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Analysis of Changes in Financial Items of the Turkish Banking Sector with VAR Model[1]

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ABSTRACT

A restructuring program has been realized in the Turkish Banking Sector after the crises of 2000 and 2001. At the same time the restructuring program was implemented in the economy. Volatility is considered one of the most important risk indicator. The high volatility in a data set means that the risk is high. The aim of the study is to predict the strong changes in the main activity items of the banking sector from the post-crisis period to the present, based on the number of delays. During the period from the end of 2002 to the end of 2017, the volatility of the main financial items at the end of the three-month period has been analyzed in the Turkish Banking Sector. Afterwards, these main items were taken into consideration of past trends and predictive equations related to the levels that can be reached in the future were established. As a result of the analysis, it is seen that the highest change is primarily in the volume of the sector and in the loans and deposit items immediately afterwards. The high change in these two main factors in balance sheet naturally leads to a high volatility of the balance sheet total as well.

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1. INTRODUCTION

The volatility of economic and financial data is generally high in developing countries. The most important reason for this is the internal dynamics of the economies of these countries. Undoubtedly, political risks are also important factor that increase this volatility.

The concept of volatility, measures the magnitude of the fluctuation of a series deviating from a certain mean value, as indicated by Gujarati (2011, p.240) in the finance literature. The fact that the magnitudes of the downward or upward divergence fluctuations from the average value are large also indicates that there is a high risk in the relevant index / price / return series. This emerging risk situation can mean potential gains for investors as well as possible loss. Considering this point, in order to be able to make

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effective investment decisions in volatile markets, as mentioned by Yalama (2008, p.45) and Şahin (2015, p.108), firstly the volatility of these markets needs to be modelled.

Transition to liberalization after 1980 primarily showed its impact in the banking sector. Pricing, risk premium and volatility concepts have come to the forefront as a result of financial liberalization, the acceleration and globalization of fund flows, the changing competition structure and the use of complex financial products (structured products, synthetic derivatives etc.) and technologies.
Turkish Banking Sector has undergone significant changes in the last 25 years. These changes are based on technology from one side and new products from the other. The internal dynamics of Turkey's economy with various risks in terms of macroeconomic indicators is very sensitive. This sensitivity is naturally reflected in the sectors within the economy as well

A possible negativity in the Turkish Banking Sector, which is at the focus of the economy, affects the whole economy in a short time. In order to be prepared for such situations, it is vital that the banking sector tries to anticipate all kinds of risks and apply a good risk management policy. With this perspective, which is the focus of the study, one of the main objectives of the study is to predict the most sensitive financial items of Turkish banks to market developments and to make recommendations regarding them.

2. LITERATURE

There are few studies on the subject in the literature. These studies are listed below. There are also relatively close studies such as those by Rekik et al. (2018), Goddard et al. (2004), and Witowschi et al. (2016).

Moshirian and Wu (2009) investigated whether there is volatility in the banking sector. In the study, analysis of 18 developed and 18 developing country market data was performed by using the public market information of banks. It has been determined that the volatility in the banking sector performs well in predicting systemic banking crises for developed markets, but fails for emerging markets. This suggests that the effect of market forces on the soundness of the banking system may be different for developed and emerging markets. In addition, it is seen in the study that macroeconomic and banking risk management indicators have different effects on the probability of a banking crisis.

In the study conducted by Moshirian and Wu (2012), using dynamic panel forecasting techniques for 36 markets, the relationship between volatility in the banking sector and future economic growth is investigated. In the study examining the relationship between finance and growth from the perspective of an asset pricing theory, a positive relationship was determined between bank stock returns and future economic growth. On the other hand, a negative connection was observed between the volatility in the

banking sector and future economic growth. The reason for this is, state ownership of banks, enforcement of insider trading law, systemic banking crises and the bank accounting disclosure standards.

In the article prepared by Fernández A.I. et al(2016), the impact of the stability of banking on industrial value added volatility was analyzed using data from 110 countries. According to the results, banking stability reduces the value added volatility in countries with developed financial and institutional systems and in sectors with greater external financial dependence. In addition, banking stability helps reduce economic volatility in countries with less competition for the bank market.

