# DETERMINANTS OF THE DOLLARIZATION IN TURKEY: DOES IT DIFFER FOR HOUSEHOLDS AND FIRMS?

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## ABSTRACT

DETERMINANTS OF THE DOLLARIZATION IN TURKEY: DOES IT DIFFER FOR HOUSEHOLDS AND FIRMS?

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Dollarization has once again come back on the agenda of the academic world due to soaring inflation globally. The policies used by central banks and financial authorities since the start of the coronavirus pandemic have accelerated inflation and increased dollarization. Therefore, analyzing the determinants of dollarization has become more important. In this study, the determinants of households' deposit dollarization, firms' deposit dollarization and loan dollarization are examined for the period from Q1-2003 to Q4-2021 via an Autoregressive Distributive Lag Model (ARDL) for Turkey. Exchange rate depreciation, inflation, USDTRY 3 months implied volatility, real deposit and lending rate, external debts to GDP, net exports to GDP and net international reserves to GDP are selected as the explanatory variables of the econometric models. These explanatory variables are selected as proxies of the currency substitution and asset substitution views. Estimation results indicate that implied volatility as a proxy of the currency substitution view positively affects firms' deposit dollarization and loan dollarization, while inflation as a proxy of the currency substitution view positively affects households' deposit dollarization. Additionally, under the asset substitution view, it is found that net international reserves which is a proxy for the institutional view is important for all types of dollarization.

**Keywords**: Deposit Dollarization, Households, Firms, ARDL

# ÖZ

TÜRKİYE'DE DOLARİZASYONUN BELİRLEYİCİLERİ: HANEHALKLARI VE FİRMALAR İÇİN FARKLI MI?

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Dolarizasyon, küresel çapta yükselen enflasyon nedeniyle akademik dünyanın gündemine yeniden girdi. Koronavirüs pandemisinin başlangıcından bu yana merkez bankaları ve finans otoriteleri tarafından kullanılan politikalar enflasyonu hızlandırdı ve dolarizasyonu artırdı. Bu nedenle dolarizasyonun belirleyicilerinin analiz edilmesi daha önemli hale gelmiştir. Bu çalışmada, Türkiye için bir Otoregresif Dağıtılmış Gecikme Modeli (ARDL) ile hanehalklarının mevduat dolarizasyonu, firmaların mevduat dolarizasyonu ve kredi dolarizasyonunun belirleyicileri 2003 Ç1 ile 2021 Ç4 arasındaki dönem için incelenmiştir. Ekonometrik modellerin açıklayıcı değişkenleri olarak döviz kuru değer kaybı, enflasyon, USDTRY 3 aylık ima edilen oynaklık, reel mevduat ve borç verme oranı, dış borçların Gayri Safi Yurt İçi Hasıla'ya (GSYİH) oranı, net ihracatın GSYİH'ye ve net uluslararası rezervlerin GSYİH'ye oranı seçilmiştir. Bu açıklayıcı değişkenler, para ikamesi ve varlık ikamesi görüşlerinin vekilleri olarak seçilmiştir. Tahmin sonuçları, para ikamesi görüşünün bir temsilcisi olarak ima edilen oynaklığın firmaların mevduat dolarizasyonunu ve kredi dolarizasyonunu olumlu etkilediğini, para ikamesi görüşünün bir vekili olarak enflasyonun ise hanehalklarının mevduat dolarizasyonunu olumlu etkilediğini

göstermektedir. Ayrıca, varlık ikamesi görüşü altında, kurumsal görüşün temsilcisi olan net uluslararası rezervlerin her tür dolarizasyon için önemli olduğu tespit edilmiştir.

**Anahtar Kelimeler**: Mevduat Dolarizasyonu, Hanehalkları, Firmalar, ARDL

*To My Unique Family*

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

# CHAPTER 1

# INTRODUCTION

There is a famous quotation that is highly appreciated in history by Confucious, "Study the past if you want to define the future". From this expression, it could be deduced that it is important to research and analyze past experiences and determine the causes of a problem to enlighten the future.

In today's academic world, dollarization has been subject to noteworthy interest, especially after the coronavirus pandemic due to expansionary monetary policies and rising inflation. Since the beginning of the Coronavirus pandemic, the policies used by central banks and financial authorities accelerated inflation around the world and caused an increase in dollarization, especially in the emerging markets. It is known from the literature that even if the causes of dollarization disappear, the reversal of dollarization is not easy (Honohan & Shi, (2002), Reinhart et al. (2003) and Imam et al. (2016)). Therefore, studies identifying the determinants of dollarization gained more importance, particularly in recent years.

In the literature, many studies have investigated deposit dollarization in total and neglected the distinction between household and firm with the exception of Ize (2005) and Corrales & Imam (2019). Do households and firms hold foreign exchange (FX) deposits or borrow in FX terms for different reasons, and if so, why? This study seeks to obtain a fresh understanding of the dollarization phenomenon by focusing on the determinants of dollarization at the household and firm levels for Turkey. Thus, three dependent variables namely households' deposit dollarization, firms' deposit dollarization and loan dollarization are used in the empirical models and the analysis covers the period from Q1-2003 to Q4-2021. This new perspective will provide insights into specifying the determinants of different types of dollarization and therefore provide valuable policy implications for reverse dollarization.

Dollarization studies are divided into two as the currency substitution and the asset substitution view in the literature. According to the currency substitution view, economic agents are primarily stimulated by high inflation, exchange rate depreciation, and high exchange rate volatility, which leads to greater dollarization of the economy. On the other hand, the asset substitution view arises from the public's allocation decisions of their portfolio by considering the risk and return characteristics of domestic and foreign assets. In the existing literature, the asset substitution view is grouped into three major categories namely the portfolio view, the market development view and the institutional view in addition to the currency substitution view (Levy-Yeyati (2006)). According to the portfolio view, given a specific distribution of real returns in each currency, dollarization is the optimum portfolio option. The market development view emphasizes how holding assets denominated in foreign currencies and furthering dollarization are caused by a financial market with less financial depth. Last but not least, the institutional view claims that weak institutional strength and structure result in a higher level of dollarization, which in turn feeds into new economic distortions. The majority of the studies for Turkey have focused on the currency substitution view and a few studies have investigated dollarization in the framework of the asset substitution view. However, to the best of our knowledge, there is no study for Turkey that considers the alternative views in the literature i.e. three perspectives of the asset dollarization view along with the currency substitution view. Additionally, in this study, three types of dollarization will be considered to provide insights into the dollarization phenomenon for Turkey, which is an additional novelty.

In order to analyze the short-run and long-run dynamics of the three types of dollarization, the Autoregressive Distributed Lag (ARDL) Bounds-testing approach of Pesaran, Shin & Smith (2001) is applied. The long-term coefficients of the ARDL model were determined for the models found to have cointegration between the variables as a result of the bounds test, and the Error Correction Model (ECM) is applied to determine the short-term coefficients and analyzes how quickly the dependent variable reaches equilibrium following a change in an explanatory factor.

The rest of the study is organized as follows. Chapter 2 reviews the history of dollarization in the Turkish economy starting with the Foreign Currency Convertible

Deposits (FCCD) decision in 1967, and ending with the FX-protected deposit application at the end of 2021. Chapter 3 reviews theoretical and empirical literature on dollarization including main studies in the world and Turkey. Chapter 4 presents the data set and its sources which also covers the descriptive statistics and unit root tests. In Chapter 5, the empirical results are discussed and compared with the literature. Finally, Chapter 6 concludes the dissertation.

# CHAPTER 2

# A BRIEF HISTORY OF DOLLARIZATION IN TURKEY

In this section, the story of dollarization in Turkey by considering decisions, implementations and consequences is reviewed. In this review, February 2001 crisis was considered as a turning point for Turkish economy and the study was divided into two as before and after this milestone.

## 2.1. History of Dollarization before 2001

In 1958, Turkey had to declare a moratorium and could not pay its foreign debts. The serious crisis in the entire economy led to the "Stabilization Measures" on August 4, 1958, and the exchange rate was devalued by approximately 320%. In the 1960s, governments in Turkey felt the need to apply for external financing due to the increasing current account deficit and the need for project investments. External financing loans are generally given by states and international organizations (Dönek, 1995). All these events caused the Foreign Currency Convertible Deposits (FCCD) to come into force with a Decree published in the Official Gazette on June 9, 1967. Doğan (1986) divides FCCDs into two periods, 1967-73 and 1975-78. FCCD was originally created to provide foreign exchange flows from foreign economies to the Turkish economy. But, in the first period of FCCDs, households or firms deposited foreign currency (FX) into FX accounts which was opened in public or private banks, and these FX deposits were transferred to The Central Bank of the Republic of Turkey (CBRT). The equivalent of this amount was made available to account holders as TL loans. For these accounts, the repayment of foreign currency and exchange rate differences were guaranteed by the Treasury. Dönek (1995) articulates that FCCDs could be converted into FX accounts at any time and increase money supply thanks to the loan provided and the exchange rate difference. In the first period, these accounts served to create internal resources instead of closing the current account deficit.

After the implementation of the mentioned model, foreign workers and exporters opened their first accounts. Along with this implementation, foreign exchange amounting to 3.5 billion dollars in total came to Turkish markets (Özyıldız, 2017). These accounts were later restricted on the grounds that they began to cause an increase in the money supply and an acceleration in inflation. Payments to these accounts overloaded the state treasury and implementation was later removed. Nas (1989) articulate that when the economy started to recover with the effect of the positive external conjuncture in 1971-72, it was decided to liquidate these accounts in 1973. Additionally, Kepenek (2005) states that after the 66% devaluation on August 10, 1970 and the positive developments in the international market, the export figures started to rise and the need for FCCD has been reduced.

However, at the end of 1973, oil exporting countries increased crude oil prices by four times which affected Turkey, along with other economies. This development increased the country's need for foreign exchange once again and foreign trade deficits began to grow. For this reason, FCCDs, which were decided to be liquidated in 1973, was put into practice again in 1975. During this system, which lasted until 1977, the Government did not reflect the price increases of oil derivatives to prices and continued to subsidize thanks to this implementation. Additionally, Boratav (2003) points out that imports were tried to be increased with foreign loans and especially through the short-term borrowing channel called FCCD. After the first months of 1977, when the opening of new accounts started to slow down, the CBRT and banks began to have difficulty repaying the old accounts due. After the Treasury was unable to make accounts payments, the system was terminated in 1978. Dönek (1995) states that in the second period, these accounts began to be used to cover the growing external deficit after the oil shock and to create resources in the country. Nas (1989) also explains that these accounts' accumulation increased short-term debts and brought Turkey on the brink of bankruptcy in 1978. Turkey, which met its long-term and short-term debts with short-term borrowings, became unable to pay its debts in 1978. Turkey, whose creditworthiness has been shaken and therefore cannot find fresh credit, has come to a point where it cannot even make compulsory imports. Additionally, Sonmez (1998) points out that, the rate of the credit line by CBRT to Treasury in emission increased from 25% to 84% during this period. As of 1976, a phenomenon of stagflation emerged and overvalued TL caused a decrease in exports and roll-over

of these accounts. In the year of 1977, Turkey experienced a balance of payment crisis with decreasing net foreign assets by 86%. From 1976 to 1979, the CBRT's direct loans increased by an average of 70% per year. All these events have increased the annual inflation to historically high levels, as illustrated in Figure 2.1. Within the framework of the agreement signed with the IMF in 1978 and 1979, Turkey's debts were postponed and these debts were undertaken by the state after 1981 and some precautions was taken to reduce inflation, restrict imports and increase savings like devaluation an increase interest rate for TL deposits (Taş, n.d.). All these decisions and ratios paved the way for 24 January 1980 decisions.

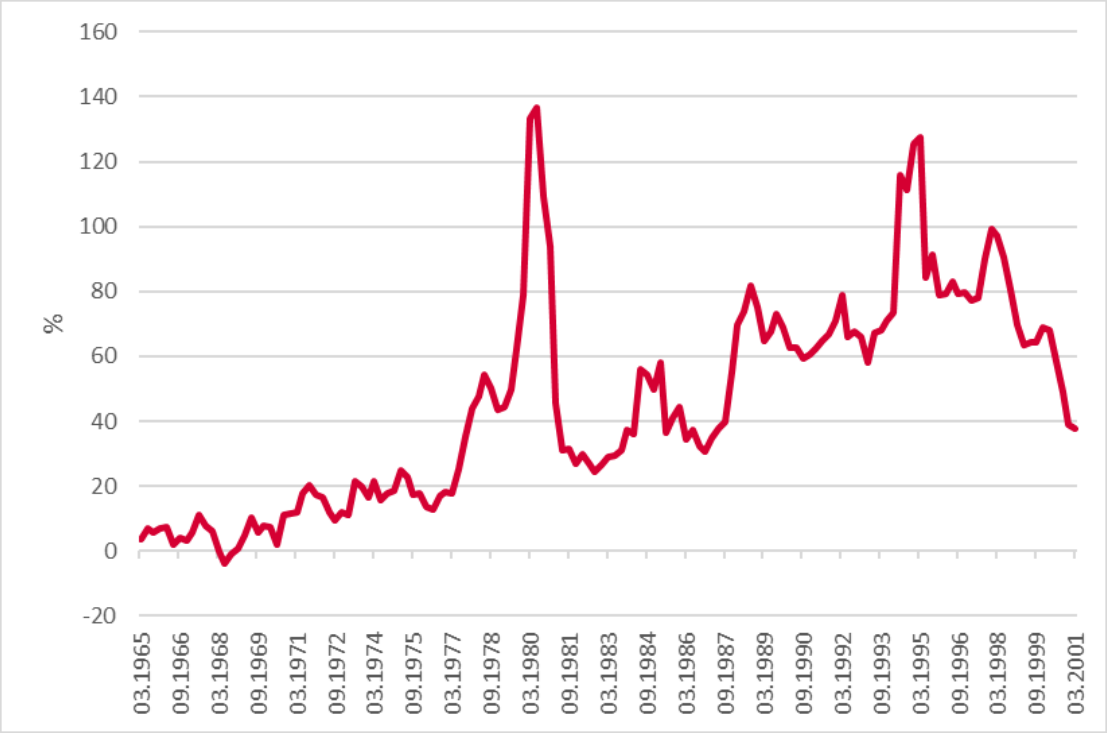


**Figure 2.1 Annual Inflation Rate in Turkey from 1965 to 2001 (CPI, Monthly, %)**

Source: Bloomberg

Before 1980, restrictions on capital movements and foreign exchange accounts were ruled by Decree No. 17 which was enacted in 1962 and covered the period from 1962 to 1983, and Decree No. 17 prohibited foreign currency deposit account with the exception of the non-essential portion of foreign currency earnings from exports. Also, this law required strictly control banks to hold foreign exchange positions within limits. In terms of foreign trade, exporters had to bring their export revenues to the country within at least three months, imports were carried out within the framework

of the annual plan, and permits were given by the CBRT by the order of the Ministry of Commerce. Hence, before 1980 dollarization was a problem via Convertible Accounts to Foreign Currency and a burden on Treasury however, restrictions on households' and firms' dollarization prevented the problem of currency substitution or asset substitution and dollarization did not exist as a serious and important phenomenon in Turkey in the pre-1980 period, since the possession and use of foreign currency by economic units were prohibited by law.

In Turkey's economy, the 24 January 1980 decisions are considered a milestone and the first step to liberalizing the economy. These decisions were made with the goals of reducing inflation, bridging the gap in foreign financing, and achieving a more globalized, market-based economic system. Based on these decisions, export subsidies were given and exchange rate were adjusted daily order to increase the competitiveness of Turkish exports and encourage export-led growth. These decisions also comprised suggestions for how to lessen the role of government in the economy as a result of this approach, subsidies were eliminated, with the exception of the sectors of transportation, energy, and fertilizer. Moreover, the nation liberalized its foreign trade, profit transfers were made easier, offshore contracting services were fostered, and foreign capital investments were encouraged. With these decisions, imports were liberalized over time and tax refunds, low-interest loans, and customs exemptions on imported inputs for exporter manufacturers all served to stimulate exports. All of these precautions are aimed to prevent another balance of payment crisis. Karluk (1996) states that the short-term goals of the program were solving payment difficulties, reducing inflation, and accelerating economic growth by activating unutilized capacities. The long-term targets were narrowing the public sector, privatization, and eliminating the intervention of the state in the markets. Accordingly, it is based on the idea that prices in the markets of goods and services and factors of production will be determined freely by supply and demand according to market conditions. First step of efforts to focus on market-oriented policies in the financial liberalization process was taken with the changes made in the exchange rate regime (CBRT, 2002). In the fixed exchange rate regime implemented before 1980, the value of the Turkish lira was determined and adjusted by the government according to changing economic conditions. However, delays in adjustments caused the Turkish lira to appreciate significantly and excessively in some periods. For this reason, a more realistic and

flexible exchange rate policy started to be implemented with the stabilization program announced in January 1980. Hence, the value of the Turkish lira against other currencies was considerably decreased towards its market value, which also prevented the existence of the black market. As of 1 May 1981, the CBRT started daily exchange rate adjustments.

