

## Panel Data Analysis to Identify the Factors Affecting Turkish Currency Assets of Foreign Deposit Banks

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### Abstract

With the implementation of free market economy in Turkey starting from 1980, restrictions on foreign capital flows began to be abolished. Within the scope of international expansion in financial aspects, steps for integration with global financial markets were taken, and regulations were made. Accordingly, the number of foreign banks in Turkish banking system have increased since 1980, and reached an important scale in the sector. The share of foreign deposit banks' total assets in the entire banking sector is at 22,8% level as of 2019. In this study, panel data analysis was performed to identify the factors affecting the Turkish currency assets of foreign deposit banks. The 11-year data for the 2009-2019 period were utilized in the study. Turkish Currency Assets / Total Assets was determined as the dependent variable in the analysis. The factors affecting the Turkish currency assets of foreign deposit banks were identified as Turkish Currency Liability / Total Liability [TPYUK], Turkish Currency Deposits / Total Deposits [TPMEV], and Turkish Currency Loans / Total Loans [TPKREDI]. Based on the study results the model formed was significant, and the ratio of independent variables for explaining the dependent variable in the model was approximately 48%. The independent variables TPYUK and TPKREDI were revealed to have a statistically significant positive effect on the dependent variable at 5% significance level. A 1-unit raise in TPYUK increased the dependent variable by 0,436 unit, and a 1-unit raise in TPKREDI by 0,033 unit. No statistically significant effect of TPMEV as the other independent variable was identified on the dependent variable.

**Keywords:** Foreign Deposit Banks, Turkish Currency Assets, Panel Data Analysis, Free Market Economy, Foreign Capital.

**JEL Classification:** G12, G17, G21

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### 1. Introduction

Investments in another country by individuals or institutions located in one country is called "international investment" or "foreign capital investment". These investments can be through purchasing capital market instruments such as bonds and stocks, or directly as foreign capital investments in buildings, factories, land and facilities. A foreign bank can be described as an institution investing in the banking sector in more than one country and owning a bank. Foreign banks can own banks in other countries in two ways. The first is to found a bank in a foreign country, and the second is to purchase some or all shares of a bank in another country [1].

With globalization and financial liberalization, the financial ties between economies have increased in number, and with socio-economic and technological developments, world banking system has started to reshape. In the developing Turkish economy, restrictions on capital flows were replaced by implementations integrated with global financial markets with the introduction of free market economy after 1980 [2].

Free market economy practices and liberal policy process bring along certain advantages and

disadvantages. The advantages of foreign banks' entering the sector are as follows [3]:

- Foreign banks can encourage domestic ones to reduce their costs,
- Foreign banks can increase domestic banks' activities and diversity of financial services through competition.
- Foreign banks can increase domestic banks' financial intermediary activities by offering new services.
- Foreign banks, with their capital, can contribute to the country's economic growth by enabling raise in the loans open to the private sector.
- Foreign banks can support the transparency of the sector to be enhanced.
- Foreign banks, with their administrative approach, can contribute to the effectiveness of internal audit to be increased and operational risks to be reduced.
- Comprehensive and advanced risk management system in foreign banks can enable more effective bank balance sheets.
- Foreign banks can improve the quality of human resources by providing knowledge and skills through training, technology and new application methods.

On the other hand, opening of the sector to foreigners has also the following disadvantages [3]:

- a. Domestic banks have to compete against international banks with strong capital.
- b. There can be negative effects on local businesses.
- c. Foreign banks may mostly work with multinational companies.
- d. The government’s control over the economy may decrease.
- e. Domestic banks may have to take more risks in the competitive environment.
- f. Foreign banks may have different priorities and not support national interests as much as domestic banks.

In developing countries, the globalization of banking supports the service structure and operation mode of the banking system, and international expansion of the country's economy. Due to their large financial structures and ability to impact capital flows, multinational banks operating in many countries make significant contributions to foreign capital's entering into the country's economy. Being open to foreign banks can facilitate countries' borrowing policy and need for foreign fund [4].

