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Testing Distributions in Banking Sector Loans with Different Computer Programs: An Experimental Analysis for Turkey

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Within the fields of risk management and banking, the normality condition is one of the basic assumptions to apply value at risk, capital asset pricing or linear regression models on credit risk assessment. However, banking sector data related to loans may not be normally distributed. Hence, it needs to be put through scientific tests. For this purpose, firstly, Anderson-Darling, Jarque-Bera, Kolmogorov-Smirnov, Shapiro-Wilk, and Shapiro-Francia tests are applied to ninety-two banking sector loan variables and it is demonstrated that most of the variables are not normally distributed. Additionally, the parameters of Normal, Birnbaum-Saunders, Exponential, Extreme Value, Gamma, Generalized Extreme Value, Inverse Gaussian, Log-Logistic, Logistic, Lognormal, Nakagami, Negative Binomial, Non-Parametric, Poisson, Rayleigh, Rician, t- Location-Scale, and Weibull distributions are estimated for loan variables. Thirdly, when the data are not normally distributed, it is necessary to examine the other test results. Therefore, Kolmogorov-Smirnov, Anderson Darling, and Chi-square test results are employed for sixty-one distributions related to the variables and best fitted distribution per variable is aimed at. The results indicate that different computer codes and programs may give different outcomes in connection with the normality and best fitting distribution. Therefore, the use of different strategies may also be adopted in risk management courses along with the traditional ones since the normality assumption is an essential first step for the application of such techniques. Finally, pedagogically speaking, it should be noted that teaching the essence of mathematical background and computer codes could be strategically useful for students in internalizing these distribution concepts.

Keywords: *distribution, banking sector loans, risk management*

JEL Codes: *C46, G21, G32*

Introduction

Researchers working on economics, banking and finance need the data to be stationary and normally distributed. The assumption is evident in both theoretical and empirical studies. For instance, the capital asset pricing model of Sharpe (1964)

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assumes that data are normally distributed. However, in conditions when they are not, problems arise in measuring and interpreting the data. Apart from theoretical assumptions, normality is also prerequisite for application of different methods in statistics and econometrics. For example, the stationarity assumption for linear regression method is a required condition for normality where studies like Suhar and Zaki's (2021) apply normality tests for both independent and dependent variables before estimating the linear regression model as a pre-condition.

It is expected that normally distributed data would be symmetric around the mean and would have constant variance. While the sample mean would be distributed symmetrically, it should not be too fat-tailed or skewed to the right or left. However, as stated by the *principle of Heisenberg uncertainty*, one may not know the exact location and speed of an electrode simultaneously (Kaku 2019, p. 62). This principle may also be valid for economic time series. Since mean is similar to location and variance, it may be interpreted as speed where the mean and the variance of a variable cannot also be known at the same time. There may currently be a mean that does not change for the time being yet variance may indicate a heteroscedasticity problem. Therefore, non-normality is a natural context consistent with the above-mentioned physics principle. In addition, as the *catapult effect* indicates, another object may be benefitted to accelerate its speed (see Kaku 2019, p. 191). Similarly, for credit data you may need government support to decrease nonperforming loans. However, this may disturb the data and create a non-normal structure. To visualize whether there is non-normality, the normality test can be conducted either with graphs or statistical techniques. The simplest two-dimensional graph would be a histogram or a quantile-quantile (QQ) plot to detect the shape. One may also apply basic tests such as Jarque-Bera, skewness and kurtosis. There is a variety of distributions, and selecting an appropriate one may become a difficult task and require technology.

There are several normality tests applied in economics, money, banking and finance studies. Aparicio and Enstrada (1997) test the normality of the Scandinavian stock market and reject the normality by Kolmogorov-Smirnov (KS), Goodness of Fit (GF), and Jarque-Bera (JB) statistics. They conclude that the data fit to the scaled-t distribution by GF tests. One may also refer to Jantschi and Bolboaca (2018) for further evaluation of some GFs. Aparicio and Estrada (2001) also reject the normality for European stock markets' daily data. Goncu et al. (2012) benefit from Istanbul Stock Exchange data and apply Anderson-Darling test (AD) claiming that generalized extreme value distribution is superior to normal distribution. Therefore, they support the extreme value theorem for the Turkish data. On the other hand, Coronel-Brizio and Hernandez-Montoya (2010) apply AD for power-law distribution for Dow Jones Index of the US economy. Borowski (2018) also tests the normality of sixty-five equity market indices using normality tests Cramer-von Mises (CM) and AD and rejects the normality for all of them. Azat (2014) applies the Shapiro-Francia test (SF) to several countries' financial and banking sector data including nonperforming loans and finds them to be normally distributed. This study aims at comparing the results of different tests and computer programs and demonstrating that they may be problematic in the field of education when teaching the normality concept in risk management courses.

