicated that inflation has positive influence on Greek banks profits.	There is no similarity with thesis research result.
Pasiouras, Kosmidou(2007)	Macroeconomical conditons are related with ROA ratios in 15 European Union Countries' domestic and foreign banks.	There is similarity with thesis research result. Turkey's net interest margins are negatively and significantly correlated with Turkish banks' ROA ratios. In addition, Turkey's interest rates, euribor rates, USD/TL parity had significant impact on many banks in Turkey.
Atasoy(2007)	Turkish banks' ROA ratios were correlated with inflation between the period of 1990-2005.	There is no similarity with thesis research result.
Goddard,Molyneux,Wilson(2004)	Cross sectional regression indicated a crucial positive influence of GDP on banks' profits in 583 European Union banks.	There is no similarity with research result.

3.9. The Impact of USD/TL Parity and OPEC Oil Prices on Turkish Banks' Deposits

3.9.1. Literature Review- Foreign Exchange Role and Oil Prices Role for Banking System

It is unearthed that foreign exchange exposure has different influence on Chinese banks. Negative foreign exchange exposure has inverse relation with Chinese larger banks' performance. It can be interpreted that appreciation of the renminbi diminishes Chinese large banks' equity values. Larger banks have important proportion of asset in the Chinese banking industry; thus, that research finding indicated that it is probable that an appreciation of the renminbi can deteriorate the Chinese banking sector's performance. It is probable that an overvaluation of the renminbi will likely have an inverse impact on the bank profitability, and thus the equity values can diminish (Wong, Wong, Leung, 2009).

Chamberlain, Sandra, Howe, and Popper (1995) indicated that USA' banks' returns virtually moved in the same way with foreign exchange of dollar. That is, USA banks' returns rose in the case of dollar appreciation and deteriorates when it diminishes: It can be mentioned that U.S bank holding companies had "long" position in dollars.

As a policy implication, Poghosyan, Hesse (2009) suggested that Islamic countries' banks can use oil price boom advantange during economic downturns for lending.

Poghosyan, Hesse (2009) indicated that high oil price increased Islamic banks' liquidity. Nonetheless, when oil prices dimished from 140$ per barrel, the diminished oil price has not only deteriorated Islamic banks performance; but also there was also adverse impact on conventional bank performances.

Utilizing 145 banks data in 11 oil-exporting MENA countries, aggregate influence of oil price shocks on banks' profitability analysed. The result showed that oil price shocks have indirect influence on bank performance, the direct effect was found insignificant (Poghosyan, Hesse, 2009).

3.9.2. Theoretical Framework

Systematic risks are derived from market forces and can not be eleminated. Political risks, currency risks, consumer purchasing power risks can be given as example for systematic risks. Moreover, macroeconomical factors can also be given as example to systematic risks. As it is known, Opec oil prices have significant impact on global economy. When oil price rises, there are winners and losers. If oil price rises, oil rich countries will have more funds to invest overseas.

According to **Mundell Fleming theory**, impossible trinity occurs between free capital flow, fixed exchange rate and sovereign monetary policy. After 2001 banking crisis in Turkey, Turkey's Central Bank embarked floating exchange rate policy. When Turkey had fixed exchange rate policy, Turkey had free capital flow but Turkey did not have sovereign monetary policy. Because Turkey used monetary policy to maintain fixed exchange rate regime. After Turkey adopted floating exchange rate regime, Turkey had more free capital flow. With free capital flow, due to the high interest rates, demand to Turkish lira has increased; and Turkish lira has appreciated. That caused financial system deposits to increase in Turkey. Although Turkey adopted floating exchange rate regime, Turkey still do not adopt sovereign monetary policy. Because Turkey is small open economy; the economy is mainly depend upon international money inflows. Figure 3.17 shows impossible trinity graph.

Figure 3. 17. Impossible Trinity Graph

According to **interest rate parity theory**, if one currency' interest rate is higher than other currency' interest rate, that currency having higher interest rate will depreciate against the other currency that have lower interest rate. Since Turkish lira's interest rate is higher than USA dollar's interest rate, Turkish lira will depreciate against USA dollar. That circumstance will have repercussion on Turkish banking sector. Since Turkey do not have fixed exhange regime, and assuming USA dollar's interest rate is lower than Turkish lira interest rate in long time period, Turkish banks have to get long position in USA dollar in order to not face with liquidity risk. Assuming that global interest rate rises, in that circumstance, Turkey's central bank has to increase political interest rates to compensate international currency outflows and increase international currency inflows with more higher interest rates. The BoP (Balance of Payment) curve will move upward and there will be capital flows to other countries that are having higher interest rates. The central bank will buy home currency and sell foreign currency to preclude financial crisis in Turkey. Due to the volatility of global interest rates, interest rates can diminish across the globe, in that circumstance, Bop (Balance of Payment) curve will move downward; central bank will sell domestic currency and buy foreign currency.

Opec oil prices indicate the health of global economy and are an important components of systematic risk. During the global financial crisis (2008), oil prices fell abruptly. If global economy is in good position, OPEC committee increases oil prices to get the income share from the global economy. That means business cycle went into

boom cycle. That systematic risk example can increase global liquidity and leads banks to take more foreign deposits. Moreover, when oil prices profit rises, Arab sheikhs' incomes also rises. That circumstance can lead Arab sheiks to administer new firms and to have more partnership with other global firms. In addition to that, when oil prices augment, Arab Sheikhs and other oil traders can send their deposits to foreign banks. Since Turkey economy has higher interest rate than many countries' interest rates, investors can purchase treasury bills and deposit their money to Turkish banks and even can be shareholder of the banks.

3.9.3. Data Descriptions

A) Independent Variables:
1) **USD/TL Parity:** USD/TL parities were retrieved from St.Louis Federal Reserve Database.
2) **OPEC Oil Prices:** Opec oil prices were retrieved from Statista.
3) **Federal Reserve Rate:** That is the reference interest rate globally. Data were retrieved from St.Louis Federal Reserve Database.

B) Dependent Variables
1) **Turkish Banks' Deposits:** Turkish banks' deposits were retrieved from Global Financial Development Database.
2) **16 Turkish Commercial Banks' Deposits:** 16 Turkish commercial banks' deposits were retrieved from Turkish Banking Association Database.
3) **Turkish Banks' Aggregate Total Liquidity Adequacy :** Total liquidity adequacy is defined as adequacy of total liquidities to money withdrawals. Data were retrieved from BDDK database. Data were just utilized with USD/TL parity.
4) **Turkish banks' Aggregate Equities:** That data show the business valuation of Turkish banks. Data were retrieved from BDDK database. Data were just utilized with USD/TL parity.

5) **Turkish Commercial Banks' Net Income:** Data were retrieved from Turkish Banking Association Database. Data were just used with USD/TL parity and federal reserve rates.

6) **Turkish Banking Crisis:** That variable is binary variable and was retrieved from Global Financial Development Database.

3.9.4. Methods

3.9.4.1. Lag Length Selection for Quarterly VAR Models

In Vector Autoregressive framework (VAR), choosing true lag length is indispensable. Lag length changes are sensitive for impulse response analysis, Vector Error Correction model. Ivanov, Kilian(2005) indicated that for quarterly data, AIC can not be used. The SIC can be used up to 120 quarters. After 120 quarters, HQC is the most accurate criterion. Moreover, for quarterly VEC processes, the SIC criteria will be used for all sample sizes.

Table 3. 7. Quarterly VAR Models for Impulse Response Lag Selection

T	AIC	HQC	SIC	LR1	SLR1	LM1
80	1,76	1,18	0,79	2,17	1,14	1,36
100	1,28	0,93	0,89	1,74	1,09	1,20
120	1,10	0,97	0,96	1,60	1,09	1,17
160	1,06	1,00	1,10	1,43	1,10	1,15
200	1,06	1,01	1,17	1,34	1,11	1,14

Source: Ivanov, Kilian(2005)

According to quarterly VAR models for impulse response lag selection, it can be indicated SIC criteria had lowest value for the analysis. Quarter data will be available between December 2002- September 2014. In VAR and BVAR models, in order to choose optimal lag length, SIC criteria will be used. Table 3.7 shows that SIC criteria had lowest value.

3.9.4.2. Univariate Markov Regime Switching Model

Table 3. 8. Univariate Markov Regime Switching Model

Dependent Variable: DEPOSITS1

Method: Switching Regression (Markov Switching)

Date: 08/24/15   Time: 03:49

Sample (adjusted): 6 31

Included observations: 26 after adjustments

Number of states: 2

Initial probabilities obtained from ergodic solution

Ordinary standard errors & covariance using numeric Hessian

Random search: 25 starting values with 10 iterations using 1 standard

    deviation (rng=kn, seed=1047889579)

Convergence achieved after 13 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Regime 1		
C	-1.898639	0.916157	-2.072395	0.0382
		Regime 2		
C	2.922120	0.702445	4.159929	0.0000
		Common		
AR(1)	-0.384163	0.237880	-1.614945	0.1063
AR(2)	0.028450	0.227092	0.125280	0.9003
AR(3)	0.308862	0.224681	1.374665	0.1692
AR(4)	0.422324	0.227581	1.855709	0.0635
LOG(SIGMA)	0.306971	0.206415	1.487154	0.1370
	Transition Matrix Parameters			
P11-C	-0.519817	1.005805	-0.516817	0.6053
P21-C	-1.097937	0.778429	-1.410452	0.1584
Mean dependent var	1.131075	S.D. dependent var		2.631126
S.E. of regression	3.219830	Sum squared resid		196.9788
Durbin-Watson stat	1.800861	Log likelihood		-60.04557
Akaike info criterion	5.311198	Schwarz criterion		5.746693
Hannan-Quinn criter.	5.436605			
Inverted AR Roots	.83	-.21+.77i	-.21-.77i	-.79

Univariate Markov Regime Switching Model was used to measure the probability of Turkish banks' future deposits growth with 2 regimes. According to Markov Regime Switching analysis (Table 3.8), Regime 1 is crisis for Turkish banking industry' deposits and Regime 2 is growth for Turkish banking industry' deposits. Figure 3.18. indicates that Turkish banking sector' deposits are mainly in growth stage.

Figure 3. 18. Markov Regime Switching Model
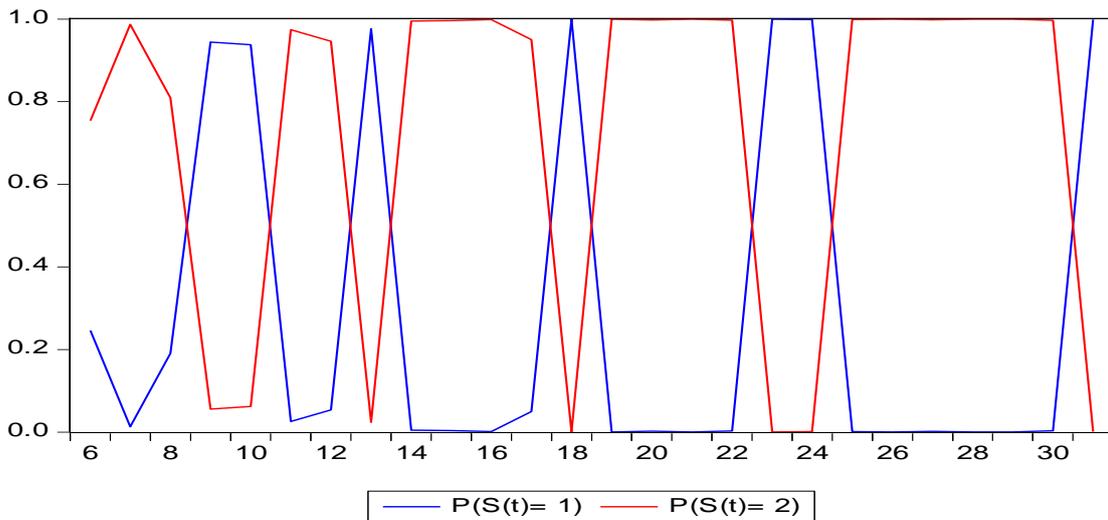
Table 3. 9. Constant Markov transition Summary

Equation: UNTITLED

Date: 08/24/15   Time: 03:57

Transition summary: Constant Markov transition

   probabilities and expected durations

Sample (adjusted): 6 31

Included observations: 26 after adjustments

Constant transition probabilities:

$P(i, k) = P(s(t) = k \mid s(t-1) = i)$

(row = i / column = j)

	1	2
1	0.372895	0.627105
2	0.250127	0.749873

According to Constant Markov transition Summary (Table 3.9), it can be indicated that, with %74,9873 probability, Turkish banking sector will increase deposits. Moreover, if Turkish banking sector is in crisis period, there is %62,7105 probability that Turkish banking sector will increase the deposits in the consecutive period.

3.9.4.3. VAR Granger Causality Analysis of Turkish Banks' Deposits (1970-2010)

Table 3. 10. VAR Granger Causality/Block Exogeneity Wald Tests
VAR Granger Causality/Block Exogeneity Wald Tests

Date: 07/08/15   Time: 20:31

Sample: 1 42

Included observations: 38

Dependent variable: D(DEPOSITS)

Excluded	Chi-sq	Df	Prob.
D(TLUSD)	8.477739	2	0.0144
D(OIL(-1))	6.129440	2	0.0467
All	12.40198	4	0.0146

According to Table 3.10, it can be indicated that USD/ TL parity and first lag of oil price is significant predictor of Turkish banks' deposits between 1970-2010.

3.9.4.4. Impulse Response Analysis of Turkish Banks' Deposits (1970-2010)

Table 3. 11. VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria

Endogenous variables: D(DEPOSITS) D(TLUSD) D(OIL(-1))

Exogenous variables:

Date: 07/08/15   Time: 20:56

Sample: 1 42

Included observations: 35

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-179.6410	NA	9.651551*	10.77948	11.17943*	10.91755*
2	-170.5396	15.08227	9.682483	10.77369*	11.57359	11.04982
3	-167.6432	4.303318	14.07298	11.12247	12.32231	11.53665
4	-161.5244	8.041789	17.46667	11.28711	12.88690	11.83935
5	-156.7555	5.450144	24.35408	11.52889	13.52862	12.21919

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

According to Table 3.11' result, lag 1 was choosen for VAR application.

Table 3. 12. Vector Autoregression Estimates
Vector Autoregression Estimates
Date: 07/08/15   Time: 13:53
Sample (adjusted): 5 42
Included observations: 38 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(DEPOSITS)	D(TLUSD)	D(OIL(-1))
D(DEPOSITS(-1))	0.147729	0.013454	-0.481273
	(0.17375)	(0.00816)	(0.54194)
	[0.85022]	[1.64813]	[-0.88806]
D(DEPOSITS(-2))	-0.181339	-0.008969	-0.688248
	(0.17066)	(0.00802)	(0.53227)
	[-1.06260]	[-1.11871]	[-1.29303]
D(TLUSD(-1))	10.70312	0.446425	40.04939
	(3.82537)	(0.17972)	(11.9313)
	[2.79793]	[2.48401]	[3.35668]
D(TLUSD(-2))	-5.759913	-0.046853	-34.28817
	(3.98437)	(0.18719)	(12.4272)
	[-1.44563]	[-0.25030]	[-2.75912]
D(OIL(-2))	0.111452	-0.001787	-0.097356
	(0.05185)	(0.00244)	(0.16170)
	[2.14971]	[-0.73357]	[-0.60206]
D(OIL(-3))	0.087017	-0.000376	0.361442
	(0.06601)	(0.00310)	(0.20587)
	[1.31831]	[-0.12114]	[1.75566]
C	-0.051192	0.030372	1.587211
	(0.47081)	(0.02212)	(1.46844)
	[-0.10873]	[1.37314]	[1.08089]
R-squared	0.319402	0.280123	0.410428
Adj. R-squared	0.187673	0.140792	0.296317
Sum sq. Resids	193.3818	0.426836	1881.230
S.E. equation	2.497624	0.117341	7.790047
F-statistic	2.424691	2.010484	3.596747
Log likelihood	-84.83419	31.37024	-128.0595
Akaike AIC	4.833379	-1.282644	7.108393
Schwarz SC	5.135039	-0.980984	7.410054
Mean dependent	0.555262	0.047147	1.988421
S.D. dependent	2.771159	0.126590	9.286488

Determinant resid covariance (dof adj.)	4.685449
Determinant resid covariance	2.543815
Log likelihood	-179.4986
Akaike information criterion	10.55256
Schwarz criterion	11.45754

VAR analysis was conducted in Table 3.12.

Figure 3. 19. ARMA Polynomial Root Graph
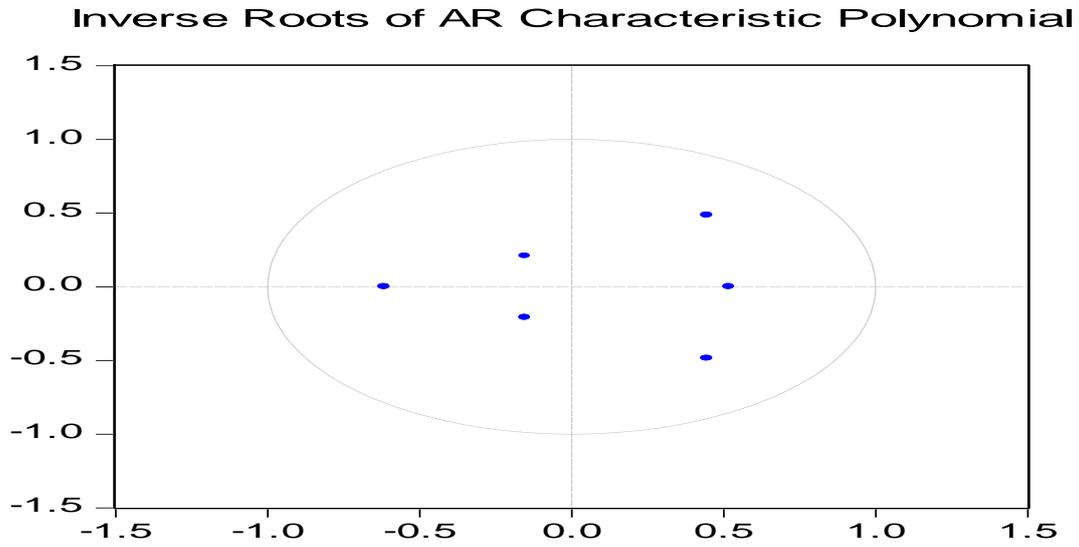
VAR stability test had conducted; at Figure 3.19, since dots are inside the circle; it can be indicated that there is no stabilization problem in VAR analysis. Impulse response analysis was conducted.

Figure 3.20. indicates that with optimal lag 1, shock of USD/TL and shock of first lag of OPEC oil price increased Turkish banks' deposits between 1970-2010.

Figure 3. 20. Impulse Response Analysis of Turkish bank's aggregate deposits
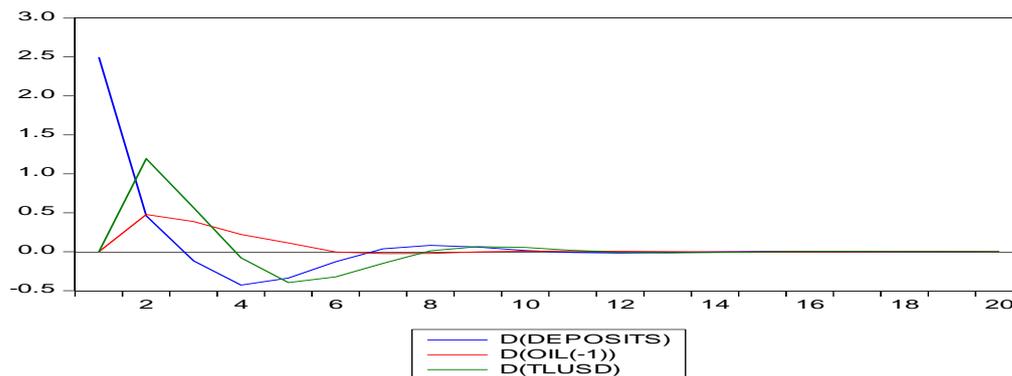
3.9.4.5. Variance Decomposition Analysis of Turkish Commercial Banks' Deposits

According to variance decomposition analysis (Figure 3.21), USD/TL parity is more successful than first lag of OPEC oil prices to explain the Turkish banks' deposits changes between 1970-2010.