With the liberal economy policies implemented in Turkey starting from the 1980s, foreign banks have

owned banks in the country generally through purchase. Their total assets in the banking sector, including foreign-capitalized branch banking, and foreign-capital investment and development banking are at 23,2% level as of 2019 [5]. Since foreign banks have reached a substantial scale in the banking sector, conducting relevant research was taken into consideration.

In order to identify the position of foreign banks in the sector, it will be useful to provide information about their general situation. According to the data by the Banks Association of Turkey, the number of foreign-capital deposit banks that residents abroad have shares of 51% or more is 21 by the year 2019. The share of non-resident banks in total equities was about 23% by September 2019, excluding the trading shares on Borsa Istanbul. Considering those working in the banking sector; 29% of them work in state-owned deposit banks, 34% in private deposit banks, and 26% in foreign banks. Regarding concentration; there are 3 state-owned banks, 1 private and 1 foreign bank in the top 5 banks; and there are 3 state-owned, 3 private, 3 foreign banks and 1 development and investment bank in the top 10 banks. The sector shares of the bank groups are presented in Table 1.

Table 1. Sector Shares of Bank Groups as of 2019 (%) [6]

	Assets	Loans	Deposit
Deposit Banks	87	87	92
State-owned	34	36	37
Privately-owned	31	30	32
Foreign-owned	22	21	23
Development and Investment Banks	7	8	0
Participation Banks	6	5	8
Banking Sector	100	100	100

Considering the share of Turkish Currency (TC) items in the balance sheet by the end of 2019; the share of TC assets in total assets was 55% in foreign banks, 65% in state-owned banks, and 57% in private banks. As for distribution of resources; the share of TC liabilities in total liabilities was 59% in state-owned banks, 48% in private banks and 47% in foreign banks [5]. The developments between 2009-2019 in Turkish currency assets of foreign deposit banks founded in Turkey are presented in the Figures 1.

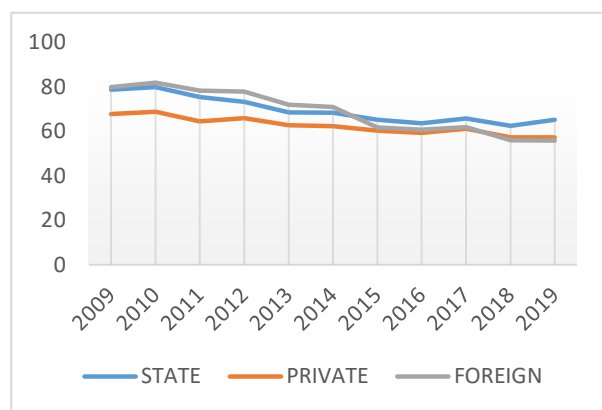


Figure 1. Turkish Currency Assets / Total Assets Ratio (2009-2019) [5]

The ratio of TC assets to total assets kept declining over the years between 2009 and 2019. State-owned banks had the highest rate while foreign deposit banks had the lowest rate with 55.7% in terms of bank groups in 2019.

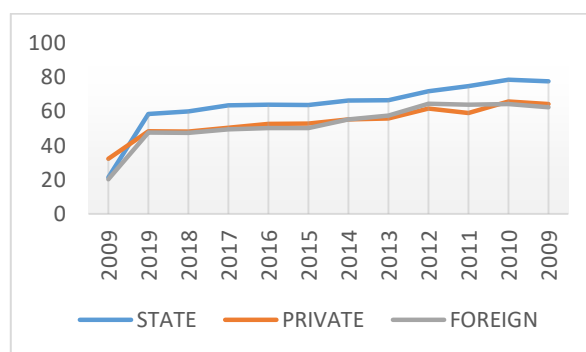


Figure 2. Turkish Currency Liabilities / Total Liabilities Ratio (2009-2019) [5]