The following section describes the data and the methodology applied in this paper. The third section provides the results and discusses them briefly. The last section offers a brief summary and provides recommendations regarding teaching strategies.

Materials and Methods

Obtaining healthy and well-constructed data is crucial to conducting a study on testing normality. For this study, monthly data are gathered from the Turkish Banking Association Risk Center[1]. Appendix presents a detailed explanation of the data spanning between the years of 2009 and 2021. This paper also employs several normality tests[2]. One may refer to Berlinger et al. (2021, Table 1) for cumulative distribution functions of several distribution types which benefit from AD in terms of comparison. Anderson and Darling (1954) suggest that the criterion W_n^2 is the average of the squared discrepancy $\left[F_n(x)-F(x)\right]^2$ weighted by $\psi\left(F(x)\right)$, and the increase in $F(x)$ and *n*, which is for normalization purpose, indicates the number of sample data points (see Equation 1).

$$W_n^2 = n\int_{-\infty}^{+\infty}\left[F_n(x)-F(x)\right]^2\psi\left(F(x))dF(x)\right) \qquad (1)$$

Within the equation, $F\left(x\right)$ is the continuous distribution function, and $F_n(x)$ is the empirical distribution function. Anderson and Darling (1954) benefit from $\psi\left(F(x)\right)=\dfrac{1}{F(x)(1-F(x))}$ which assigns heavy weight to tails. Therefore, their assumption is different than that of the CM (Von Mises 1931) which acknowledges the weighting function as equal to 1. Therefore, the difference between AD and CM relies on the weighting function. According to Anderson and Darling (1952), this test is superior to KS due to giving more weight on the tails of the distribution. It should be noted that the AD statistic is the modification of KS via changing the weight attached to the tails of distribution. The AD gives more weight on the observation within the tails of distribution (Wikipedia 2021). Moreover, critical values of the AD change depending on the distribution. However, this is not true for KS which is distribution-free (ITL 2021). Therefore, for each distribution, there is a different critical value table in the AD. If this statistic is higher than the critical values of theoretical distribution, one may reject the null of normality. Hence, the AD can be

[1]Available at: https://www.riskmerkezi.org/en/home. [Accessed 20 June 20 2021]
[2]See Akdeniz (2018) for basic distributions in statistics.

summarized by the following equation where the weighting function is different than 1 (Equation 2)[3].

$$AD^2 = n\int_{x=-\infty}^{x=+\infty} \frac{\left[F_n(x) - F(x)\right]^2}{F(x)[1-F(x)]} dF(x) \qquad (2)$$

Authors as Marmor and Bashkansky (2018) used the AD test to detect change in the distribution. They make the difference between a theoretical distribution and a stable process and interpret AD^2 as the observed fluctuation divided by the expected fluctuation. Therefore, the high change in the deviation from the stable points would carry one to a higher AD statistic. Marmor and Bashkansky (2018) claim that the AD statistics has the capacity to capture the structural change in the distribution of the data. The change in the AD statistics by data points may be beneficial to detect the change in the distribution and observe abnormal events. The sectoral homogeneity in terms of normality would decrease the credit risk of banking and allow one to observe problematic sectors. One may benefit from *p*- values of AD to produce a knowledge of credit risk in a banking sector.