Figure 3. 21. Variance Decomposition Analysis of Turkish banks' deposits

Variance Decomposition of D(DEPOSITS)
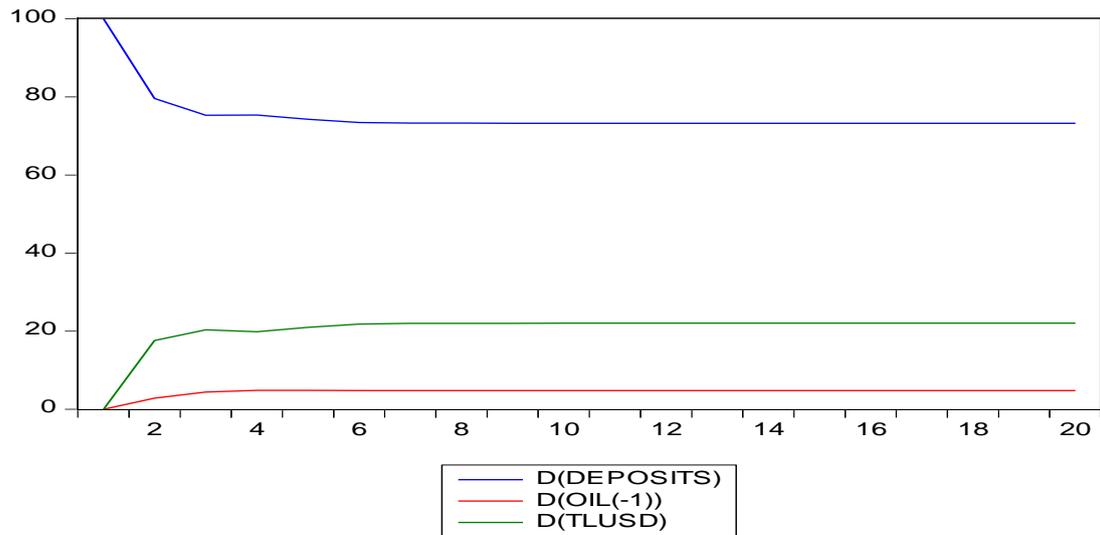
3.9.4.6. Impulse Response Analysis of Turkish Banks' Deposits (1980-2010)

Figure 3. 22. Impulse Response Analysis

Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.
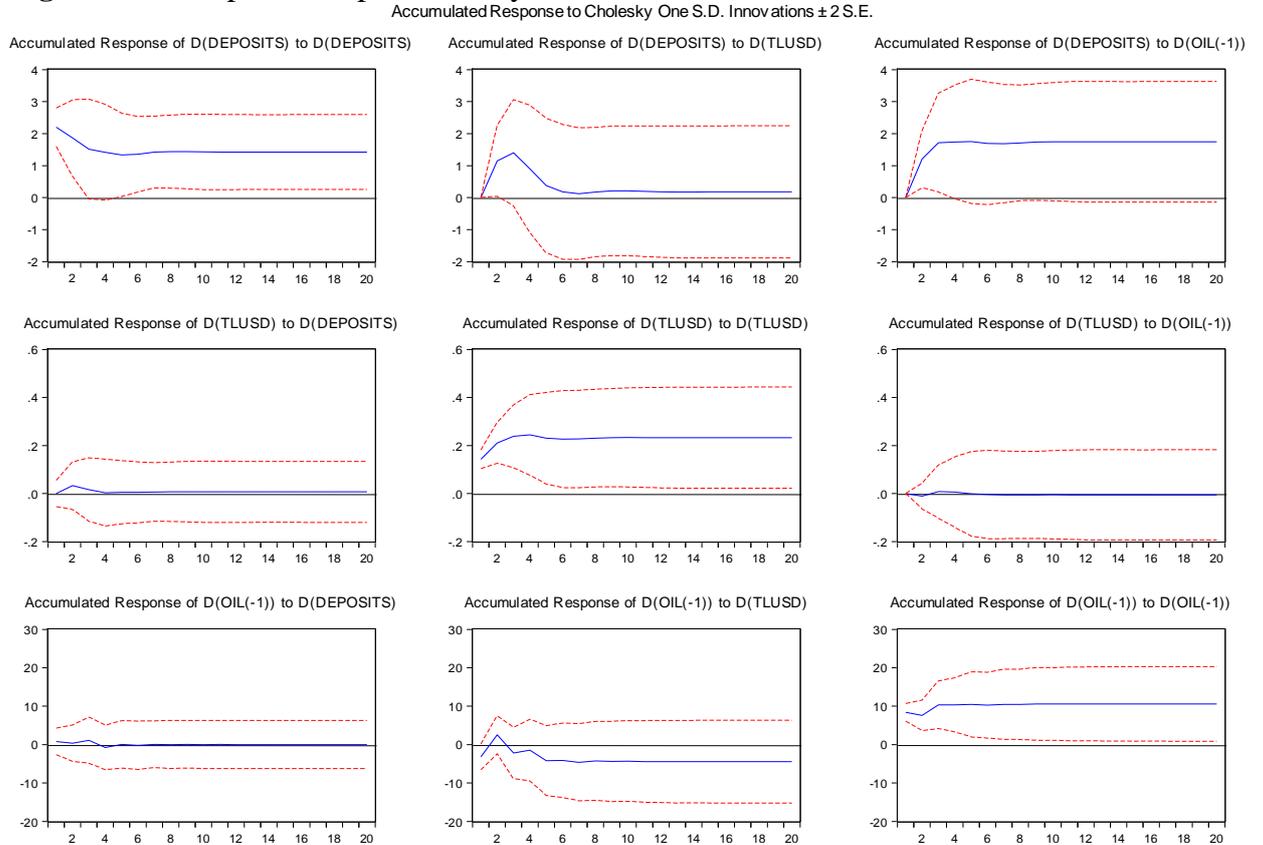
With optimal lag length of 1, one standard deviation shock of USD/TL parity and one standard deviation shock of first lag of OPEC oil prices increased Turkish banks' deposits between 1980-2010 (Figure 3.22).

3.9.4.7. Variance Decomposition Analysis of Turkish Commercial Banks' Deposits (1980-2010)

Variance decomposition analysis (Table 3.13) was conducted with 100 repetitions of Monte Carlo simulation. According to Table 3.13, %22,29590 variance of Turkish banks' deposits were explained by USD/TL parity. Moreover, %19,63363 variance of Turkish banks' deposits were explained by the first lag of OPEC oil price.

Table 3. 13. Variance Decomposition Analysis

Period	S.E.	D(DEPOST)	D(TLUSD)	D(OIL(-1))
1	2.197714	100.0000	0.000000	0.000000
		(0.00000)	(0.00000)	(0.00000)
2	2.775767	64.13535	17.03774	18.82691
		(14.3511)	(13.1805)	(10.3762)
3	2.856040	62.08780	16.90226	21.00994
		(14.5235)	(12.9651)	(10.5964)
4	2.902181	60.23546	19.41411	20.35044
		(14.9663)	(12.2922)	(10.8440)
5	2.949814	58.39148	21.90522	19.70330
		(15.4281)	(12.4076)	(10.6819)
6	2.957080	58.10928	22.24045	19.65027
		(15.5711)	(12.3840)	(10.5802)
7	2.958592	58.10996	22.25866	19.63138
		(15.9687)	(12.8758)	(10.9645)
8	2.959274	58.08471	22.28474	19.63055
		(16.2286)	(13.3462)	(11.6046)
9	2.959548	58.07397	22.29219	19.63384
		(16.6010)	(13.7282)	(12.1127)
10	2.959582	58.07354	22.29187	19.63459
		(16.8770)	(13.9285)	(12.5081)
11	2.959636	58.07183	22.29417	19.63400
		(17.2908)	(14.1685)	(13.0099)
12	2.959662	58.07081	22.29546	19.63373
		(17.5974)	(14.3614)	(13.4880)
13	2.959671	58.07050	22.29587	19.63363
		(17.8727)	(14.6390)	(13.9892)
14	2.959672	58.07050	22.29587	19.63363
		(18.0851)	(14.9020)	(14.4123)
15	2.959672	58.07049	22.29588	19.63363
		(18.3612)	(15.1691)	(14.9291)
16	2.959673	58.07048	22.29590	19.63363
		(18.6008)	(15.3159)	(15.3841)
17	2.959673	58.07047	22.29590	19.63363
		(18.8723)	(15.4473)	(15.7225)
18	2.959673	58.07047	22.29590	19.63363
		(19.1162)	(15.5201)	(16.0283)
19	2.959673	58.07047	22.29590	19.63363
		(19.4564)	(15.6082)	(16.3847)
20	2.959673	58.07047	22.29590	19.63363
		(19.7203)	(15.7157)	(16.6259)

3.9.4.8. Generalized Method of Moments

Wald test(Table 3.14.) was used to identify the fixed effect for the period of 1980-2010. Table 3.14. indicates that Wald Test' p value is less than 0.05. It can be indicated that there is fixed effect for the periods of 1980-2010. Therefore, GMM method can be used to explain the impact of USD/TL parity and first lag of OPEC oil price on Turkish bank's deposits. Financial time series can have autocorrelations and that circumstance can lead spurious result and can manifest an endogeneity problem. In order to minimize endogeneity problem, GMM technique will be implemented.

Table 3. 14. Wald Test:

Wald Test:

Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	6.730097	(3, 25)	0.0018
Chi-square	20.19029	3	0.0002

Different kinds of GMM methods were applied. In sampling analysis had been done. Figure 3.23. indicates the GMM-TSLS forecast analysis. Figure 3.24. and Figure 3.25. indicates GMM-White and GMM-HAC forecast analysis respectively.

Figure 3. 23. GMM-TSLS

Figure 3. 24. GMM-WHITE

Forecast: DEPOSITSF	
Actual: DEPOSITS	
Forecast sample: 1 31	
Adjusted sample: 4 31	
Included observations: 28	
Root Mean Squared Error	7.246774
Mean Absolute Error	6.446407
Mean Abs. Percent Error	22.91852
Theil Inequality Coefficient	0.140179
Bias Proportion	0.791309
Variance Proportion	0.076009
Covariance Proportion	0.132682

Figure 3. 25. GMM-HAC

Forecast: DEPOSITSF	
Actual: DEPOSITS	
Forecast sample: 1 31	
Adjusted sample: 4 31	
Included observations: 28	
Root Mean Squared Error	5.610227
Mean Absolute Error	4.889946
Mean Abs. Percent Error	17.58293
Theil Inequality Coefficient	0.105170
Bias Proportion	0.759040
Variance Proportion	0.067913
Covariance Proportion	0.173047

Table 3.15. indicates that the lowest root mean square error was found in GMM-TSLS methods. Therefore, GMM-TSLS method will be choosen to conduct the analysis.

Table 3. 15. GMM Methods Errors Comparison

GMM Methods Errors Comparison	RMSE
GMM-TSLS	5.59
GMM-White	7.24
GMM-HAC	5.61

According to GMM-TSLS analysis (Table 3.16), Since Jansen statistics' p value is more than 0.05, there is no overidentification problem. AR(1) is significant and AR(2)

is non-significant. Therefore, serial correlation requirement was validated. Moreover, since Durbin Watson value is close 2, there is no autocorrelation in GMM-TSLS model. Instrumental variables were added to analysis. Two dummy variables were used for 2 crisis period. One dummy variable indicates Turkish banking crisis in 2001. Other dummy variable indicates global financial crisis in 2008. Year of 2009 was also taken as crisis year. One dummy variable was used for Justice and Development Party existence. Financial system deposit inflows, domestic credits to consumers, Turkish banks' assets to GDP ratio, private credits were also determined as instrumental variables.

Table 3. 16. GMM-TSLS Analysis

Dependent Variable: D(DEPOSITS)

Method: Generalized Method of Moments

Date: 09/02/15   Time: 17:40

Sample (adjusted): 1984 2010

Included observations: 27 after adjustments

Estimation weighting matrix: Two-Stage Least Squares

Standard errors & covariance computed using estimation weighting matrix

Instrument specification: C D(ASSETTOG) D(CONSUMER) D(CREDITTO)
    CRISISDU JDP D(PRIVATCR) D(GDPPERCA) NONJDP
    C D(ASSETTOG) D(CONSUMER) D(CREDITTO) CRISISDU
    D(FSDTOGDP) D(GDP) D(GDPPERCA) D(INTEREST) JDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DEPOSITS(-1))	0.485794	0.195419	2.485912	0.0219
D(OIL)	-0.043422	0.049028	-0.885649	0.3863
D(OIL(-1))	0.145155	0.051473	2.820001	0.0106
D(TLUSD)	7.580151	3.536541	2.143380	0.0446
D(TLUSD(-1))	-3.599712	3.896391	-0.923858	0.3666
AR(1)	-0.733438	0.250643	-2.926222	0.0084
AR(2)	-0.401933	0.233227	-1.723355	0.1003

R-squared	0.226336	Mean dependent var	1.085154
Adjusted R-squared	-0.005764	S.D. dependent var	2.591041
S.E. of regression	2.598498	Sum squared resid	135.0438
Durbin-Watson stat	2.126289	J-statistic	19.78048
Instrument rank	20	Prob(J-statistic)	0.100821

Inverted AR Roots	-.37-.52i		-.37+.52i	

It can be indicated that, USD/TL parities and first lag of OPEC oil prices had significant positive impact on Turkish banks' deposits between 1980-2010.

Figure 3. 26. GMM-TSLS Residual Graph

Figure 3.26. indicates the GMM-TSLS' analysis residual graph. It can be indicated that there is no important anomaly in residuals.

Coefficient ellipsoid analysis was conducted. At Figure 3.27, since shapes are close to circle, it can be indicated that there is no multicollinearity problem in GMM-TSLS model.

Figure 3. 27. Ellipsoid Analysis
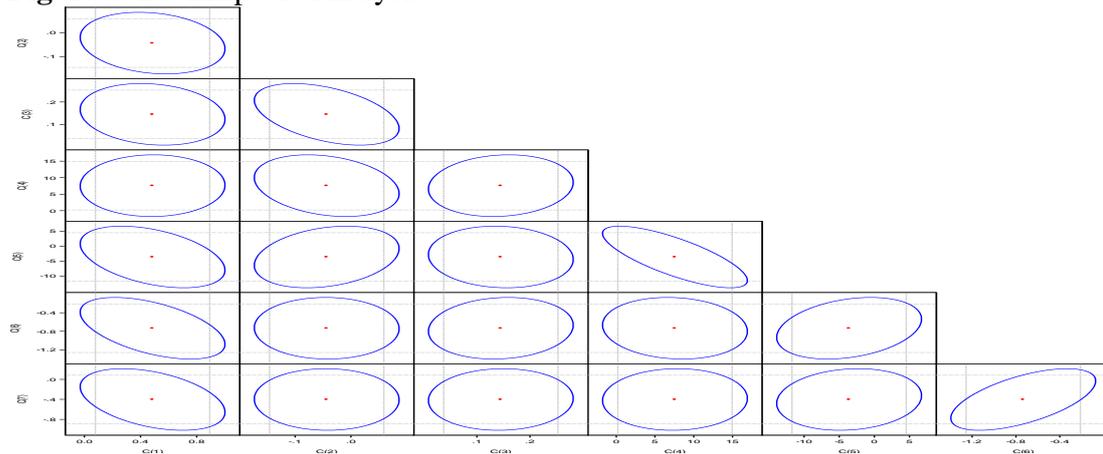
3.9.4.9. VAR Granger Causality Test (1980-2010)

According to VAR criteria(Table 3.17), optimal lag length is 1.

Table 3. 17. VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria

Endogenous variables: D(DEPOSITS) D(TLUSD) D(OIL(-1))

Exogenous variables: C

Date: 07/10/15   Time: 22:04

Sample: 1 31

Included observations: 27

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-149.4984	NA	16.16174	11.29618	11.44016*	11.33899
1	-138.1902	19.26571*	13.71050*	11.12520	11.70113	11.29646*
2	-128.9238	13.72808	13.84832	11.10547*	12.11334	11.40516

Table 3. 18. VAR Granger Causality/Block Exogeneity WaldTests

VAR Granger Causality/Block Exogeneity WaldTests

Date: 07/10/15   Time: 22:11

Sample: 1 31

Included observations: 27

Dependent variable: D(DEPOSITS)

Excluded	Chi-sq	Df	Prob.
D(TLUSD)	10.44640	2	0.0054
D(OIL(-1))	9.146892	2	0.0103
All	15.06584	4	0.0046

According VAR Granger Causality test at Table 3.18 , USD/TL parity and first lag of OPEC oil prices are significant predictor of Turkish banks' deposits between the period of 1980-2010. That result also supports GMM-TSLS result.

3.9.4.10. Responses of Turkish Commercial Banks' Deposits to Macroshocks

In that section, micro analysis (Table 3.19) will be applied. Between period of December 2002-September 2014, one standard deviation of USD/TL parity and one standard deviation of first lag of OPEC oil price impact on 16 Turkish commercial banks' deposit responses will be scrutinized. VAR analysis and BVAR analysis was conducted. Optimal lag lengths were found as 1 for all banks. BVAR analysis and VAR analysis had same results. (-) show decrease on banks' deposits. (+) shows increase in banks' deposits. USD/TL parity shock decreased 12 Turkish commercial banks' deposits and increase 4 Turkish commercial banks' deposits. First lag of OPEC oil price shock increased 10 Turkish commercial banks' deposits and decreased 6 Turkish commercial banks' deposits.

Table 3. 19. Responses of Turkish commercial banks' deposits to USD/TL parity and oil price shocks

	USD/TL Parity	First lag of OPEC oil price
Akbank	(-)	(+)
Alternatifbank	(-)	(+)
Anadolubank	(+)	(+)
Arapturkbank	(+)	(+)
Burganbank	(-)	(-)
Denizbank	(-)	(-)
Finansbank	(-)	(+)
Garantibank	(+)	(+)
HSBC	(-)	(+)
ING	(-)	(-)
Is Bank	(-)	(+)
Sekerbank	(-)	(+)
Tekstilbank	(-)	(-)
Turkey economy bank	(-)	(+)
Turkishbank	(-)	(-)
Vakıfbank	(+)	(-)

3.9.4.11. Bayesian Impulse Response Analysis of 16 Turkish Commercial Banks

Figure 3. 28. Impulse Response Analysis-Akbank' deposits

Accumulated Response of D(AKBANK) to Cholesky
One S.D. Innovations
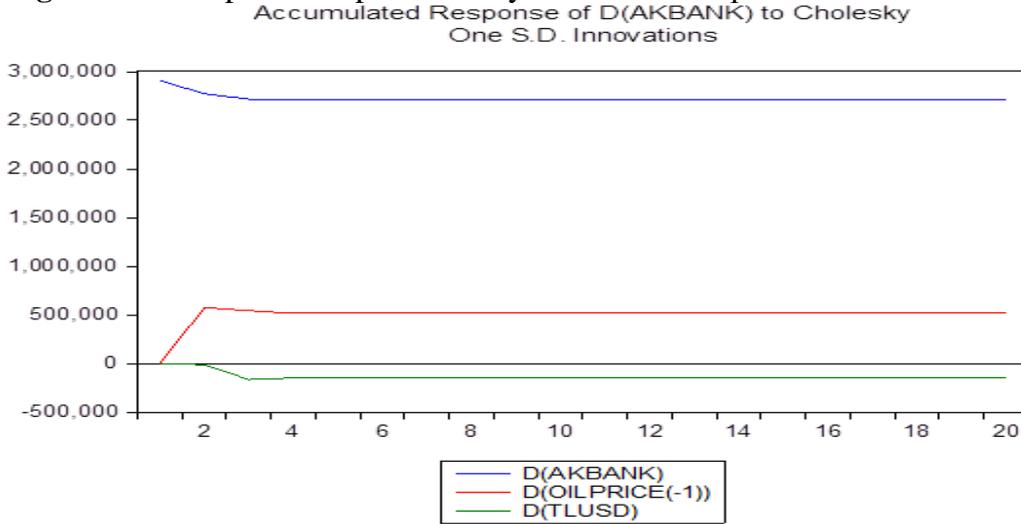
At Figure 3.28, it can be indicated that oil price shock increased Akbank's deposits and USD/TL parity shock decreased Akbank's total deposits between the period of December 2002-September 2014.