In the study of Pholphirul (2008), a time series study was conducted in Thailand to investigate the causal links of financial instability and different sources of macroeconomic volatility. The results show that financial instability and the probability of a banking crisis are mostly affected by the volatility in trade deficit and less affected by price-related volatility. In addition, variables related to financial system development appear to be important factors in ensuring the stability of the financial sector. The estimated coefficients also show that financial system development helps balance growth volatility and reduce the likelihood of economic recession.

Huang et al. (2014) examined whether the banking structure has an impact on industrial growth volatility. The results of the study showed that the bank concentration increased the industrial growth volatility, but reduced the volatility in the sectors that need higher external liquidity. Various sensitivity checks show that the findings in the study remain for different model characteristics, banking market structure measurements, liquidity need indicators and neglected variables.

3. DATA AND METHODOLOGY

In the analysis, some financial data related to the quarterly turnover between December 2002 and December 2017 of the Turkish Banking Sector were used. The main purpose is to predict which of the items in the financial statements of banks can be a leading risk indicator. Thus, bank managements will pay special attention to the planning and management of these items. Because balance sheet management is easier when the markets do not have problems. The important thing for bank management is to create a financial structure that can adapt to changes in the rapidly changing market environment.

When the data to be included in the analysis are determined, it has been noted that these data are likely to react to changes in the market in a short time, to continuously protect the on-balance-sheet significance and to be indicators that are included in the main activity areas.

Among the assets and liabilities balance sheet items, the main items included in the analysis are; liquid assets, financial assets held for trading, financial assets available for sale, investments held to maturity, loans, loans under follow-up (gross), deposits, funds borrowed, money market takings. The data used in the analysis are taken from the Banks Association of Turkey statistical data section of the web page.

The VAR model was used in the analysis. VAR (Vector Autoregressive) model, Sims (1980) was developed and adopted without being subject to discrimination of all inner variables autoregressive model. According to Cooley and LeRoy (1985), VAR models are reduced form models and are a simple tool that summarizes the dynamic properties of the data.

VAR models are often preferred in terms of time series since dynamic relations can be given without any restrictions on the structural model.

In addition, the inclusion of lagged values of dependent variables in the VAR model makes it possible to make strong predictions for the future.

In the model, a common delay length is first determined for all variables. The variables are respectively taken as the dependent variable and the delayed values of its and other variables are regressed by taking the argument.

$$\begin{bmatrix} X_t \\ Y_t \\ C_t \\ RM_t \end{bmatrix} = A_0 + A_1 \begin{bmatrix} X_{t-1} \\ Y_{t-1} \\ C_{t-1} \\ RM_{t-1} \end{bmatrix} + A_2 \begin{bmatrix} X_{t-2} \\ Y_{t-2} \\ C_{t-2} \\ RM_{t-2} \end{bmatrix} + \ldots + A_m \begin{bmatrix} X_{t-m} \\ Y_{t-m} \\ C_{t-m} \\ RM_{t-m} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \end{bmatrix} \quad (1)$$

$$\begin{bmatrix} X_t \\ M_t \end{bmatrix} = A_0 + A_1 \begin{bmatrix} X_{t-1} \\ M_{t-1} \end{bmatrix} + A_2 \begin{bmatrix} X_{t-2} \\ M_{t-2} \end{bmatrix} + \ldots + A_m \begin{bmatrix} X_{t-5} \\ M_{t-5} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \end{bmatrix} \quad (2)$$

In equations, t period, A_0 constant term vector, coefficient vectors of A_i variables, and μ_{it} random error terms that match the classical EKK assumptions. In the VAR equation, the standard F test or the Wald χ^2 square test can be used in determining the causality relationships between the variables. If the VAR system is not stationary, some results such as impact response standard errors will be invalid.

4. ANALYSIS RESULTS

In the first stage, descriptive static statics of the data were examined. Detailed information on descriptive statistics can be found in annex 3a and annex 3b. In the 15-year period, the Akaike information criterion reached as the result of the analysis was looked at in order to be able to select the ones with the equilibrium estimating the highest change from the main balance sheet items.

In the table 1, there are sequential balance sheet items from the highest coefficient to the lowest coefficient. According to Akaike AIC Ratings results, it is seen that liabilities, loans and deposits have the highest coefficient, while non-performing receivables have the lowest coefficient.