After the 24 January 1980 decisions, especially in the face of the rising inflation rate in the 1980s, the government's limitation of the interest rates that banks can apply to bonds and certificates of deposit, but not applying such restrictions to bankers, created unfair competition between banks and bankers in favor of the latter (Uluyol, 2019). The low-interest rate given by banks to deposits, negative real interest rates, and the absence of alternative financial instruments such as foreign exchange accounts which had not yet started caused the bankers to fill the gap. After a while, the absence of necessary legal regulations and this competitive environment led to a crisis known as the "Bankers Crisis" in 1982. In December 1983, the CBRT was given the authority to set deposit interest rates and to review these rates regularly.

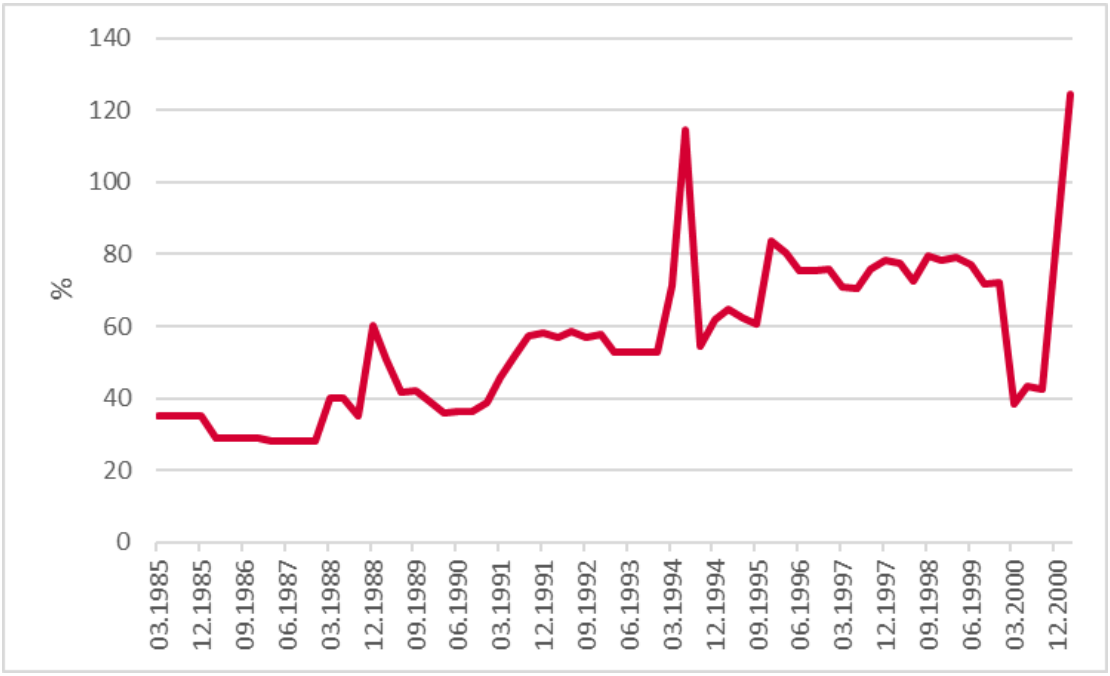


**Figure 2.2 Effective Maximum Interest Rates For Deposits of Banks up to 1 Month (Monthly, %)**

Source: CBRT

Although the 24 January 1980 decisions were taken, there were no changes in the foreign exchange regime and control of capital movements until Decree No. 28 was enacted on December 29, 1983. In the period from 1962 to 1983, Decree No. 17 was in force and Decree No. 28 was considered as a reform for the Turkish foreign exchange regime. With this decision, important steps were taken in the direction of liberalization (Kızıl, 1991). At the end of 1983, the impediments to commercial banks' foreign exchange operations were lifted in accordance with the stabilization program put into place afterward, and an opportunity for residents to have foreign currency accounts was opened. In other words, dollarization started for Turkey by introducing foreign currency deposits and creating competitive markets for foreign exchange deposits in December 1983. Metin-Ozcan and Us (2009) clarify that dollarization has been experienced since the introduction of foreign currency deposits in December 1983. Sarı (2007) expresses that banking transactions related to foreign trade were removed from CBRT's monopoly and given to private banks with this Decree.

On 7 July 1984, shortcomings of Decree No. 28 were completed and it was transformed into Decree No. 30 which was enacted. The exchange rate regime and capital movements were largely liberalized with this decision. The main regulations are listed as follows in CBRT (2002):

- Restrictions on the import of banknotes, coins, and other payments in Turkish lira were lifted, import of these was subject to the permission of the Government.

- Foreign currency imports to Turkey were liberalized, allowing people in Turkey to have foreign currency with them and to save freely without being subject to any registration and asking for origin.

- Residents in Turkey were allowed to hold foreign currency, open foreign currency accounts, and make payments in foreign currency.

- The CBRT was authorized to import and export gold bullion. Other banks were also allowed to sell bullion in the domestic market.

- Banks were allowed to take deposits in foreign currency from Turkish citizens, keep foreign money overseas, and conduct foreign currency transactions.

- The import and export of all kinds of securities were permitted. Securities issued in foreign currency in Turkey were allowed to be sold to non-Turkish residents.

- Foreigners were allowed to invest, carry out commercial activities, buy shares, establish partnerships, and open branches, representative offices, and agencies by bringing the necessary capital in foreign currency.

- Banks were allowed to determine the exchange rates to be used in their own transactions within a narrow range (6% for foreign currency and 8% for effectives) created around the exchange rate announced by the CBRT which was released on 1 May 1981.

- On 1 July 1985, limits were abolished for banks to freely determine foreign exchange prices and broader powers were given to banks. However, banks did not move too far from the exchange rate announced by the CBRT.

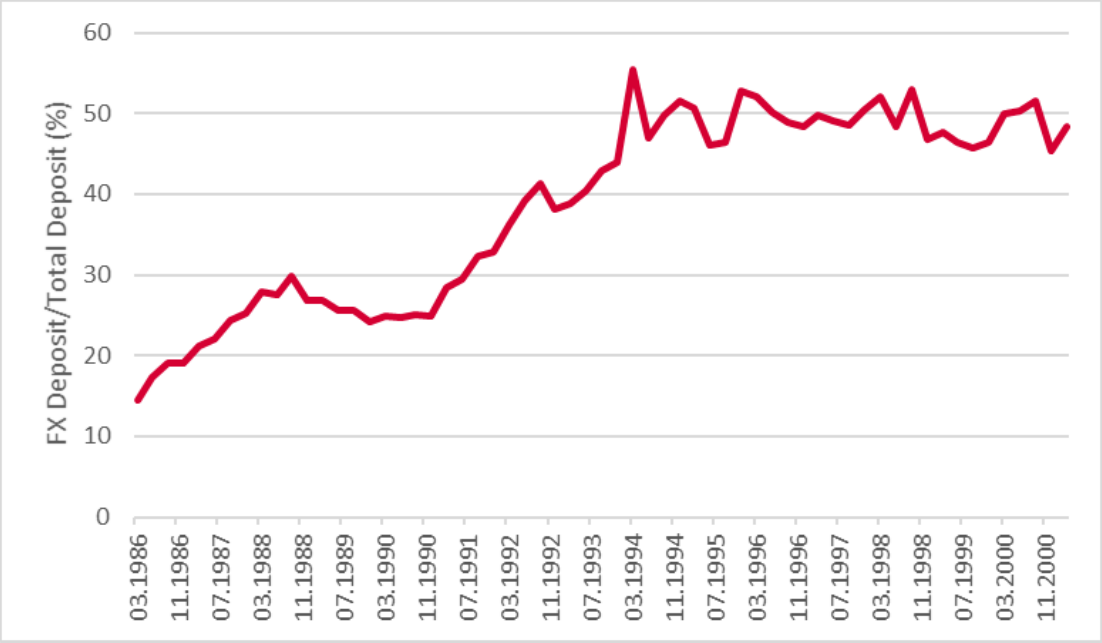


**Figure 2.3 Deposit Dollarization Rate in Turkey from 1986 to 2001 (Quarterly, %)**

Source: CBRT

As it is shown in Figure 2.3, CBRT started to keep deposit data from the first month of 1986 and deposit dollarization data for Turkey can be used as of this date. The deposit dollarization rate representing FX deposits to total deposits, which was 15%

at the time of data recording, increased until 1988 and rose to 30%. Although this rate declined by the end of 1990, as can be seen from the Figure 2.3, after 1990, this rate increased and by the 2000s, the deposit dollarization rate had reached to 50%.

As a result of rapid increases in exchange rates as shown in Figure 2.4, price differences between the official and black market, speculative movements of the banks, the reluctance of exporters to bring their foreign currency to the country, and increasing inflation, new decisions were taken on February 4, 1988, in order to stop the flight from TL and to maintain the foreign exchange balance. With these decisions, deposit interest rates for TL were increased to %75 under the control of CBRT, tax refund rates were changed and foreign exchange inflow was taken under control in order for exporters to bring foreign currency to the country in a short time. Also, the required reserve ratio was increased from 15 percent to 25 percent. Increasing the required reserve ratios and completing the obligation in a shorter time increased the confidence in TL and reduced the gap between the exchange rates in the free market and the official exchange rates.

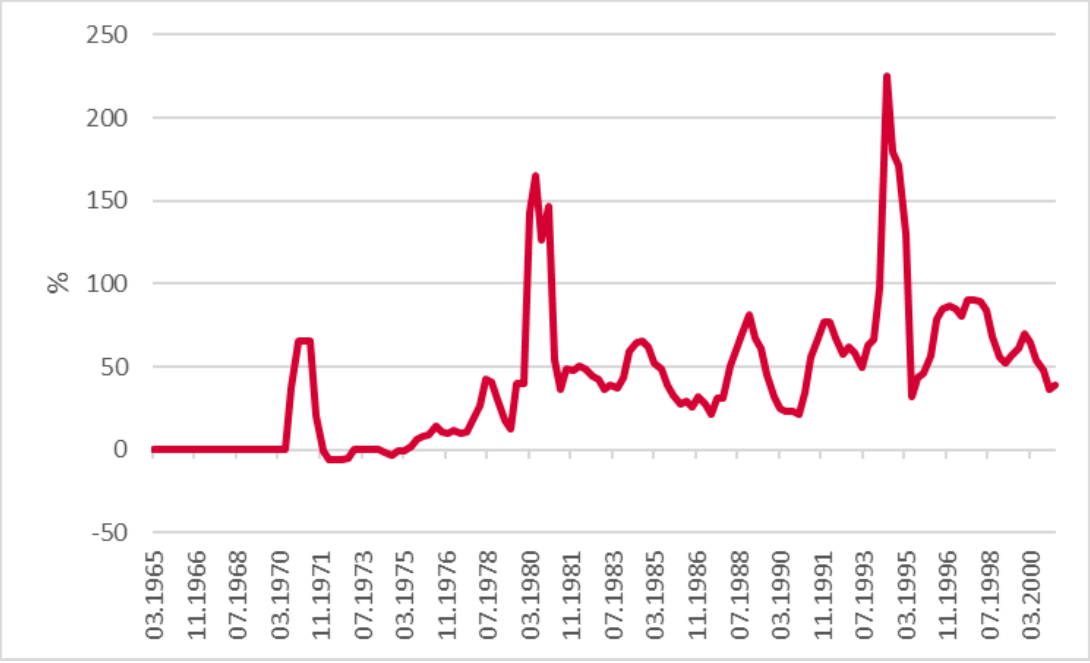


**Figure 2.4 Annual Depreciation of Exchange Rate in Turkey from 1965 to 2001 (USDTRY, Monthly, %)**

Source: CBRT

The liberalization of capital movements in Turkey was completed in 1989. Decree No. 32 was published in the Official Gazette on August 11, 1989 with the name of protecting the value of Turkish currency. In the months that followed this decree, it was seen that certain regulations were made and all limitations on capital movements have been removed as a result of this legislation. The main regulations introduced by the Decree No. 32 are as follows in CBRT (2002):

- People residing in Turkey can receive foreign currency from banks and private financial institutions without any restrictions and are not subject to any restrictions for holding foreign currency.
- Residents in Turkey can bring the foreign currency that they receive into the country in return for any kind of service that they provide to non-residents in Turkey.
- Foreign residents are free to buy and sell all kinds of securities listed on the Istanbul Stock Exchange and issued with the permission of the Capital Markets Board. Residents in Turkey is allowed to buy foreign securities.
- Foreign residents in Turkey are allowed to receive and transfer foreign currency and send Turkish Lira abroad.
- Borrowing foreign currency from overseas is allowed.
- Banks or private financial organizations can be used to move income earned from the sale or liquidation of foreign capital overseas.
- Opening a Turkish lira account and transferring the principle and interest associated with these accounts in Turkish lira or foreign currencies are both free for non-residents.

Within the framework of liberalization policies being implemented, after the liberalization of imports and exports to a large extent with the January 24 decisions, it was aimed to fully liberalize capital movements and the transition to full convertibility of the Turkish Lira with the Decree no. 32. In this framework, the Decree no. 30, which includes the restriction of the convertibility of the Turkish lira and some restrictions on the free movement of capital, was repealed and liberalization was completed with the Decree no. 32 and other regulations enacted thereafter. However, since the financial liberalization was initiated during a period of economic instability, this new structure caused new financial shocks and economic difficulties. (Sönmez, 1998).

Between 1989 and 1991, due to the tight monetary policy, which was aimed to reduce inflation and attract capital flows from abroad, and the Decree no. 32 caused the international market to determine the foreign exchange rate, interest rate, and money supply via capital flows which were attracted by high real interest rate. As a result of these policies, the Turkish Lira started to appreciate in real terms. In 1991, Persian Gulf War and the early general election battered the Turkish economy and the deposit dollarization rate began to rise which remained stable for 1989 and 1990. Due to these developments, inflation increased even more after 1990 and income distribution deteriorated. The budget deficits, which were tried to be covered with debts and CBRT advances, were the precursors of the 1994 crisis. Before 1994, under high political and geopolitical tension, the government gave up overvalued Turkish Lira and preferred to close the public deficits with CBRT advances (Memiş, 2020). The credit-rating agencies on Wall Street gave Turkey high scores for its outstanding economic performance in the 1980s. The government benefited from these ratings in 1992 and 1993 to raise money to close its budget deficits. The total amount of foreign bond issued during this time was US$7.5 billion but these resources could not prevent the crisis. The government preferred to use capital inflows to suppress interest rates and these implementations disrupted the balance of interest rate and foreign exchange rate. As illustrated in Figure 2.5, from December 1991, to April 1994, when the crisis reached its peak, the net portfolio flows into the country were approximately 8 billion USD. Sarı (2007) explains that the funds which the Treasury can use from the CBRT's resources reached the planned amount for the whole year in the first months of the year. All of the targets set for monetary aggregates have increased more than twice the predicted rates.