Figure 3. 29. Impulse Response Analysis- Alternatifbank' Deposits

Accumulated Response of D(ALTERNAT) to Cholesky
One S.D. Innovations
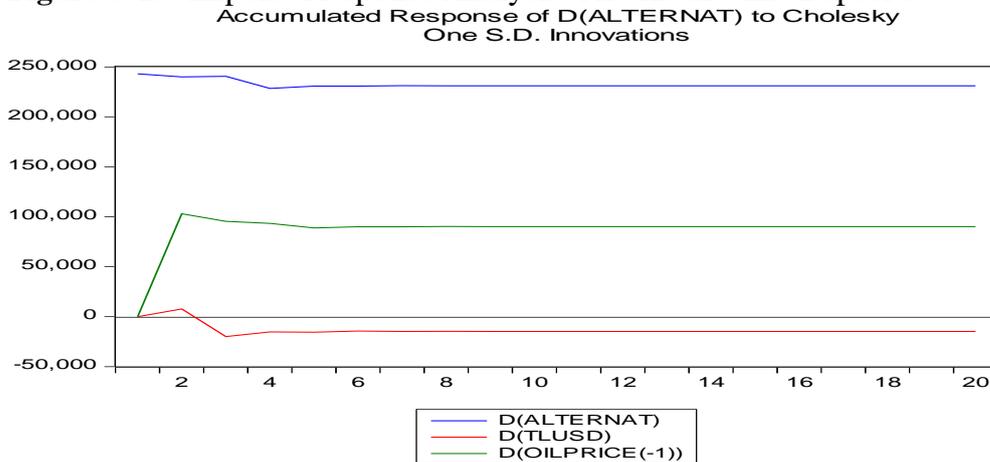
According to impulse response analysis (Figure 3.29.), oil price shock increased Alternatif Bank's deposits. USD/TL parity shock decreased Alternatif Bank's deposits between the period of December 2002-September 2014.

Figure 3. 30. Impulse Response Analysis- Anadolubank' Deposits

Accumulated Response of D(ANADOLUB) to Cholesky
One S.D. Innovations
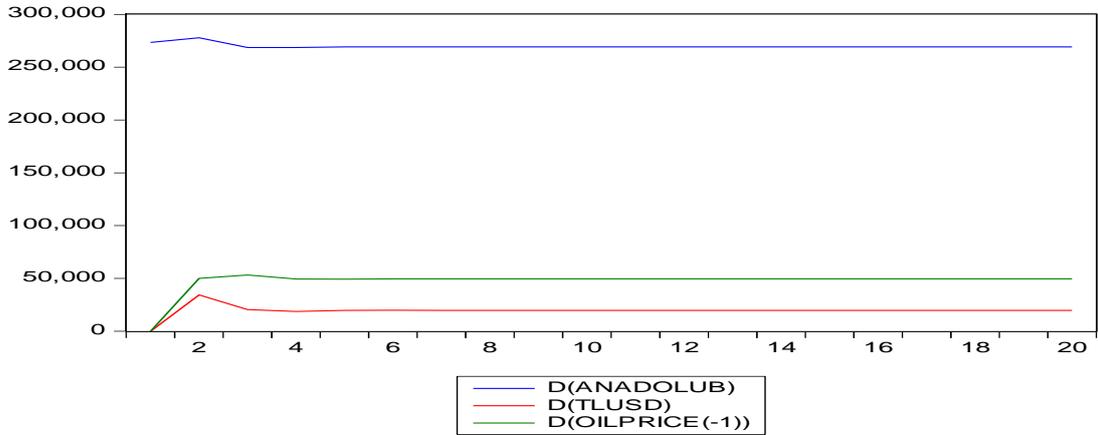
At Figure 3.30, it can be indicated that one standard deviation shock of USD/TL parity and first lag of OPEC oil price increased Anadolubank's deposits between December 2002-September 2014.

Figure 3. 31. Impulse Response Analysis- Arabturkbank' Deposits

Accumulated Response of D(ARAPTURK) to Cholesky
One S.D. Innovations
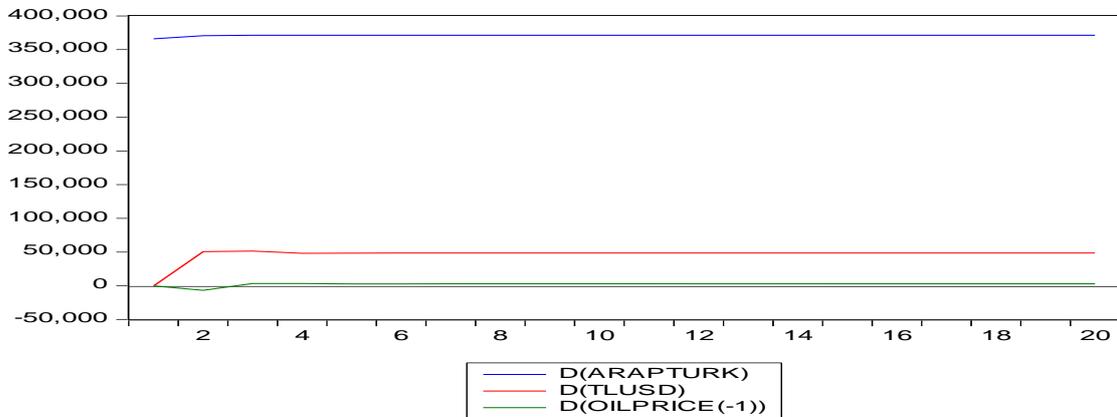
At Figure 3.31, it can be indicated that both shock of USD/TL parity and oil price increased Arabturkbank's deposits between the period of December 2002-September 2014.

Figure 3. 32. Impulse Response Analysis- Burganbank' Deposits

Accumulated Response of D(BURGANBA) to Cholesky
One S.D. Innovations
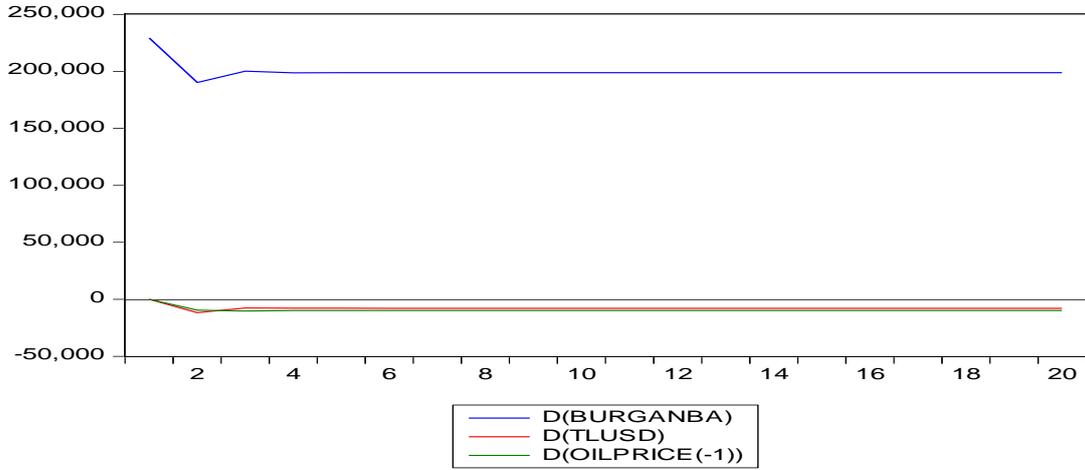
At Figure 3.32, it can be indicated that both shock of USD/TL parity and oil price decreased Burgan Bank's deposits between the periods of December 2002-September 2014.

Figure 3. 33. Impulse Response Analysis- Denizbank' Deposits

Accumulated Response of D(DENIZBAN) to Cholesky
One S.D. Innovations
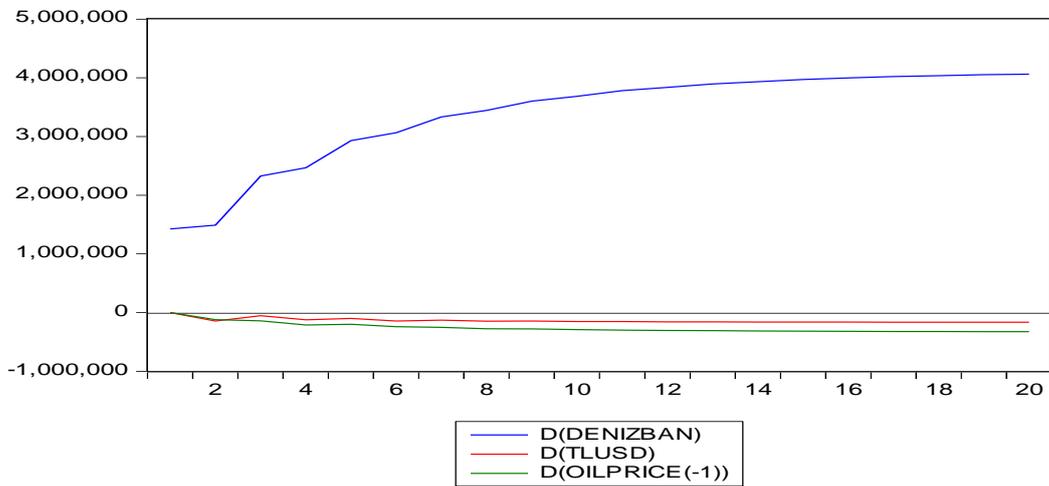
At Figure 3.33, it can be indicated that both shock of USD/TL parity and oil price decreased Denizbank's deposits between the period of December 2002-September 2014.

Figure 3. 34. Impulse Response Analysis- Finansbank' Deposits

Accumulated Response of D(FINANSBA) to Cholesky
One S.D. Innovations
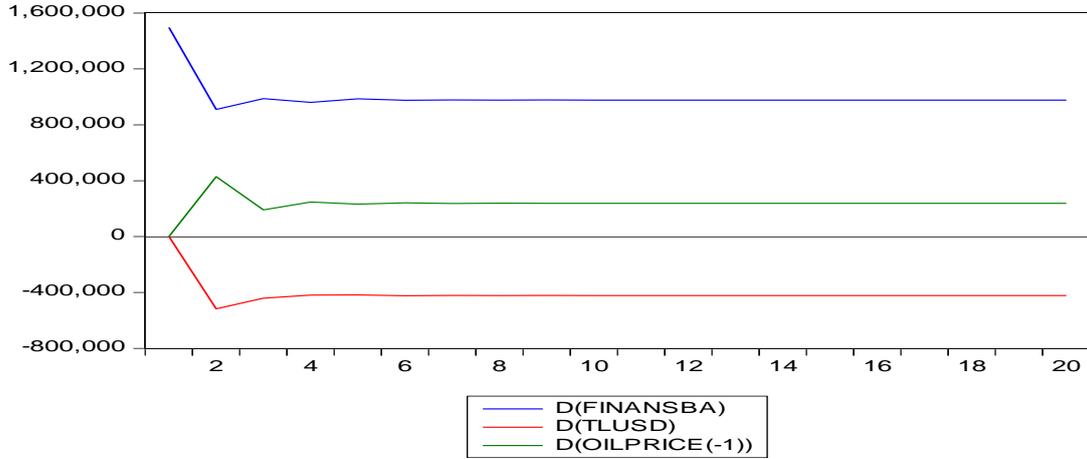
According to impulse response analysis (Figure 3.34), shock of oil price increased Finansbank's deposits. Shock of USD/TL parity decreased Finansbank's deposits between the period of December 2002-September 2014.

Figure 3. 35. Impulse Response Analysis- Garantibank' Deposits

Accumulated Response of D(GARANTIB) to Cholesky
One S.D. Innovations
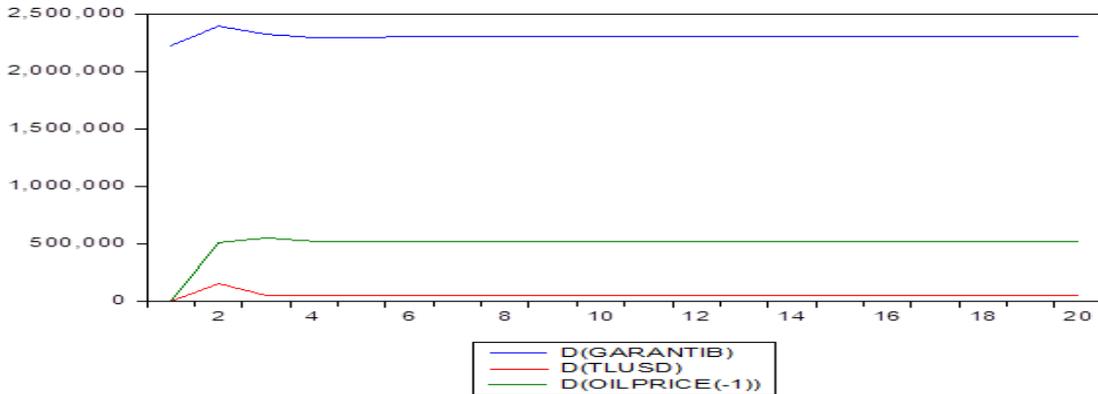
According to impulse response analysis(Figure 3.35), both shock of USD/TL parity and oil price increased Garanti Bank's total deposits between the period of December 2002-September 2014.

Figure 3. 36. Impulse Response Analysis- HSBC' Deposits

Accumulated Response of D(HSBCBANK) to Cholesky
One S.D. Innovations
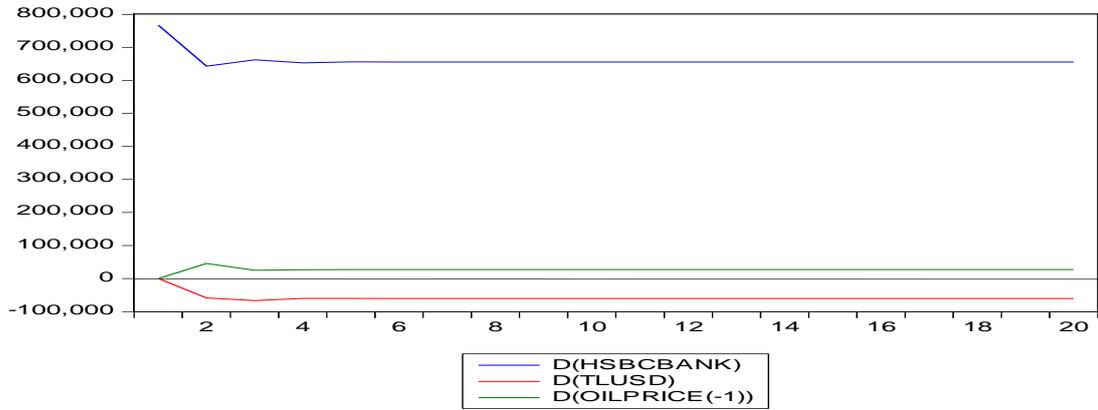
At Figure 3.36, it can be indicated that, shock of USD/TL parity decreased HSBC Bank's deposits. Shock of oil price increased HSBC bank's deposits between the period of December 2002-September 2014.

Figure 3. 37. Impulse Response Analysis- ING' Deposits

Accumulated Response of D(ING) to Cholesky
One S.D. Innovations
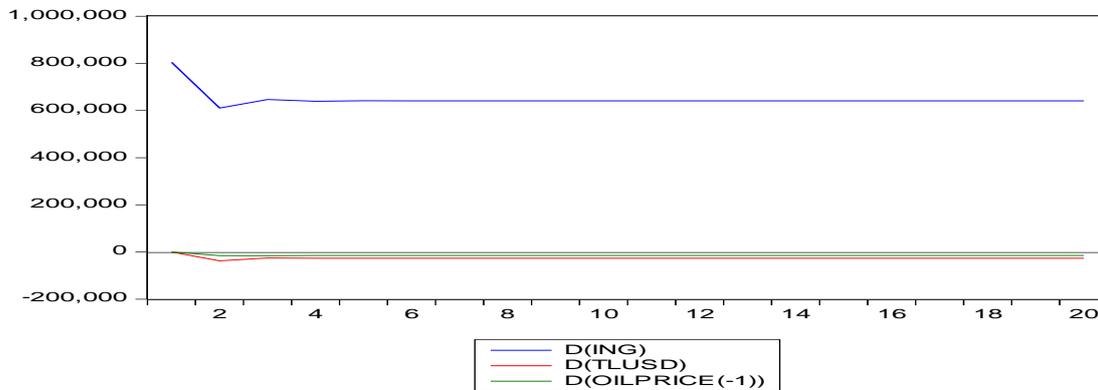
At Figure 3.37, it can be indicated both shock of USD/TL parity and oil price decreased ING Bank's deposits between the periods of December 2002-September 2014.

Figure 3. 38. Impulse Response Analysis- Isbank' Deposits

Accumulated Response of D(ISBANKAS) to Cholesky
One S.D. Innovations
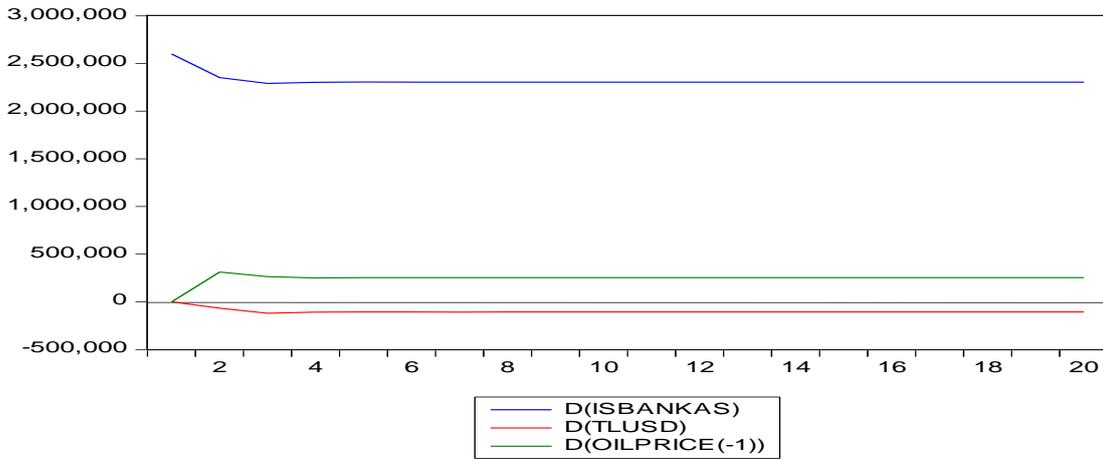
At Figure 3.38, it can be indicated that shock of USD/TL parity decreased Is Bank's deposits. Shock of oil price increased Is Bank's deposits between the period of December 2002-September 2014.

Figure 3. 39. Impulse Response Analysis- Sekerbank' Deposits

Accumulated Response of D(SEKERBAN) to Cholesky
One S.D. Innovations
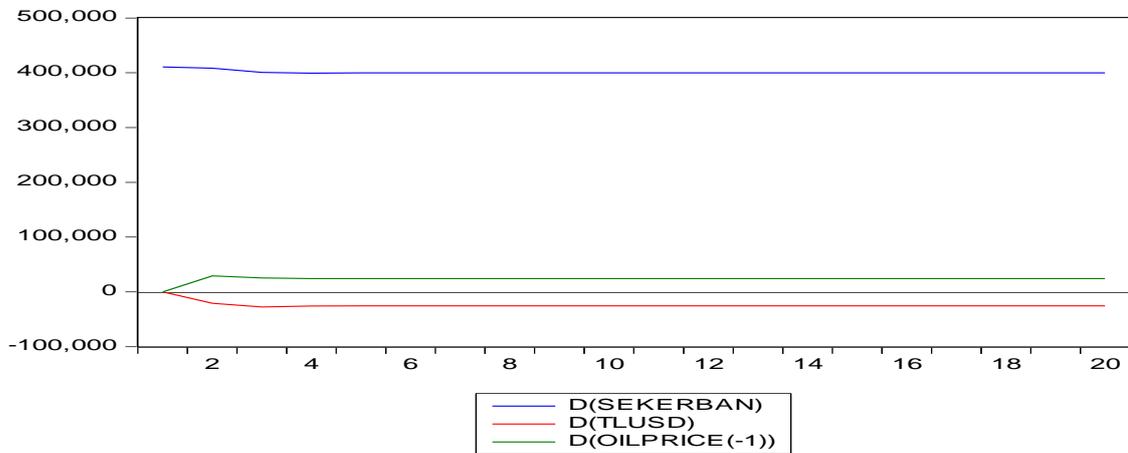
At Figure 3.39, it can be indicated that shock of USD/TL parity decreased Sekerbank's deposits. Moreover, oil price shock increased Sekerbank's deposits between the period of December 2002-September 2014.