Table 1. Akaike AIC Ratings

Rank	Item	Akaike AIC
1	Liabilities	23,48048
2	Loans	22,38437
3	Deposits	22,36932
4	Liquid Assets	21,63020
5	Funds Borrowed	21,10757
6	Investments Held To Maturity	20,88513
7	Financial Assets Available For Sale	20,82383
8	Money Market Takings	20,66901
9	Financial Assets Held For Trading	18,97349
10	Loans Under Follow-Up	16,46206

The progress of the share of loans and deposits in the balance sheet over the years in the banking sector is shown in the chart below. As can be seen below, the share of loans in assets and deposits in liabilities is high. During the period, while the share of loans in assets increased, the share of deposits in liabilities decreased slightly.

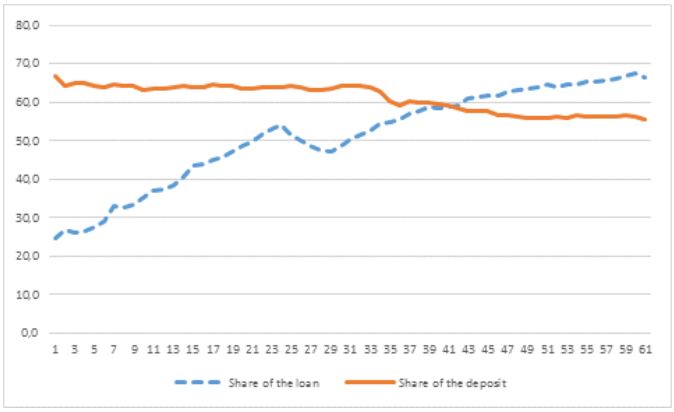

Figure 1. Development of Balance Sheet Share of Loans and Deposits

A test was made to see whether the data are stable or not. As a result of the Spectral Estimation Bartlett Kernel Method and Dicky Fuller and Philip Perron stationarity tests, the data were determined to be stationary ($p < 0.01$).

Table 2. Stationarity Test Results (Equity, Credit Obtained, Trading Securities, Loans, Liquid Assets, Deposits, Liabilities, Interbank Money Market, Available-for-Sale Securities, Non-Performing Loans, Assets To Be Held To Maturity)

Method	Statistic	Prob.**	Cross - sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-12.7903	0.0000	11	645
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-12.4385	0.0000	11	645
ADF - Fisher Chi-square	199.326	0.0000	11	645
PP - Fisher Chi-square	239.100	0.0000	11	649
** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.				

Table 3 : Autocorrelation and Partial Correlation Test Results

	AC	PAC	Q-Stat	Prob
1	0.425	0.425	11.375	0.001
2	0.368	0.229	20.081	0.000
3	0.301	0.106	25.982	0.000
4	0.290	0.107	31.575	0.000
5	0.308	0.130	37.989	0.000
6	0.263	0.045	42.746	0.000
7	0.298	0.110	48.978	0.000
8	0.380	0.203	59.288	0.000
9	0.218	-0.094	62.766	0.000
10	0.057	-0.241	63.004	0.000
11	0.150	0.068	64.717	0.000
12	0.251	0.195	69.585	0.000
13	0.117	-0.153	70.669	0.000
14	0.154	0.011	72.582	0.000
15	0.025	-0.123	72.633	0.000
16	-0.014	-0.193	72.649	0.000
17	0.023	0.076	72.696	0.000
18	-0.018	0.117	72.725	0.000
19	0.081	0.028	73.314	0.000
20	0.166	0.073	75.885	0.000
21	0.062	0.022	76.253	0.000
22	-0.036	-0.133	76.381	0.000
23	-0.037	-0.008	76.522	0.000
24	-0.121	-0.061	78.029	0.000
25	-0.057	-0.057	78.377	0.000
26	-0.099	-0.157	79.453	0.000
27	-0.032	0.110	79.571	0.000
28	0.038	0.126	79.736	0.000

As a result of autocorrelation and partial autocorrelation, no consecutive sequencing was found in the data. In this case, there is no white noise.

AR roots were examined to determine the stationarity of the VAR system and all VAR systems were determined to be stationary.

The delay length was determined to be 2 for each equation according to the AIC criterion.