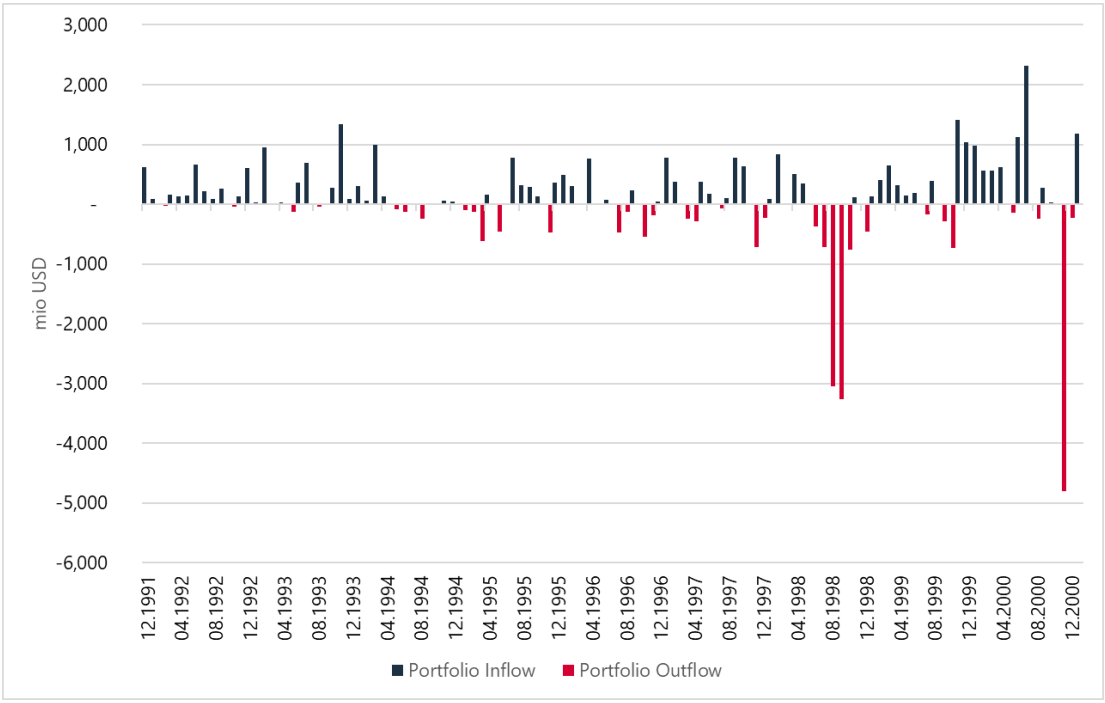


**Figure 2.5 Portfolio Inflow and Outflow to Turkey from 1991 to 2001 (Monthly, mio USD)**

Source: CBRT

In addition to all these monetary and financial difficulties, bureaucratic debates and political troubles also contributed a lot in the process leading up to the 1994 crisis. Confidence in the administration was damaged by disagreements between Prime Minister and the head of the CBRT. Instead of agreeing to the CBRT's suggestion to issue more public debt in the form of government securities, the prime minister insisted on monetizing the budget deficit by selling government debt instruments to the CBRT. In August 1993, the governor of the CBRT resigned due to this problem. As a result of all these events, international credit rating agencies lowered Turkey's debt rating to below investment grade in January 1994. A second governor of the CBRT resigned after this event (Törüner, 2006). An absence of confidence in the government and the downgrading Turkey’s debt rating led to considerable capital flight and the collapse of the foreign exchange rate. Upon these developments, the CBRT intervened in the markets, but the rise in the exchange rate could not be prevented and at the beginning of 1994, the Turkish Lira had to be devalued by 13.4% (Gürses, 2014) & (Törüner, 2006). However, stability in the markets could not be achieved and the 5 April 1994

Economic Stability Decisions were taken. The main decisions announced on 5 April 1994 are as follows in (Törüner, 2014):

- Turkish Lira was devalued by approximately 38 percent against other currencies.
- The CBRT made changes in the exchange rate calculation system. According to the new application, exchange rates began to be calculated from the data of ten big banks.
- The decision to privatize state-owned enterprises was taken.
- Salaries of civil servants and workers in 1994 were limited to budget appropriations.

With these stabilization measures, it was aimed to rapidly reduce inflation, ensure price stability, make structural changes, minimize the need for borrowing by rapidly reducing public deficits, privatization of SOE's, increase in exports and to minimize the difference between exports and imports.

After running a deficit of 17% of GDP in the first quarter of 1994, the government was able to produce a minor budget surplus in the second quarter of 1994, primarily as a result of higher taxes. However, tax revenues were decreased due to the slowdown in governmental spending, a dramatic reduction in company confidence, and the ensuing decline in economic activity. After a fast-economic expansion in 1992 and 1993, the fiscal crisis caused a 5 percent decrease in real GDP in 1994. In 1994, real wages also declined; the average nominal salary growth of 65% was 20% less than the rate of inflation in consumer prices and deposit dollarization rate reached 55% (Ahmet, n.d.)

The most important development in the 1990s was the signing of the Customs Union Agreement with the European Union in 1995 and its entry into force in 1996. On March 6, 1995, the Customs Union Agreement with the European Union was signed. Thus, an important threshold was left behind in the commercial liberalization process that started with the decisions of January 24, 1980 (Memiş, 2020). In other words, the last stop of liberalization in foreign trade policies had been reached. Kepenek (2011) states that significant tax loss occurred with the signing of the Customs Union Agreement. In addition, increasing imports caused increased current account deficits.

This agreement made the increase in foreign trade volume dependent on the increase in imports.

The rapid recovery in the economy after 1995 had a positive impact on the economic growth of Turkey. High real interest rates made TL-denominated financial instruments attractive, thus currency substitution slowed down, but did not reverse, deposit dollarization rate decreased to 46%. Closed foreign exchange positions were reopened, and foreign borrowing started, albeit with higher costs. In this positive environment, an increase was observed in CBRT gross reserves until the 1998 Asian and Russian crisis (Figure 2.6). The CBRT's reserves were boosted during the years 1995 to 1997, when non-state industries adopted a growth path based on accessible foreign borrowing by utilizing of the favorable conditions of the international economic and financial environment. Public domestic debts rise and inflation stays high because sufficient surpluses in the fiscal balance cannot be produced (Celasun, 2002).

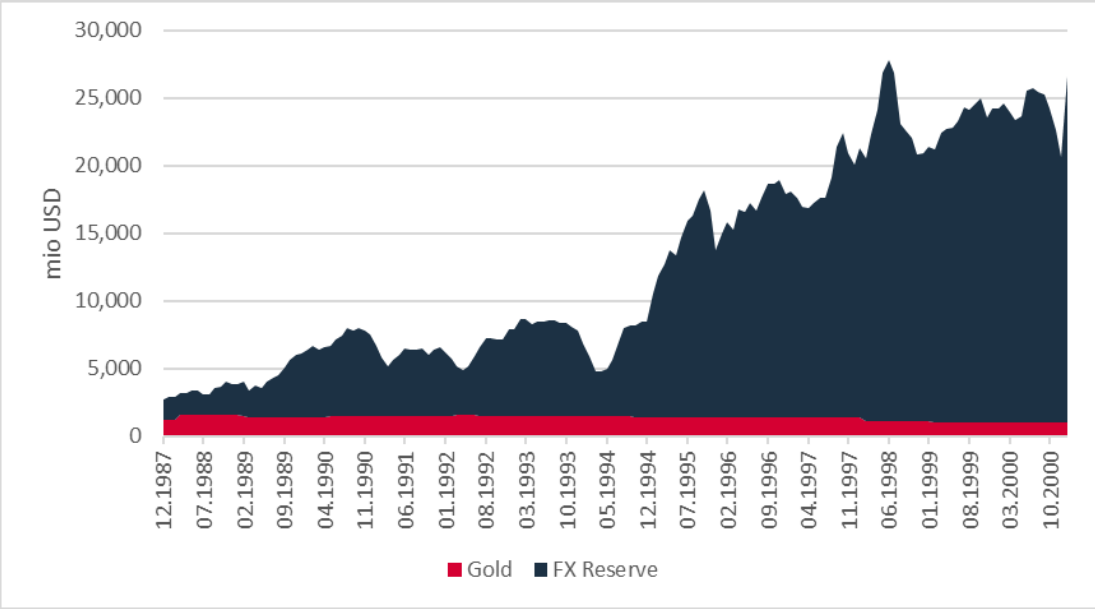


**Figure 2.6 CBRT's Gross Reserves from 1987 to 2001 (Monthly, mio USD)**

Source: CBRT

A "monitoring agreement" has been signed with the IMF in July 1998. In the agreement, it was stated that the main macro problems would be solved, the regulations on auditing in the financial sector would be increased and the tax draft would be

enacted. As a matter of fact, immediately after the agreement, limitations were imposed on banks' futures and short positions. Domestic banks have tried to close their open positions in order to comply with the new obligations. With these events, after the third quarter of 1998 which was the peak of the crisis, the deposit dollarization rate decreased from 53% to 46% within a year. However, demand for foreign currency has resumed, albeit slowly, with the effect of the CBRT's reduction in short-term interest rates. Portfolio outflow from the country from June to October 1998 reached 8 billion USD due to the contraction in global liquidity conditions and the impact of the Russian and Asian crisis. In this period, even foreign direct investments were about to standstill (Figure 2.7). In 1999, Russian crisis, Asian crisis and Marmara Earthquake caused exports to decline and reduce the revenue from tourism. Thereupon, in December 1999, a new stand-by agreement with the IMF, depending on the Close Monitoring Agreement program, came to the fore. (The Banks Association of Turkey (BAT), 2019)

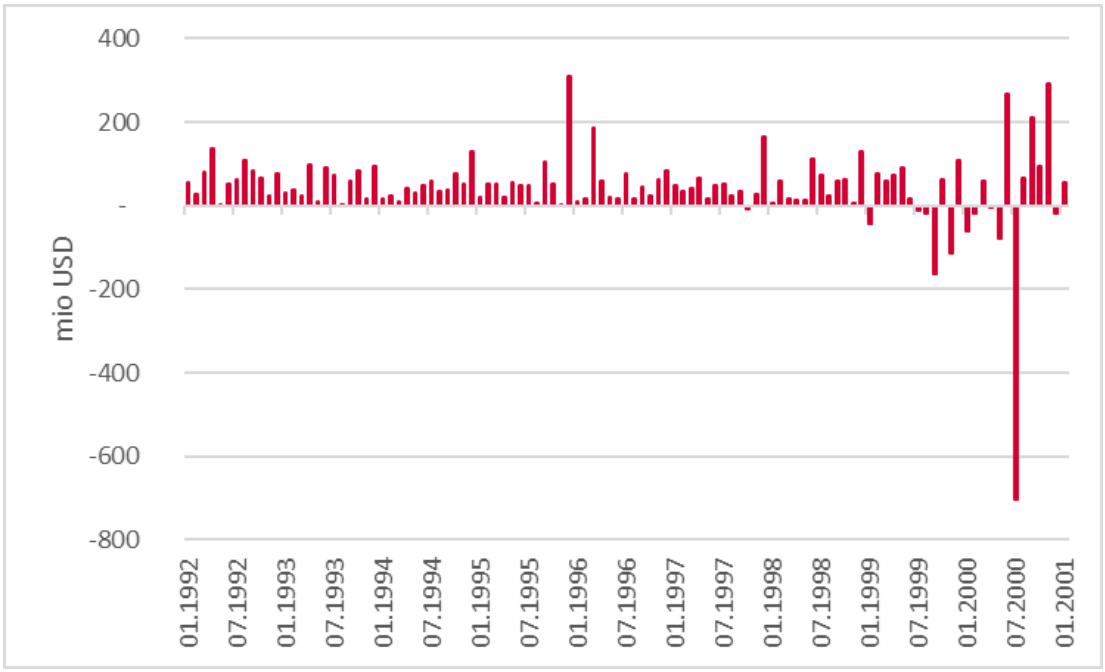


**Figure 2.7 Foreign Direct Investment to Turkey from 1991 to 2001 (Monthly, mio USD)**

Source: CBRT

In December 1999, the "Disinflation Programme", for which these arrangements were a prerequisite for IMF stand-by agreement, was accepted and it has been effectively implemented since the beginning of 2000. This agreement, which started at the beginning of 2000 and covered a period of three years, aimed to reduce the inflation and real interest rates to a certain level by increasing the budget surplus, implementing a tight fiscal policy, accelerating structural reforms and privatization. Boratav (2015) states that even during the crisis years, IMF policies prioritized the ability of finance capital to receive interest payments from the state, prioritizing a certain primary budget surplus relative to national income, and this targeting was achieved by suppressing public expenditures to a large extent. Numerous structural changes were made as part of the “Disinflation Program”, which also used the exchange rate as a nominal anchor for monetary and exchange rate policy. The program began to produce results in 2000. Capital inflows to the country increased, net portfolio inflow to the country was 8.5 billion USD from the end of 1999 to November 2000, but the inflation did not decline as quickly as was anticipated. Real exchange rate became overvalued by the effect of capital inflows relying on IMF agreement. As a result of the rapid increase in imports, current account deficit increase. Excessive credit burden of banks, short-term foreign loans, unrealistic credit risk and insufficient capital of banks had a detrimental influence on the process leading up to the crisis. The liquidity squeeze peaked at the end of November 2000 as a result of these developments raising the banks' need for cash given that their assets primarily comprised of Treasury securities. The excessive loss in the value of Treasury securities and rushing to close their open position increased bank’s liquidity need. The overnight interest rate, which was 39% in October increased to 95% in November and 183% in December reaching its peak. There was a portfolio outflow of 4.8 billion dollars in November. All of these triggered to increase the foreign exchange demand and there was a pressure on the exchange rates towards depreciation. The "Additional Reserve Facility" which comprised 7.5 billion Dollars credit provided by the IMF in December and the measures announced by the Government helped to overcome the November 2000 crisis. But these developments caused deposit dollarization rate to surpass 50% (Celasun, 2002).

In an environment of negative economic expectations, unexpected political tensions arose on February 19, 2001, before the Treasury's massive debt redemption. After the debate between the prime minister and the president on February 21, 2001, about the

constitution in the council of ministers, the overnight interest rates rose to 7500%. Memis (2020) articulates that after the political crisis, there was intense demand for foreign exchange, mainly from the banking sector. Foreign investors started to leave the market, which was already experiencing liquidity problems, and the economic program implemented suffered a serious loss of confidence. On the same day, a foreign exchange demand of more than 7 billion dollars emerged. There was a portfolio outflow of nearly 6 billion dollars after February 2001 crises. Although the CBRT tried to meet some of the foreign exchange demand, as of February 22, 2001, exchange rate was left to float and the exchange rate depreciated approximately 100%. With the transition to the floating exchange rate regime, the practice of using the exchange rate as a nominal anchor for monetary and exchange rate policy which was introduced in the program of December 1999 was terminated. The 2001 Crisis started as a political crisis triggered by the political chaos, but turned into a financial crisis with the realization of interest rate, exchange rate, and liquidity risks, and then into a crisis that affected the real sector with the bankruptcy of banks. The Turkish Economy shrank by 9.4% in 2001, the unemployment rate reached 8.5% in 2001 which was 6.6% in 2000. Since the exchange rate as a nominal anchor was abandoned due to the crisis and the preconditions for the transition to inflation targeting have not been met yet, the monetary program of 2001 by CBRT, took into account the base money as the nominal anchor. Base money is expressed as the sum of net domestic assets and net foreign assets in the Bank's balance sheet. In order not to cause an inflationary monetary expansion, this program has set an upper limit on net domestic assets and determined the periodic base values that net international reserves, which form the basis of net foreign assets, can be taken (Sarı, 2007).

The unstable political structure, the efforts to monetize the Treasury's debts most of the time by the CBRT, populist decisions of governments, the high inflation rate and high exchange rate cycle, the unstable course of portfolio flows from abroad and the high dollarization rate as a result were hallmarks of the period from 1967 to the 2001 February crisis.

## 2.2. History of Dollarization after 2001

In March 2001, World Bank Vice President Kemal Derviş was invited to Turkey and the responsibility of the economy was given to him. "Transition to a Strong Economy Program" announced by him in May 2001 which was supported by the stand-by agreement signed with the IMF and World Bank loans. Many of the legislative changes envisioned in the IMF program have helped build confidence in exit from the crisis environment. The main objectives of "Transition to a Strong Economy Plan" are to: take action in the banking sector; ensure "fiscal discipline;" begin structural reforms; and use macroeconomic policies to effectively control inflation and sustainable growth. Also, ensuring monetary stability and ensuring instrument independence for the CBRT, made stronger and gave confidence to macroeconomic policies in the country (Hazine, 2001). May 2001 revision to the CBRT Law introduced the primary goal of the CBRT as achieving and maintaining price stability and implementing the necessary steps to ensure price stability is given to CBRT's discretion. Also, with this legislation, CBRT was empowered to support the government's growth and employment policies without compromising price stability. Moreover, the channels of directly monetizing deficits of the Treasury has been closed and instrument independence was given to CBRT that is right to decide its own monetary policy tool so as to achieve its primary goal (CBRT, n.d.).

Starting from 2002 to 2005, "implicit inflation targeting" which aimed at future inflation levels has been implemented as a monetary policy tool in the fight against inflation because preconditions for the transition to explicit inflation targeting have not been met yet. The last stability program implemented in the past 30 years is the 2002 one that aimed to reduce inflation to 12% and then to single digits in 3 years (CBRT, 2003). The difference between this stabilization program from the previous ones was the CBRT law, assuring the independence of the CBRT, the regulations made in the banking sector, and the measures taken to maintain discipline in the public finances. Additionally, Kara (2006) states that the majority of the demanding set of "preconditions" for implicit inflation targeting were not met by Turkey except central bank independence. The main monetary aggregate targeted for the CBRT at the beginning of 2002 continued to be the monetary base. Later in 2002, the CBRT used short-term interest rates as the main nominal anchor, while the monetary base was used

as an additional nominal anchor (Sarı, 2007). Despite unfavorable global atmospheric conditions and events like the Iraq War, the implicit inflation targeting system proved successful in 2002 by reducing inflation to nearly 30% at the end of the year, where the target was 35% (Figure 2.8).