Figure 3. 40. Impulse Response Analysis- Tekstilbank' Deposits

Accumulated Response of D(TEKSTILB) to Cholesky
One S.D. Innovations
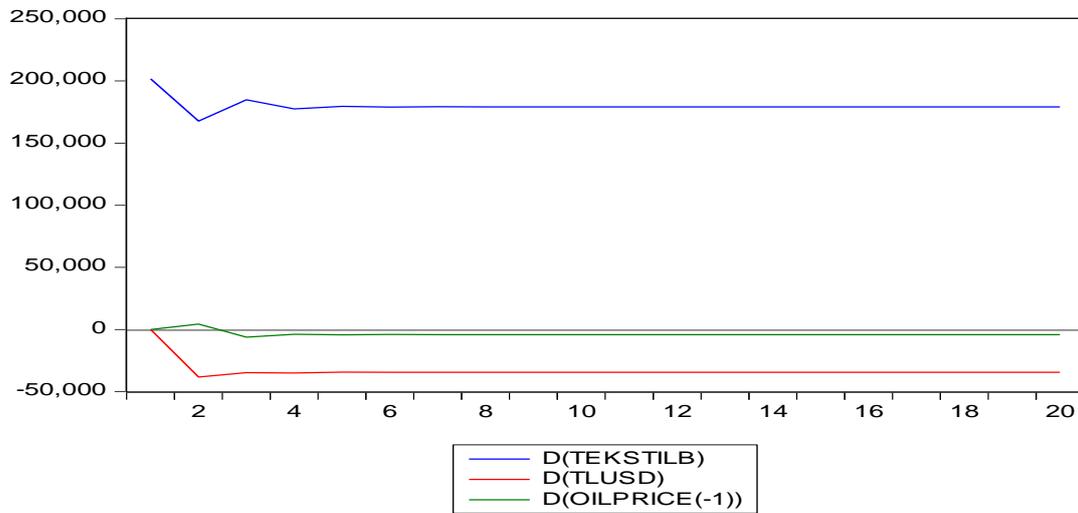
At Figure 3.40, it can be indicated that both shock of USD/TL parity and oil price decreased Tekstilbank's deposits between the period of December 2002-September 2014.

Figure 3. 41. Impulse Response Analysis- Turkekonomibank' Deposits

Accumulated Response of D(TURKEKON) to Cholesky
One S.D. Innovations
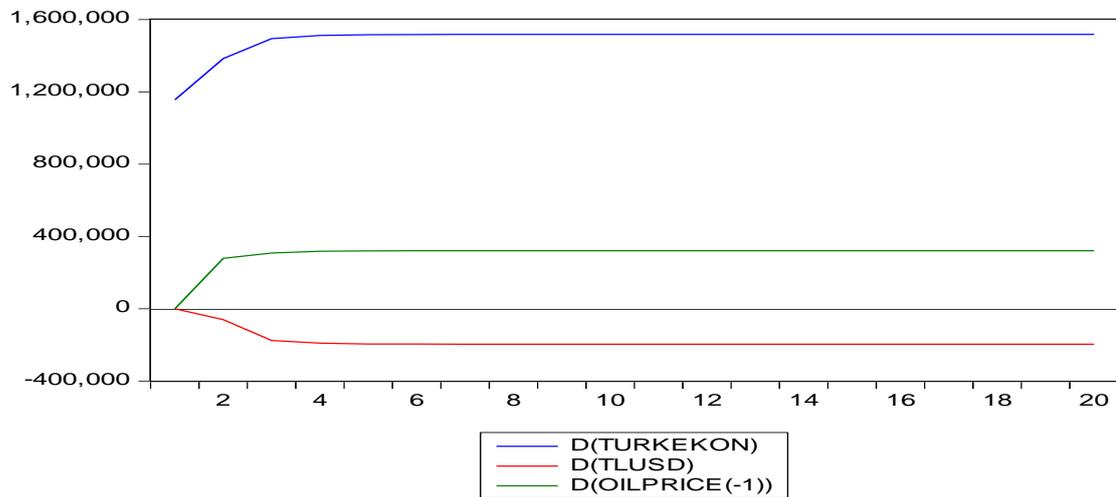
At Figure 3.41, it can be indicated that, USD/TL parity shock decreased Turkey Ekonomi Bank's total deposits. Moreover, oil price shock increased Turkey Ekonomi Bank's total deposits betwen the period of December 2002-September 2014.

Figure 3. 42. Impulse Response Analysis- Turkishbank' Deposits

Accumulated Response of D(TURKISHB) to Cholesky
One S.D. Innovations
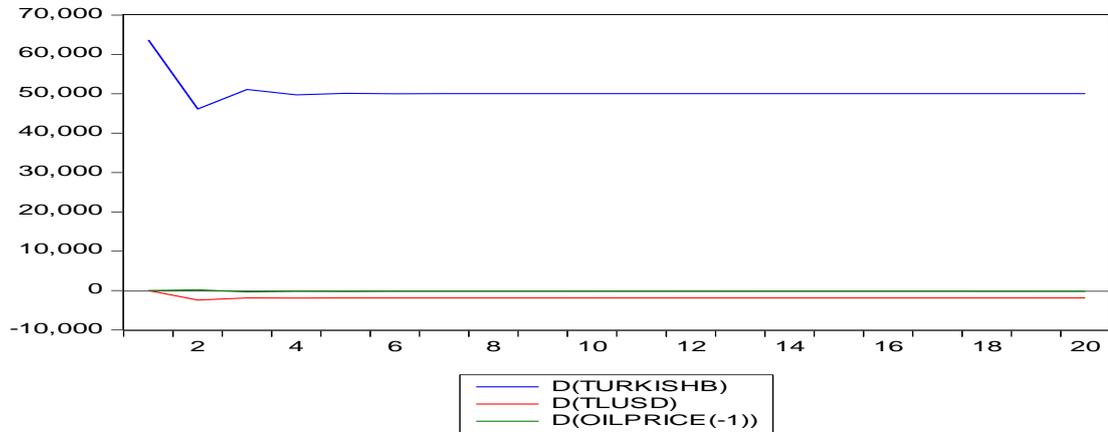
At Figure 3.42, it can be indicated that, both shock of USD/TL parity and oil price decreased Turkish Bank's deposits between the period of December 2002-September 2014.

Figure 3. 43. Impulse Response Analysis- Vakıfbank' Deposits

Accumulated Response of D(VAKIFLAR) to Cholesky
One S.D. Innovations
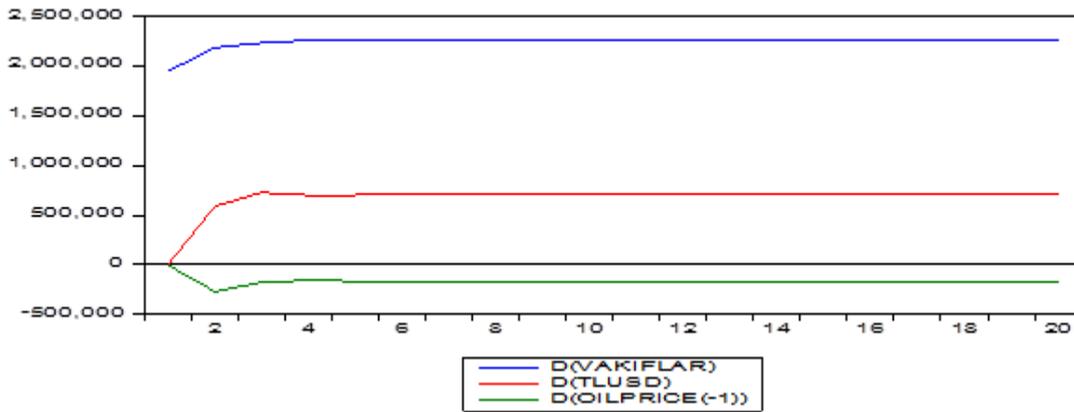
According to impulse response analysis (Figure 3.43), shock of USD/TL parity increased Vakiflar Bank's total deposits. Moreover, shock of oil price decreased Vakiflar Bank's deposits between the period of December 2002-September 2014.

3.9.4.12. Variance Decomposition Analysis of Turkish Commercial Banks' Deposits

Table 3. 20. Variance Decomposition Analysis

Deposits Variance	Lag Number	USD/TL Parity	First lag of OPEC Oil price
Akbank	1	0,75	3,26
Alternatifbank	1	1,19	15,09
Anadolubank	1	1,75	3,20
Arapturk	1	1,96	0,11
Burganbank	1	0,28	0,16
Denizbank	1	0,11	0,07
Finansbank	1	8,82	7,82
Garantibank	1	0,69	5,23
HSBC	1	0,58	0,41
ING	1	0,22	0,03
IsBank	1	0,10	1,44
Sekerbank	1	0,28	0,50
Tekstilbank	1	3,37	0,31
Turkekonomi	1	1,15	5,24
Vakıflar	1	8,52	1,86

According to variance decomposition analysis (Table 3.20), USD/TL parity explains the 8,82 % variance of Finansbank deposits. Moreover, USD/TL parity explains the 8,52 % variance of Vakıflar Bank' total deposits. In addition to that, first lag of OPEC oil price explains 15,09 % variance of Alternatif Bank's total deposits. In addition, first lag of OPEC oil price explains 7,82 % variance of Finansbank's total deposits between the period of December 2002-September 2014.

3.9.4.13. Granger Causality Analysis for 3 Turkish Commercial Banks

**Table 3. 21.** Granger Causality Analysis

	Lag Number	Oil(-1)	Tlusd	Direction
Alternatifbank	1	Unidirectional	-	Positive
Finansbank	1	Unidirectional	Unidirectional	Positive
Vakıfbank	1	-	Unidirectional	Positive

After conducting impulse response analysis, Granger causality analysis was applied for 16 Turkish commercial banks' total deposits. According to Granger causality result **(Table 3.21)**, unidirectional relationship was found for 3 banks. Those banks are Alternatif Bank, Finans Bank and Vakıflar Bank. Dependant variable is 16 commercial bank's deposits and independent variables are USD/TL parity and first lag of OPEC oil price. Time span was be between December 2002-September 2014. There are research findings for 3 banks. Those banks are Alternatif Bank, Finans Bank and Vakıflar Bank. Data were transformed from nonstationary to stationary. Since quarter data was used, Granger causality will be conducted up to 4 lag. If significant result is just found for optimal lag length, VAR Granger causality test will be conducted.

Table 3. 22. Pairwise Granger Causality Tests
Pairwise Granger Causality Tests

Date: 06/21/15   Time: 00:51

Sample: 1 48

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(ALTERNAT)	46	0.08328	0.7743
D(ALTERNAT) does not Granger Cause D(TLUSD)		9.36947	0.0038
D(OILPRICE(-1)) does not Granger Cause D(ALTERNAT)	45	6.80814	0.0125
D(ALTERNAT) does not Granger Cause D(OILPRICE(-1))		1.61826	0.2103
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	45	1.75043	0.1930
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		4.20585	0.0466

According to Table 3.22, first lag of OPEC oil price can forecast Alternatif Bank's deposits between the period of December 2002-September 2014.

Table 3. 23. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests

Date: 06/21/15   Time: 00:52

Sample: 1 48

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(ALTERNAT)	45	0.33570	0.7168
D(ALTERNAT) does not Granger Cause D(TLUSD)		4.96687	0.0118
D(OILPRICE(-1)) does not Granger Cause D(ALTERNAT)	44	3.24180	0.0498
D(ALTERNAT) does not Granger Cause D(OILPRICE(-1))		0.16271	0.8504
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	44	2.19371	0.1251
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		2.06605	0.1403

According to Table 3.23, for lag 2, first lag of OPEC oil price can forecast Alternatif Bank's deposits between the period of December 2002-September 2014.

Table 3. 24. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests

Date: 06/21/15   Time: 00:52

Sample: 1 48

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(ALTERNAT)	44	0.53323	0.6624
D(ALTERNAT) does not Granger Cause D(TLUSD)		3.03415	0.0412
D(OILPRICE(-1)) does not Granger Cause D(ALTERNAT)	43	2.51315	0.0739
D(ALTERNAT) does not Granger Cause D(OILPRICE(-1))		0.11227	0.9524
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	43	2.00405	0.1308
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		2.87526	0.0495

According to Table 3.24, for lag 3, first lag of OPEC oil price can forecast Alternatif Bank's deposits between the period of December 2002-September 2014.

Table 3. 25. Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(ALTERNAT)	43	0.03002	0.9982
D(ALTERNAT) does not Granger Cause D(TLUSD)		2.13678	0.0976
D(OILPRICE(-1)) does not Granger Cause D(ALTERNAT)	42	3.22449	0.0244
D(ALTERNAT) does not Granger Cause D(OILPRICE(-1))		0.76870	0.5533
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	42	1.21223	0.3243
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		2.23603	0.0864

According to Table 3.25, for lag 4, it can be indicated that first lag of oil price can be used to predict future Alternatif Bank' total deposits between the period of December 2002-September 2014.

Table 3. 26. Pairwise Granger Causality Tests
Pairwise Granger Causality Tests
Date: 06/21/15   Time: 01:05
Sample: 1 48
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(FINANSBA)	46	5.52601	0.0234
D(FINANSBA) does not Granger Cause D(TLUSD)		2.34548	0.1330
D(OILPRICE(-1)) does not Granger Cause D(FINANSBA)	45	7.05702	0.0111
D(FINANSBA) does not Granger Cause D(OILPRICE(-1))		0.27485	0.6029
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	45	1.75043	0.1930
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		4.20585	0.0466

According to Table 3.26, for lag 1, it can be indicated that USD/TL parity and first lag of OPEC oil price can forecast Finans Bank's deposits between the period of December 2002-September 2014.

Table 3. 27. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests

Date: 06/21/15   Time: 01:06

Sample: 1 48

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(FINANSBA)	45	3.41957	0.0426
D(FINANSBA) does not Granger Cause D(TLUSD)		2.58648	0.0878
D(OILPRICE(-1)) does not Granger Cause D(FINANSBA)	44	5.56065	0.0075
D(FINANSBA) does not Granger Cause D(OILPRICE(-1))		0.02289	0.9774
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	44	2.19371	0.1251
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		2.06605	0.1403

According to Table 3.27, for lag 2, it can be indicated that both USD/TL parity and first lag of OPEC oil price can forecast Finans Bank's deposits between the period of December 2002-September 2014.

Table 3. 28. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests

Date: 06/21/15   Time: 01:06

Sample: 1 48

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(FINANSBA)	44	3.14446	0.0365
D(FINANSBA) does not Granger Cause D(TLUSD)		2.56968	0.0689
D(OILPRICE(-1)) does not Granger Cause D(FINANSBA)	43	3.94448	0.0157
D(FINANSBA) does not Granger Cause D(OILPRICE(-1))		0.09982	0.9596
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	43	2.00405	0.1308
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		2.87526	0.0495

According to Table 3.28, for lag 3, it can be indicated that, both USD/TL parity and first lag of OPEC oil price can be used to forecast Finans Bank's deposits.

Table 3. 29. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests
Date: 06/21/15   Time: 01:07
Sample: 1 48
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(FINANSBA)	43	2.42943	0.0666
D(FINANSBA) does not Granger Cause D(TLUSD)		1.80950	0.1498
D(OILPRICE(-1)) does not Granger Cause D(FINANSBA)	42	5.16291	0.0024
D(FINANSBA) does not Granger Cause D(OILPRICE(-1))		0.06500	0.9919
D(OILPRICE(-1)) does not Granger Cause D(TLUSD)	42	1.21223	0.3243
D(TLUSD) does not Granger Cause D(OILPRICE(-1))		2.23603	0.0864

According to Table 3.29, for lag 4, it can be indicated that, USD/TL parity and first lag of OPEC oil price can forecast Finans Bank's deposits between the period of December 2002-September 2014.

Table 3. 30. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests
Date: 06/21/15   Time: 01:22
Sample: 1 48
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TLUSD) does not Granger Cause D(VAKIF)	46	3.98398	0.0523
D(VAKIF) does not Granger Cause D(TLUSD)			0.4605

According to VAR criteria, optimal lag length was found as 1 for Vakıflar Bank. For lag 1, it can be indicated that USD/TL parity can forecast Vakıfbank's deposits between the period of December 2002 − September 2014 (Table 3.30). Moreover, with lag 2, lag 3, lag 4, USD/TL parity can not forecast Vakıflar Bank's total deposits. Thus, VAR Granger Causality/Block Exogeneity Wald Test will be conducted.

Table 3. 31. VAR Granger Causality/Block Exogeneity Wald Tests

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 06/21/15   Time: 01:23
Sample: 1 48
Included observations: 46

Dependent variable: D(VAKIFLAR)

Excluded	Chi-sq	Df	Prob.
D(TLUSD)	3.983985	1	0.0459
All	3.983985	1	0.0459

According to VAR Granger Causality/ Block Exogeneity Wald Test (Table 3.31), USD/TL parity can forecast Vakıflar Bank's deposits between the period of December 2002-September 2014.

3.9.4.14. Vector Error Correction Model

Vector Error Correction test(Table 3.33) was conducted to unearth the relationship between Turkish commercial banks' net income and macrovariables. Turkey's interest rates and euribor eleminated. USD/TL parity has long term relationship with 7 banks' net income. Federal reserve rates have long term relationship with 7 banks' net income. By using Schwarz criteria, lag lengths were determined.

Table 3. 32. QUARTERLY VECM LAG SELECTION

T	AIC	HQC	SIC	LR1	SLR1	LM1
80	3,88	1,04	0,70	5,38	1,48	1,58
100	1,37	0,90	0,79	3,26	1,15	1,15
120	1,05	0,94	0,85	2,26	1,10	1,04
160	1,02	0,98	0,91	1,58	1,07	0,99
200	1,02	0,99	0,95	1,34	1,05	0,99

Source: Ivanov, Kilian(2005)

In quarterly VECM models, since quarter data will be used between December 2002-September 2014, SIC criteria will be used. Table 3.32 shows that SIC criteria had lowest value in all periods.