Results and Discussion

In 1827 Robert Brown observed the movements of pollens in water, and several scientists including Einstein and Wiener tried to explain these irregular interactions and collisions by functions (Capar 2013, p. 259). As these movements are random, predetermination of pollen behavior is impossible. Apart from this non-stationarity, the concept of normal is also the inverse of non-normal in social sciences. Therefore, if a person thinks and acts like an average person, he is accepted as normal in a society. Then people having marginal thoughts and behaviors would be on the tails of distribution. Similarly, in banking sector, some sectors and loans are also considered as marginal. If the number of people not paying their loans is not distributed normally, it means the banking sector is at risk. If there is a case of normality, its expected value will be equal to its mean. In such a case, it would be easier to decrease the credit risk and take precautions. Methods such as value at risk (VaR) might be applied, and the parameter estimates could be tested by *t*- statistics. Thus, banking sector authorities would be able to observe whether it is resilient or not *a la* Brunnermeier (2021).

The credit risk of a bank would diminish by the level and quality of collaterals. Banks may take payrolls and be on the safe side working with employees but with companies, since credit amount is usually high, the type and volume of the collateral are essential for protecting the bank's profitability position during a high probability of credit default case. Since companies have tangible and intangible assets, some

[3]One can also refer to Giles (2001) for this topic.

sectors would have more tangible assets than others. Realistically speaking, almost all sectors need credit to increase their production and services. Banks ask for a collateral from these companies. The cash is the best collateral, but not all companies would have sufficient amount of it. Some sectors produce intangible goods such as software. These companies would have less collateral and have a lower chance of getting a loan from a bank. At this stage, a competition problem may arise since high tangible asset-intensive companies would have a bigger opportunity to get a loan. As stated by The Economist (2021, p. 14), there will be a distinction between data and collateral. It will also be possible to get a loan by the past data of a customer rather than his/her current assets. Here, the indicator may be the data for a bank while lending.

Interpreting *p*- values for AD, Jarque-Bera, KS, Shapiro-Wilk (SW), and Shapiro Francia (SF) normality test results that are given in Table 1 is not a simple task. The null hypothesis for all these five tests is normality. 18 out of 92 variables are normally distributed according to these AD- test results. In addition, Table 2 provides Normal, Birnbaum-Saunders, Exponential, Extreme Value, Gamma, Generalized Extreme Value, Inverse Gaussian, Log-Logistic, Logistic Lognormal, Nakagomi, Negative Binomial, Nonparametric, Poisson, Rayleigh, Rician, t Location Scale and Weibull tests' results for parameters as well as their log-likelihood ratios. These parameters are obtained using Matlab. To see whether the "Distribution Fitter" tool of Matlab selects normality as the other tests; variables B1, K5 and K8 are normally distributed according to the AD-test in Table 1. However, Matlab Distribution Fitter Tool selects B1 (t Location-Scale), K5 (Birnbaum-Saunders) and K8 (Birnbaum-Saunders) by the lowest log-likelihood ratio tests. As a final experiment, Easy Fit 5.5 computer program results are provided in Tables 3-5 for the first thirteen variables. As seen in tables, KS, AD, and Chi-Square tests select different distributions. For instance, KS selects B1 (Dogum (4P)), K5 (Logistic), and K8 (Inv. Gaussian) (Table 3). AD selects B1 (Dogum (4P)), K5 (Gamma), and K8 (Weibull (3P)) (Table 4). And finally, Chi-Square test selects B1 (Cauchy), K5 (Inverse Gaussian), and K8 (Erlang (3P)) (Table 5)[4].

[4]Tables 1-5 provide only the significant test results. Complete test results are given in Appendices A-D which can be found on author's website: https://sites.google.com/view/afsinsahin/home.