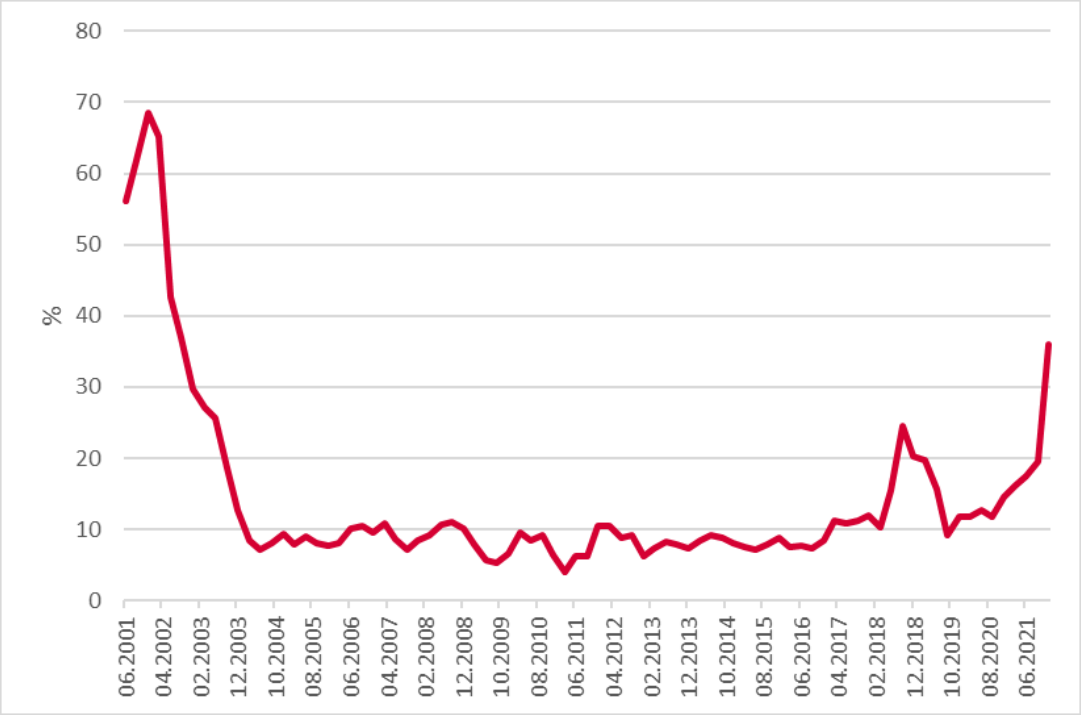


**Figure 2.8 Annual Inflation Rate in Turkey from 2001 to 2021 (CPI, Monthly, %)**

Source: Bloomberg

The positive developments in inflation enabled reduction of the overnight borrowing interest rate from 57% to 44% in 2002. Most importantly, with the improvement in inflation and inflationary expectations, a significant reverse currency substitution process started; households sold their foreign currency assets and turned to Turkish Lira assets (Figure 2.9). As a result of these events, CBRT started to accumulate foreign exchange reserves through foreign exchange buying auctions as of April (Figure 2.10). The total amount of foreign currency bought by CBRT from the market through auctions and interventions was 0.8 billion USD in 2002. Net portfolio outflows continued throughout 2002 and an outflow of 0.5 billion USD was realized due to geopolitical risks.


**Figure 2.9 Deposit Dollarization Rate in Turkey from 2001 to 2021 (Quarterly, %)**

Source: CBRT

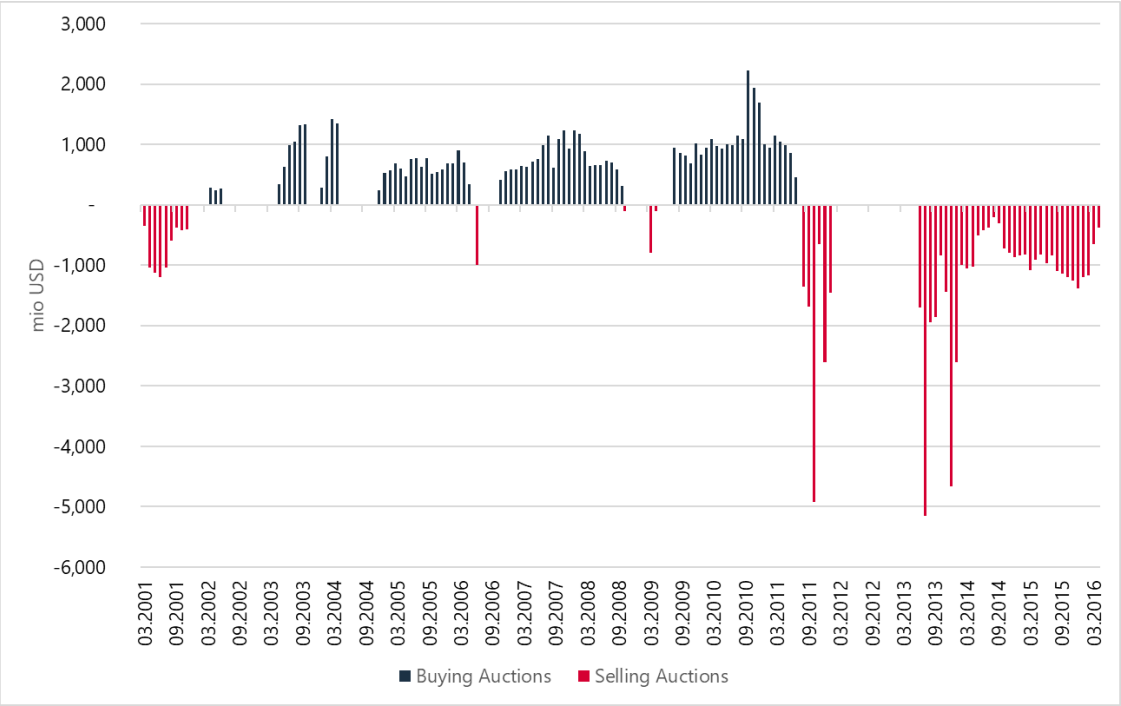


**Figure 2.10 Foreign Exchange Buying-Selling Auctions against Turkish lira (Monthly, mio USD)**

Source: CBRT

In 2003, CBRT determined the short-term interest rate (the overnight borrowing interest rate) as the main policy tool in order to reach the target of price stability, and the difference between the targeted inflation and the actual inflation was used to set the policy rate for CBRT. The elimination of external uncertainties and geopolitical risks to a large extent, the implementation of the economic program with determination, the expectation that the tight stance in the fiscal discipline will continue and structural reforms will not be deviated allowed the CBRT to cut the overnight borrowing rate six times from 44% in April, to 26% in October. A strong foreign exchange reserve was a very important factor that increased the efficiency of the CBRT's monetary policy and the confidence in the markets, and facilitated domestic and foreign borrowing (CBRT, 2003). In 2003, households continued to sell their foreign exchange deposits and converted their portfolio into TL-denominated assets owing to increased confidence in the economic policies implemented. The deposit dollarization rate declined from 60% to 50% at the end of 2003 (Figure 2.9). All of these led to an increased supply of FX in the financial system and CBRT utilized these

conditions via Foreign Exchange Buying Auctions and Buying Interventions against the Turkish lira. The total amount of foreign currency bought by CBRT from the market through auctions and interventions was 9.9 billion USD (Table 2.1).

**Table 2.1 Direct Foreign Exchange Interventions of the CBRT (mio USD)**

| Date | Amount Bought | Amount Sold |
|---|---|---|
| 11.07.2002 | | 3 |
| 2.12.2002 | 16 | |
| 24.12.2002 | | 9 |
| 12.05.2003 | 62 | |
| 21.05.2003 | 517 | |
| 9.06.2003 | 566 | |
| 18.07.2003 | 938 | |
| 10.09.2003 | 704 | |
| 25.09.2003 | 1,442 | |
| 16.02.2004 | 1,283 | |
| 11.05.2004 | | 9 |
| 27.01.2005 | 1,347 | |
| 9.03.2005 | 2,361 | |
| 3.06.2005 | 2,056 | |
| 22.07.2005 | 2,366 | |
| 4.10.2005 | 3,271 | |
| 18.11.2005 | 3,164 | |
| 15.02.2006 | 5,441 | |
| 13.06.2006 | | 494 |
| 23.06.2006 | | 763 |
| 26.06.2006 | | 848 |
| 18.10.2011 | | 525 |
| 30.12.2011 | | 1,865 |
| 2.01.2012 | | 525 |
| 3.01.2012 | | 326 |
| 4.01.2012 | | 155 |
| 23.01.2014 | | 3,151 |
| 1.12.2021 | | 844 |
| 3.12.2021 | | 504 |
| 10.12.2021 | | 687 |
| 13.12.2021 | | 3,120 |
| 17.12.2021 | | 2,123 |
| **TOTAL** | **25,534** | **15,951** |

Source: CBRT

In 2004, CBRT continued to cut interest rates in line with the success of implicit inflation targeting and with the reduction of geopolitical risks. The CBRT cut short-term interest rates 4 times, taking into account the target and future inflation. The overnight borrowing interest rate, which was at the level of 26% as of the end of 2003, decreased to 18% after the reductions. Also, while the CBRT used short-term interest rates as the main policy instrument in line with the 12% inflation target, it followed the size of base money, net domestic assets, and net international reserves as performance criteria and indicative values. Net international capital flows were the

main factor determining CBRT's foreign exchange buying auctions and interventions in this period, with the effect of appreciation in TL-denominated assets and confidence in economic policy because there was no decrease in the foreign exchange deposits of household accounts in the mentioned period (Figure 2.9). In 2004, With the effect of confidence in the policies implemented and the decrease in geopolitical risks, portfolio inflows to the country were 8 billion USD as it is shown in Figure 2.11. The total amount of foreign currency bought by CBRT from the market through auctions and interventions was nearly 5,4 billion USD.

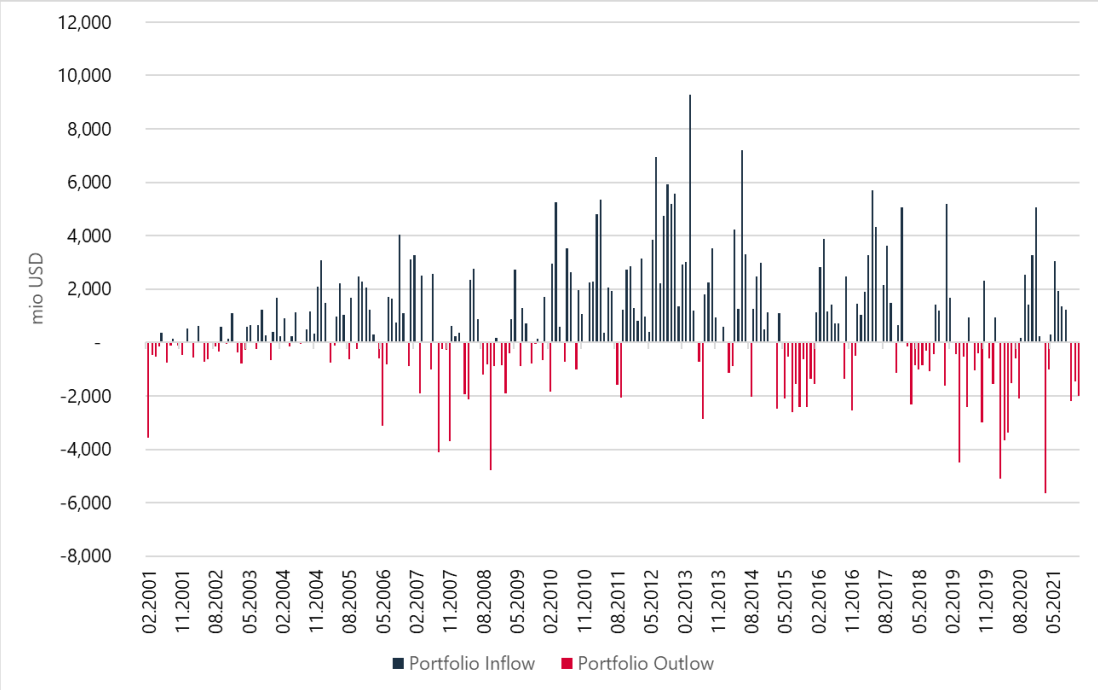


**Figure 2.11 Portfolio Inflow and Outflow to Turkey from 2001 to 2021 (Monthly, mio USD)**

Source: CBRT

At the beginning of 2005, CBRT determined the inflation target of 8% and CBRT continued to use short-term interest rates as the main policy instrument in achieving control of inflation. As of October 12, 2005, as a reflection of the positive developments in inflation, the CBRT reduced short-term interest rates 8 times, from 18% to 13,5%. The CBRT declared this period as the final preparation period for the transition to the explicit inflation targeting regime. Furthermore, within the framework of the stand-by agreement with IMF covering the period of May 2005-May 2008, base

money, net domestic assets, and net international reserves are followed as indicators or performance criteria for 2005. This agreement was the last stand-by agreement between the IMF and Turkey. With the implementation of a new three-year economic program centered on fiscal and monetary discipline and structural reforms, and the positive developments in the negotiation process for full membership to the European Union, positively affecting both the reverse dollarization process (from 45% to 36%) (Figure 2.9) and the balance of payments, the CBRT has increased its foreign exchange purchases and reserves which continued to strengthen (Figure 2.13) (CBRT, 2005). With the effect of the negotiations for full membership to the European Union, direct investments to the country increased significantly and reached 9 billion USD and net portfolio flows reached 14 billion USD (Figure 2.12). The total amount of foreign currency bought by CBRT from the market through auctions and interventions was approximately 22 billion USD in 2005.

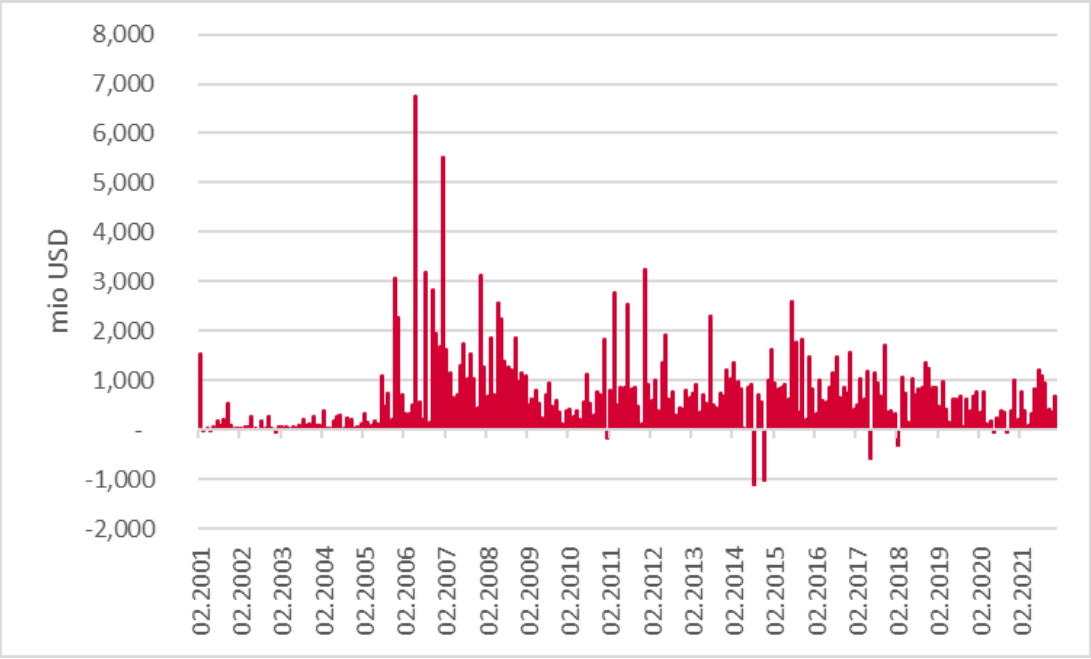


**Figure 2.12 Foreign Direct Investment to Turkey from 2001 to 2021 (Monthly, mio USD)**

Source: CBRT

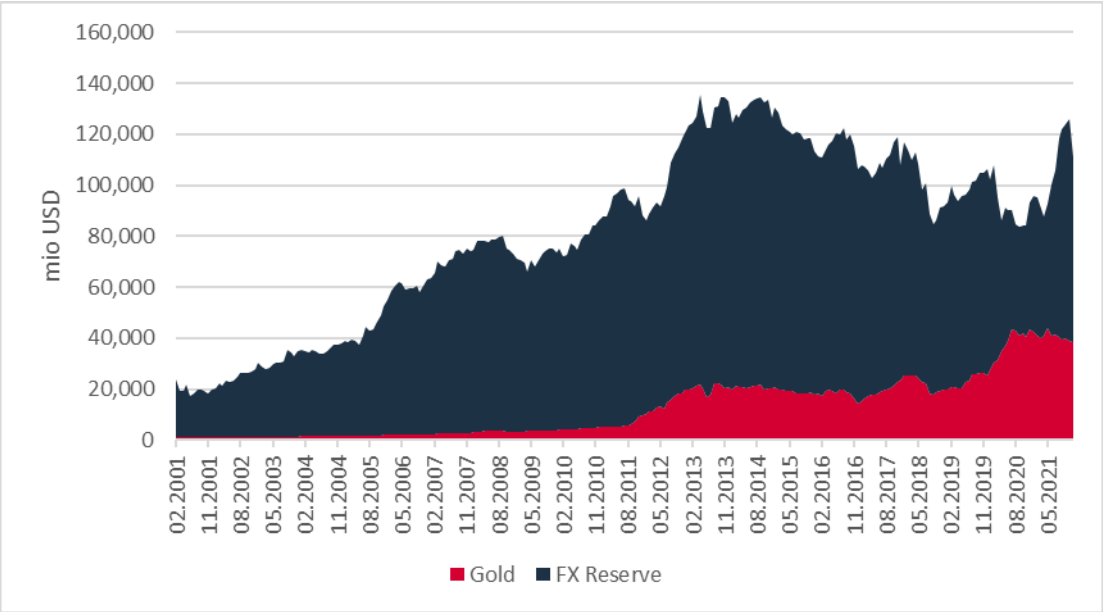


**Figure 2.13 CBRT's Gross Reserves from 2001 to 2021 (Monthly, mio USD)**

Source: CBRT

CBRT started to implement an explicit inflation targeting regime starting from 2006. Explicit inflation targeting regime is defined as basing the monetary policy on a numerical inflation target or target range determined for a reasonable period and disclosing it to the public in order to achieve and maintain price stability, which is the ultimate goal of the CBRT. The targeted variable which was announced at the beginning of 2006 is the year-end inflation rate which was easy to understand for the public. Country's credit risk on international markets has decreased to levels that are historically low, the banking system has acquired a more robust structure, and both the borrowing requirement and the public sector debt have decreased throughout the 2002–2005 period owing to implicit inflation targeting and tight fiscal policy measures (Deniz, 2022). Additionally, the explicit inflation targeting regime was implemented by the Turkish monetary authority in 2006 in light of the country's overall favorable economic trend, rapid drop in the debt to GDP ratio, and greater economic resilience (Civcir & Akçağlayan, 2010). All of these successes triggered the idea that explicit inflation targeting could be adopted.