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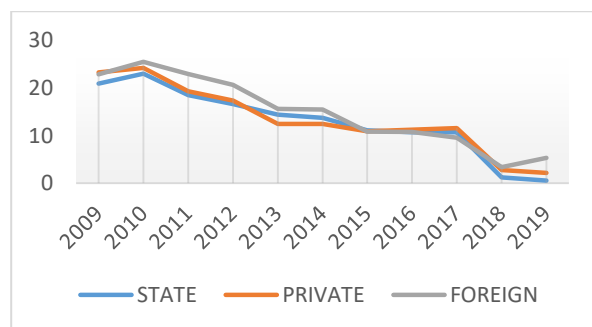


Figure 3. Turkish Currency Liquid Assets / Total Assets Ratio (2009-2019) [5]

The ratio of TC liquid assets to total assets kept decreasing over the years between 2009-2019. State-owned banks were at the lowest level in terms of bank groups in 2019 whereas foreign banks were at the highest level with 5,3%. It can be inferred from this figure that the banks tend not to save TC as liquid, and it stems from utilizing funds through short-term investments as well as avoiding the risk of exchange rates.

## 2. Research Methodology

In order to identify the factors affecting Turkish currency assets of foreign banks, an analysis will be performed. In this study, first, literature review on the relevant subject will be provided, after that purpose and context of research will be provided, then information on the research method and model in terms of panel data analysis will be declared, finally the findings obtained from the analysis will be evaluated.

### 2.1. Literature Review

Some of the studies in the literature on analysis of foreign banks and Turkish currency assets are summarized below.

Çakar [4] studied the market-entry reasons and effects of foreign banks operating in Turkish banking sector, and identified that foreign banks have a delayed impact on the net interest margin in proportion to their share in the market.

Bayraktar and Wang [7] investigated, in their study, the impact of foreign bank investment on the performance of domestic banks, and the effect of financial liberalization process on this relationship. The datasets were formed from the BankScope database comprising of 30 industrial and developing countries and involving the period between 1995-2002. They implemented the panel data regressions by gathering all countries together and grouping them based on their financial liberalization order. It was concluded that both profit and cost indicators in the countries were negatively correlated with the share of foreign banks, and that compared to the other two country groups, countries liberalizing their capital account for the first time benefited less from the entry of foreign banks.

In order to study the current situation of Turkish banking sector and the effect of foreign banks on the sector, Azizov [8] examined the rates of capital adequacy, asset quality, liquidity, profitability and income-expense structure for the years 2001-2005 on the basis of foreign, private and state-owned bank groups regarding capital structure. The study revealed that foreign banks did not have a significant effect on the sector due to their small share in the sector. However, it was observed that the competition between banks contributed to the efficiency of the banking sector.

Ata [9] compared the domestic and foreign banks available in the banking sector based on their financial performances and investigated the effect of foreign banks on the performance of banks in general. Considering the profitability, efficiency, liquidity and risk factors of the banks utilized as decision-making units in the study, a multivariate logistic regression analysis was conducted. The data of banks operating between 2002-2007 were used in the study. It was concluded that domestic banks were more efficient than foreign banks in terms of performance indicators.

Sarıtaş and Gökçe [10], in their study, examined foreign and national banks in Turkey between 2005-2010 by comparing them based on the rates of capital adequacy and total loan. The results of the statistical analyses did not support the hypothesis indicating a significant relationship between the resource and adequacy ratio of the capital. According to the t-test results, no significant relationship was identified between the capital resource and total loan amount since the number of national and foreign banks was very different from each other.

Yıldırım [11] conducted a study on foreign and domestic deposit banks by comparing them regarding their productivity. In the analysis involving the period between 2002-2011, no significant difference was identified for the productivity of the bank groups.