Table 3. 33. VECTOR ERROR CORRECTION MODEL

	Fed(-1)	Fed(-2)	Fed(-3)	Fed(-4)	Fed(-5)	Tlus(-1)	Tlus(-2)	Tlus(-3)	Tlus(-4)	Tlus(-5)
Vakıflar	X	X	X	X	X	X	X	X	X	X
Burgan	-	-	-	-	-	X	X	X	X	-
Anadolu	X	X	X	X	-	-	-	-	-	-
Alternatif	-	-	-	-	-	-	-	-	-	-
IsBank	X	X	X	X	-	-	-	-	-	-
Sekerbank	-	-	-	-	-	-	-	-	-	-
Arapturk	-	-	-	-	-	X	X	X	X	-
HSBC	-	-	-	-	-	-	-	-	-	-
Akbank	X	X	X	-	-	X	X	X	-	-
Denizbank	-	-	-	-	-	X	X	X	X	-
Garanti	-	-	-	-	-	X	X	X	X	X
ING	X	X	X	X	X	-	-	-	-	-
Turkekon	X	X	X	X	-	-	-	-	-	-
Turkishbank	-	-	-	-	-	-	-	-	-	-
Tekstilbank	X	X	X	X	-	X	X	X	X	-
Finansbank	-	-	-	-	-	-	-	-	-	-

3.9.4.15. Ols Break Regression

Table 3. 34. OLS I

OLS BREAK REGRESSION
Dependent Variable: D(DEPOSITS)
Method: Least Squares with Breaks
Date: 09/18/15   Time: 16:56
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments
Break type: Bai-Perron tests of 1 to M globally determined breaks
Break selection: Unweighted max-F (UDmax), Trimming 0.15, Max. Breaks
    5, Sig. level 0.05
Breaks: 1990, 1994, 1998, 2002, 2006
HAC standard errors & covariance (Quadratic-Spectral kernel, Andrews
    bandwidth = 2.3079)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
	1982 - 1989 -- 8 obs			
D(DEPOSITS(-1))	-0.045750	0.287494	-0.159134	0.8767
D(TLUSD)	-865.2997	752.1043	-1.150505	0.2767
D(TLUSD(-1))	-4215.015	1579.445	-2.668668	0.0235
	1990 - 1993 -- 4 obs			
D(DEPOSITS(-1))	0.192159	0.244082	0.787274	0.4494
D(TLUSD)	-242.1214	82.45614	-2.936366	0.0149
D(TLUSD(-1))	210.1608	33.44206	6.284327	0.0001
	1994 - 1997 -- 4 obs			
D(DEPOSITS(-1))	1.022166	0.848356	1.204878	0.2560
D(TLUSD)	46.51398	56.71223	0.820175	0.4312
D(TLUSD(-1))	-137.2652	66.06970	-2.077582	0.0645
	1998 - 2001 -- 4 obs			
D(DEPOSITS(-1))	-0.494758	0.090904	-5.442655	0.0003
D(TLUSD)	3.209113	1.606619	1.997432	0.0737
D(TLUSD(-1))	3.733624	2.019570	1.848723	0.0942
	2002 - 2005 -- 4 obs			
D(DEPOSITS(-1))	-0.797301	0.588948	-1.353771	0.2056
D(TLUSD)	20.87187	8.278342	2.521262	0.0303
D(TLUSD(-1))	53.17206	21.51848	2.470995	0.0330
	2006 - 2010 -- 5 obs			
D(DEPOSITS(-1))	0.364957	0.276690	1.319012	0.2166
D(TLUSD)	-10.79434	16.12564	-0.669390	0.5184
D(TLUSD(-1))	3.787381	10.13710	0.373616	0.7165
C	1.955041	1.052593	1.857357	0.0929
R-squared	0.727282	Mean dependent var		1.000853
Adjusted R-squared	0.236390	S.D. dependent var		2.526821
S.E. of regression	2.208056	Akaike info criterion		4.667736
Sum squared resid	48.75511	Schwarz criterion		5.563551
Log likelihood	-48.68217	Hannan-Quinn criter.		4.948294
F-statistic	1.481553	Durbin-Watson stat		1.214569
Prob(F-statistic)	0.266410			

Table 3. 35. OLS II

Dependent Variable: D(DEPOSITS)
Method: Least Squares with Breaks
Date: 09/19/15   Time: 01:56
Sample (adjusted): 1983 2010
Included observations: 28 after adjustments
Break type: Bai-Perron tests of 1 to M globally determined breaks
Break selection: Unweighted max-F (UDmax), Trimming 0.15, Max. Breaks
     5, Sig. level 0.05
Breaks: 1987, 1992, 1997, 2001
HAC standard errors & covariance (Quadratic-Spectral kernel, Andrews
     bandwidth = 1.5113)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
	1983 - 1986 -- 4 obs			
D(DEPOSITS(-1))	-2.505096	0.590827	-4.239980	0.0011
D(OIL(-1))	-0.527735	0.086135	-6.126835	0.0001
D(OIL(-2))	0.952155	0.320424	2.971550	0.0117
	1987 - 1991 -- 5 obs			
D(DEPOSITS(-1))	1.718312	0.650754	2.640492	0.0216
D(OIL(-1))	0.574577	0.271287	2.117965	0.0557
D(OIL(-2))	0.361793	0.146884	2.463112	0.0299
	1992 - 1996 -- 5 obs			
D(DEPOSITS(-1))	1.377762	0.552930	2.491750	0.0283
D(OIL(-1))	-1.209179	0.667529	-1.811426	0.0952
D(OIL(-2))	0.895190	0.453203	1.975254	0.0717
	1997 - 2000 -- 4 obs			
D(DEPOSITS(-1))	-1.894277	0.301159	-6.289959	0.0000
D(OIL(-1))	1.062860	0.224227	4.740111	0.0005
D(OIL(-2))	-0.954683	0.248589	-3.840405	0.0024
	2001 - 2010 -- 10 obs			
D(DEPOSITS(-1))	0.093414	0.226782	0.411912	0.6877
D(OIL(-1))	0.123005	0.040080	3.069003	0.0097
D(OIL(-2))	0.136853	0.029830	4.587796	0.0006
	Non-Breaking Variables			
C	0.502387	0.650216	0.772647	0.4547

R-squared	0.769501	Mean dependent var		1.011174
Adjusted R-squared	0.481377	S.D. dependent var		2.572566
S.E. of regression	1.852646	Akaike info criterion		4.366666
Sum squared resid	41.18757	Schwarz criterion		5.127926
Log likelihood	-45.13333	Hannan-Quinn criter.		4.599391
F-statistic	2.670727	Durbin-Watson stat		1.730225
Prob(F-statistic)	0.046640			

OLS Break Regression (Table 3.34 and Table 3.35) was applied to unearth the impact of USD/TL parity and OPEC oil prices on Turkish banks' deposits between the period of 1980-2010. It can be indicated that, impact of USD/TL parity is more than the impact of OPEC oil prices on Turkish banks' deposits. Nevertheless, USD/TL parity lost its significance at latest breaks. OPEC oil prices had significant positive impact on Turkish banks' deposits at latest break. In the out-of sampling section, the impact of USD/TL parity and OPEC oil prices on Turkish banks' deposits will be measured.

3.9.4.16. Out of Sample Forecasting:

3.9.4.16.1. Exponential Smoothing

In order to forecast between 1980 and 2021, Holt-Winters exponential smoothing technique was applied to Turkish banks' deposits, OPEC oil price and USD/TL parity. Holt-Winters exponential smoothing technique adjusts in-sample data according to latest data. Tables indicated about Holt-Winters exponential test results. The models (Table 3.36, 3.37, 3.38) were choosen with the least root mean square errors.

Table 3. 36. Exponential Smoothing I
Date: 07/16/15   Time: 13:26

Sample: 1 31

Included observations: 31

Method: Holt-Winters No Seasonal

Original Series: DEPOSITS

Forecast Series: DEPOSISM

Parameters:	Alpha	1.0000
	Beta	0.0000
Sum of Squared Residuals		192.7133
Root Mean Squared Error		2.493303
End of Period Levels:	Mean	46.73240
	Trend	0.728063

Table 3. 37. Exponential Smoothing II

Date: 07/16/15   Time: 13:28

Sample: 1 31

Included observations: 31

Method: Holt-Winters No Seasonal

Original Series: OIL

Forecast Series: OILSM

Parameters:		Alpha		0.4000
		Beta		0.3500
Sum of Squared Residuals				3096.891
Root Mean Squared Error				9.994984
End of Period Levels:			Mean	96.49721
			Trend	8.505582

Table 3. 38. Exponential Smoothing III

Date: 07/16/15   Time: 13:29

Sample: 1 31

Included observations: 31

Method: Holt-Winters No Seasonal

Original Series: TLUSD

Forecast Series: TLUSDSM

Parameters:	Alpha			1.0000
	Beta			0.5100
Sum of Squared Residuals				0.577969
Root Mean Squared Error				0.136544
End of Period Levels:			Mean	1.791604
			Trend	0.111901

3.9.4.16.2. OLS Method

After data have adjustment, OLS method was applied to new data set. It has been found that between 1980-2021, USD/TL parity do not have significant impact on Turkish banks' deposits (Table 3.39).

Table 3. 39. OLS Method I
Dependent Variable: DEPOSITS

Method: Least Squares

Date: 07/16/15   Time: 14:51

Sample (adjusted): 1981 2021

Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.189582	0.957202	1.242770	0.2216
DEPOSITS(-1)	0.963336	0.049987	19.27155	0.0000
TLUSD	1.583731	1.028221	1.540263	0.1318

R-squared	0.986471	Mean dependent var	36.47959
Adjusted R-squared	0.985759	S.D. dependent var	18.47885
S.E. of regression	2.205168	Akaike info criterion	4.489840
Sum squared resid	184.7851	Schwarz criterion	4.615223
Log likelihood	-89.04172	Hannan-Quinn criter.	4.535498
F-statistic	1385.418	Durbin-Watson stat	2.042266
Prob(F-statistic)	0.000000		

OLS method was applied again. Since forecasting of Holt-Winters adjusted data was applied with the first lag of dependent variable, data have trend structure. Thus, @trend variable was placed into both methods. If @trend data were insignificant, it was removed. **It was found that with significant coefficient of @trend constraint, between the period of 1980-2021, first lag of OPEC oil price has significant positive impact on Turkish banks'deposits (Table 3.40).**

Table 3. 40. OLS Method II
Dependent Variable: DEPOSITS

Method: Least Squares

Date: 07/16/15   Time: 14:50

Sample (adjusted): 1981 2021

Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.575369	0.842403	3.057171	0.0041
DEPOSITS(-1)	0.688461	0.083511	8.243982	0.0000
OIL(-1)	0.096355	0.024331	3.960185	0.0003
@TREND	0.231143	0.082347	2.806920	0.0079

R-squared	0.990494	Mean dependent var	36.47959
Adjusted R-squared	0.989723	S.D. dependent var	18.47885
S.E. of regression	1.873292	Akaike info criterion	4.185739
Sum squared resid	129.8412	Schwarz criterion	4.352917
Log likelihood	-81.80765	Hannan-Quinn criter.	4.246616
F-statistic	1285.078	Durbin-Watson stat	1.884805
Prob(F-statistic)	0.000000		

3.9.4.16.3. Ramsey Reset Test

Ramsey Reset Test (Table 3.41) was applied to check the stability of the model of deposits, constant, first lag of deposits and @trend. Since Ramsey test probability is more than 0.05, analysis were validated.

Table 3. 41. Ramsey RESET Test

Ramsey RESET Test

Equation: UNTITLED

Specification: DEPOSITS C DEPOSITS(-1) OIL(-1) @TREND

Omitted Variables: Powers of fitted values from 2 to 3

	Value	Df	Probability
F-statistic	2.441804	(2, 35)	0.1017
Likelihood ratio	5.355311	2	0.0687

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	15.89860	2	7.949299
Restricted SSR	129.8412	37	3.509221
Unrestricted SSR	113.9426	35	3.255502
Unrestricted SSR	113.9426	35	3.255502

LR test summary:

	Value	Df
Restricted LogL	-81.80765	37
Unrestricted LogL	-79.12999	35

3.9.4.16.4. Cusum Test

Figure 3. 44. Cusum Test
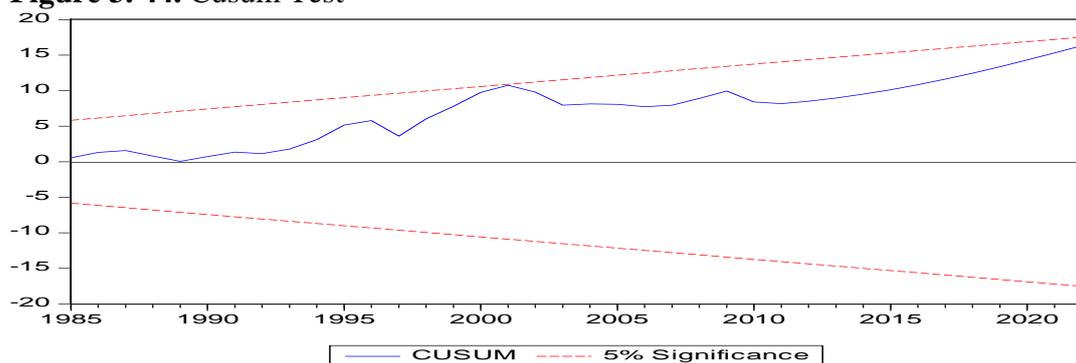
Cusum test (Figure 3.44) was applied for the coefficient of first lagged oil price and first lagged of Turkish banks' deposits model and @trend variable. It was found that coefficients were stable between 1980 and 2021. It can be interpreted that independent variables' coefficients do not have structural break between 1980-2021.

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3.9.4.16.5. Granger Causality Analysis

According to VAR lag length criteria(Table 3.42), optimal lag length was found as 1.

Table 3. 42. VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria

Endogenous variables: D(DEPOSITS) D(OIL(-1))

Exogenous variables: C

Date: 07/16/15   Time: 15:54

Sample: 1980 2021

Included observations: 38

#	LogL	LR	FPE	AIC	SC	HQ
0	-225.8490	NA	553.5326	11.99205	12.07824*	12.02272
1	-220.1406	10.51549*	506.2541*	11.90213*	12.16070	11.99413*
2	-218.3778	3.061684	570.8905	12.01988	12.45083	12.17321
3	-216.0009	3.878110	625.1944	12.10531	12.70863	12.31997

Table 3. 43. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests

Date: 07/16/15   Time: 15:57

Sample: 1980 2021

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
D(OIL(-1)) does not Granger Cause D(DEPOSITS)	40	4.36828	0.0435
D(DEPOSITS) does not Granger Cause D(OIL(-1))		0.88430	0.3531

According to (Table 3.43) result, first lag of OPEC oil price can forecast Turkish commercial bank's deposits.

Figure 3. 45. Leverage Plot

DEPOSITS vs Variables (Partialled on Regressors)
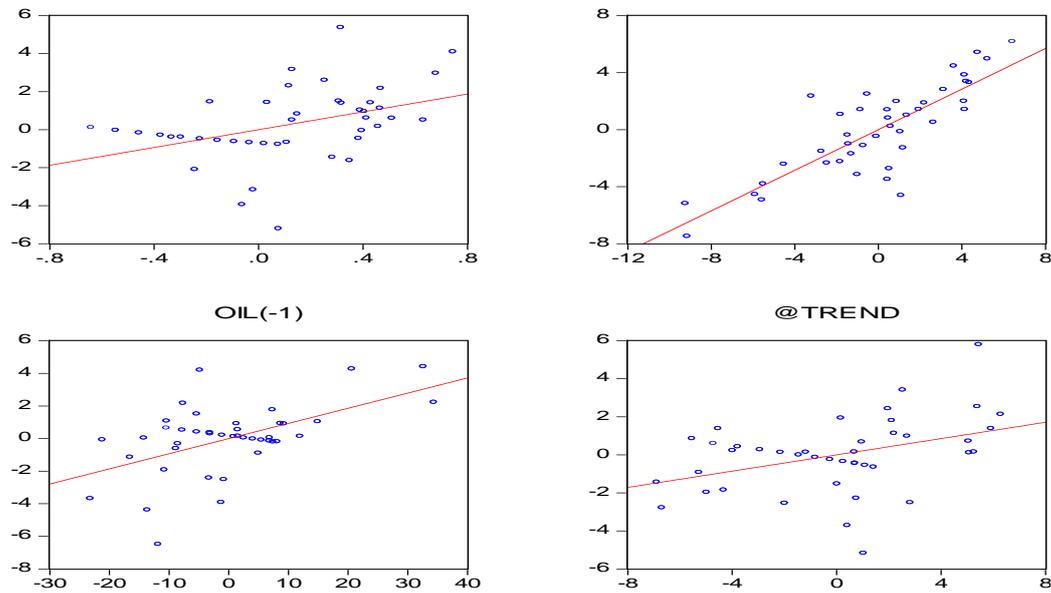
Leverage plot (Figure 3.45.) has been applied to data. It can be indicated that the relation direction is positive.But since data is not stationary, there is no certainty about relationship.

Table 3. 44. Least Squares

Dependent Variable: D(DEPOSITS)

Method: Least Squares

Date: 07/16/15   Time: 16:16

Sample (adjusted): 1983 2021

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.069897	0.342425	3.124465	0.0035
D(OIL(-1))	0.089241	0.033136	2.693182	0.0106
D(OIL(-2))	0.097776	0.033082	2.955518	0.0054
R-squared	0.257355	Mean dependent var		1.494802
Adjusted R-squared	0.217212	S.D. dependent var		2.295021
S.E. of regression	2.030526	Akaike info criterion		4.326505
Sum squared resid	152.5523	Schwarz criterion		4.453171
Log likelihood	-83.53011	Hannan-Quinn criter.		4.372304
F-statistic	6.410969	Durbin-Watson stat		1.983365
Prob(F-statistic)	0.004069			

Granger causality equation applied to Turkish banks' deposits and first lag of Opec oil price. According to Table 3.44, sum of significant coefficients are positive. It can be indicated there is positive and significant relationship between the first lag of OPEC oil price and Turkish bank's deposits between 1980 and 2021. With that result, leverage plot analysis is validated.

3.9.4.16.6. BDS Test and Hodrick- Prescott Filter

Table 3. 45. BDS Test for HPDEPOSITS

BDS Test for HPDEPOSITS

Date: 08/25/15   Time: 16:00

Sample: 1980 2010

Included observations: 31

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.166839	0.008196	20.35542	0.0000
3	0.261262	0.013280	19.67334	0.0000
4	0.305143	0.016122	18.92655	0.0000
5	0.331569	0.017139	19.34588	0.0000
6	0.345794	0.016867	20.50107	0.0000

According to BDS test (Table 3.45.), Hodrick-Prescott Filtered Turkish banks' deposits are strong-form efficient. When Hodrick-Prescott Filter applied, since data is annual, lambda will be choosen as 100.

Figure 3. 46. Hodrick-Prescott Filtered Turkish banks' deposits

Hodrick-Prescott Filter (lambda=100)
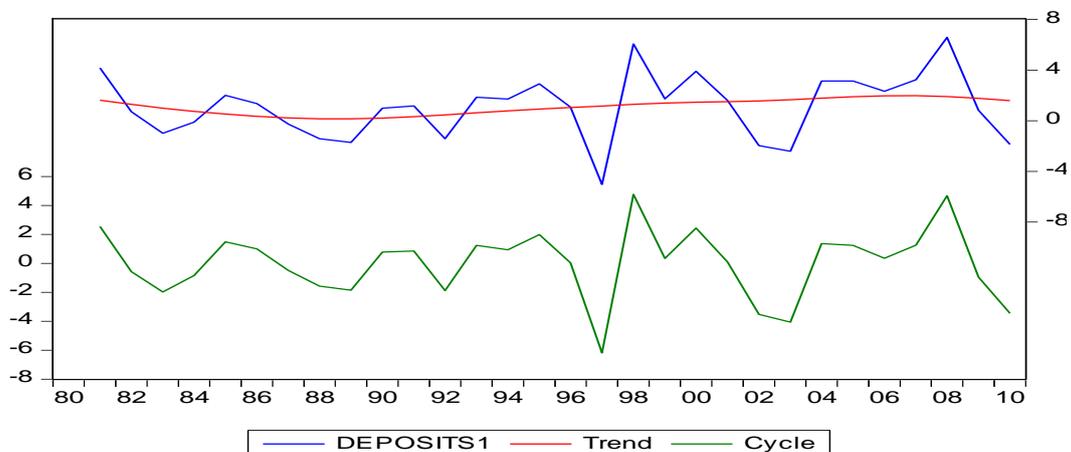
Hodrick-Prescott Filter was applied to stationary deposit series. According to graph (Figure 3.46.), it can be concluded that Turkish banks' deposits growth is decreasing, then increasing, later on at the end of the data, the growth reached at the 1980's growth level.

Table 3. 46. BDS Test for HPOIL

BDS Test for HPOIL

Date: 08/25/15   Time: 16:01

Sample: 1980 2010

Included observations: 31

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.158436	0.012589	12.58553	0.0000
3	0.240626	0.020571	11.69738	0.0000
4	0.265759	0.025196	10.54772	0.0000
5	0.249754	0.027026	9.241143	0.0000
6	0.190260	0.026840	7.088626	0.0000

According to BDS test (Table 3.46), Hodrick-Prescott Filtered OPEC oil prices are strong-form efficient.

Figure 3. 47. Hodrick-Prescott Filtered OPEC oil prices

Hodrick-Prescott Filter (lambda=100)
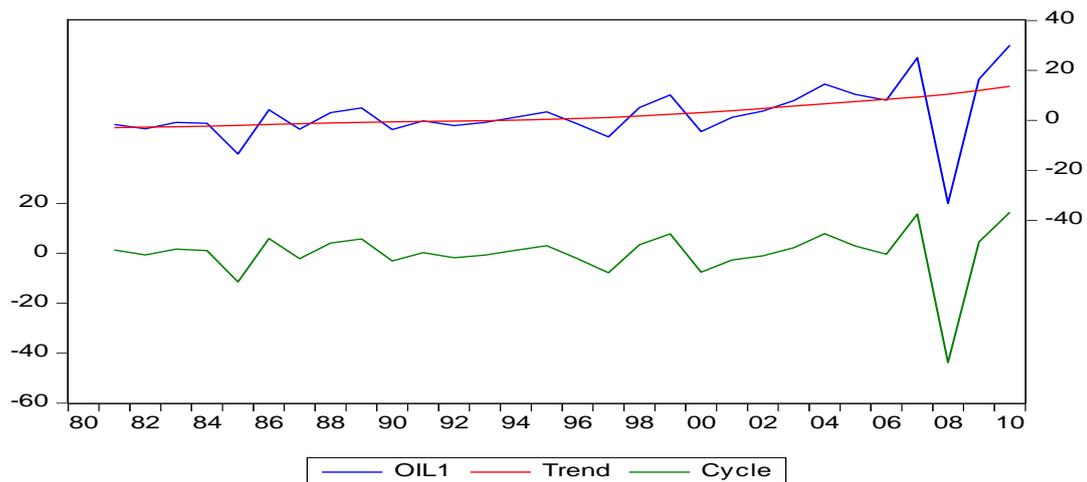
Hodrick-Presscott Filter was applied to stationary OPEC oil prices. According to graph (Figure 3.47), it can interpreted that, with removing business cycles, OPEC oil prices growth has been increasing.