In 2006, the volatility in financial markets limited capital flows to developing countries, and Turkey was affected by this. Due to global liquidity conditions the

foreign exchange supply decreased, thus the volatility in the exchange rates were observed (Figure 2.14). In response CBRT increased short-term interest rate from 13,5% to 17,5%. As a result of these events, a deviation from the inflation target was experienced and the dollarization rate increased from 35% to 38%. Although CBRT continued its foreign exchange purchases from the market through auctions and interventions in the first half of the year, it stopped foreign exchange purchases and sold approximately 3 billion USD in June. After the measures taken by the CBRT against the fluctuations in the financial markets in May-June and the improvement in the global liquidity conditions, it was observed that the foreign exchange market attained relative stability. However, dollarization rate continued to increase until first quarter of 2007 which stood for roughly 38%. Foreign exchange buying auctions, which were suspended on May 16, 2006, were resumed as of November 10, 2006 (CBRT, 2006). The total amount of foreign currency bought by CBRT from the market through auctions and interventions was approximately 11,6 billion USD in 2006.

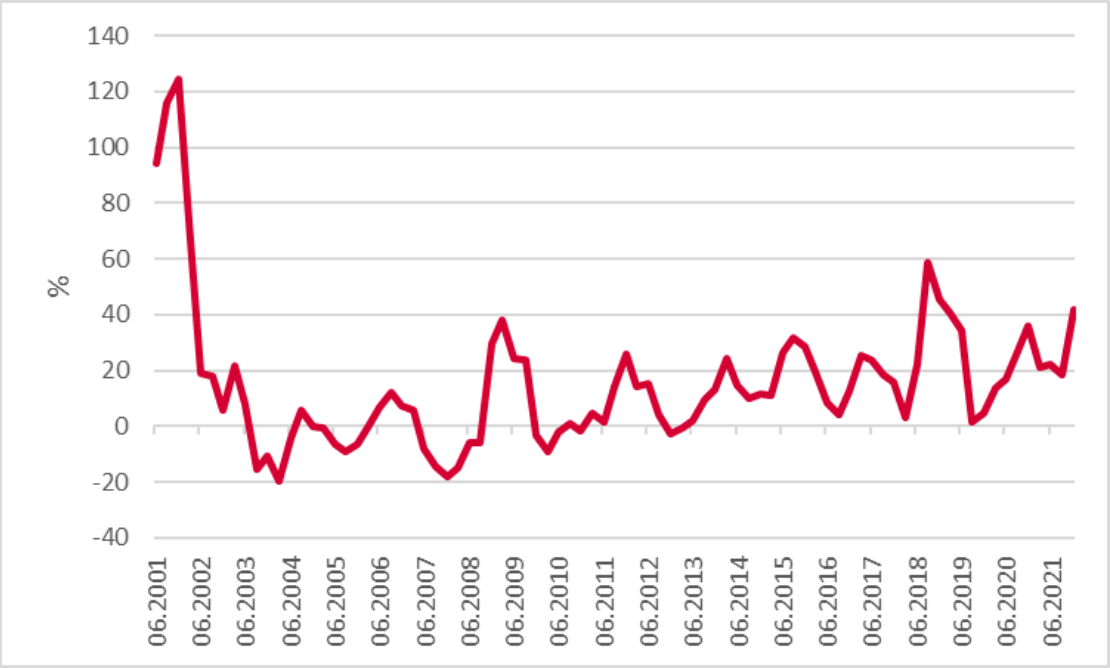


**Figure 2.14 Annual Depreciation in Exchange Rate in Turkey from 2001 to 2021 (USDTRY, Monthly, %)**

Source: CBRT

Because of the elections in July 22, 2007, political tensions rose and fiscal restraint was relaxed. Additionally, rises in the price of food and energy globally were experienced. In line with the positive outlook in the core inflation trend, which excludes energy, food and managed/directed products, a measured interest rate cut process has been initiated since September 2007. In this context, the overnight borrowing interest rate was reduced by 175 basis points from 17.50% to 15.75% until the end of 2007 in the 4 meeting. Deposit dollarization rate continued to rise with the effect of political tension and global liquidity condition in the first half of the year. Yet, with the end of the elections, the decrease in political tension and the relaxation in global liquidity conditions, the dollarization rate decreased to 34% at the end of the year and continued the downward trend that started in 2002. Additionally, with the positive effect of direct investment and portfolio investment which were roughly 20 billion USD, no increase was observed in the USDTRY rate and CBRT was able to continue its foreign exchange purchases in 2007 as well. The total amount of foreign currency bought by CBRT from the market through auctions and interventions was approximately 10 billion USD in 2007 (CBRT, 2007).

Oil prices in particular saw a significant spike in price during the 2000s, as did all other commodities and agricultural goods. The economic expansion seen in densely populated nations like China and India increased demand for these goods and raised their prices. Food costs rose to their greatest point ever in 2008, according to records (UN, 2009). While valuable commodities like gold and oil rose to record highs, the financial and economic systems initially experienced difficulties as a result. What triggered the crisis in the financial system was that the constantly rising house prices created an extremely optimistic atmosphere in the markets and banks easily provided loans to low-income families to buy housing (sub-prime mortgages). When the optimism in housing prices disappeared and prices began to fall, the subprime mortgage market collapsed, causing low-income families who could not pay their loan interests to bankruptcy and their houses to be confiscated. Later on, it was realized that the collapse in the subprime mortgage market was only the tip of the iceberg. As a result of the long-term loans opened by the banks to the especially low-income families which considered risky in the normal time, the money to give credit begins to decrease. After that, it wants to turn the collateral of the mortgage loans opened into paper called CDO (collateralized debt obligation) to the market, increase its liquidity and direct the

resources back to the loan again. Bear Stearns, one of the banks with risky loans and CDOs consisting of these loans, could not be recovered despite all the efforts of the FED by providing an emergency loan to prevent a sudden collapse and was sold to JPMorgan in March 2008. The sale of Bear Stearns was followed by the collapse of Lehman Brothers, Merrill Lynch and AIG. On October 3, 2008, The House of Representatives passed the Emergency Economic Stabilization Act of 2008 which included 700 billion USD bailout program and legislation was signed at the same day. However, the spread of the crisis in the USA to Europe could not be prevented and the crisis has become global (Güllü, 2011). Özatay (2009) states that the 2008 economic crisis is a financial crisis and the crisis in the US was mostly caused by inaccurate loan applications given by banks and problems with the repayment of loans in the housing market.

The absence of comparable "subprime" loans in Turkey, which triggered to the mortgage crisis in the USA, shielded the country's real estate market from those issues. The banking sector was not significantly impacted because it was strengthened as a result of the actions made in response to the 2001 Crisis (Apak & Aytaç, 2009). Nevertheless, by the last quarter of 2008, the deepening of the loss of confidence in the global financial markets adversely affected the global liquidity flows, creating an extraordinary demand for the liquidity of the US dollar in particular, leading to a significant depreciation of the Turkish lira, parallel to other emerging market currencies. Despite these developments in the exchange rate, both the slowdown in aggregate demand and the decline in commodity and food prices had a positive impact on the inflation outlook and gave the monetary policy room to move (CBRT, 2008). In this context, CBRT reduced the overnight borrowing interest rate from 15.75% to 15%. From August 2008 until the end of the year, nearly 7.5 billion USD outflow was realized from the net portfolio investments and this situation reduced the liquidity in the foreign exchange markets. USDTRY rate increased nearly 30% in October and November. Despite the volatility in the exchange rate and the deterioration in the economic situation throughout 2008, the deposit dollarization rate remained flat at a rate of 33%. However, there was a liquidity problem in the market from time to time due to global liquidity absence and in order to prevent these liquidity problems in the foreign exchange markets, intermediation activities were resumed in the Foreign Exchange Deposit Market at the CBRT, lending rates in this market were reduced and

maturities were extended. As of October, foreign exchange buying auctions were temporarily suspended in order to reduce the problems that the developments in international markets may cause in our country's financial markets. The total amount of foreign currency bought by CBRT from the market through auctions was nearly 7.5 billion USD in 2008.

The effects of the crisis, which started in the financial markets of developed countries and spread to the entire global system as of the fourth quarter of 2008, continued to be observed throughout 2009. As the crisis spread to the European Union, it has also contributed to a decline in Turkey's exports for 2008 and 2009, as the European Union, accounts for a sizable portion of Turkey's exports (Engin & Göllüce, 2016). Due to all these developments, Turkish economy shrank by 4.7% in 2009 for the first time after the 2001 crisis. However, a current account deficit in a recession was experienced for the first time in Turkey's history in 2009. This shows that the continuation of economic production as well as growth is possible with the dependence on the current account deficit (Boratav, 2015). The heaviest recession in the world economy in this period led the central banks to limit the destruction on growth, employment and the financial system. With the sudden slowdown in global economic activity and the collapse in commodity prices in international market led to a rapid decline in global inflation, the central banks of developing countries, whose financial markets were relatively stable and the deterioration in the risk premium was more limited, made high interest rate cuts (CBRT, 2009). The robust structure of Turkey's financial system and the relatively limited deterioration in the risk premium enabled CBRT to cut interest rate 850 bps. Despite the interest rate cuts, the stable course in the USDTRY rate continued. Additionally, reverse dollarization did not occur in 2009 as in 2008 because deposit dollarization rate stayed stable at nearly 33%. The years 2008 and 2009 can be considered as the years when the downward trend in deposit dollarization was broken (Figure 2.9). Beginning in August 2009, it was noted that liquidity and risk appetite had recovered as a result of optimistic expectations for the world economy. This development increased capital flows to Turkey which was calculated 7,2 billion for direct investment and portfolio investment inflow and other developing nations as a result of these events the foreign exchange market had attained a degree of relative stability. As of August 4, 2009, foreign exchange purchase auctions were once again held. The total amount of foreign currency bought by CBRT from the market through

auctions was nearly 4.3 billion USD in 2009. In addition, thanks to the post-crisis abundance in global liquidity conditions, CBRT continued its foreign exchange purchases through auctions, until July 2011 and strengthened its reserves by approximately 25 billion USD. Boratav (2015) states that with the 2008 global financial crisis, Turkey has passed into a period of stagnation and increasing fragility in portfolio flows.

In 2010, while the growth in developed countries was slower, the growth in developing countries was faster and more stable with the effect of the increase in global liquidity condition. CBRT, on the other hand, was one of the first developing countries to cut interest rates at the beginning of the crisis and prepared its exit strategy on April 14, 2010, which included canceling the liquidity measures taken during the crisis and normalizing the monetary policy. These measures were the gradual withdrawal of the liquidity provided to the market in excess of its needs and the increase in the reserve requirement ratios. Due to the low levels of interest rates on a global scale, CBRT made 4 interest rate cuts towards the end of 2010 and 500 bps cuts were applied. These levels in interest rates were recorded as historically low. However, on May 20, 2010 CBRT started to use one-week repo rate as a policy rate until late 2017. In 2010, when 24 billion USD entered the country through net portfolio flows and net direct investments, CBRT continued its foreign exchange buying auctions and a total of 15 billion USD was purchased. Also, deposit dollarization ratio decreased from 33% to 29% by reducing trend in inflation and stability in USDTRY.

After the global financial crisis, monetary policy in many countries started to take financial stability into account in addition to price stability. While the CBRT has kept price stability as its main objective, it has started to take macro financial stability into account to the extent the conditions allow. Within the framework of this new structure, in order to provide the diversity of instruments required by the multi-purpose monetary policy, a policy mix is designed in which the interest rate corridor between overnight borrowing and lending rates and required reserves are used together, in addition to the policy rate (CBRT, 2011). Boratav (2015) criticizes the post global financial crisis period policies, stating that the inflation targeting policy was violated as the actual inflation exceeded the targeted inflation and the exchange rate targeting was adopted from time to time. In this period, CBRT aimed to limit short-term capital flows and

prevent overvaluation in the exchange rate. On the other hand, it focused on domestic loans and tried to control the growth in demand. In line with these goals and in order to transition to multi-purpose monetary policy practices, CBRT used the interest rate corridor, required reserves and reserve option mechanism in this period. In periods when global liquidity conditions improved and capital flows to the country increased, CBRT used the lower band of the interest rate corridor and capital flows were reduced. Required reserve ratios were increased when credit expansion and domestic demand had to be controlled. The reserve option mechanism (ROM) which enables banks to have a certain percentage of reserves at foreign currency or gold for Turkish lira reserve requirements, on the one hand, acted as a financial stabilizer when capital flows were intense and increased CBRT's gross reserves. On the other hand, banks are anticipated to use the ROM facility less and remove foreign exchange reserves stored at the CBRT as a source of foreign exchange liquidity during a period of capital outflows. Until August 2011, when the European financial crisis reached its peak, Turkey was exposed to short-term capital flows and CBRT increased the required reserves and used the lower band of the interest rate corridor so that the USDTRY would not be overvalued and this hot money would not upset the balance. In 2011, CBRT reduced one-week repo rate 2 times and 50 bps cuts were applied. While there was a net portfolio flow of approximately 20 billion USD until August, this flow remained at the level of 3 billion USD after August. While CBRT withdrew 6.5 billion USD from the market through foreign exchange buying auctions until August, it sold approximately 16 billion USD through foreign exchange selling auctions and interventions until January 2012 due to the decrease in foreign exchange supply in the market after August. In the first quarter of 2011, deposit dollarization declined to its historically lowest level of 28%, but this rate started to rise with the deepening of the European crisis.

In 2012, CBRT increased its gross and net reserves by actively using the ROM mechanism and by focusing on export rediscount credits. On January 2, 2012, limits of export rediscount credits increased 1.5 billion USD to 4.5 billion USD and at the end of the year, the export rediscount credits limit was increased to 6 billion USD. In addition, some conveniences regarding the use of credit in 2012 has been brought. As a result, the use of export rediscount credits in 2012 contributed 8.3 billion USD to our CBRT net foreign exchange reserves as it is illustrated in Figure 2.15. The ROM

application, on the other hand, does not affect the CBRT's net foreign exchange reserves, but increases its gross reserves. CBRT gross reserves reached approximately 120.8 billion USD in 2012. ROM increases the resilience of the system against internal and external shocks by helping the banking sector to manage its FX liquidity more flexibly. Therefore, it should be emphasized that this mechanism reduces the need for both regular FX auctions and direct intervention. (CBRT, 2012). Except for January, CBRT did not conduct foreign exchange selling auctions and interventions, and net portfolio flows reached 40 billion USD in 2012 which considerably supported CBRT's reserves. Deposit dollarization rate remained stable.