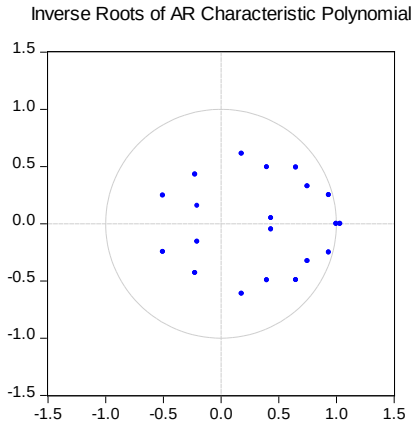

Figure 2. Location of Inverse Roots of AR Characteristic Polynomial in Unit Circle

As can be seen from Fig. 1, none of the inverse roots of the AR characteristic polynomial lies outside the unit circle, confirming that the established VAR system has a stable structure. In addition, normality, autocorrelation and variance tests were performed for the error terms of the VAR model. For normality, the JB statistic was calculated to be 6.174 (p-value: 0.412), with the error terms having normal distribution and the null hypothesis being accepted at the 5% significance level. The LM statistic for testing the presence of autocorrelation was set at 11.547 (p-value: 0.134), and the autocorrelation null hypothesis between error terms was accepted at a 5% significance level. Finally, in order to test for the presence of variant variance, the null hypothesis was accepted at a significance level of 5% and the variance between the error terms was obtained as 31.845 (p-value: 0.697). These results show that the VAR model provides the necessary assumptions.

Coefficients and decision criteria of models are detailed in the appendix 1. According to the analysis results in the table 4, the explanatory power of the findings is very high (R^2).

Table 4: Explanation ratio of models according to dependent variables.

	R-squared
Funds Borrowed	0,996556
Financial Assets Held For Trading	0,886830
Loans	0,999531
Liquid Assets	0,995327
Deposits	0,999227
Liabilities	0,999305
Money Market Takings	0,992092
Financial Assets Available For Sale	0,994096
Loans Under Follow-Up	0,998371
Investments Held To Maturity	0,951146

When the coefficient of determination is considered, it is seen that the dependent variable is the highest credit. However, when loans are dependent variables in liquid assets, deposits, liabilities, PP borrows, treasury repos, and follow-up variables, R^2 values are very close to each other.
The estimation equations obtained as a result of the 2-period delayed Var analysis according to the dependent variables are given in appendix 2.

5. DISCUSSION AND CONCLUSIONS

The banking sector is one of the sectors most affected by economic dynamics. Considering that the other financial institutions outside the banks are not very developed, understanding and following the internal dynamics of the banking sector is important for future projections.

In this context, it is predicted that the highest variability will be in the main volume (in the passive sum) when the estimation of long-term changes in banking sector balance sheet items is examined. The reason for using the VAR analysis method in the study is that the lagged values of the dependent variables in VAR models make it possible to make strong predictions for the future (Kumar, Leona, Gasking, 1995: 365).

The beginning of the analysis period is the years of emergence from the domestic crisis and the share of the loans in the balance sheet increases and the share of the deposits decreases in the following periods. By the end of 2011 and the beginning of 2012, when the impact of the global crisis began to slow down, deposits on the resource side continued to decline, as will be seen in the chart. In particular, it can be said that the increase in foreign borrowing facilities of banks is one of the main factor. In this framework, while the loans moved upwards from one side, the deposit moved downward from the other side. However, in this trend, volatility of both is considerably higher than the other main items. This indicator shows that banks have high risks in credit and deposit items. Then, the high volatility in liquid assets can be attributed to the high volatility in the market. Because the cost of being liquid is important. It can

be said that the banks are changing their policies in this item in short intervals considering the market conditions.

The data obtained as a result of the analysis gives important clues for the Turkish Banking Sector. Because, a significant portion of the resources in the Turkish Banking Sector consists of the deposit item. On the asset side, the biggest share belongs to the loans item. In the analysis, since it is determined that the biggest change is in these two items, it is stated that banks should give more importance to credit and deposit management in terms of risk. Because, on the passive side, there is no other foreign resource that can be an alternative to deposit. On the asset side, the strongest item is loans. At the same time, the determination of liquid assets as another item with high volatility gives an important clue for banks. Indeed, when the market in balance deteriorated in Turkey, the first negative developments are taking place in the liquidity side.