Table 3. 47. BDS Test for HPUSDTL

BDS Test for HPUSDTL

Date: 08/25/15   Time: 16:02

Sample: 1980 2010

Included observations: 31

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.173682	0.007531	23.06371	0.0000
3	0.286786	0.012121	23.65994	0.0000
4	0.356882	0.014618	24.41353	0.0000
5	0.395743	0.015437	25.63634	0.0000
6	0.404143	0.015091	26.78055	0.0000

According to BDS test (Table 3.47), Hodrick-Prescott Filtered USD/TL parities are strong-form efficient.

Figure 3. 48. Hodrick-Prescott Filtered USD/TL Parity

Hodrick-Prescott Filter (lambda=100)
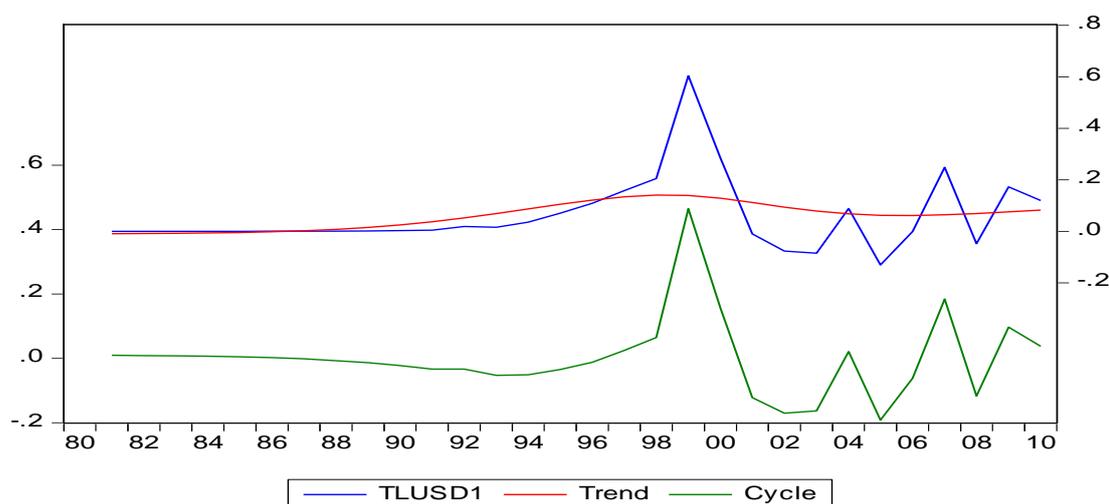
According to Hodrick-Presscott Filter (Figure 3.48), at some period, USD/TL parity growth increasing fast. After fast increase, USD/TL parity conversion reach moderate levels.

The next objective is to find the correlation matrix and covariance matrix between Hodrick-Prescott Filtered adjusted series of Turkish banks' aggregate deposits, Opec oil prices, USD/TL parity between the period of 1980-2010.

Table 3. 48. Correlation Matrix

	HPDEPOSITS	HPOIL	HPUSDTL
HPDEPOSITS	1.000000	0.746501	0.445420
HPOIL	0.746501	1.000000	0.446393
HPUSDTL	0.445420	0.446393	1.000000

According to correlation matrix (Table 3.48), correlation between HPOIL and HPDEPOSITS is higher than the correlation between HPUSDTL and HPDEPOSITS. That finding supports out-of sampling analysis (1980-2011) that has been done in previous section.

Table 3. 49. Covariance Matrix

	HPDEPOSITS	HPOIL	HPUSDTL
HPDEPOSITS	0.366230	2.100680	0.013108
HPOIL	2.100680	21.62247	0.100941
HPUSDTL	0.013108	0.100941	0.002365

According to covariance matrix (Table 3.49), all series move in same direction. The covariance between HPDEPOSITS and HPOIL is higher than the covariance between HPDEPOSITS and HPUSDTL. That finding supports out-of sampling analysis (1980-2021). At out of sampling analysis, it was found that significance of USD/TL parity was lost and first lag of OPEC oil price' significance was not lost.

3.9.4.16.7. ARDL Model

ARDL model was implemented to validate the out-of sampling section. ARDL model was used to unearth the long term relationship between Turkish banks' deposits, oil prices, USD/TL parity. In ARDL model, data have not to be stationary. In addition, different orders such as I(0), I(1) can be used to detect long term relationship. Before embarking ARDL model, optimal model selection has to be done. Most optimal ARDL(p,q,r) model will be choosen. Among 20 models, ARDL(1,2,2) will be choosen.

Figure 3. 49. ARDL Optimal Lag Selection

Akaike Information Criteria (top 20 models)
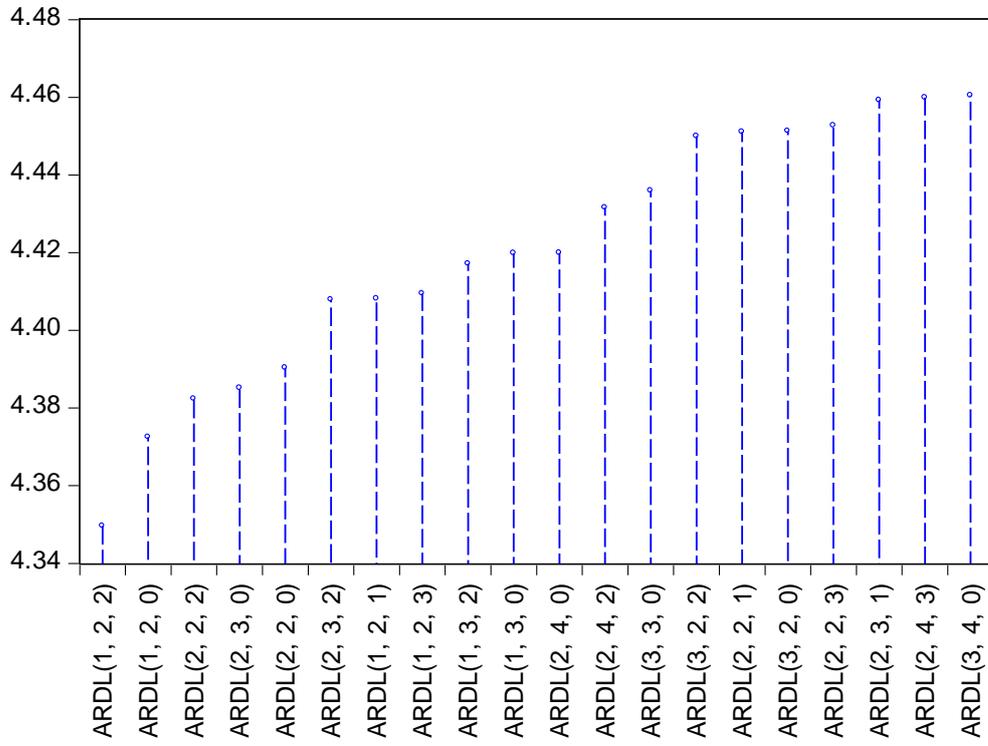
After implementing ARDL(1,2,2) model, ARDL bound test has to be validated.

Table 3. 50. ARDL Bounds Test

ARDL Bounds Test
Date: 11/29/15   Time: 11:29
Sample: 1982 2010
Included observations: 29
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K	
F-statistic	7.689602	2	

Critical Value Bounds

Significance	I0 Bound	I1 Bound	
10%	4.19	5.06	
5%	4.87	5.85	
2.5%	5.79	6.59	
1%	6.34	7.52	

At ARDL Bounds Test, F statistics of ARDL(1,2,2) model surpassed the threshold values of critical value bounds. After that step, ARDL Cointegrating and Long Run Form Analysis (Table 3.51) has to be done.

Table 3. 51. ARDL Cointegrating And Long Run Form

ARDL Cointegrating And Long Run Form
Dependent Variable: DEPOSITS
Selected Model: ARDL(1, 2, 2)
Date: 11/29/15   Time: 11:30
Sample: 1980 2010
Included observations: 29

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OIL)	-0.008188	0.042413	-0.193062	0.8489
D(OIL(-1))	-0.126801	0.048573	-2.610499	0.0167
D(TLUSD)	2.375393	3.374463	0.703932	0.4896
D(TLUSD(-1))	5.952874	3.576462	1.664459	0.1116
D(@TREND())	0.387754	0.122133	3.174856	0.0048
CointEq(-1)	-0.761471	0.164456	-4.630248	0.0002

Cointeq = DEPOSITS - (0.2271*OIL + 3.0661*TLUSD + 10.0882 + 0.5092
  *@TREND)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIL	0.227096	0.033846	6.709679	0.0000
TLUSD	3.066065	1.872527	1.637394	0.1172
C	10.088214	1.489476	6.772995	0.0000
@TREND	0.509217	0.141102	3.608855	0.0018

According to ARDL Cointegrating and Long Run Form Analysis (Table 3.51), cointegrating equation variable is significant and negative. That means, there is long term relationship between variables. In addition, it can be indicated that there is long term relationship between, Opec oil prices and Turkish banks' deposits. In the future, according to ARDL model, when OPEC oil prices rises 10 % , Turkish banks' deposits will grow by 2.27096%. That means, oil resource rich countries will invest in Turkish banking system. Banks in Turkey will get substantial amount of oil money as deposits and give credits to   real estate developers especially. Moreover, GMM-TSLS methodology unearthed that the short term impact coefficient is 0.145155. According to ARDL(1,2,2) model, long term coefficient 0.227096. It can be interpreted that in the long term, OPEC oil prices will be more important for the augmentation of Turkish banks' deposits. Nevertheless, there is no long term relationship between USD/TL parity and Turkish banks' deposits. That circumstance derived from high volatility of USD/TL parity.

3.10. Scenario Analysis of OPEC Oil Prices and USD/TL Parity (1980-2010)

In that section, the main objective is to find OPEC oil price' arbitrary changes impact on Turkish banks' deposits growth. In scatter plot diagram, polynomial technique was used to unearth the relation. According to given graph, in most of the oil price changes, Turkish banks' deposits augmented. Data were converted to stationary.

Figure 3. 50. OPEC Oil Price Scenario Analysis
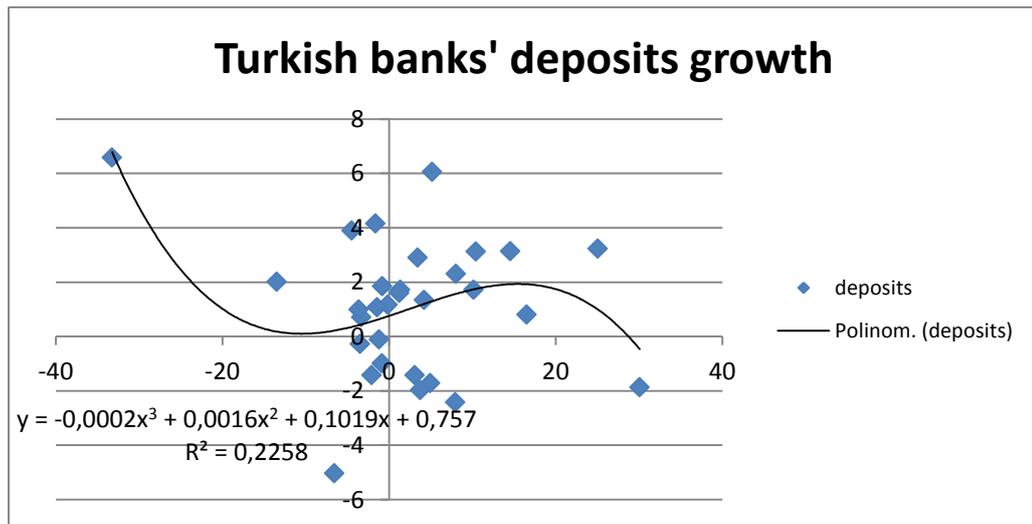
Moreover, the largest negative price change was %33. The largest positive price change was %30. Sequence from -33 to +33 (change in oil prices) was formed symmetrically. According to **Figure 3.50**, when there is moderate negative change at oil prices, Turkish bank's deposits grew slightly. **At moderate levels, positive prices changes curve' area is more than negative price changes curve' area.** It can be indicated that, polynomial function has convex structure during the negative phase of oil price changes. Moreover, polynomial function has concave structure during the positive phase of oil price changes. It can be indicated that during negative phases of oil price changes, the changes of Turkish commercial banks' deposits were positive at most of the negative phases. Moreover, during positive phase of OPEC oil prices changes, Turkish commercial banks' deposits changes were positive at most of the time period.

Figure 3. 51. USD/TL Parity Scenario Analysis
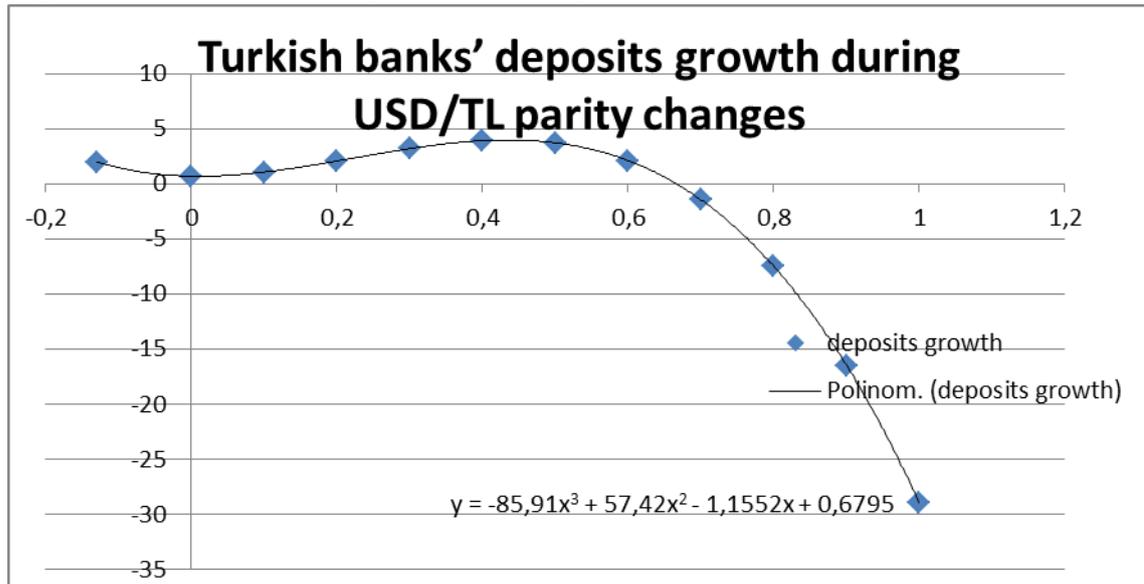
According to interest rate parity theory, since Turkish lira' interest rate is more than the USD/TL parity, Turkish lira will depreciate against the USD in the long run. Not only Turkish lira has depreciation problems; but also other emerging countries' currencies diminished against the USD. Recently, Turkey has financial crisis. At the end of the December 2014, USD/TL parity was 2.20. Currently USD/TL parity is around 3.00. Since Turkey has highly volatile currency, scenario analysis was conducted. **Figure 3.51. indicates that Turkish banks mainly benefit from the depreciation of Turkish lira. Nevertheless, since there is concavity structure, polynomial forecast indicates that Turkish banks' deposits can plummet fast.** At 2015, some Turkish banks had crisis position. Thus, some risky credits were called back. In addition to that, due to the fast rise of American dollar, there are many lay-offs in Turkish business industry and many Turkish customers can not pay their mortgage credits. Therefore, some banks had cooperation with real estate businesses.

3.11. The Impact of USD/TL Parity on Turkish Commercial Banks' Liqudity Adequacies and Equities

Liquidity is significant parameter for banks. If liqudity collapse happens, banks will be in bankruptcy. In order to have sustainable liqudity adequacy , liquid assets should compensate the short term withdrawals. According to Basel III criteria, the proportion of highly liquid assets to 30 days total net liqudity outflows should be more or equal to 100%. Due to the interest rate parity, USD/TL parity increases fast. At 2001 banking crisis in Turkey, interest rates were skyrocketed and USD/TL parity increased very fast. That circumstance led many Turkish commercial banks' liqudity adequacies to decrease and caused many Turkish commercial banks to have bankruptcy position. Figure 3.52 indicates about the Turkish banks' liquidity adequacies for the period of 2007 April-2015 September. It can be indicated that highly volatile USD/TL parity and election uncertainty triggers liquidity adequacies to plummet in Turkey.

Figure 3. 52. Turkish Banks' Liquidity Adequacy
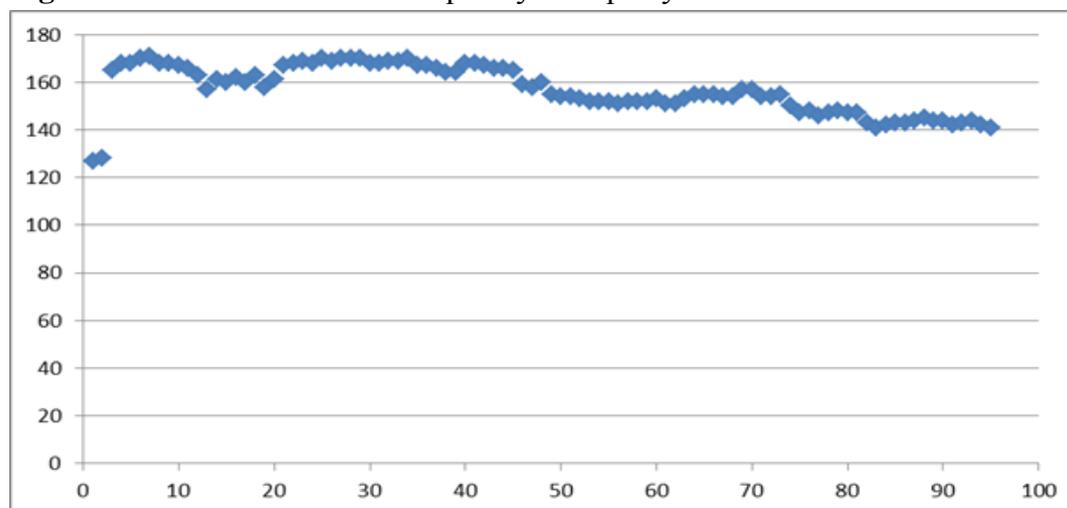
Source: BDDK Database

Due to the diminished liqudity adequacies, Turkish banks have to increase capitals. As an example, Tekstil banks management endavours to sell %75.5 of shares to China's ICBC bank for the valuation of 669 million Turkish lira. For banks' valuation, equity accumulation is significant. Kahraman(2008) indicated that many banks' business valuation is done in accordance with the total equity of the bank.

Table 3. 52. Business Valuation of Banks

Business valuation	Equity of the banks
Finansbank valuation	3,60X Finansbank' equity
Oyakbank valuation	3,26X Oyakbank' equity
Dışbank valuation	1,8X Dışbank' equity
Akbank valuation	2,8X Akbank' equity
Garantibank valuation	2,4X Garantibank' equity
MNGbank valuation	3,40 X MNG bank' equity
Tekfenbank valuation	3,60X Tekfenbank' equity
Denizbank valuation	4,55X Denizbank' equity

Source: Kahraman(2008)

Figure 3.53. indicates about the total equities of   Turkish banks. Turkish banks' total equities augmented between April 2007- February 2015. With respect to Kahraman(2008) indications, it can be argued that, Turkish banks' business value has been increasing fast.

Figure 3. 53. Turkish Banks' Total Equities
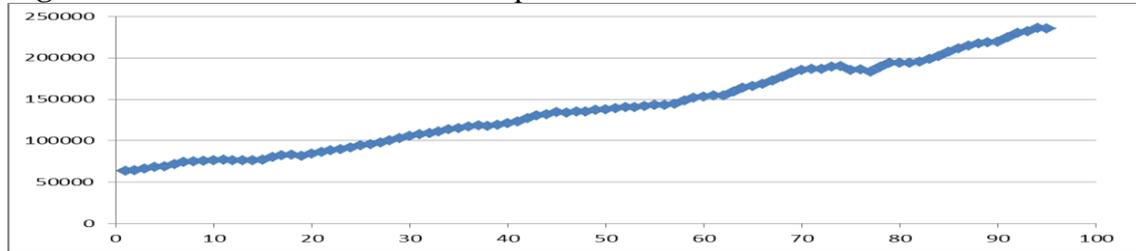
 Source: BDDK Database

In that thesis, aggregate data of Turkish banks' liqudity adequacies and equities were collected. The impact of USD/TL parity on Turkish commercial banks' liquidity adequacies and equties will be measured.