Table 1. *Tests for Normality*

Var.	AD-Test (p- value)		Jarque-Bera Test (p- value)		Kolmogorov-Smirnov Test Statistic (p- value)		Shapiro-Wilk Test (p- value)		Shapiro-Francia Test (p- value)	
B1	0.7044		0.7193		0.0510		0.1994		0.1772	
K5	0.1157		0.0754	*	0.1120	**	0.0001	***	0.0004	***
K8	0.2058		0.1006		0.1110	**	0.0011	***	0.0040	***
K11	0.1233		0.0170	**	0.1160	**	0.0007	***	0.0015	***
K12	0.1170		0.0540	*	0.1210	**	0.0003	***	0.0014	***
K15	0.1606		0.0512	**	0.1220	**	0.0004	***	0.0019	***
K17	0.2733		0.1043		0.0930	**	0.0009	***	0.0032	***
K19	0.5541		0.1853		0.0930	**	0.0171	**	0.0343	**
K25	0.1723		0.0778	*	0.0940	**	0.0003	***	0.0017	***
K33	0.1374		0.0471	**	0.1230	**	0.0002	***	0.0011	***
K35	0.1938		0.0789	*	0.0940	**	0.0013	***	0.0053	***
K37	0.8489		0.6838		0.0930	**	0.2788		0.4036	
K42	0.4531		0.2719		0.0930	**	0.0119	**	0.0316	**
K43	0.1128		0.0575	**	0.1060	**	0.0001	***	0.0004	***
K44	0.1232		0.0446	**	0.1290	**	0.0002	***	0.0008	***
K52	0.5292		0.8801		0.0930	**	0.0376	**	0.0583	*
K53	0.2145		0.0742	*	0.0970	**	0.0029	***	0.0092	***
K62	0.1464		0.0484	**	0.1150	**	0.0005	***	0.0023	***

Note: The table provides the p- values of the test statistics. The statistics that fail to reject the normality are shown in bold font. Anderson-Darling Test (AD), Kolmogorov-Smirnov Test Statistic, and Jarque-Bera Test are calculated by WinRATS 8.1. The WinRATS 8.0 codes are written by Doan (2019). Eviews 10.0 add-ins were used to test the normality with Shapiro-Wilk and Shapiro-Francia tests.

Table 2. *Matlab Distribution Tests Results*

Distribution	Parameters	B1	K5	K8
Birnbaum-Saunders	Beta (Scale)	50,763.70	171,866,000,000.00	3,517,580,000.00
	Std. Err.	3,041.99	4,922,420,000.00	90,862,300.00
	Gamma	0.78	0.28	0.25
	Std. Err.	0.05	0.02	0.02
	Log likelihood	-1,788.72	-2,444.76	-2,069.47
t Location-Scale	Mu (Location)	67,827.90	178,624,000,000.00	3,629,680,000.00
	Std. Err.	1,916.11	5,126,520,000.00	93,928,300.00
	Sigma (Scale)	21,994.90	49,770,100,000.00	910,244,000.00
	Std. Err.	2,327.34	3,630,300,000.00	67,599,200.00
	Nu (Degrees of Freedom)	17.13	2,770,140.00	6,166,880.00
	Std. Err.	25.58	456,441.00	746,056.00
	Log likelihood	-1,687.08	-2,448.67	-2,072.52

Note: The parameters are estimated by using the Matlab computer program.

Table 3. *EasyFit 5.5 Kolmogorov-Smirnov Test Results*

Distribution	B1	B2	B3	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
Cauchy		0.05											
Dagum (4P)	0.04		0.07										
Frechet							0.09						
Gen. Extreme Value									0.09	0.10			
Gen. Pareto													0.05
Inv. Gaussian											0.07		
Logistic								0.09					
Lognormal						0.07							
Pearson 6				0.08									
Johnson SB					0.09							0.06	

Table 4. *EasyFit 5.5 Anderson Darling Test Results*

Distribution	B1	B2	B3	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
Cauchy		0.63											
Dagum (4P)	0.32		1.11										
Frechet (3P)							1.10						
Gamma								1.31					
Gen. Extreme Value									0.84	1.70			
Gen. Gamma				0.75									0.53
Gen. Pareto					1.44							0.68	
Log-Pearson 3						0.90							
Weibull (3P)											0.66		

Table 5. *EasyFit 5.5. Chi-square Test Results*

Distribution	B1	B2	B3	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
Cauchy	2.65	5.48	11.18										
Erlang (3P)											3.58		
Exponential (2P)													2.18
Frechet										3.69			
Gamma				1.14									
Gen. Extreme Value									9.65				
Gen. Pareto												1.85	
Inv. Gaussian								4.58					
Log-Logistic (3P)						1.40	13.93						