In the light of all these data, it is important for Turkish banks to give more importance to diversification in terms of resources and assets and to develop alternative balance sheet items in terms of continuity and risk management. In future studies, systematic and non-systematic risks leading to this volatility in credit and deposit can be analyzed.

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Appendix1. Coefficients and decision criteria of models

		Dependent Values									
		Funds Borrowed	**Financial assets held for trading**	**Loans**	**Liquid Assets**	**Deposits**	**Liabilities**	**Money Market Takings**	**Financial Assets Available for Sale**	**Loans under follow-up**	**Investments held to Maturity**
İndependent Values	Funds Borrowed (-1)	1,175971	0,317776	-0,0965	0,326744	0,009027	0,796255	0,194569	0,003776	0,002122	-0,1825
	Funds Borrowed (-2)	-0,7602	-0,3601	-0,7019	-0,5796	-0,2927	-2168307	-0,5428	-0,0416	0,007616	0,119021
	Financial assets held for trading (-1)	-1383859	0,119673	-0,9981	-0,6966	-1463527	-2122593	0,383185	1,299568	-0,0801	-1148497
	Financial assets held for trading (-2)	0,047838	0,226744	0,125028	0,175015	0,818513	0,468085	-0,4073	-0,4683	-0,0789	0,052945
	Loans (-1)	0,310934	0,115825	2,253019	0,805244	1,742651	2,905987	0,050439	0,238594	-0,0020	0,097286
	Loans (-2)	-0,1340	0,026809	-0,8426	-0,2844	-0,9861	-1506695	-0,2430	-0,3547	-0,0049	-0,1840
	Liquid Assets (-1)	-0,1508	0,017300	0,119772	0,808078	-0,1894	0,272395	0,308530	0,478964	-0,0048	-0,4272
	Liquid Assets (-2)	-0,2149	-0,1459	-0,4008	-0,2573	-0,0824	-0,8001	-0,1269	-0,3217	-0,0027	0,319163
	Deposits (-1)	0,333675	0,102664	-0,5001	-0,7565	0,242950	-0,6426	-0,1564	-0,1690	-0,0138	0,684264
	Deposits (-2)	-0,3585	-0,1366	-0,2946	0,270514	-0,3332	-0,6131	0,250974	-0,2610	0,022651	0,145626
	Liabilities (-1)	-0,3631	-0,2228	-0,4584	-0,1732	-0,6132	-0,7213	-0,0176	-0,2058	0,012041	-0,1968
	Liabilities (-2)	0,376850	0,145256	0,690284	0,156955	0,599243	1,578752	0,236806	0,535142	-0,0084	-0,1597
	Money Market Takings (-1)	0,496426	0,276330	0,242451	-0,1316	0,474375	0,758289	0,409252	-0,3363	-0,0255	0,535056
	Money Market Takings (-2)	-0,2328	-0,0977	-0,6191	-0,1189	-0,5119	-1279024	-0,3204	-0,1998	0,047083	0,067360
	Financial Assets Available for Sale (-1)	-0,2456	-0,0492	0,197602	0,088352	0,243896	0,166757	-0,3446	1,211385	-0,0315	-0,6109
	Financial Assets Available for Sale (-2)	0,032343	0,026129	0,264370	0,237935	0,558878	0,603628	0,124934	-0,1100	0,001797	0,046180
	Loans under follow-up (-1)	2,737521	0,117264	7,738944	2,506383	13,01593	15,01524	-4144617	1,064896	0,996806	2,729074
	Loans under follow-up (-2)	-1653129	0,632736	-4325409	-2358870	-9127438	-1075002	2,839807	-1867034	-0,0551	-2545191
	Investments held to Maturity (-1)	-0,5479	-0,1191	-0,1758	0,217573	0,289912	0,042166	-0,1081	0,391459	0,001170	0,363496
	Investments held to Maturity (-2)	0,307059	0,147537	0,319538	0,200674	0,396182	0,938246	0,128928	0,129680	-0,0193	-0,0352
	C	52350,94	25945,13	51894,28	47913,10	77090,48	143339,4	-23677,74	-35155,04	3778,443	34529,53
D	R-squared	0,996556	0,886830	0,999531	0,995327	0,999227	0,999305	0,992092	0,994096	0,998371	0,951146