3.11.1. Bayesian VAR- Impulse Response Analysis

Time span will be   April 2007- February 2015. The main objective is to scrutinize the response of Turkish banks' liquidity and equities within the scenario of arbitrarily

increased USD/TL parity. In the Bayesian VAR model, the main objective is to unearth the response of Turkish banks' equities and liquidities within the scenario of one standard deviation positive shock of USD/TL parity. In that model, optimal lag number is found as 1 (Table 3.53). Afterwards, Bayesian VAR model (Table 3.54) is implemented.

Table 3. 53. VAR Lag Order Selection Criteria
VAR Lag Order Selection Criteria

Endogenous variables: D(EQUITY) D(LIQUIDITY) D(USDTLPARITY)

Exogenous variables: C

Date: 11/04/15   Time: 21:56

Sample: 2007M04 2015M02

Included observations: 90

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-844.7172	NA	30471.01	18.83816	18.92149	18.87176
1	-822.9128	41.67061*	22929.10*	18.55362*	18.88693*	18.68803*
2	-816.7395	11.38627	24434.39	18.61643	19.19972	18.85165
3	-811.4664	9.374390	26592.55	18.69925	19.53252	19.03528
4	-804.7608	11.47411	28077.17	18.75024	19.83349	19.18707

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 3. 54. Bayesian VAR Estimates

Bayesian VAR Estimates

Date: 11/04/15   Time: 21:57

Sample (adjusted): 2007M06 2015M02

Included observations: 93 after adjustments

Prior type: Litterman/Minnesota

Initial residual covariance: Diagonal VAR

Hyper-parameters: Mu: 0, L1: 1, L2: 0.99, L3: 1

Standard errors in ( ) & t-statistics in [ ]

	D(EQUITY)	D(LIQUIDITY)	D(USDTL)
D(EQUITY(-1))	0.190257	-0.000281	7.59E-06
	(0.10015)	(0.00027)	(3.2E-06)
	[1.89967]	[-1.02544]	[2.39504]
D(LIQUIDITY(-1))	-7.708571	0.055854	0.000862
	(38.1760)	(0.10448)	(0.00121)
	[-0.20192]	[0.53458]	[0.71389]
D(USDTL(-1))	-12220.88	-20.65587	0.392494
	(3312.79)	(9.06551)	(0.10484)
	[-3.68900]	[-2.27851]	[3.74367]
C	1632.600	0.900515	-0.005193
	(257.980)	(0.70593)	(0.00816)
	[6.32840]	[1.27564]	[-0.63613]
R-squared	0.211343	0.062567	0.156382
Adj. R-squared	0.184759	0.030969	0.127945
Sum sq. Resids	2.22E+08	1660.364	0.222026
S.E. equation	1578.365	4.319234	0.049947
F-statistic	7.950018	1.980053	5.499330
Mean dependent	1833.774	0.139785	0.013724
S.D. dependent	1748.093	4.387709	0.053485

Figure 3. 54. AR Polynomial Root Graph

Inverse Roots of AR Characteristic Polynomial
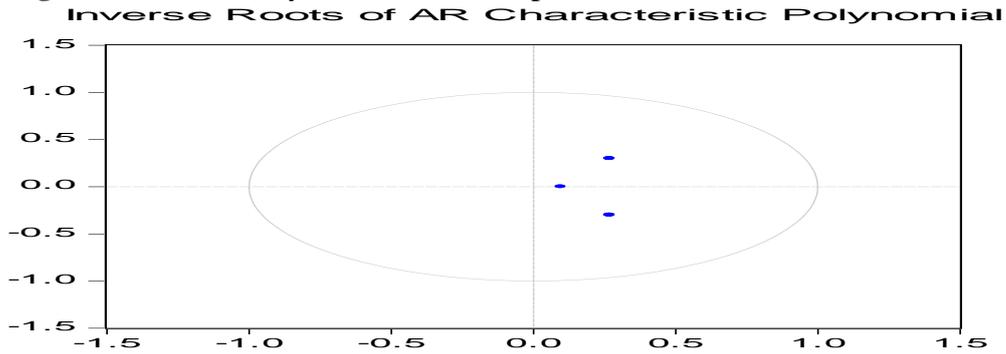
Figure 3. 55. Bayesian Impulse Response Analysis

Response of D(EQUITY) to Cholesky
One S.D. D(USDTLPARITY) Innovation

Response of D(LIQUIDITY) to Cholesky
One S.D. D(USDTLPARITY) Innovation
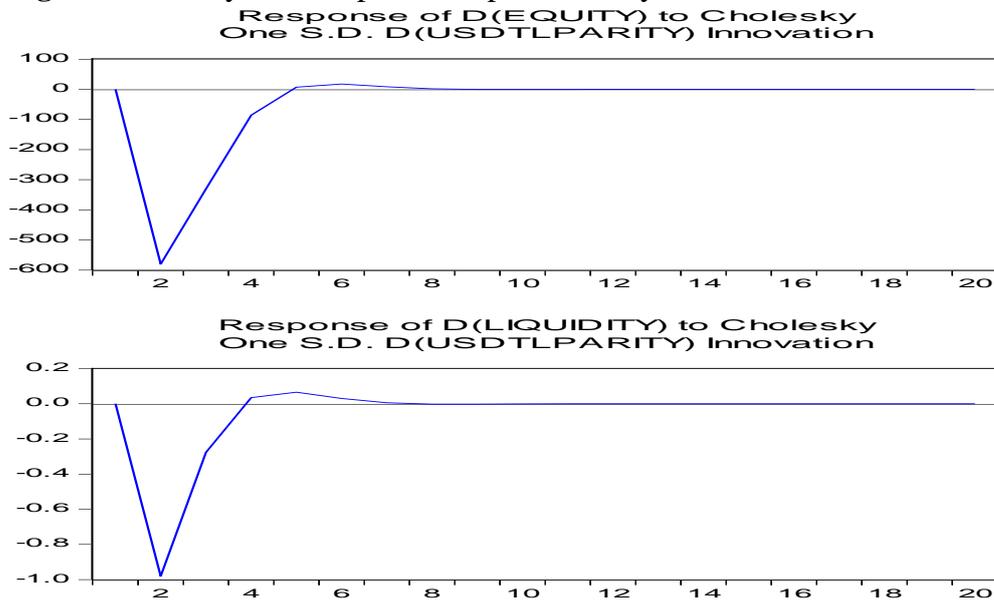
There is no non-stationary problem with Bayesian VAR models. In addition, all dots lie inside the circle (Figure 3.54). When one standard deviation shock of USD/TL parity applies to Turkish commercial banks, Turkish banks' equity and liqudity diminishes but those series come to equilibrium point fast (Figure 3.55). **It can be indicated that one standard deviation positive shock of USD/TL parity deteriorates Turkish banks' total equities and liqudity adequacies; but shock impact is not long.** It can be indicated that, when there is one standard deviation positive shock of USD/TL parity, Turkish banks' business value is less than the non-volatile times. The USD/TL parity shocks impact is similar for Turkish banks liquidity adequacies and total equities.

3.11.2. Multivariate Markov Regime Switching Regression

In that section, Markov Regime Switching Regression (Table 3.55) applied. In Markov Regime Switching Model, the main objective is the scrutinize the impact of USD/TL parity on Turkish banks' liqudity adequacies within different regime periods. Within the model, there are two regime periods. First regime is highly volatile USD/TL parity. Second regime is low volatile USD/TL parity. First regime had significant negative impact on Turkish banks' liqudity adequacies and second regime had non-significant positive impact on Turkish banks' liqudity adequacies.

Table 3. 55. Switching Regression (Markov Switching)
Dependent Variable: LIQUIDITY1
Method: Switching Regression (Markov Switching)
Date: 11/04/15   Time: 22:16
Sample (adjusted): 2007M09 2015M02
Included observations: 90 after adjustments
Number of states: 2
Initial probabilities obtained from ergodic solution
Ordinary standard errors & covariance using numeric Hessian
Random search: 25 starting values with 10 iterations using 1 standard
    deviation (rng=kn, seed=1998354727)
Convergence achieved after 21 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
	Regime 1			
C	-0.204626	0.238316	-0.858634	0.3905
USDTLPARITY1	-7.126730	3.409776	-2.090087	0.0366
LOG(SIGMA)	0.833357	0.091179	9.139742	0.0000
	Regime 2			
C	-0.003117	0.008629	-0.361268	0.7179
USDTLPARITY1	0.150798	0.097648	1.544309	0.1225
LOG(SIGMA)	-4.098018	0.197755	-20.72268	0.0000
	Common			
AR(1)	0.009801	0.002836	3.455778	0.0005
AR(2)	-0.000994	0.003149	-0.315536	0.7524
AR(3)	0.011760	0.004525	2.598828	0.0094
AR(4)	0.025510	0.000647	39.42610	0.0000
	Transition Matrix Parameters			
P11-C	1.183025	0.317949	3.720803	0.0002
P21-C	1.558842	0.670928	2.323410	0.0202
Mean dependent var	-0.300000	S.D. dependent var		2.084992
S.E. of regression	2.164071	Sum squared resid		374.6562
Durbin-Watson stat	2.186827	Log likelihood		-148.2919
Akaike info criterion	3.562041	Schwarz criterion		3.895349
Hannan-Quinn criter.	3.696451			
Inverted AR Roots	.07-2.02i	.07+2.02i	.00+.02i	.00-.02i
	Estimated AR process is nonstationary			

Figure 3. 56. Markov Regime Probabilities

Filtered Regime Probabilities
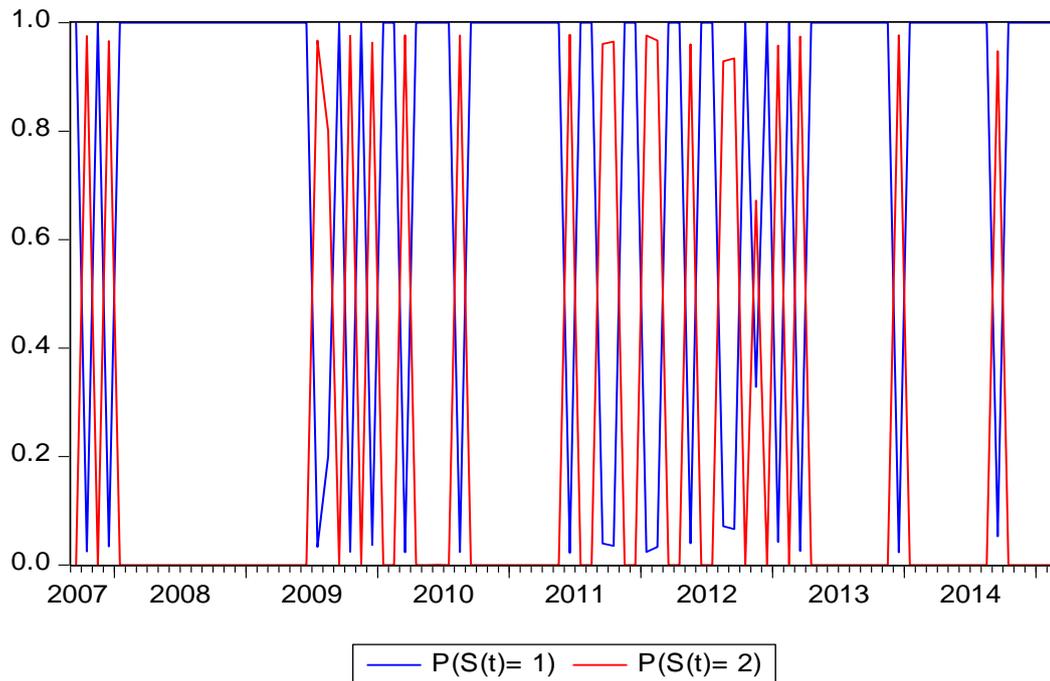
According to Markov Regime Switching graph(Figure 3.56), it can be indicated that, USD/TL parity is highly volatile and Turkish banks' had many shocks but USD/TL parity shocks were thwarted in success. In the future, highly volatile regime is expected. Currently, there can be negative scenarios. The scenario is the meeting of Fed Management Board at December 2015. At December 2015, if USA economy is in bonanza period, federal reserve can increase federal reserve rates. That can cause Turkish currency to depreciate fast and Central Bank of Turkey can increase interest rates up to %20 percentage. That situation can cause fast withdrawal of deposits and that can create liqudity problems. Basel I, Basel II, Basel III main criteria is to increase capital adequacy ratio and to prevent leverages. For each respective Basels, capital requirement has been increasing. In order to thwart from highly volatile scenarios, Turkish banks has to increase their equties much more then before.

3.12. The Impact of USD/TL Parity and Opec Oil Price on the Probability of Banking Crisis in Turkey

3.12.1. Logit Analysis

In that section, logit analysis was conducted. The objective is to unearth the impact of USD/TL parity and Opec oil price on the probability on banking crisis in Turkey. All data were first differenced. Mc Fadden R-square is 0.541145. LR statistic probability is 0.044070. Therefore, Logit Analysis can be conducted. **According to Logit Analysis, first lag of OPEC oil prices and USD/TL parity do not have significant impact on probability of banking crisis in Turkey.**

Table 3. 56. Logit Analysis
Dependent Variable: BANKCRISIS
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 12/11/15   Time: 11:12
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments
Convergence achieved after 5 iterations
QML (Huber/White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-19.42959	6.712082	-2.894718	0.0038
D(CENTRALBANKASSETTOGDP)	0.178359	0.259582	0.687101	0.4920
D(CPI)	0.106316	0.136582	0.778406	0.4363
D(GDP)	-2.28E-11	1.26E-11	-1.810671	0.0702
D(OIL(-1))	0.036089	0.057268	0.630177	0.5286
D(POPULATION)	1.85E-05	6.98E-06	2.645434	0.0082
D(TLUSD)	0.266661	2.432731	0.109614	0.9127
D(DEPOSITS)	0.086245	0.230242	0.374582	0.7080

McFadden R-squared	0.541145	Mean dependent var	0.172414
S.D. dependent var	0.384426	S.E. of regression	0.286629
Akaike info criterion	0.973589	Sum squared resid	1.725278
Schwarz criterion	1.350774	Log likelihood	-6.117047
Hannan-Quinn criter.	1.091719	Deviance	12.23409
Restr. Deviance	26.66220	Restr. log likelihood	-13.33110
LR statistic	14.42810	Avg. log likelihood	-0.210933
Prob(LR statistic)	0.044070		

Obs with Dep=0		24 Total observation	29
Obs with Dep=1		5	

3.12.2. Gradient Analysis

According to gradient analysis, USD/TL parity' gradients indicate that there was temporary shocks of USD/TL parity for 2001 banking crisis in Turkey. The gradient function of USD/TL parity has golden ratio trend. **In short term, temporary capital flows decreased the probability of banking crisis in Turkey. Afterwards, international investors withdrew substantial amount of American dollar deposits and that circumstance triggered banking crisis in Turkey. After crisis occur in Turkish banking sector, substantial amount of USD deposits were sent to Turkey to compensate the earlier capital withdrawals. Since USD/TL parity do just have impact on one crisis, USD/TL parity do not have significant impact on Turkey's banking crises probability for the dataset of 1980-2010.**

Figure 3. 57. Gradient Analysis
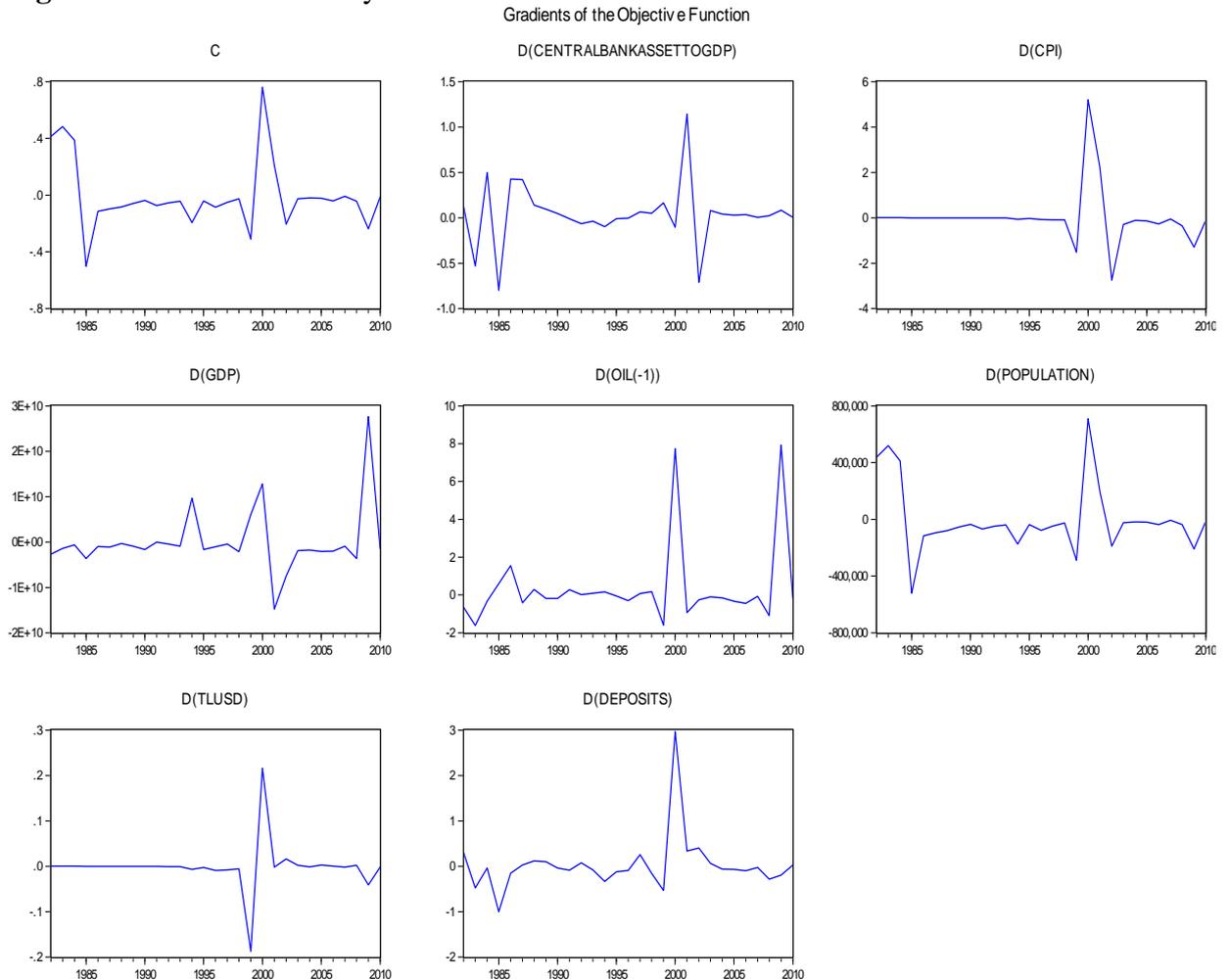
3.13. Hypothesis Confirmation Table

Table 3. 57. Hypothesis confirmation table

Hypothesis 12: USD/TL parity had significant positive impact on the change of Turkish banks' total deposits.	**Hypothesis 12 is confirmed.**
Hypothesis 12a: USD/TL parity was the significant predictor of Turkish banks' deposits between 1970 and 2010.	**Hypothesis 12a is confirmed.**
Hypothesis 12b: USD/TL parity had significant positive impact on the change of Turkish banks' deposits between 1980 and 2010.	**Hypothesis 12b is confirmed.**
Hypothesis 13: USD/TL parity shock decreased Turkish banks' total deposits between the period of December 2002-September 2014.	**Hypothesis 13 is confirmed.**
Hypothesis 14: Opec oil prices had significant positive impact on Turkish banks' total deposits and are significant predictor of Turkish banks' deposits.	**Hypothesis 14 is confirmed.**
Hypothesis 14a: Opec oil prices can be significant predictor of Turkish banks' deposits between 1970-2010.	**Hypothesis 14a is confirmed.**
Hypothesis 14b: Opec oil prices had significant impact on Turkish banks' total deposits between 1980 and 2010.	**Hypothesis 14b is confirmed.**
Hypothesis 15: Opec oil price shocks significantly increased Turkish banks' deposits.	**Hypothesis 15 is confirmed.**
Hypothesis 15a: Opec oil price shocks significantly increased Turkish banks' deposits between 1970 and 2010.	**Hypothesis 15a is confirmed.**
Hypothesis 15b: Opec oil price shocks significantly increased Turkish banks' deposits between 1980 and 2010.	**Hypothesis 15b is confirmed.**
Hypothesis 15c: Opec oil price shocks increased Turkish commercial banks' deposits between December 2002-September 2014.	**Hypothesis 15c is confirmed for 10 commercial banks in Turkey.**
Hypothesis 16: There is long term relationship between Turkish commercial banks' net income	**Hypothesis 16 is confirmed for 7 banks in Turkey.**

and USD/TL parity.	
Hypothesis 17: There is long term relationship between Turkish commercial banks' net income and USA' federal reserve rates.	**Hypothesis 17 is confirmed for 7 banks in Turkey.**
Hypothesis 18: There is long term relationship between Turkish banks' net income and euribor rates.	**Hypothesis 18 is not confirmed.**
Hypothesis 19: There is long term relationship between Turkish banks' net income and Turkey's interest rates.	**Hypothesis 19 is not confirmed.**
Hypothesis 20: USD/TL parity can forecast the Turkish banks' deposits between 1980 and 2021.	**Hypothesis 20 is not confirmed.**
Hypothesis 21: OPEC oil prices can forecast the Turkish banks' deposits between 1980 and 2021 and there is long term relationship between OPEC oil prices and Turkish banks' deposits.	**Hypothesis 21 is confirmed.**
Hypothesis 22: When positive shock implemented on USD/TL parity, Turkish banks' liqudity adequacies and equities plummeted between April 2007- February 2015.	**Hypothesis 22 is confirmed.**
Hypothesis 23: There was a significant impact of USD/TL parity and OPEC oil price on banking crisis between 1980 and 2010.	**Hypothesis 23 is not confirmed.**

3.14. Literature Confirmation

Table 3. 58. Literature Confirmation

Chamberlain,Sandra,Howe,Popper(1995)	U.S banks' returns increase when dollar augments and deteriorates when it diminishes. U.S banks took long position in dollars.	There is similarity with thesis research result.
Poghosyan,Hesse(2009)	The diminished oil liqudity has not only deteriorated Islamic banks performance, but also their conventional peers.	There is similarity with thesis research result.