Conclusion

In this study, distribution tests are applied to banking sector data. The banking sector loan data should be normally distributed. If the data of customers not paying their loans on time are normally distributed, the credit risk would be easily measured by risk measurement techniques such as VaR and classical regression methods, and forecast techniques would be applied. However, as demonstrated here they may not be normally distributed, and it is also necessary to determine their shape and parameters. Computer codes and programs that are available for this purpose, provide different results as also shown here. At this point it should be remembered that conventional strategies of education orient us to use the simplest tools such as Excel which does not inherit necessary commands. Therefore, the most scientific and appropriate way of teaching the distribution of economic variables is teaching their mathematical background. Using available computer programs and codes may be misleading and have inverse effects in teaching these topics. In addition, mapping techniques would help one to distinguish between normality and alternative distributions while making use of test statistics. Pedagogically, mapping techniques would increase the visualization in teaching risk management in banking. Finally, in order to explain them in a simpler way, advanced distributions may be taught and applied in risk management courses through benefiting from digitalization and graph techniques.

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Appendix

Explanation of the Variables			
Var.	**Explanation**	**Date**	**Result**
B1	The Number of Real People Defaulted in Paying Individual Loans	2009:M1-2021:M03	Normal
B2	The Number of Real People Defaulted in Paying Individual Credit Cards	2009:M1-2021:M03	Not Normal
B3	The Number of Real People Defaulted in Paying Individual Loans or Credit Cards	2009:M1-2021:M03	Not Normal
K1	Cash Loans, Wood and Wood Products, Amount, (One TL)	2013:M07-2021:M04	Not Normal
K2	Cash Loans, Fishery, Amount (One TL)	2013:M07-2021:M04	Not Normal
K3	Cash Loans, Manufacturing Industry not Classified in Another Places, Amount (One TL)	2013:M07-2021:M04	Not Normal
K4	Cash Loans, Personal Loans (Others), Amount (One TL)	2013:M07-2021:M04	Not Normal
K5	Cash Loans, Personal Loans (Housing), Amount (One TL)	2013:M07-2021:M04	Normal
K6	Cash Loans, Personal Loans (Automobile), Amount (One TL)	2013:M07-2021:M04	Not Normal
K7	Cash Loans, Personal Loans, Loan Card, Amount (One TL)	2013:M07-2021:M04	Not Normal
K8	Cash Loans, Textile and Textile Products Industry, Amount (One TL)	2013:M07-2021:M04	Normal
K9	Cash Loans, Mines Excluding Metal Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K10	Cash Loans, Other Essential Social Services, Amount (One TL)	2013:M07-2021:M04	Not Normal
K11	Cash Loans, Other Essential Social and Individual Services, Culture Services Amount (One TL)	2013:M07-2021:M04	Normal
K12	Cash Loans, Education, Amount (One TL)	2013:M07-2021:M04	Normal
K13	Cash Loans, Electric, Gas and Water Resources, Amount (One TL)	2013:M07-2021:M04	Not Normal
K14	Cash Loans, Electrical and Optical Instruments, Amount (One TL)	2013:M07-2021:M04	Not Normal
K15	Cash Loans, Real Estate Commission, Renting and Management Activities, Amount (One TL)	2013:M07-2021:M04	Normal
K16	Cash Loans, Energy and Mining, Amount (One TL)	2013:M07-2021:M04	Not Normal
K17	Cash Loans, Non-Energy Mining, Amount, (One TL)	2013:M07-2021:M04	Normal
K18	Cash Loans, Financial Intermediaries, Intermediary Institutions and Others, Amount, (One TL)	2013:M07-2021:M04	Not Normal