	Adj. R-squared	0,994743	0,827267	0,999284	0,992867	0,998820	0,998939	0,987930	0,990989	0,997513	0,925433
	Sum sq. resids	2,49E+09	2,95E+08	8,93E+09	4,20E+09	8,79E+09	2,67E+10	1,61E+09	1,87E+09	23911269	1,99E+09
	S.E. equation	8094,090	2784,578	15325,73	10511,30	15210,88	26511,84	6500,353	7023,517	793,2490	7242,120
	F-statistic	549,7894	14,88889	4048,511	404,6485	2456,273	2730,141	238,3725	319,9130	1164,297	36,99146
	Log likelihood	-6.016.733	-5.387.181	-6.393.388	-6.170.910	-6.388.950	-6.716.743	-5.887.359	-5.933.030	-4.646.309	-5.951.113
	Akaike AIC	21,10757	18,97349	22,38437	21,63020	22,36932	23,48048	20,66901	20,82383	16,46206	20,88513
	Schwarz SC	21,84703	19,71296	23,12383	22,36967	23,10878	24,21995	21,40848	21,56329	17,20153	21,62459
	Mean dependent	137124,7	17997,62	686219,3	160864,5	682486,3	1162926,	79027,46	156317,4	22276,28	78338,48
	S.D. dependent	111639,1	6699,946	572758,7	124455,4	442854,9	813737,8	59168,42	73987,35	15907,30	26521,24

Appendix 2.

Funds Borrowed = 1.18* Funds Borrowed (-1) - 0.76* Funds Borrowed (-2) - 1.38* Financial assets held for trading (-1) + 0.05* Financial assets held for trading (-2) + 0.32* Loans (-1) - 0.13* Loans (-2) - 0.15* Liquid Assets (-1) - 0.21* Liquid Assets (-2) + 0.33* Deposits (-1) - 0.36* Deposits (-2) - 0.36* Liabilities (-1) + 0.38* Liabilities (-2) + 0.50* Money Market Takings (-1) - 0.23* Money Market Takings (-2) - 0.258* Financial Assets Available for Sale (-1) + 0.03* Financial Assets Available for Sale (-2) + 2.74* Loans under follow-up (-1) - 1.65* Loans under follow-up (-2) - 0.55* Investments held to Maturity (-1) + 0.31* Investments held to Maturity (-2) + 52350.94

Financial assets held for trading = 0.32* Funds Borrowed (-1) - 0.36* Funds Borrowed (-2) + 0.12* Financial assets held for trading (-1) + 0.23* Financial assets held for trading (-2) + 0.12* Loans (-1) + 0.027* Loans (-2) + 0.02* Liquid Assets (-1) - 0.15* Liquid Assets (-2) + 0.10* Deposits (-1) - 0.14* Deposits (-2) - 0.224* Liabilities (-1) + 0.15* Liabilities (-2) + 0.28* Money Market Takings (-1) - 0.10* Money Market Takings (-2) - 0.05* Financial Assets Available for Sale (-1) + 0.03* Financial Assets Available for Sale (-2) + 0.12* Loans under follow-up (-1) + 0.63* Loans under follow-up (-2) - 0.12* Investments held to Maturity (-1) + 0.15* Investments held to Maturity (-2) + 25945.13

Loans = - 0.10* Funds Borrowed (-1) - 0.71* Funds Borrowed (-2) – 1.00* Financial assets held for trading (-1) + 0.13* Financial assets held for trading (-2) + 2.3* Loans (-1) - 0.84* Loans (-2) + 0.12* Liquid Assets (-1) - 0.400* Liquid Assets (-2) - 0.50* Deposits (-1) - 0.29* Deposits (-2) - 0.46* Liabilities (-1) + 0.70* Liabilities (-2) + 0.24* Money Market Takings (-1) - 0.62* Money Market Takings (-2) + 0.20* Financial Assets Available for Sale (-1) + 0.26* Financial Assets Available for Sale (-2) + 7.74* Loans under follow-up (-1) - 4.33* Loans under follow-up (-2) - 0.18* Investments held to Maturity (-1) + 0.32* Investments held to Maturity (-2) + 51894.28