Research results corresponds with Chamberlain, Howe, Popper(1995)' and Poghosyan, Hesse(2009)' indications.

PART 4

4. CONCLUSION

In that thesis, the main independent variables were Turkish banks' non-interest income, G7 countries' non-interest income, 205 countries banks' non-interest income, USD/TL parity and OPEC oil prices. It can be argued that, OPEC oil prices will increase Turkish banks' deposits in the future. It is also expected that probable increase of USD/TL parity and federal reserve rates will increase many Turkish banks' profits in the future. In addition, USD/TL parity had positive significant impact on Turkish banks' deposits for the period of 1970-2010 and 1980-2010. Moreover, due to high overhead costs and operating expenses and narrowed net interest margins, Turkish banks' increased their non-interest income fast. Moreover, due to the narrowed interest margins, cost of credits become less expensive and loan volume of Turkish banks increased fast.

According to research result, for the periods of 2005, 2006, 2007, 205 countries banks' non-interest income is positively and significantly correlated with 205 countries banks' ROA ratios. During the global financial crisis period (2008-2009), there was no correlation for 205 countries' cross-sectional dataset. At 2010 and 2011, there were significant positive correlation between 205 countries banks' non-interest income and 205 countries bank's ROA ratios.

Moreover, for 205 countries cross-sectional dataset, banks' non-interest income had significant positive impact on banks' ROA ratios. It can be indicated that non-interest income did not create tail risks for globally. It can be indicated that banking regulatory authorities across the world stimulate non-interest income components with not much risk bearing instruments.

In addition, there was positive significant correlation between high income countries' non-interest income and ROA ratios for the period of 1999-2013. In addition, the impact of G7 countries' non-interest income had positive significant impact on G7 countries' banks' ROA ratios for the period of 1999-2013. In addition, net interest margins led G7 countries banks' to increase non-interest income.

No significant result was found for medium income and low income countries. Nevertheless, it can be indicated that low income and medium income countries increased their non-interest income fast in recent years. Gurbuz,Yanık, Ayturk (2013) indicated that ratio of non-interest income has increased all around the world. They mentioned that that increase is fundamental in the last three decades. Gurbuz,Yanık, Ayturk(2013)'s indication supports the thesis research results.

Between the period of December 2002-July 2015, at all breaks, Turkish banks' non-interest income had significant positive impacts on Turkish banks' profits. Due to the banking law in Turkey, Turkish banks' non-interest income system does not create tail risk with overdiversification. As an example, Turkisk banks can not have intermediary function for hedge funds. Since hedge funds have concave return to financial markets in USA, many banks' investment units had lost billions of dollars non-interest income revenue during global financial crisis (2008-2009). Turkish banks' non interest income was mainly taken from simple processes such as taking swift fee from international payments, taking filing fee from customers during loan processes and international trade intermediation. Thus, there is less probability to have overdiversification risk.

According to Johansen Fisher Panel Cointegration Analysis, there is long term relationship between G7 countries' non-interest income and ROA ratios. In addition, in the long term, Germany and USA' non-interest income and ROA ratios will move in similar direction.

In that thesis, it is shown that golden ratio can be applied for financial analysis. Turkish banks' profits had discrete Fibonacci behavior. That Fibonacci behaviour mainly derives from Turkish banks' non-interest income. When Sydney Opera House' golden ratio trend was analyzed, it was unearthed that Sydney Opera House' golden ratio had impulsive and corrective behaviour. The golden ratio behavior of Sydney Opera House is dependent upon "leaned Z" structure. It was found that Sydney Opera House' golden ratio behaviour had similarity with Turkish banks profits' golden ratio behaviours. That similarities correspond with Elliot Wave Theory.

Between the period of December 2002 and September 2014, macroeconomical variables were important determinants for some of the Turkish commercial banks' profits. For Akbank and Isbank, euribor had important impact on Akbank's and Isbank's profitability. When euribor rates decline, those banks can have lower cost of

credit from Europe and sell the credits with higher interest rate in Turkey. Moreover, for Sekerbank and Vakıfbank, Turkey's interest rate had significant impact on their profits. In addition to that, USD/TL parity had significant positive impact on Burganbank' and Arabturkbank's net income. In addition to that, rising value of USD/TL parity decreases (Turkish Bank)'s profits.

Pasiouras and Kosmidou (2007) analysed the domestic and foreign commercial banks in 15 European Union countries. It has been manifested that macroeconomic conditions are related with ROA ratios. The research finding in the thesis coincides with Pasirous and Kosmidou(2007)'s research finding.

By applying VAR Granger causality/Block Wald test, USD/TL parities and first lag of OPEC oil prices were significant predictor of Turkish banks' deposits within the periods of 1970 and 2010.

In addition, by applying GMM-TSLS methods, it was found that USD/TL parities and first lag of OPEC oil prices had significant positive impact on Turkish banks' deposits between the period of 1980 and 2010.

For the periods of 1970 and 2010 and 1980 and 2010, impulse response analysis and variance decomposition analysis was conducted. According to impulse response analysis, when one standard deviation positive shock applied to USD/TL parity and first lag of OPEC oil prices, Turkish banks' deposits increased. That analysis corresponds with GMM-TSLS method and VAR Granger Causality/ Block Wald test. According to variance decomposition analysis, %22,29 variance of Turkey's deposits was explained by USD/TL parity and %19,63 variance of Turkey's deposits was explained by first lag of OPEC oil price.

Moreover, for impulse response analysis, the shock effect of the first lag of OPEC oil price on Turkey bank's deposits is more than than the shock effect of USD/TL parity on Turkish banks' deposits within the period of 1980-2010. It can be argued that, when OPEC oil prices increases, financial system deposits in Turkey increased between December 2002- September 2014. Moreover, when one standard deviation positive shock given to first lag of OPEC oil price, 10 Turkish commercial banks' deposits increased. 6 Turkish commercial banks' deposits decreased between December 2002-September 2014. That research result corresponds with Poghosyan and Hesse (2009)'s indication. Poghosyan, Hesse (2009) indicated that diminished oil prices from their

peak of $140 a barrel, not only have detrimental impacts on Islamic banks performance, but also there will be adverse impacts on conventional banks.

Moreover, when one standard deviation positive shocks given to USD/TL parity, 12 Turkish commercial banks' deposits plummeted. 4 Turkish commercial banks' deposits increased. When USD/TL parity increases fast, Turkish economy can be in "bear" position for foreign investors and local investors in recent years. That analysis' research result is different than 1970-2010 and 1980-2010 analysis. Since banking crisis occured in Turkey at 2001, that circumstance can cause depositors to withdraw their deposits from bank when USD/TL increases fast. At 2001 banking crisis, many depositors could not withdraw their money. After banking law enacted, if bank default occur, 100 000 TL deposits are guaranteed by state. Although, deposit guarantee threshold increased from 50 000 TL, many depositors are still cautious when there is shock on USD/TL parity. In addition, real estate sector development is another reason for fast withdrawal. Many households withdrew their USD deposits and convert those deposits into real estate investments.

In addition, Granger causality analysis was applied to find the relationships between the first lag of OPEC oil price and 16 Turkish commercial banks' deposits. Also by using Granger causality analysis, the relationships between USD/TL parity, OPEC oil price and 16 commercial banks' deposits were found. 3 banks had significant results. First lag of Opec oil price is significant predictor of Alternatif Bank' and Finansbank' deposits. In addition to that, USD/TL parity is significant predictor of Finansbank's and Vakıflarbank's deposits. Relationship direction is positive and there is unidirectional relationship.

Moreover, OLS-out of sampling test had been implemented for the period of 1980-2021. USD/TL parity significance for Turkish banks' deposits lost and OPEC oil prices can still forecast the change of Turkish banks' deposits until 2021. According to ARDL model, there is long term relationship between OPEC oil prices and Turkish banks' deposits. In addition, it was found that there is no long term relationship between Turkish banks' deposits and USD/TL parity.

According to national income accounting theory, Turkey's imports are higher than Turkey's exports. That caused Turkey's saving rates are to be lesser than Turkey's investment rates. Therefore, household savings are not sustainable. Between December

2002-September 2014, impulse response analysis with BVAR was conducted to identify the comparative shock impact of 1 month, 3 months, 6 months, 12 months deposit rates on 16 Turkish commerical banks' deposits seperately. It was found that for 14 Turkish commercial banks, 1 month deposit rate positive shock impact was more than other months deposit rates' positive shock impacts on 14 banks' deposits. For 2 banks, 3 month deposit rates' shock impact on deposits is more than other months deposit rates' shock impacts on deposits. Those 2 banks are Finansbank and Tekstil bank. It can be argued that Turkish banks' deposits system mainly dependant upon 1 month interest rates.

In addition, by taking interest rate parity and systematic risk theories into account, VECM model applied for 16 commercial banks' net income. Data span was December 2002- September 2014. 7 commercial banks' net income has long term relationship with USD/TL parity. 7 commercial banks' net income has long term relationship with USA' Federal Reserve rates. 4 commercial banks' net income does not have long term relationship with USD/TL parity or USA' Federal Reserve rates. Chamberlian, Hower, Poper(1995) indicated that bank holding companies' profits augments when the dollar rises and plummetes when it diminishes and they indicated that U.S bank holding companies had "long" position in dollars. That indication is similar with the research result finding.

Moreover, when what if scenario analysis applied on oil prices, it was unearthed that, during negative growth based time period of oil price conversions, at most of the cases, Turkish commercial banks' deposits growth was in positive stage. In addition to that, during positive growth based time period of oil prices conversion, at most of the cases, Turkish commercial banks' deposits growth was in positive stage and more than the Turkish commercial banks' deposits growth during the negative price change phase.

In addition, when what if scenario analysis applied to USD/TL parity, it can be demonstrated that, Turkish banks' deposits grew during the appreciation of USD/TL parity. Nevertheless, there is concavity structure. Fast rise of USD/TL parity can plummet the Turkish banks' deposits exponentially.

USD/TL parity and first lag of OPEC oil price had significant positive impact on Turkish banks' deposits. When USD/TL parity has one standard deviation positive shock, 16 Turkish commercial banks prevent from the shock in short period of time.

When impulse response analysis applied and one standard deviation positive shock is given to USD/TL parity, 12 commercial banks' deposits were diminished between the period of December 2002-September 2014. But, those banks prevent from the shock in short period of time and their response function reached at equilibrium point which is zero. It can be interpreted that with BDDK regulations and BASEL standards, Turkish commercial banks increased their capital adequacy ratios to prevent liquidity risks. It can be indicated that USD/TL parity, oil prices are important determinants of Turkish banks' deposits. In addition to that, many Turkish customers have dolar accounts. When US dollar rises against Turkish lira, many Turkish customers withdraw their dolar deposits and convert it to Turkish lira to deposit TL account to have more interest revenue.

According to logit analysis, first lag of OPEC oil prices and USD/TL parity do not have significant impact on probability of bank crisis in Turkey. Nevertheless, gradient analysis indicates that before Turkey's 2001 banking crisis, substantial amount of USD deposits existed in Turkey. Within short period of time, more USD deposits were withdrawn from Turkish economy. That circumstance triggered Turkish banking crisis.

The high volatile regime of USD/TL parity significantly decreased Turkish banks' liquidity adequacies between April 2007- February 2015. The low volatile regime had positive non-significant impact on Turkish banks' liqudity adequacies between April 2007- February 2015. In addition, when one standard deviation positive shock is given to USD/TL parity, Turkish banks' total liquidity adequacies diminishes temporarily.

In addition, equity accumulation is important for business valuation. The more banks have total equity, the more business valuation of banks exist. When arbitrary one standard deviation of positive shock is given to USD/TL parity, Turkish banks' total equities plummets. But the shock impact is not permenant. Although there are are negative anomalies for short term, Turkish banks' total equities have been increasing fast. Shock of USD/TL parity has similar impact on Turkish banks' liquidity adequacies and Turkish banks' total equities.

5. RESEARCH LIMITATION

E-views 8, 9 and SPSS software was available for research. Due to the limited availability of software, more advance analysis could be done. Moreover, due to privacy, banks may not give risk data to researchers.

6. POLICY IMPLICATION

In that thesis, mainly macroeconomical parameters impacts on Turkish commercial banks' deposits analysed. It was seen that USD/TL parity shock decreased 12 commercial banks' deposits and USD/TL parity shock increased just 4 commercial bank's deposits. Although 12 commercial banks' deposits prevent from the risk within short time period, in order to have more strong risk management function, 12 Turkish banks' deposits should be increased even in crisis time. During the USD/TL parity shock, shareholders of those banks should have more position in dollars. If shareholders of Turkish banks have international investments with their subsidiaries and have project income in USD dollar, they can transfer their project income with USD to increase capital adequacy ratio of the bank. Moreover, USD/TL parity shock can be forecasted from risk management department. VaR-CVaR analyses can be conducted to calculate bank maximum loses during crisis scenario. With the suggestion of risk management department, during possible withdrawal of deposits at the crisis time, new international USD dollar depositor can be attracted to bank. Moreover, before probable crisis, Turkish banks can roll out initial public offering and bond issue to local and international investors to increase its capital to prevent possible liquidity shock. It is highly prospective that many banks' share prices plummet during the crisis period; with increased rate of capital, bank treasury can repurchase the bank stock to increase the value of share prices and z ratio.

Z score equals to= [(ROA+CAR)/SDROA]. In crisis periods, standard deviation of ROA is high. In order to decrease liquidity problem, banks' capitals should compensate the negative impact of ROA and SDROA on banks' z score. All of the banks in Turkey has been examined by BDDK via stress test method. During the stress test, if some of the banks' capital are under the threshold, BDKK warns the bank. Sometimes crisis can be even harsher and more capital can be needed than BDDK thresholds. Banks' general administration should have more capital for liquidity risk budget. Liquidity default is like airplane accident. A bank can be successful in %99,9 proportion of confidence interval. But if %0,01 proportion of confidence interval creates liquidity problem, there will be tail risk and many customers can withdraw deposits from the bank. If liquidity is under the threshold, then bank will be under default. It

can be indicated that liquidity risk protector capital should be more than BDDK thresholds.

In addition to that, if USD/TL parity shock occurs and deposits decrease, it can be possible that banks' share prices can be around year average or more than year average. In that situation, in order to attract capital, banks can use stock split option to attract capital.

It can be mentioned that Turkish customers do not save sustainable saving. In that circumstance, banks can not use adequate deposits to give more loans to businesses and households. Recently, ING bank embarked new promotion dubbed as "Orange Account". With that account, customers will have interest rate around %11 percent. In Orange Account, customers can use time deposits and they do not have to wait three months to get interest rate revenue. Since many customers use 1 month time deposit, many customers will use that account and ING bank will have more deposits to give more loans to households. Due to the orange account, customers can withdraw their money fast after 1 month. Since Turkish households do not have sustainable saving, they can withdraw their money fast. Deposits of ING can decrease. In order to cope with that situation, ING bank has to use Orange Account promotion for long period of time. Moreover, besides Orange Account, new deposit promotions can be prepared to attract more deposits from customers. In addition, ODEA bank embarked new policy about filing fees. Customers who pay their debts regulary will not pay filing fee. Other banks can use that policy to minimize court issues. In addition, by removing filing fee, more consumers can be satisfied and other prospective customers can exist.

In addition to that, OPEC oil prices are found to have significant impact on Turkish bank's deposits. When oil price shock exists, Alternatif Bank's deposits increase tremendously. Because it is subsidiary of the Commercial Bank of Qatar. If other banks want to find new corporate shareholders, they can find shareholders who are the owners of oil reserves. In that case, they can increase the liquidity of the bank.

Moreover, according to Turkish banking law, 30 000 000 TL paid in capital needed to open new bank. At least 500 000 000 TL total capital needed to enter the Turkish banking system. Since there is competitive enviroment and huge costs, investors need at least 1000.000.000 TL capital to establish a new bank in Turkey. If there are

investors who want open bank in Turkey, they should know banking law and BDDK authority very well.

In addition to that, Turkish commercial banks can use the lower interest rate of syndication credit from Europe and convert Euro to Turkish lira. Later on, Turkish banks can sell imported credits with higher interest rates and so their profit margins can increase. Since EU is in crisis, interest rates are low. At some EU countries, interest rates are negative. Turkish banks can use low interest rate advantage in Europe. General administration of Turkish banks can sign credit contract with more than 20 European banks at the same time. They can get syndication credit with the combination of European banks. Moreover, Turkish banks can issue bond to international investors. For example, Vakıfbank issued bond in international markets with Manhattan Bank intermediation. Other Turkish commercial banks can strengthen ties with global banks to get funding. With network between general administrations of Turkish banks and global banks, Turkish banks can get more funds from international investors. When Turkish banks get tremendous profits, they can even lend to other banks across the globe.

Moreover, in Turkish banking system, there are trials about Turkish banks' non-interest income component. Due to the trials and BDDK regulations, banks can lose millions of TL due to the diminished non-interest income. In that case, within the scope of BDDK law and advocates advice, Turkish banks need to diversify their non-interest income components more by reflecting taxes on non-interest rate revenue components. In addition, banks can cut filing fee to face with less trials with customers. ING bank as an example, cut filing fee from 200 TL to 9 TL during 2015 summer period. ING Bank can decrease filing fee to 50 tl for all months. With that policy, they can face less problems with customers. Other banks can also diminish filing fees to moderate levels.

In addition, in methodology section, by Holt-Winters exponential smoothing technique and Ordinary Least Square method, year of 2021 was forecasted. It was found that first lag of oil prices had significant positive impact on Turkish bank's deposits between the period of 1980 and 2021. Bank risk management departments should watch the oil price changes to increase liqudity. Because oil price shows global health of economy. If oil prices rise, Turkish banks' deposits augment, If there is positive shock on oil prices, Turkish banks' deposits increase fast. Turkish banks have to attract oil

resource rich countries' investors. By taking substantial deposit from petrodollar investors, they can finance new real estate and energy projects.

Moreover, if banks want to increase their business valuation, they should decrease type 2 errors in credit modeling. In addition, banks can use autofinancing methods. As an example, banks can stop paying dividends for long period of time. If they stop paying dividends, banks equities will increase more and business valuation will be much more higher. After having tremendous profits, banks can embark dividend policy.

Turkish banks' are mainly dependant upon short term deposit rates. Therefore, Turkish banks can have difficulty to finance long time projects. In order to minimize that problem, banks can have partnership with oil reserve owners and investors who have substantial amount of American dollar deposits.

Turkish banking law should restrict short term capital outflows to minimize the banking crisis probability.

Lastly, other researchers can enlargen that work by having daily analysis in finance laboratory. With daily parameters, they can analyze the macroeconomical impacts. In addition to that, a new analysis can be applied to bank shares. GARCH models, Monte Carlo Simulations, VaR analysis can be conducted to extend the external factors impacts on Turkish commercial banks' risk management indicators.

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