To compare the performances of foreign banks, Uslu [12] analyzed the data of 12 foreign banks between the years 2010-2016 with the CAMELS rating system. The data obtained from the research revealed that, taking 2010 as the basis, half of the foreign banks' performance declined in 2016. Moreover, it was identified that, after 2014, bank profitability, management quality and capital adequacy decreased, but liquidity adequacy and asset quality increased, and sensitivity to market risk also had a slight increase.

### 2.2. Purpose and Context of Research

It is necessary to evaluate foreign banks based on their activities in the banking sector and their relationship with the economy. There are different opinions on the entrance of foreigners in the banking sector regarding the country's economy. When foreigners enter into the banking sector, competition in the sector increases, quality of financial services improves, access to banking services is supported, and integration of the country's economy with international capital is

enabled. In addition, foreign banks bring along higher technology and innovative applications in the sector, and with the new approaches they adopt in banking activities, contribute to the improvement of supervision, surveillance and legal regulations [9].

The factors affecting foreign banks' assets in the national currency of the country are investigated in this study. In order to protect the value of Turkish currency and maintain its function in economy as the national currency, the factors influencing Turkish currency assets in the asset structure of foreign banks are intended to be identified. Consequently, the ratio of Turkish currency assets / total assets was determined as the dependent variable in the analysis of the study. Foreign deposit banks which were established in Turkey and kept operating between 2009-2019 were considered within the context of the research. Therefore, foreign banks operating as branches in Turkey and foreign-capitalized development and investment banks were excluded. Despite being founded in Turkey, 3 foreign deposit banks that were recently established and had data limitations based on their activities could not be included. As a result, the analysis was performed by utilizing the data of 12 foreign deposit banks. Since the financial data of all the foreign banks within the research scope to be used as variables for the years 2009-2019 were acquired, balanced panel application was performed. The foreign deposit banks in the study sample are presented in Table 2.

Table 2. Foreign Banks in the Study Sample

No.	Deposit Bank
1	Alternatifbank Inc.
2	A&T Bank Inc.
3	Burgan Bank Inc.
4	Citibank Inc.
5	Denizbank Inc.
6	Deutsche Bank Inc.
7	HSBC Bank Inc.
8	ICBC Turkey Bank Inc.
9	ING Bank Inc.
10	QNB Finansbank Inc.
11	Turkland Bank Inc.
12	Garanti BBVA Inc.

In the application study, 12 foreign deposit banks operating in Turkish banking system were identified as the decision-making unit. The data for the variables were obtained from the July 2020 report by the Banks Association of Turkey, and they included the 11-year period between 2009-2019.

### 2.3. Research Model

Panel data, in which cross-sectional and time-series data were combined, was first encountered in studies by Hildreth (1950), Kuh (1959), Grunfeld and Griliches (1960), Zellner (1962), Balestra and Nerlove (1966), and Swamy (1970). Nevertheless, applied studies in real terms mostly began in the 1990s. Estimating economic relationships with the help of

panel data models formed by using cross-sectional data with time dimension is called "panel data analysis". It is generally encountered in this analysis that the number of cross-sectional units (N) is more than the number of time periods (T) (N> T) [13].

Panel data analysis can be expressed at Formula (1).

$$Y = \alpha_{it} + \beta_{it} X_{it} + u_{it}$$

$$i=1, \dots, N; t=1, \dots, T \tag{1}$$

In the formula;

Y: dependent variable,

X: independent variable,

$\alpha$ : constant parameter,

$\beta$ : slope parameter

u: error term. "i" subscript represents units (person, firm, city, country etc.), and "t" subscript represents time (day, month, year etc.) [13].

Panel data analysis is a method combining cross-sectional and time-series analyses. Since the panel data has a complex structure, there is packaged software (Stata, EViews etc.) developed in computer environment to conduct analysis [14].

Panel data model is the regression model estimated by panel data. Therefore, everything that comes to mind regarding the regression model such as tests, functional figures, and assumptions are also relevant for panel data models. In these models, as in classical regression models, there is one dependent variable and one or more independent (explanatory) variables [15].