Liquid Assets = 0.33* Funds Borrowed (-1) - 0.58* Funds Borrowed (-2) - 0.70* Financial assets held for trading (-1) + 0.18* Financial assets held for trading (-2) + 0.81* Loans (-1) - 0.28* Loans (-2) + 0.81* Liquid Assets (-1) - 0.26* Liquid Assets (-2) - 0.76* Deposits (-1) + 0.27* Deposits (-2) - 0.17* Liabilities (-1) + 0.16* Liabilities (-2) - 0.13* Money Market Takings (-1) - 0.12* Money Market Takings (-2) + 0.09* Financial Assets Available for Sale (-1) + 0.24* Financial Assets Available for Sale (-2) + 2.51* Loans under follow-up (-1) - 2.36* Loans

under follow-up (-2) + 0.22* Investments held to Maturity (-1) + 0.21* Investments held to Maturity (-2) + 47913.10

Deposits = 0.01* Funds Borrowed (-1) - 0.29* Funds Borrowed (-2) - 1.46* Financial assets held for trading (-1) + 0.82* Financial assets held for trading (-2) + 1.74* Loans (-1) - 0.99* Loans (-2) - 0.19* Liquid Assets (-1) - 0.08* Liquid Assets (-2) + 0.24* Deposits (-1) - 0.33* Deposits (-2) - 0.6* Liabilities (-1) + 0.60* Liabilities (-2) + 0.47* Money Market Takings (-1) - 0.52* Money Market Takings (-2) + 0.24* Financial Assets Available for Sale (-1) + 0.59* Financial Assets Available for Sale (-2) + 13.02* Loans under follow-up (-1) - 9.13* Loans under follow-up (-2) + 0.29* Investments held to Maturity (-1) + 0.40* Investments held to Maturity (-2) + 77090.48

Liabilities = 0.80* Funds Borrowed (-1) - 2.17* Funds Borrowed (-2) - 2.12* Financial assets held for trading (-1) + 0.47* Financial assets held for trading (-2) + 2.91* Loans (-1) - 1.51* Loans (-2) + 0.27* Liquid Assets (-1) - 0.80* Liquid Assets (-2) - 0.64* Deposits (-1) - 0.61* Deposits (-2) - 0.72* Liabilities (-1) + 1.58* Liabilities (-2) + 0.76* Money Market Takings (-1) - 1.28* Money Market Takings (-2) + 0.17* Financial Assets Available for Sale (-1) + 0.61* Financial Assets Available for Sale (-2) + 15.02* Loans under follow-up (-1) - 10.75* Loans under follow-up (-2) + 0.04* Investments held to Maturity (-1) + 0.94* Investments held to Maturity (-2) + 143339.39

Money Market Takings = 0.19* Funds Borrowed (-1) - 0.54* Funds Borrowed (-2) + 0.38* Financial assets held for trading (-1) - 0.41* Financial assets held for trading (-2) + 0.05* Loans (-1) - 0.24* Loans (-2) + 0.31* Liquid Assets (-1) - 0.13* Liquid Assets (-2) - 0.16* Deposits (-1) + 0.25* Deposits (-2) - 0.02* Liabilities (-1) + 0.24* Liabilities (-2) + 0.41* Money Market Takings (-1) - 0.32* Money Market Takings (-2) - 0.34* Financial Assets Available for Sale (-1) + 0.12* Financial Assets Available for Sale (-2) - 4.14* Loans under follow-up (-1) + 2.84* Loans under follow-up (-2) - 0.11* Investments held to Maturity (-1) + 0.13* Investments held to Maturity (-2) - 23677.74

Financial Assets Available for Sale = 0.00* Funds Borrowed (-1) - 0.04* Funds Borrowed (-2) + 1.30* Financial assets held for trading (-1) - 0.47* Financial assets held for trading (-2) + 0.24* Loans (-1) - 0.35* Loans (-2) + 0.48* Liquid Assets (-1) - 0.32* Liquid Assets (-2) - 0.17* Deposits (-1) - 0.26* Deposits (-2) - 0.21* Liabilities (-1) + 0.54* Liabilities (-2) - 0.34* Money Market Takings (-1) - 0.20* Money Market Takings (-2) + 1.21* Financial Assets Available for Sale (-1) - 0.11* Financial Assets Available for Sale (-2) + 1.06* Loans under follow-up (-1) - 1.87* Loans under follow-up (-2) + 0.39* Investments held to Maturity (-1) + 0.13* Investments held to Maturity (-2) - 35155.04