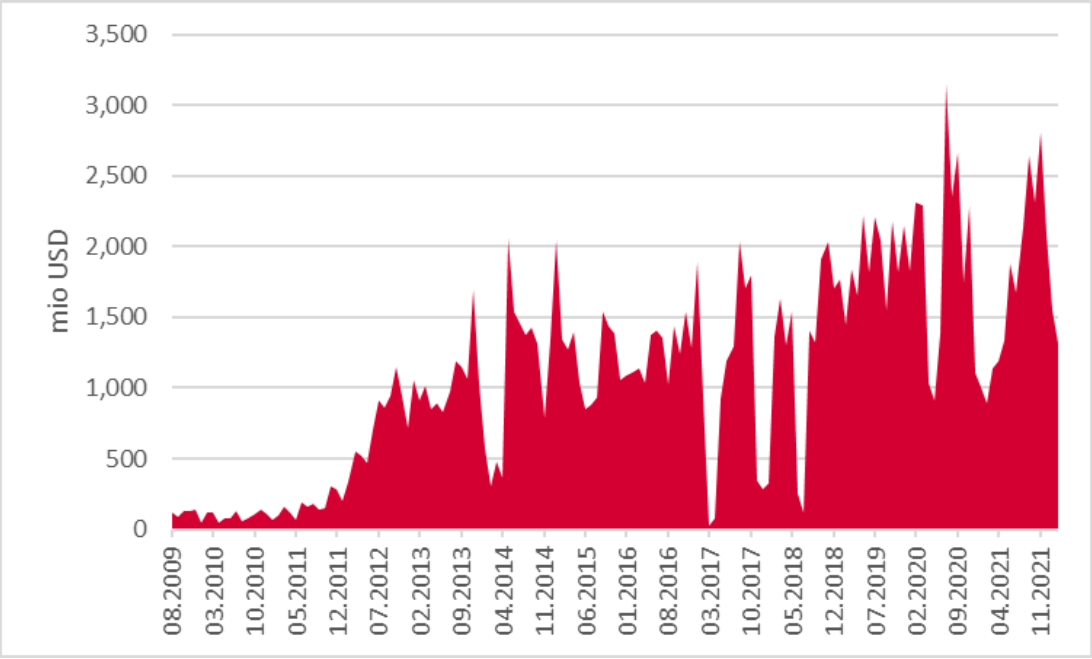


**Figure 2.15 Rediscount Credits' Contribution To FX Reserves (Monthly, mio USD)**

Source: CBRT

In 2013, CBRT continued to increased net and gross international reserves via the application of ROM and export rediscount credits (Figure 2.15). Portfolio flows to the country continued in the first half of the year and deposit dollarization remained stable. However, as a result of the increase in political risks towards the end of the year, a slowdown was observed in portfolio flows, an increase in the USDTRY rate began and the dollarization rates began to rise. Boratav (2019) underlines that the exchange rate policy that CBRT tried to be effective by using communication channels did not

yield any results, bringing the USDTRY rate to rise again in December 2013. Starting from the second half of the year, CBRT sold 17.6 billion USD in foreign currency through auctions in 2013. After all this happened, due to the lack of foreign exchange supply in the financial markets, the USDTRY rate increased. On January 23, 2014, CBRT sold approximately 3.1 billion USD of foreign currency through the intervention method, however, the sale was not enough to ease the tension in the market and the weekly repo rate was increased from 4.5% to 10% on January 29, 2014. With the easing of political tension and the passing of the 2014 municipality elections, CBRT reduced its weekly repo rates to 8.25% by making 3 cuts in interest rates. After the elections, portfolio flows to the country continued and nearly 20 billion USD entered the country by the end of the year. Throughout 2014, CBRT's foreign exchange sales continued with the auction method and intensified especially in the pre-election period in order to provide FX liquidity in the market. The total amount of foreign exchange sold in 2014 was roughly 10 billion USD by CBRT. Also, CBRT started to sell FX state-owned enterprises in 2014. Deposit dollarization rate reached 38% however, with the easing of political tension fallen to 35%.

In 2015, developments in global monetary policies have been the main determinant of movements in financial markets. In this period, almost all financial assets were repricing on a global scale and portfolio flows towards developing countries turned into outflows (CBRT, 2015). While CBRT continued to use export rediscount credits and ROM to strengthen its reserves, FX sales by auction method continued. In the first two months of 2015, two rate cuts were made and the one-week repo rate decreased from 8.25% to 7.5%. Geopolitical and political risks have increased and Turkey has experienced two elections, in June and November. In 2015, there was a portfolio outflow of 14 billion USD, especially with the effect of increasing political risks, while CBRT sold approximately 12.5 billion USD through the auction method. Deposit dollarization rate increased 43% in third quarter, however, with the easing political tension, at the end of the year this rate fallen. Boratav (2019) described the period from January 2011 to December 2015 as having 6 fluctuations, three of which are rising and three of which are falling that are lasted 7-13 months. Increasing fund flows during the rising phases raised the loans and domestic demand, sometimes the financial markets and national income, whereas decreasing fund flows caused decrease in all of them.

Considering its contribution to the effective functioning of the monetary transmission mechanism, monetary policy has been simplified considerably since March 2016 and the overnight lending rate was reduced by 250 bps, bringing it closer to the one-week repo rate. The failed coup attempt in 2016 was decisive on interest rates and exchange rates. Global markets, on the other hand, followed a relatively calm course from the beginning of 2016 until the US November 2016 elections. However, the perception of uncertainty created by the election results regarding the US economic policies significantly increased the volatility in the markets. Since this period, the US dollar has appreciated significantly against the currencies of developed and developing countries. (CBRT, 2016). CBRT rose one-week repo rate in November to 8% in order to prevent the negative impact of exchange rate movements, which were experienced due to the recent increase in global uncertainties and high volatility, on inflation expectations and pricing behavior (CBRT, 2016). All of these events have a detrimental consequence on deposit dollarization rate in 2016 which was decreased from 41% at the beginning of year to 37% at third quarter, but, in the subsequent quarter it started to went up and reached 41% due to global uncertainties. As a result of the shrinkage in global liquidity conditions after the US elections, net portfolio outflow of 4 billion USD was realized.in the last quarter of the year and an increase of nearly 20% was observed in the USDTRY exchange rate. During 2016, portfolio inflows were approximately 8 billion USD despite the fact that there was a decrease in the last quarter of the year, and CBRT sold 3.4 billion USD in the first 4 months of the year, foreign exchange sales via through auctions was terminated. In addition, CBRT provided 4.1 billion USD liquidity to the market with the rate changes under the ROM and the changes in the FX reserve requirement ratio in 2016.

The volatility in exchange rates at the beginning of 2017 and its impact on the inflation outlook were decisive in monetary policy decisions. As exchange rate developments increased the upside risks to inflation, the CBRT implemented a strong monetary tightening in January to avert the deterioration in the inflation outlook. In addition, CBRT ended weekly repo auctions in order to maintain price and financial stability and started to provide TL liquidity to the market through the late liquidity window (CBRT, 2017). CBRT increased late liquidity window rate 4 times from 10% to 12.75%. Despite the tightening in the monetary policy, there was a strong increase in corporate loans as of March 2017, with the acceleration of the Credit Guarantee Fund

(KGF) secured corporate loans (CBRT, 2017). With the effect of credit expansion in the country and the effect of the rising exchange rate at the end of 2016, annual inflation was above 10% throughout 2017. Additionally, after the US elections, the uncertainty in global liquidity conditions was terminated and net portfolio inflows were approximately 25 billion USD thanks to portfolio flows to developing countries. This flow in 2017 was the last portfolio flow to enter the country regularly. CBRT provided almost 6.25 billion USD to the market via Turkish Lira Deposits against Foreign Exchange Deposits Market and approximately 2,9 billion USD with the rate changes under the ROM and the changes in the FX reserve requirement ratio in 2017. Also, from 2014 to the end of 2017, CBRT sold 23.812 billion USD to state-owned enterprises and CBRT did not conduct any intervention or auctions in FX market. Despite the relative rise in inflation and exchange rate, portfolio flows and the liquidity provided by CBRT caused that deposit dollarization rate relatively increased 42% in the first quarter and remained constant during 2017. Boratav (2019) described the period from March 2017 to October 2017 as the "usual" repetition of Turkey's thirty years of economic relationship with the exception of crisis periods: Economy in current account deficit and this deficit is financed by financial capital inflows.

In 2018, CBRT decided that unconventional measures such as interest rate corridor should be eliminated and the policy rate simplified because the macroeconomic environment no longer required this unusual framework. Unconventional CBRT policies, such the usage of various interest rates, have occasionally come under fire for degrading the organization's communication strategy. Weekly repo funding took the place of late liquidity window funding in June 2018, and the funding composition was simplified. The weighted average funding cost as of this date has reached equality with the one-week repo rate.

After 2018, CBRT aimed to deepen the futures markets and indirectly contribute to the currency risk management of the real sector. The applications and measures made for these reasons are as follows;

- TRY Currency Swaps
- TRY Currency Swap Auctions (Traditional Method)

- TRY Cash Settled FX Futures Transactions at the BIST Derivatives Market (VIOP)
- TRY Cash Settled FX Transactions
- FX Deposit Market Transactions
- TRY Gold Swap Auctions (Traditional Method)
- TRY Gold Swaps
- FX Gold Swaps

The period covered from 2018 to end of 2021, political and geopolitical tensions have been decisive in economic developments. The deteriorating relations with the United States and the tension in the general and municipal elections caused a net portfolio outflow in 2018 and USDTRY increased approximately 40% and annual inflation rate reached a peak of %24.52 in third quarter of 2018 after 2003. Boratav (2019) states that in the first eight months of 2018, the framework has completely changed compared to 2017. A sharp decline in foreign capital inflows and the escalation of domestic capital outflows brought total capital movements to "net outflows". Portfolio inflows and credit flows showed net outflows in these eight months. Foreign banks started to collect the principal of their receivables. Foreign direct investments, on the other hand, remained stable. Krugman (2018) compares what happened in 2018 to the Asian crisis two decades ago. and explained the process that caused the crisis as foreign capital inflow, which Turkey had been exposed to for many years, and the inability to pay the accumulated debts in foreign currency as a result of "sudden stop". Additionally, Krugman clarifies “death spiral” that your currency depreciates as a result of a reduction in confidence triggered by domestic events; this makes it more difficult to pay off foreign debts; this harms the real economy and further lowers confidence, which further depreciates your currency; and so on. The effect of the deterioration in USDTRY, inflation and portfolio flows were all behind the spike in deposit dollarization in 2018. The deposit dollarization rate, which was 43% in the first quarter of 2018, climbed to %53 in the first quarter of 2019 despite the fact that CBRT increased the policy rate to 24% in September 2018. In this period, the BRSA's (Banking Regulation and Supervision Agency) swap restriction decisions with

offshore banks directed domestic banks to CBRT to make swaps, and more than half of CBRT's TL funding was realized through the swap channel (CBRT, 2021).

In 2019, relative stability was achieved in the exchange rate and annual inflation rates fell below 10% in the third quarter. Net portfolio outflow continued and reached nearly 3 billion USD. After the relative stability in exchange rate and inflation, the rise in deposit dollarization rates also stopped and this rate remained stable at 52% in 2019. In 2020, The epidemic, which spread globally in the first quarter of 2020, increased uncertainties and led to a significant contraction in global economic activity worldwide. Rapid and effective measures put into practice by central banks and financial authorities of developed and developing countries contributed to the maintenance of global financial stability. The FED held two unscheduled meetings, on March 3 and March 15, with the onset of the epidemic, and the fed funds rate was reduced from 1.50%-1.75% to 0%-0.25%. Also, FED announced the creation of temporary agreements with foreign central banks for the liquidity of the dollar, to expand its operations for purchasing Treasury securities and agency mortgage-backed securities and temporary repurchase agreement facility in order to calm markets and provide market liquidity. With the effect of the relief in global liquidity conditions and the supportive policies chosen during the epidemic, CBRT cut policy rates in the mentioned period and the policy rate decreased from 12% to 8.25%. During 2020, Although deposit dollarization rate decreased to 50% at the end of the first half of the year, it increased to roughly 55% at the end of the year due to the decrease in interest rates and the rise in USDTRY.

In 2021, CBRT changed the reserve requirement rule to increase the efficiency of the monetary transmission mechanism in keeping with its primary goal of price stability. In this context, on 1 July and 1 October, upper limit of the facility of holding FX for Turkish lira reserve requirements was decreased from 20% to 10% and 10% to 0% respectively. Thus, ROM facility of FX was terminated on 1 October which made available to banks after the financial crisis. In 2022, the ROM will be completely terminated, while the costs of FX liabilities will be increased, mechanisms that will support the development of Turkish lira deposits will be prioritized (CBRT,2021). The one-week repo rate, which is the policy rate at the beginning of 2021, was at 19%, but it was first reduced to 18% in September and to 14% in December with other interest

rate cuts. The USDTRY rate, which was 8.3 at the beginning of September, increased to 17.5 on 20 December. With the announcement of the FX-Protected deposit (KKM) plan after the cabinet meeting held on December 20, the USDTRY declined sharply to 13.05 and settled around 13.50 as of the next day. As a result of these events, the monthly inflation rose to 13.6% and the annual inflation to 36.1% in December 2021. Additionally, at the end of 2021, CBRT intervened directly in the market in the direction of selling due to the unhealthy price formations in the exchange rates. From the first day of December until December 17, the total amount of foreign currency sold by the intervention method was approximately 7.3 billion USD, as it is seen from the Table 2.1. In 2021, deposit dollarization rate increased from 54% to nearly 64% at the end of the year (Figure 2.9).

With the introduction of Foreign Currency Convertible Deposits in 1967, these accounts were mainly used to increase money supply and the loan volume in the first period and to close the current account deficit in the second period. Decree No. 28 which entered into force at the end of 1983 enabled deposit dollarization for individuals as well. Throughout this period, political instability, high inflation and exchange rates, constant devaluations and economic difficulties was experienced. The period covering from 1980 to Decree No. 32 in 1989, capital movements were relatively limited and political structure was relatively stable in Turkey, however, from 1986, when deposit dollarization data began to be released, to 1989, this rate increased. In the period from 1989 to 2001 crisis, unstable portfolio flows from abroad, political instability, monetizing the public deficits from CBRT resources, high inflation, exchange rate and high dollarization as a result were experienced. After 1989 in an environment of financial capital liberalization, Turkey experienced financial crises in 1994 and 2001. The common feature of both crises is that there was a large amount of short-term capital inflows in the pre-crisis year and large-scale capital flight in the crisis year resulted in the contraction of the economy (Celasun, 2002). Increased CBRT's independence, government's efforts to implement tight fiscal policy, stable political structure, low interest rate, exchange rate and inflation level, the stable course of portfolio flows from abroad and as a result the relatively low dollarization were hallmarks of the period from 2001 to 2018. The prominent features of the monetary policy in this period were the independence of the CBRT, the transition to a floating exchange rate and initially implicit and later on explicit inflation targeting. The

changes in the fiscal policy were as put forward in the "Transition to a Strong Economy Plan", the decrease in the budget deficit and the general government debt stock to GDP ratio, the decrease in interest rates and the extension in external debt maturities (Ekinci, 2013). After 2018, the destabilization of portfolio flows from abroad, high exchange rates and inflation became the main indicators of the period and the deposit dollarization rate reached a peak of 63% at the end of 2021.

Lastly, the story of dollarization in Turkey, which started with Foreign Currency Convertible Deposits in 1967, ends for the scope of this study with the introduction of the FX-Protected Deposits in 2021, which is based on a similar logic.

# CHAPTER 3

## LITERATURE REVIEW

Dollarization is broadly described as the use of foreign currency as a medium of exchange, store of value, or unit of account by residents and this issue has extensive coverage in low-income and emerging market countries. Dollarization is a common problem and feature of developing and transition economies (Bennett et al. (1999)). In the literature, another term regarding dollarization is financial dollarization which is a relative share of banks' loans and virtually all external obligations were denominated in foreign currencies (Yeyati 2006).

In general terms, domestic investors regard dollarization as a tool of diversification in case of high inflation, volatile exchange rate, and economic instability. In a country that is exposed to high inflation, individuals seek alternatives to protect their portfolio and purchasing power, dollarization is therefore too common.

The initial approach in the literature about dollarization was the currency substitution view, which is defined that economic agent's behavior results from fiscal imbalances, high inflation, high exchange rate depreciation and volatile exchange rate (Calvo & Vegh (1997); Savastano (1996); Baliño et al. (1999); De Nicolo et al. (2005)). In the literature, the term dollarization has also been used interchangeably with currency substitution. However, Calvo & Vegh (1992) explains that the term of dollarization is generally used to show that a foreign currency serves as a unit of account or as a store of value, and not necessarily as a medium of exchange, whereas currency substitution refers only to the use of a foreign currency as a means of exchange. By contrast, Bennett et al. (1999) emphasize that currency substitution occurs when foreign-currency-denominated assets are used as a means of payment, whereas asset substitution occurs when foreign-currency-denominated assets serve as financial assets (store of value) but not as a means of payment or unit of account. Consequently,

dollarization is regarded as the process that which domestic currency substitutes a foreign currency to fulfill the fundamental functions of money (Montoro, et al., 2013).