There are three models utilized in panel data methodology. These are classical model, fixed effects model and random effects model. To decide which model to use, formal tests (Hausman, Breusch-Pagan Test, Chow Test, F test) are performed [16].

In order to determine the factors affecting the foreign currency assets of deposit banks in the study, panel data analysis was utilized, and the model applied at Formula (2).

$$TPVAR_{it} = \alpha_{it} + \beta_{it} TPYUK_{it} + \beta_{it} TPMEV_{it} + \beta_{it} TPKREDI_{it} + u_{it} \tag{2}$$

In the model, i=1, ..., 12 represents the banks included in the study, and t=2009, ..., 2019 represents time.

In the research, the variables used to identify the factors affecting the Turkish currency assets of foreign deposit banks were evaluated as the ones considered to be the most appropriate items affecting the asset structure as regard to the shares of Turkish currency items in the bank balance sheets within bank liabilities, deposits and loans. The variables used in the panel data analysis of the study and their abbreviations are presented in Table 3.

Table 3. Dependent and Independent Variables

Abbreviation	Variable Explanation	Variable Type
TPVAR	Turkish Currency Assets / Total Assets	Dependent
TPYUK	Turkish Currency Liabilities / Total Liabilities	Independent
TPMEV	Turkish Currency Deposit / Total Deposit	Independent
TPKREDI	Turkish Currency Loan / Total Loan	Independent

In the application, Turkish currency assets / total assets ratio was determined as the dependent variable. The independent variables affecting the Turkish currency assets of foreign deposit banks were the ratios of Turkish currency liabilities/ total liabilities, Turkish currency deposits/ total deposits, Turkish currency loans/ total loans. The independent variables indicated are the variables involving the items that can be evaluated as relevant to assets, deposits and loans in Turkish currency at the banks. The share of foreign deposit banks in the banking sector is at a significant level. It is important and valuable for Turkish economy that the demand for Turkish currency increases as the foreign banks have intense Turkish Lira transactions and invest in Turkish assets. Since foreign banks play an essential role in the foreign capital investments realized in Turkey, research on identification of the factors affecting Turkish currency asset structure of foreign deposit banks in the banking sector has been taken into consideration. More than

half of the deposits in Turkish banking sector are in foreign currency, and it necessitates to encourage Turkish currency in the sector and attach more importance to the accumulation of Turkish currency assets. Therefore, analyzing the Turkish currency situation of foreign deposit banks is believed to be appropriate.

### 3. Results and Discussion

To identify the factors affecting Turkish currency assets of foreign deposit banks in this study, the ratio of Turkish currency assets to total assets was determined as the dependent variable, and model estimation was made by using the independent variables in Table 3. The analysis was conducted with a total of 132 observations.

Descriptive statistics for the variables utilized in the study are presented in Table 4.

Table 4. Descriptive Statistics for the Variables

Variable	TPVAR	TPYUK	TPMEV	TPKREDI
Mean	6.485.833	5.374.242	5.286.591	6.762.349
Standard Deviation	1.742.745	147.859	1.802.201	1.629.872
Minimum	16.02	16.04	0.8	22.05
Maximum	95	80.5	91.5	90.6
Number of Observations	132	132	132	132

According to the results in Table 4, the mean of the foreign deposit banks' Turkish currency assets for the 2009-2019 period is 64.85% in their total assets. The mean of Turkish currency liabilities is 53.74% in total liabilities. The mean of Turkish currency deposits is 52.86% in total deposits. The share of the loans denominated in Turkish Lira is 67.62% in total loans. It is inferred from the table that the asset structure of the foreign deposit banks is substantially composed of Turkish currency, and that it is at a higher level than the TC deposits in total deposits, indicating that they use mainly Turkish currency in their equity and other resources. It is considered that the loans are in Turkish currency as demand-weighted; however, such a realization can result from the exchange rate volatility despite the high interest margin of Turkish Lira. That the commercial activities of foreign deposit banks are mainly in the local currency can be interpreted to be formed within the framework of exchange rate risk and Central Bank decisions.