Loans under follow-up = 0.00* Funds Borrowed (-1) + 0.01* Funds Borrowed (-2) - 0.08* Financial assets held for trading (-1) - 0.08* Financial assets held for trading (-2) - 0.00* Loans (-1) - 0.00* Loans (-2) - 0.00* Liquid Assets (-1) - 0.00* Liquid Assets (-2) - 0.01* Deposits (-1) + 0.02* Deposits (-2) + 0.01* Liabilities (-1) - 0.01* Liabilities (-2) - 0.03* Money Market Takings (-1) + 0.05* Money Market Takings (-2) - 0.03* Financial Assets Available for Sale (-1) + 0.00* Financial Assets Available for Sale (-2) + 1.00* Loans under follow-up (-1) - 0.06*

Loans under follow-up (-2) + 0.00* Investments held to Maturity (-1) - 0.02* Investments held to Maturity (-2) + 3778.44

Investments held to Maturity = - 0.18* Funds Borrowed (-1) + 0.12* Funds Borrowed (-2) - 1.15* Financial assets held for trading (-1) + 0.06* Financial assets held for trading (-2) + 0.10* Loans (-1) - 0.18* Loans (-2) - 0.42* Liquid Assets (-1) + 0.32* Liquid Assets (-2) + 0.68* Deposits (-1) + 0.15* Deposits (-2) - 0.20* Liabilities (-1) - 0.16* Liabilities (-2) + 0.54* Money Market Takings (-1) + 0.07* Money Market Takings (-2) - 0.61* Financial Assets Available for Sale (-1) + 0.05* Financial Assets Available for Sale (-2) + 2.73* Loans under follow-up (-1) - 2.55* Loans under follow-up (-2) + 0.36* Investments held to Maturity (-1) - 0.04* Investments held to Maturity (-2) + 34529.53

Appendix 3a. Descriptive Statistic -1

	_ZKAYNAK	**AL_KREDI**	**AL_M_SAT_M**	**KREDILER**	**LIKIT_AKTIFLER**	**MEVDUAT**
Mean	135229.4	133250.3	18072.10	665546.1	156387.3	664769.1
Median	114544.4	78212.13	17441.92	438166.6	103976.6	560417.1
Maximum	345030.9	419846.6	42578.18	2059127.	439341.1	1713185.
Minimum	25698.65	15648.65	7403.525	52631.49	20002.13	137867.9
Std. Dev.	89861.41	111794.9	6600.738	574400.3	124796.0	446091.4
Skewness	0.682171	0.997573	1.235167	0.863905	0.727321	0.724512
Kurtosis	2.361548	2.778124	4.876182	2.566753	2.184895	2.446541
Jarque-Bera	5.767167	10.24249	24.45748	8.064777	7.066800	6.115213
Probability	0.055934	0.005969	0.000005	0.017732	0.029205	0.047000
Sum	8248994.	8128266.	1102398.	40598310	9539624.	40550915
Sum Sq. Dev.	4.85E+11	7.50E+11	2.61E+09	1.98E+13	9.34E+11	1.19E+13
Observations	61	61	61	61	61	61

Appendix 3b. Descriptive Statistic -2

	PASIF	**PP_BOR_**	**SAT_HAZ_R**	**TAKIP**	**VADEYE_KADAR**
Mean	1131894.	76779.49	151838.2	21872.54	77375.42
Median	870150.5	56688.53	170277.4	17826.07	81984.50
Maximum	3095039.	210053.5	269088.6	60597.13	129962.3
Minimum	211660.8	9053.136	17668.81	5886.701	42479.01
Std. Dev.	817911.9	59462.85	76769.17	15795.68	26604.66
Skewness	0.783191	0.513645	-0.237845	1.097904	0.233889
Kurtosis	2.459177	1.908684	1.716446	3.121886	1.768584
Jarque-Bera	6.979525	5.709338	4.762552	12.29259	4.410301
Probability	0.030508	0.057575	0.092433	0.002141	0.110234
Sum	69045516	4683549.	9262132.	1334225.	4719900.
Sum Sq. Dev.	4.01E+13	2.12E+11	3.54E+11	1.50E+10	4.25E+10
Observations	61	61	61	61	61