Currency substitution is generally experienced under conditions of hyperinflation or persistent high inflation when the high cost of using the local currency for transactions outweighs and this cost encourages the public to seek alternatives. The majority of people thus prefer foreign currencies which enjoy wide recognition around the world.

Yeyati (2006) makes another distinction and description about dollarization and groups dollarization into two categories, which are de jure (official) and de facto (unofficial). According to this view, de jure dollarization refers to the case in which the foreign currency is given (usually exclusive) legal tender status, while unofficial (or de facto) dollarization represents to show the use of a foreign currency alongside the national currency when the former is not legal tender. Furthermore, it is shown that de facto dollarization comprises currency substitution and asset substitution view, referring to the use of the foreign currency as a medium of exchange and store of value, respectively.

Calvo & Vegh (1992) and Heymann & Leijonhufvud (1995) extend their view with that in high inflation countries, domestic currency firstly loses its function of a store of value or unit of account and then a medium of exchange. Hence, currency substitution is described as the final stage of the dollarization process. In addition to this, it is also well known that once the runaway money from domestic currency has taken place—that is, once the public has found ways to save their local currency—a reversal is difficult; in other words, the foreign currency demand for hyperinflation countries usually show profound 'hysteresis' or 'ratchet' effects (Piterman (1988), Ericsson & Kamin (1993) and De Gregorio, J. & Arrau, P. (1993)).

Furthermore, even when inflation decreased substantially and underlying financial condition settles down, dollarization is never easy to reverse (Honohan & Shi (2002), Reinhart et al. (2003) and Imam et al. (2016)). The anticipated de-dollarization process has not happened rapidly due to the overwhelming and persistent memories experienced volatility in the past and this causes to increase in the behavior of seeking insurance. Economic agents just gradually reevaluate the economic environment, financial conditions, and the likelihood of an adverse scenario. Reinhart et al. (2003)

point out that if a county that experienced a poor inflationary history is eager to decline considerably in another inflation bout, it needs to maintain inflation at low levels for a long while to convince households and investors to stay away from re-dollarization or to hold the level of dollarization. By contrast, Bennett et al. (1999) point out that the reversal of capital flight and remonetization has an influence on the remaining high level of dollarization and advocate that some suggestive data approves this notion.

In addition to these, the progress of internationalization of the banking and financial sector with financial market deregulation after the 1980s enables to reach more alternatives for holding assets and protecting portfolio, developing the structure of capital markets also allow domestic residents and investors to have a chance for holding their assets in domestic currency and foreign currency owning to significant fall in the transaction cost. All of these processes facilitate taking advantage of diversification and trigger the growth of currency substitution. (Savastano (1996), Giovannini & Turtelboom (1994), Pentecost & Mizen (1996) and Sahay & Vegh(1995)). Bennett, et al. (1999) also advocate that dollarization is an expected and natural consequence of market liberalization.

In the literature, there have been studies that pay attention to country experiences and indicate that the persistence of dollarization continues after inflation and volatility of exchange rates fall significantly or fiscal imbalances are closed. (Ley et al., 2010 and Edwards & Magendzo (2003)). These studies contribute to progress the opinion of asset substitution view in literature. As opposed to the currency substitution view, the asset substitution view tries to explain the dollarization phenomenon by the portfolio view, the market development view, and the institutional view. (Corrales & Imam, 2019 and Ize & Yeyati, 2006).

The asset substitution stems from the economic agents' allocation decisions of their portfolio, taking into account the risk and return characteristics of domestic and foreign assets. Throughout the last decades, domestic investors or residents prefer foreign-denominated assets to have a chance to protect their portfolio against financial instability or macroeconomic risks which is usually observed in many developing countries especially when there is not abundant liquidity in the global environment. According to the asset substitution view, investors and residents seek an alternative to

protect their assets and some reasons lead them to hold foreign currency instead of the domestic currency. In general terms, the portfolio view points out these reasons that residents and investors hold and buy foreign currency in their portfolio as a response to macroeconomic instability triggered by some distortions. More specifically, optimal portfolio choice cast a light on this phenomenon. In this view, domestic residents and investor convert their assets to foreign-denominated assets or set out to accumulate foreign-denominated asset when the foreign currency deposit rate surpasses the domestic currency deposit rate in real term. Ize & Levy Yeyati (2003) clarify these behaviors with the share of dollars in the variance-minimizing portfolio relying on the domestic price level and the stability of the real exchange rate and their correlation. In variance minimizing portfolio model, investors and residents seek to portfolio to minimize the variance of expected returns by considering the volatility of exchange rate and volatility among currencies which is regarded as the appropriate to hold their assets when especially huge exchange rate depreciation or high inflation occurs (Kiguel et al. (2005)).

On another view of literature, Savastano (1996) and Honohan (2005) advocate the market development view that the relative significance of foreign currency or foreign currency denominated assets as an inflation hedge is inversely related to the economy's level of financial development. An economy involving a developed financial market gives investors and residents a chance to preserve the real value of their portfolios. A deep financial market also provides an opportunity for the investor to adapt quickly to a high inflation environment and macroeconomic instability by making high-yield and liquid financial instrument accessible that is denominated in domestic currency. By contrast, an underdeveloped economy with a shallow financial market provides domestic residents less option and diverts investors to seek protection in foreign-denominated assets and instruments. Besides these, Ize & Yeyati (2003) and Feige (2003) emphasize that a domestic financial market with no financial depth gives rise to increase dollarization because it does not provide enough opportunities for domestic residents to preserve their portfolio and triggers them to hold foreign-denominated assets. Honohan (2005), on the other hand, finds that allowing dollarization in inflationary economies supports the domestic financial system to be deeper and offset the detrimental influence of inflation on financial depth.

According to the institutional view, domestic investors and residents divert their investment to foreign-denominated assets when the power and structure of institutions are weak and this behavior exacerbates the level of dollarization via the channels which are described in the other asset substitution views. Ize & Levy Yeyati (2003) and Honohan (2005) show that in the variance-minimizing portfolio, in addition to macroeconomic policy, the institutional structure also plays a crucial role in variation in dollarization. Savastano (1996) advocates that the country's institutional framework has a profound impact on the level of dollarization and gives shape to a process of dollarization. Furthermore, even in the case of a financially repressed economy that provides less financial market depth, the process of dollarization is unfavorably impacted by institutional factors by regulating domestic holding, monetary policy, or the circulation of foreign money. Corrales et al. (2016) advocate that when macroeconomic institution starts to gain credibility in the eyes of investors and residents and policymakers assure, domestic residents and investor prefers other financial instruments except for foreign currency and this progress reduce the attractiveness of dollarization in many cases.

In the literature, there is also debate about how to define dollarization and some data limitation enforce researchers to use different statistical measures in order to estimate this phenomenon numerically. Agenor & Khan (1996), Clements & Schwartz (1993), Borensztein, et al. (1999), and Ohnsorge & Oomes (2005) use foreign exchange deposits to broad money so as to measure deposit dollarization and ignore the foreign currency used in circulation due to hard to gauge or estimate. Other researchers, however, use the statistics of foreign currency deposits to total deposits at the banking system in order to estimate deposit dollarization (Levy Yeyati (2006) and De Nicolo, et al. (2005))

These statistics, on the other hand, take into consideration just onshore dollarization and neglect offshore dollarization due to a lack of data. Eichengreen & Hausmann (1999) use the debt of the domestic firms that are provided from abroad in their own currency and foreign currency loans that are issued by a domestic financial institution as a proxy to measure liability dollarization. Reinhart, et al. (2003) use different composite indices constructed so as to be a proxy for deposit and liability dollarization. Foreign currency deposits to broad money and of domestic government debt in foreign

currency to total domestic government debt is used to gauge domestic dollarization and countries that both of these ratios do not surpass 10 percent are considered as the negligible degree of domestic dollarization. Moreover, total external debt as a share of GNP is used to construct the composite indices that enable to reach measures about dollarization.

The literature on dollarization has a difference of opinion in terms of the type of economic agents. Nicolo, et al. (2005), Levy Yeyati (2006), and Stix (2013) has focused just on aggregate that comprises household and firm deposit and/or credit dollarization, while Corrales & Imam (2019) and Ize (2005) have not ignored the difference between household and firm dollarization despite the fact that researcher generally abstains from this kind of distinction due to the deprival of cross-sectional data.

The main contribution of research from Corrales & Imam (2019) is that structural factors have a profound influence on dollarization which include both household and firm deposit and loan dollarization, rather than macroeconomic stability. The reason behind this finding is because inflation and exchange rate policies are strongly applied in most countries across the world and it is also stated that the effect of structural factors varies between household's and firm's deposit and loan dollarization.

The earlier literature points out that dollarization might exacerbate the volatility of money demand and confine the ability of the central bank to conduct monetary policy (Levy Yeyati (2006)). The currency substitution phenomenon supports this claim, on the other side, it can be also evaluated for the dollarization of domestic savings. Levy Yeyati (2006) explains that when foreign-denominated assets become less expensive, monetary expansion in the dollarized economy has more influence on the demand for reserve money. Another subtle argument concerns that many emerging markets have a considerable disadvantage rather than the developed economy which can be an effective Lender of Last Resort for reserve money and this disadvantage becomes more concise in the situation of the high level of domestic liability dollarization because it narrows down the capability of the central bank to conduct as a Lender of Last Resort. Needless to say, countries under the domestic liability of dollarization try to create conditions so as to dispose of this type of dollarization by conducting independent

monetary policy (Calvo (2006)). Furthermore, Mwase & Kumah (2015) explains that as monetary instruments fundamentally affect domestic liquidity, higher dollarization declines the capacity of central banks to control liquidity, which can increase consumer price inflation, in which case it mainly influences only a small share of local currency holdings so that central banks lose their majority of control over the liquidity. It is also stated that the central bank not only loses control over liquidity but also causes solvency risks in case the country has a high level of dollarization.

Another point of view in the literature relying on the advantage of dollarization clarifies that inflation has been considerably lower in a country having a high level of dollarization than in non-dollarized ones (Edwards and Magendzo (2003)). Besides, Honohan & Shi (2003) find that dollarization has the influence of offsetting the detrimental impact of inflation on financial depth. Levy Yeyati (2006) points out that dollarization might decline the willingness to inflate and enable to fall inflation expectations by increasing the perceived cost of monetary expansion.

In Turkey, several studies have been carried out so far to understand the drivers of dollarization. Selçuk (1994) is one of the earliest studies on dollarization in Turkey. Selçuk developed an equation to determine the dollarization rate in Turkey between 1986 and 1992 by applying Ordinary Least Squares (OLS). The formula takes into account the money supply, monthly average exchange rates set by the CBRT, and FX deposits. The analysis leads to the conclusion that dollarization and actual TL depreciation are positively correlated. Selçuk's analysis suggests that as dollarization rises, seigniorage income falls, which may lead to high inflation.

Another study in this area is Civcir (2001), which explain dollarization using the extended portfolio model by applying Johansen Cointegration Approach between 1986 and 1999. This portfolio model extends the simple portfolio model which encompasses only interest rate differentials by including expected change in the exchange rate, exchange rate risk, and credibility of current economic policies. Civcir (2001) points out that the interest differential between the domestic currency and foreign currency, and the expected exchange rates are the most substantial determinants of dollarization in Turkey.

Darıcı (2004) analyzes dollarization rate from 1990 to 2002 by applying OLS and finds that real exchange rate and inflation influence the dollarization rate, whereas time deposit interest rate does not have significant impact on this rate.

Metin Ozcan & Us (2007) analyzes dollarization which is shaped by macroeconomic imbalances arising from exchange rate volatility, inflation volatility and expectation, and finds that all of these have an influence on dollarization by applying Autoregressive Distributed Lag Bound Test (ARDL). They also apply impulse response analysis and variance decomposition analysis to demonstrate that dollarization seems to sustain its persistent nature, thus hysteresis still prevails. Thus, they show that unfavorable macroeconomic conditions make a contribution to dollarization inertia.

Sarı (2007) examines dollarization for Turkey for the period 1990-2006. The analysis uses FX deposits/Total depositsas the dependent variable and inflation, real foreign exchange rate, interest rate differentials between TL and USD, and a dummy variable as independent variables by applying OLS and Vector Autoregressive Analysis (VAR). Sarı (2007) points out that exchange rate and inflation have an impact on dollarization.

One of the most significant studies is Metin Ozcan & Us (2009) which analyzes dollarization for the period from 1996 to 2006 by highlighting aspects of the subject that were previously ignored. Metin Ozcan & Us (2009) analyze dollarization not only from the demand side (asset dollarization) but also from the supply side (liability dollarization) and it examines dollarization not only domestically but also externally including offshore dollarization by applying Johansen Cointegration Approach. They find that before the 2001 financial crisis, dollarization is caused by the demands of economic agents and showed an upward trend, but the post-crisis period witnessed a supply-driven and decreasing rate of dollarization. However, after the crisis period, the abundance in global liquidity triggered offshore dollarization and led to higher asset dollarization via offshore dollarization. Furthermore, they mention that the inflation targeting framework caused more external funding due to arbitrage opportunities which were thanks to relatively higher real interest rates than the rest of the world.

Dumrul (2010) explains the currency substitution (domestic residents' FX deposits/GDP) with trade openness, expected inflation rates, expected real exchange rates, trade openness and interest rate differentials between Turkey and USA from 1988 to 2009 using by ARDL approach. Dumrul also examines the relationship between Central Bank's gross foreign exchange reserves and currency substitution and finds that all variables have a positive influence on currency substitution at a 10% significance level except trade openness.

# CHAPTER 4

# DATA AND METHODOLOGY

In this chapter, data and methodology used in this study are explained and variables are examined in the following two parts. In the first part, variables used to analyze households' deposit dollarization, firms' deposit dollarization and loan dollarization in Turkey are explained. Study covers 2003Q1 to 2021Q4 period, due to the fact that the household and firm dollarization distinction in the data starts from 2003. In the subsequent part the econometric techniques used in the analysis are introduced and the reason for choosing these particular methods are discussed.

## 4.1. Data

### 4.1.a. Introduction of Variables and Data Sources

This study utilizes quarterly data of Turkey to analyze the determinants of dollarization for households' in terms of deposit dollarization, firms' in terms deposit dollarization and loan dollarization. In the analysis ARDL error correction modelling (ECM) which enables to differentiate between short-run dynamics and long run trends of the three categories of dollarization that is used. In order to measure dollarization in the literature some studies like Agenor & Khan (1996), Clements & Schwartz (1993) and Borensztein, et al. (1999) use foreign exchange (FX) deposits to broad money as the dollarization ratio. However, in this study dollarization ratio is defined as FX deposits to total deposits in the banking system following Levy Yeyati (2006) and De Nicolo, et al. (2005). The sum of FX credit and all of foreign currency indexed loan to total credit is used for loan dollarization ratio due to data availability.

Variables used in this study are external debt to GDP ratio, net exports to GDP ratio, quarterly change in USD Dollar/ Turkish Lira exchange rate, quarterly change in

consumer price index, real deposit rate (deposit rate at time t minus inflation rate at time t+1), real lending rate (lending rate at time t minus inflation rate at time t+1), USDTRY 3-month ATM implied volatility derived from Black Scholes option pricing model and net international reserve to GDP ratio. GDP data is taken from TURKSTAT and it is seasonally and calendar adjusted gross domestic product by expenditure approach (1998 base). USD dollar/ Turkish Lira exchange rate and consumer price index in the empirical model are used in the quarterly change form. Also, consumer price index is seasonally adjusted by TRAMO-SEATS method by using JDemetra 2.2.2 program.

Data sources are the Central Bank of the Republic of Turkey (CBRT), Turkish Statistical Institute (TURKSTAT), Ministry of Treasury and Finance of Turkey and Bloomberg Terminal. All variables' abbreviation, definition, frequency and data sources are shown in Table 4.1. Also, calculated variables in equations and how it calculated can be seen below.