Before conducting panel data analysis in the study, it is necessary to examine whether there is a multicollinearity problem among the variables. The simple correlation coefficient between two variables is desired to be 0.80 and higher [17]. Before the panel data analysis, correlation analysis was performed on

the variables, and the coefficient data obtained from the correlation analysis are presented in Table 5.

Table 5. Correlation Analysis of the Independent Variables

	TPVAR	TPYUK	TPMEV	TPKREDI
TPVAR	1.0000			
TPYUK	0.9245	1.0000		
TPMEV	0.7717	0.7746	1.0000	
TPKREDI	0.8051	0.7069	0.6404	1.0000

The analysis results revealed that there was a +0,8 correlation between the dependent variable of TPVAR and the independent variable of TPYUK; however, there was no +0,8 correlation with the other independent variables. As the decision-making units were all foreign deposit banks, it was relatively insignificant to obtain ratios above 0.8 even though the correlation between units was calculated in this study.

That time series reach a certain value or fluctuate around the expected value over time is called "stationarity". Before the statistical analysis of the time series is performed, it is necessary to determine whether the process for that series is constant over time. The effects of factors influencing time series may be either permanent or temporary. Permanent effects cause the series to deviate from stationarity and

prevent them from reaching a certain value, leading the analysis results to be evaluated erroneously [13]. Therefore, the variables are tested to determine whether they are static or not.

Cases with or without correlation between units are encountered in the literature. The tests developed for

the scenarios without correlation are called first generation tests, and the tests developed for the scenarios with correlation are called second generation tests [18]. The data in Table 6 present the cross-sectional dependence results for each variable used in the analysis.

Table 6. Unit Root Tests

Variable	Pesaran (2004) CD Test	Pesaran's CIPS Unit Root Test	
		Lagged level Statistics	First difference Statistics
TPVAR	19.39*		-2.826*
TPYUK	12.40*		-3.171*
TPMEV	10.01*	-2.557*	
TPKREDİ	9.84*		-2.566**

\*,\*\*,\*\*\* represent importance levels of 1%, 5% and 10% respectively

The results of the correlation between units (Pesaran CD Test) indicated a correlation at 1% significance level in all variables. Based on the result, it was necessary to prefer second generation unit root tests to examine the stationarity of the variables. Pesaran CIPS Test was utilized as the second-generation unit root test in the study. The test was hypothesized as “H0: bi = 0 for all i” [15]. Considering the test results used to control the stability of the series in the study, it was identified that some variables used in the modeling included unit root, indicating that the series were not

stationary. By taking the first differences of these variables, the stationarity of the series was enabled.

After it was checked if the series included unit root or not, and those with unit roots were made stationary, the second step was to determine the panel data analysis method to be applied. In order to find out which of the three methods used in panel data analysis is suitable for the research model, it is required to run some tests, which are F test, LM test and Hausman test. The statistics for the tests applied are presented in Table 7.

Table 7. F Test and LM Test Results

TPVAR <sub>it</sub>	F Test		LM Test	
	Statistics	Probability	Statistics	Probability
	0.21	0.9963	0.00	1.000

\*,\*\*,\*\*\* represent importance levels of 1%, 5% and 10% respectively

It is observed in F test and LM test statistics in Table 7 that the probability values are higher than 0.05. Since the hypothesis that “H0: no unit and time effect” was accepted for both tests, the analysis continued with the pooled least squares method [15].

To examine the existence of heteroscedasticity and autocorrelation in the model based on the pooled least squares method, White Test and Wooldridge Autocorrelation Test were performed successively. The relevant test results are presented in Table 8.