K19	Cash Loans, Financial Intermediaries, Leasing, Factoring Firms and Others, Amount (One TL)	2013:M07-2021:M04	Normal
K20	Cash Loans, Food, Beverage and Tobacco Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K21	Cash Loans, Cash Loans, Construction, Amount (One TL)	2013:M07-2021:M04	Not Normal
K22	Cash Loans, Private Persons Employing Worker, Amount (One TL)	2013:M07-2021:M04	Not Normal
K23	Cash Loans, Pulp and Paper Industry, Printing Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K24	Cash Loans, Pulp and Paper Industry, Printing Industry, Pulp and Paper Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K25	Cash Loans, Rubber and Plastic Products, Amount, (One TL)	2013:M07-2021:M04	Normal
K26	Cash Loans, Chemistry and Chemical Products Industry, Amount (One TL)	2013:M07-2021:M04	Normal
K27	Cash Loans, Machinery and Equipment Industry, Electrical and Electroless Home Appliance, Amount (One TL)	2013:M07-2021:M04	Not Normal
K28	Cash Loans, Machinery and Equipment Industry, Machinery and Equipment, Amount (One TL)	2013:M07-2021:M04	Not Normal
K29	Cash Loans, Main Metal Industry and Worked Metal, Processed Goods Production, Processed Metal Goods Industry (Excluding Equipment), Amount (One TL)	2013:M07-2021:M04	Not Normal
K30	Cash Loans, Main Metal Industry and Worked Metal, Processed Goods Production, Main Metal Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K31	Cash Loans, Nuclear Fuel, Coal Production, Amount (One TL)	2013:M07-2021:M04	Not Normal
K32	Cash Loans, Hotel and Restaurant (Tourism), Amount (One TL)	2013:M07-2021:M04	Not Normal
K33	Cash Loans, Health and Social Services, Amount (One TL)	2013:M07-2021:M04	Normal
K34	Cash Loans, Defense and Public Management, Required Social Security Institutions, Amount (One TL)	2013:M07-2021:M04	Not Normal
K35	Cash Loans, Agriculture, Hunting, Forestry, Amount (One TL)	2013:M07-2021:M04	Normal
K36	Cash Loans, Transportation, Storage and Communications, Other Transportation Activities and Storage, Amount (One TL)	2013:M07-2021:M04	Not Normal
K37	Cash Loans, Transportation, Storage and Communications, Communication, Amount (One TL)	2013:M07-2021:M04	Normal

K38	Cash Loans, Transportation, Storage and Communications, Transportation, Amount (One TL)	2013:M07-2021:M04	Not Normal
K39	Cash Loans, Textile and Textile Products Industry, Leather Clothing and Fur Processing Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K40	Cash Loans, Textile and Textile Products Industry, Clothing Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K41	Cash Loans, Textile and Textile Products Industry, Textile Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K42	Cash Loans, Wholesale, Retail Sale, Motor Vehicle, Motor Vehicle Spare Parts and Accessories, Sale and Repair, Amount (One TL)	2013:M07-2021:M04	Normal
K43	Cash Loans, Wholesale, Retail Sale, Motor Vehicle, Motor Vehicle Services, Retail and Personal Goods, Amount (One TL)	2013:M07-2021:M04	Normal
K44	Cash Loans, Wholesale, Retail Sale, Motor Vehicle, Motor Vehicle Services, Wholesale Trade and Brokerage, Amount (One TL)	2013:M07-2021:M04	Normal
K45	Cash Loans, Transportation Vehicles Industry, Ship Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K46	Cash Loans, Transportation Vehicles Industry, Motor Vehicles, Amount (One TL)	2013:M07-2021:M04	Not Normal
K47	Nonperforming Loans, Wood and Wood Products Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K48	Nonperforming Loans, Fishery, Amount (One TL)	2013:M07-2021:M04	Not Normal
K49	Nonperforming Loans, Manufacturing Industry Not Classified in Another Places Amount (One TL)	2013:M07-2021:M04	Not Normal
K50	Nonperforming Loans, Individual Loans, Other, Amount (One TL)	2013:M07-2021:M04	Not Normal
K51	Nonperforming Loans, Individual Loans, Housing, Amount (One TL)	2013:M07-2021:M04	Not Normal
K52	Nonperforming Loans, Auto, Amount (One TL)	2013:M07-2021:M04	Normal
K53	Nonperforming Loans, Credit Card, Amount (One TL)	2013:M07-2021:M04	Normal
K54	Nonperforming Loans, Leather and Leather Products Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K55	Nonperforming Loans, Other Non-Metal Mines Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K56	Nonperforming Loans, Other Social and Individual Services, Other Social Services, Amount (One TL)	2013:M07-2021:M04	Not Normal