Table 8. Model Assumption Tests

TPVAR <sub>it</sub>	Heteroscedasticity		Autocorrelation	
	Statistics	Probability	Statistics	Probability
	13.79	0.000*	0.140	0.715*

\*,\*\*,\*\*\* represent importance levels of 1%, 5% and 10% respectively

The assumption tests in Table 8 indicated only heteroscedasticity problem in the model. To correct the standard errors in that case, Huber-Eicker-White

estimator was utilized. The results obtained are presented in Table 9.

Table 9. Panel Data Analysis Results for the Factors Affecting Turkish Currency Assets of Foreign Deposit Banks

Variables	Coefficients	Standard Error	T Statistics	Probability
TPYUK	<b>0.436</b>	<b>0.098</b>	<b>4.45</b>	<b>0.000*</b>
TPMEV	0.010	0.028	0.37	0.711
TPKREDI	<b>0.033</b>	<b>0.086</b>	<b>3.89</b>	<b>0.000*</b>
C	-1.660	1.740	-0.96	0.340
R <sup>2</sup>	0.470			
F Statistics	14.200	Probability	0.000	

\*,\*\*,\*\*\* represent importance levels of 1%, 5% and 10% respectively

According to the aforementioned results of the analysis on the factors affecting the Turkish currency assets of foreign deposit banks, it is observed that the model's strength to explain the significant and independent variable is at the level of 47%. It can be

inferred from the high ratio that independent variables were selected correctly while creating the model. The independent variables TPYUK and TPKREDI were identified to have a statistically significant and positive effect on the dependent variable (TPVAR) of

the model. Regarding the coefficient findings obtained, as TPYUK increases by 1 unit, TPVAR increases by 0.436 unit. Likewise, when TPKREDI increases by 1 unit, TPVAR increases by 0.033 unit. The other independent variable TPMEV has no statistically significant effect on the dependent variable.

#### 4. Conclusion

Foreign banks mostly owned the banks in the country through purchases following the liberal economy policies implemented in Turkey starting from the 1980s. Due to the considerable amount of foreign deposit banks today, they are worth investigating. In the research study, it was intended to identify the factors affecting Turkish currency assets of foreign deposit banks. For the research application, panel data analysis was utilized, and the model was formed by selecting dependent and independent variables for panel data analysis within this context. The data for the variables used in the research study were obtained from the 2019 report by the Banks Association of Turkey.

In order to identify whether there was a multicollinearity problem in the study, first, correlation analysis and, to test the stationarity of the series, unit root test was performed. Based on the test results, the series involving unit roots were stabilized by taking their first differences, and the analysis continued with the series made stationary. To determine the estimator to be preferred, F test and LM tests were performed, and the analysis continued with the pooled least squares model regarding the results obtained. When the basic assumptions in the model were examined, only heteroscedasticity was identified, and the model analysis was conducted through the Huber-Eicker-White estimator, which performs analysis considering the deviations. According to the analysis result, TPYUK and TPKREDI variables affect the dependent variable of the model (TPVAR) in a statistically significant and positive way. The coefficient findings indicate that when TPYUK increases by 1 unit, TPVAR increases by 0.436 unit, and when TPKREDI increases by 1 unit, TPVAR increases by 0.033 unit.

In light of the data obtained from the study conducted to determine the factors affecting Turkish currency assets of foreign deposit banks, the increase in TPYUK and TPKREDI variables were found to have a positive effect on TC assets in the bank balance sheet, and it was considered significant that the increase in TC liabilities had a much greater effect on total assets even though the weight of loans in total assets was quite high. It can be because the loans are less effective as they are included in total assets in the current balance sheet although there is an external Turkish currency fund inflow to banks in the increase of liabilities. This study has a unique structure that has never been encountered in the literature before, considering that it determines the factors affecting Turkish currency assets, and includes an analysis that

no other research study contains in practice. This study can be considered as an opportunity for researchers to identify other factors likely to affect Turkish currency assets of banks in the future.

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