K57	Nonperforming Loans, Other Social and Individual Services, Amount (One TL)	2013:M07-2021:M04	Not Normal
K58	Nonperforming Loans, Education, Amount (One TL)	2013:M07-2021:M04	Not Normal
K59	Nonperforming Loans, Electricity, Gas and Water Resources, Amount (One TL)	2013:M07-2021:M04	Not Normal
K60	Nonperforming Loans, Electricity and Optical Instruments, Amount (One TL)	2013:M07-2021:M04	Not Normal
K61	Nonperforming Loans, Real Estate Brokering, Renting and Management, Amount (One TL)	2013:M07-2021:M04	Not Normal
K62	Nonperforming Loans, Extraction of Energy Producing Mines, Amount (One TL)	2013:M07-2021:M04	Normal
K63	Nonperforming Loans, Extraction of Non-Energy Producing Mines, Amount (One TL)	2013:M07-2021:M04	Not Normal
K64	Nonperforming Loans, Financial Intermediation, Intermediary Institution, Amount (One TL)	2013:M07-2021:M04	Not Normal
K65	Nonperforming Loans, Financial Intermediary, Leasing Factoring, Amount (One TL)	2013:M07-2021:M04	Not Normal
K66	Nonperforming Loans, Food, Beverage and Tobacco Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K67	Nonperforming Loans, Construction, Amount (One TL)	2013:M07-2021:M04	Not Normal
K68	Nonperforming Loans, Private Persons Employing Worker, Amount (One TL)	2013:M07-2021:M04	Not Normal
K69	Nonperforming Loans, Pulp and Paper Industry, Printing Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K70	Nonperforming Loans, Pulp and Paper Industry, Pulp and Paper Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K71	Nonperforming Loans, Rubber and Plastic Products Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K72	Nonperforming Loans, Chemistry and Chemical Products, Amount (One TL)	2013:M07-2021:M04	Not Normal
K73	Nonperforming Loans, Machinery and Equipment Industry, Electricity and Electroless Household Appliances, Amount (One TL)	2013:M07-2021:M04	Not Normal
K74	Nonperforming Loans, Machinery and Equipment Industry, Machinery and Equipment, Amount (One TL)	2013:M07-2021:M04	Not Normal
K75	Nonperforming Loans, Base Metal Industry and Processed Mine Production, Amount (One TL)	2013:M07-2021:M04	Not Normal
K76	Nonperforming Loans, Base Metal	2013:M07-2021:M04	Not

	Industry and Processed Mine Production, Amount (One TL)		Normal
K77	Nonperforming Loans, Nuclear Fuel, Oil and Coal, Production, Amount (One TL)	2013:M07-2021:M04	Not Normal
K78	Nonperforming Loans, Hotel and Restaurants, Amount (One TL)	2013:M07-2021:M04	Not Normal
K79	Nonperforming Loans, Health and Social Services, Amount (One TL)	2013:M07-2021:M04	Not Normal
K80	Nonperforming Loans, Defense and Public Management, Obligatory Social Security Institutions, Amount (One TL)	2013:M07-2021:M04	Not Normal
K81	Nonperforming Loans, Agriculture, Hunting and Forestry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K82	Nonperforming Loans, Transportation, Storage and Communications, Other Transportation Activities and Storage, Amount (One TL)	2013:M07-2021:M04	Not Normal
K83	Nonperforming Loans, Transportation, Storage and Communications, Amount (One TL)	2013:M07-2021:M04	Not Normal
K84	Nonperforming Loans, Transportation, Storage and Communications, Transportation, Amount (One TL)	2013:M07-2021:M04	Not Normal
K85	Nonperforming Loans, Textile and Textile Products Industry, Leather Clothing and Fur Processing Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K86	Nonperforming Loans, Textile and Textile Products Industry, Clothing Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K87	Nonperforming Loans, Textile and Textile Products Industry, Textile Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K88	Nonperforming Loans, Wholesale, Retail, Motor Vehicle Services, Motor Vehicle Sale, Amount (One TL)	2013:M07-2021:M04	Not Normal
K89	Nonperforming Loans, Wholesale and Retail Motor Vehicle Services, Retail Trade and Individual Wares, Amount (One TL)	2013:M07-2021:M04	Not Normal
K90	Nonperforming Loans, Wholesale and Retail Motor Vehicle Services, Wholesale Trade and Brokering, Amount (One TL)	2013:M07-2021:M04	Not Normal
K91	Nonperforming Loans, Means of Transport, Construction of Ship Industry, Amount (One TL)	2013:M07-2021:M04	Not Normal
K92	Nonperforming Loans, Means of Transport, Motor Vehicles and their Accessories, Amount (One TL)	2013:M07-2021:M04	Not Normal