**Table 4.1 Variable Names, Definition and Data Source**

| Abbreviation | Definition | Frequency | Source |
|---|---|---|---|
| Hdol | Households' Deposit Dollarization | Quarterly | CBRT |
| Fdol | Firms' Deposit Dollarization | Quarterly | CBRT |
| Loandol | Loan Dollarization | Quarterly | CBRT |
| De | Exchange Rate Depreciation | Quarterly | CBRT |
| $\pi$ | Inflation | Quarterly | TURKSTAT |
| Rd | Real Deposit Rate: i(t) - inf(t+1) | Quarterly | CBRT |
| Rl | Real Lending Rate: i(t) - inf(t+1) | Quarterly | CBRT |
| Exd | External Debt %of GDP | Quarterly | Ministry of Treasury and Finance |
| Nx | Net Exports %of GDP | Quarterly | TURKSTAT |
| Vol | USDTRY 3 Months Implied Volatiliy | Quarterly | Bloomberg |
| Res | Net International Reserves %of GDP | Quarterly | CBRT |

The variables used in the models are calculated as below:

$$\text{Households'Deposit Dollarization} = \frac{\text{Households' Foreign Currency Deposits}}{\text{Total Deposits}}$$

$$\text{Firms'Deposit Dollarization} = \frac{\text{Firms' Foreign Currency Deposits}}{\text{Total Deposits}}$$

$$\text{Loan Dollarization} = \frac{\text{FX Credits}}{\text{Total Credits}}$$

$$\text{Exchange Rate Depreciation} = \frac{\text{USDTRY}(t+1) - \text{USDTRY}(t)}{\text{USDTRY}(t)}$$

$$\pi = \frac{\text{CPI}(t+1) - \text{CPI}(t)}{\text{CPI}(t)}$$

$$\text{Real Deposit Rate} = \text{TRY Deposit Rate}\ (t) - \text{TRY Inflation Rate}\ (t+1)$$

$$\text{Real Lending Rate} = \text{TRY Lending Rate}\ (t) - \text{TRY Inflation Rate}\ (t+1)$$

$$\text{External Debt \%of GDP} = \frac{\text{External Debt}}{\text{GDP}}$$

$$\text{Net Exports \%of GDP} = \frac{\text{Export} - \text{Import}}{\text{GDP}}$$

$$\text{Net International Reserves \%of GDP} = \frac{\text{Net International Reserves of CBRT}}{\text{GDP}}$$

$$\text{Net International Reserves} = \text{Foreign Assets of CBRT} - \text{Total Foreign Liabilities of CBRT}$$

Table 4.2 shows the descriptive statistics of the variables. Hdol, Fdol, Loandol, De, $\pi$, Exd, Nx and Vol have positive skewness meaning that they have long right tail, whereas rest of the series have negative skewness meaning that they have long left tail. It can be seen that De, $\pi$, rd, rl, Exd and Vol have kurtosis which is higher than 3 showing that they have a peaked distribution, while the rest of the series have kurtosis lower than 3 so that their distributions are flat relative to the normal. Moreover, it is stated in Table 4.2 that Jarque- Bera test and their probability values show that Hdol, Loandol, Exd, Nx and Res distribute normally because their probability values are more than 0.05 and do not reject the $H_0$ that the data is normally distributed. The rest of the series has a probability of less than 0.05 and reject the $H_0$.

**Table 4.2 Descriptive Statistics**

| | Hdol | Fdol | Loandol | De | $\pi$ | rd | rl | Exd | Nx | Vol | Res |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 26.68 | 13.63 | 23.79 | 2.85 | 2.91 | 3.21 | 6.58 | 26.37 | -2.61 | 14.82 | 14.14 |
| Median | 25.91 | 12.20 | 25.10 | 1.79 | 2.58 | 1.92 | 5.83 | 25.27 | -2.85 | 13.16 | 16.01 |
| Maximum | 42.48 | 23.21 | 45.29 | 30.88 | 30.62 | 25.50 | 25.74 | 38.23 | 4.80 | 60.13 | 27.22 |
| Minimum | 17.04 | 9.28 | 10.43 | -8.23 | -1.39 | -44.84 | -40.67 | 19.87 | -8.05 | 4.00 | -1.73 |
| Std. Dev. | 6.31 | 3.40 | 7.75 | 7.70 | 3.74 | 9.06 | 8.77 | 4.55 | 2.54 | 6.88 | 7.08 |
| Skewness | 0.52 | 0.76 | 0.12 | 1.42 | 5.56 | -1.57 | -1.74 | 0.47 | 0.54 | 4.00 | -0.64 |
| Kurtosis | 2.48 | 2.45 | 2.83 | 5.92 | 41.26 | 12.67 | 13.15 | 2.21 | 3.47 | 26.25 | 2.80 |
| Jarque-Bera | 4.26 | 8.26 | 0.26 | 52.47 | 5,027.66 | 327.04 | 364.54 | 4.76 | 4.42 | 1,914.73 | 5.27 |
| Probability | 0.12 | 0.02 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.11 | 0.00 | 0.07 |
| Sum | 2,027.41 | 1,036.05 | 1,808.27 | 216.33 | 221.34 | 244.25 | 499.90 | 2,004.36 | -198.10 | 1,126.16 | 1,074.73 |
| Sum Sq. Dev. | 2,985.73 | 865.62 | 4,504.86 | 4,448.67 | 1,048.69 | 6,155.59 | 5,771.33 | 1,550.63 | 482.46 | 3,549.55 | 3,757.39 |
| Observations | 76 | 76 | 76 | 76 | 76 | 76 | 76 | 76 | 76 | 76 | 76 |

In order to prevent any multicollinearity problem, correlations between the variables are calculated and shown in Table 4.3. Allen (1997) articulates that multicollinearity exists whenever an independent variable is highly correlated with one or more of the other independent variables in a multiple regression equation. Multicollinearity is a concern since it nullifies the independent variable's statistical significance. As it is stated in Table 4.3, among the explanatory variables there is high correlation between rd and rl. For this reason, these variables are used as alternatives and not simultaneously used as explanatory variables.

**Table 4.3 Correlation Coefficients**

| | Hdol | Fdol | Loandol | De | $\pi$ | rd | rl | Exd | Nx | Vol | Res |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hdol | 1 | 0.3996 | 0.6302131 | 0.0663854 | 0.3879 | 0.146127 | 0.15616561 | 0.67337 | 0.585838 | 0.35953 | -0.86409 |
| Fdol | 0.3996 | 1 | 0.5450651 | 0.44078286 | 0.4381 | -0.5966749 | -0.5271271 | 0.65393 | 0.3861 | 0.51047 | -0.17289 |
| Loandol | 0.6302 | 0.5451 | 1 | 0.19106118 | 0.2768 | 0.0098594 | 0.08158775 | 0.87768 | 0.399248 | 0.12577 | -0.53391 |
| De | 0.0664 | 0.4408 | 0.1910612 | 1 | 0.5294 | -0.4940287 | -0.4361193 | 0.09296 | 0.067322 | 0.52599 | 0.07026 |
| $\pi$ | 0.3879 | 0.4381 | 0.2767606 | 0.5294018 | 1 | -0.5845832 | -0.5827242 | 0.19167 | 0.127388 | 0.73901 | -0.3181 |
| rd | 0.1461 | -0.597 | 0.0098594 | -0.4940287 | -0.585 | 1 | 0.9762565 | 0.0054 | 0.164584 | -0.55293 | -0.17925 |
| rl | 0.1562 | -0.527 | 0.0815878 | -0.4361193 | -0.583 | 0.9762565 | 1 | 0.05679 | 0.230718 | -0.53183 | -0.19197 |
| Exd | 0.6734 | 0.6539 | 0.877679 | 0.09295507 | 0.1917 | 0.0054005 | 0.05679332 | 1 | 0.417867 | 0.12477 | -0.52189 |
| Nx | 0.5858 | 0.3861 | 0.3992475 | 0.06732154 | 0.1274 | 0.1645842 | 0.23071832 | 0.41787 | 1 | 0.27229 | -0.32729 |
| Vol | 0.3595 | 0.5105 | 0.1257715 | 0.52599003 | 0.739 | -0.5529344 | -0.5318262 | 0.12477 | 0.272294 | 1 | -0.24022 |
| Res | -0.864 | -0.173 | -0.5339097 | 0.07026024 | -0.318 | -0.1792519 | -0.1919668 | -0.52189 | -0.327294 | -0.24022 | 1 |

### 4.1.b. A Brief Look at the Variables of the Study

An overview of the raw data is given in this section so that readers can have a basic grasp of the variable movements.

Figure 4.1 and 4.2 illustrates households' and firms' FX deposit rate in total deposits from Q1-2003 to Q4-2021. It is observed from the graph that deposit dollarization for

households have a downward trend between Q1-2003 and Q1-2011, and an upward trend between Q1-2011 and Q4-2021. Over the period shown, deposit dollarization reached its peak in Q4-2021, at 41% for households' deposit dollarization and 23% for firms' deposit dollarization. Additionally, it is obvious that while the firms' deposit dollarization generally increased during the period shown, households deposit dollarization shows considerable fluctuation relative to that of firms.

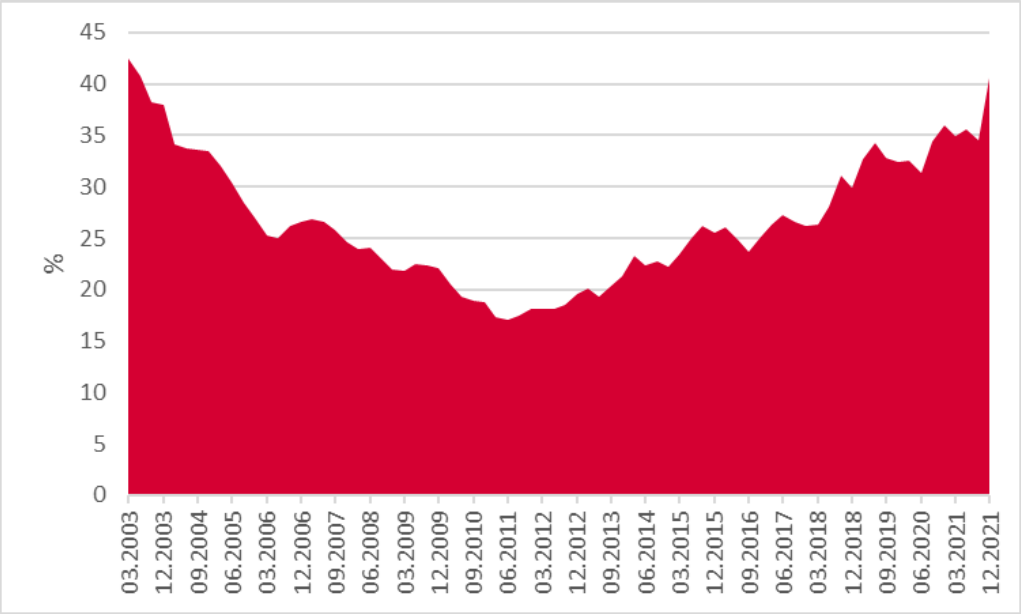


**Figure 4.1 Households' FX Deposit Share in Total Deposits (Quarterly, %)**

Source: CBRT

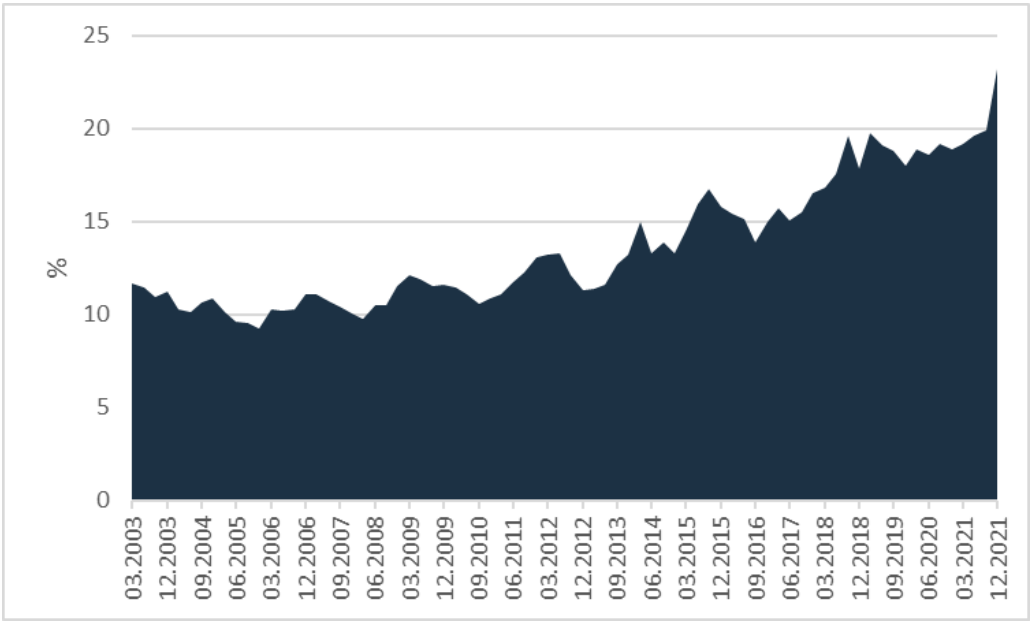


**Figure 4.2 Firms' FX Deposit Share in Total Deposits (Quarterly, %)**

Source: CBRT

Figure 4.3 presents the loan dollarization during the study period. The financial environment and domestic measures taken after the 2001 crisis, made it difficult for individuals to access foreign currency loans. Moreover, the positive conjuncture in the country lowered loan dollarization until the third quarter of 2009. Throughout the period from 2009 to 2021, ratio of FX credits to total credits which represents the loan dollarization in this study, witnessed an upward trend. In Q3-2018, it reached a peak of 35% and fell slightly in the subsequent years until Q3-2021 as illustrated in Figure 4.3.

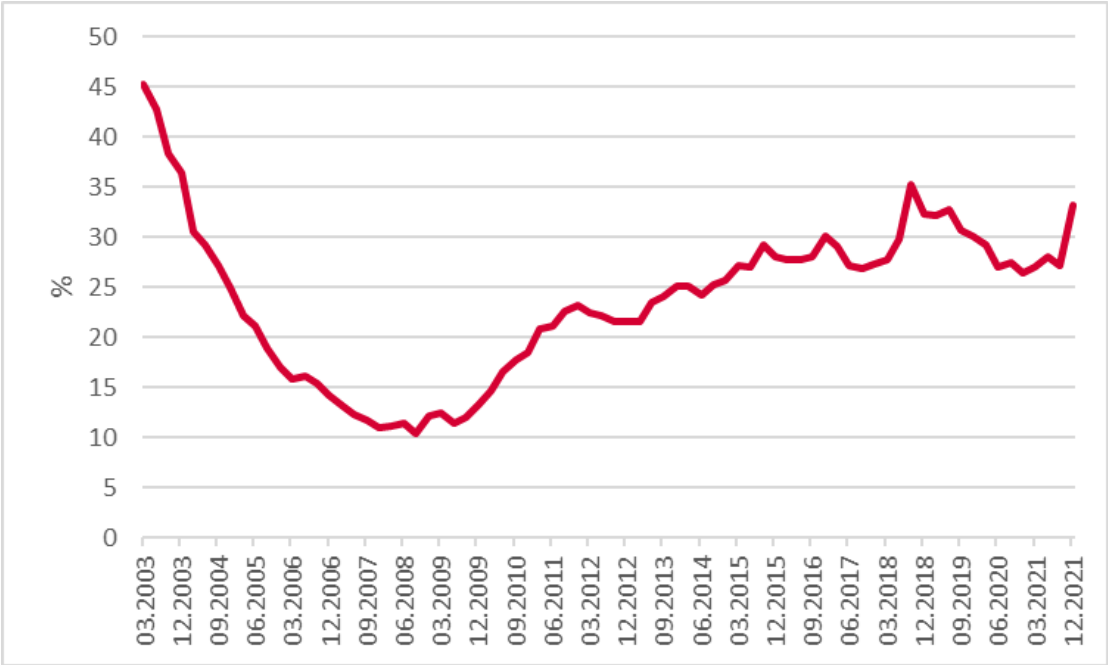


**Figure 4.3 FX Credits Share in Total Credits (Quarterly, %)**

Source: CBRT

In Figure 4.4 real interest rates over the study period is presented. From the beginning of data until the end of 2008, both real deposit and lending rates showed downward trends. Real returns contributed to the increase in portfolio flows to the country and the process of reverse dollarization till the end of 2008. After the end of 2009, real deposit rate fluctuated around zero while real lending rate fluctuates between 1% to 8% until the end of 2017. During this period, it is observed that real deposit and lending rates generally remained stable. At the beginning of 2018, real deposit and lending rate fell significantly to below zero, nonetheless as the CBRT's policy rate raised, it rose back above 10%. After increasing steadily from Q2-2018 to Q2-2019, real deposit and lending rate fell dramatically to below -40%. Moreover, during the period shown, real lending rate stayed above real deposit rate as illustrated in Figure 4.4. In the literature the portfolio view described dollarization as the best portfolio option given a particular distribution of real returns in each currency. In this study, real deposit rate and real lending rate are used to determine the explanatory power of this view for the Turkish case. Corrales & Imam (2019) states that higher real deposit rates should cause lower levels of deposit dollarization for households and firms, and a higher level of loan dollarization.

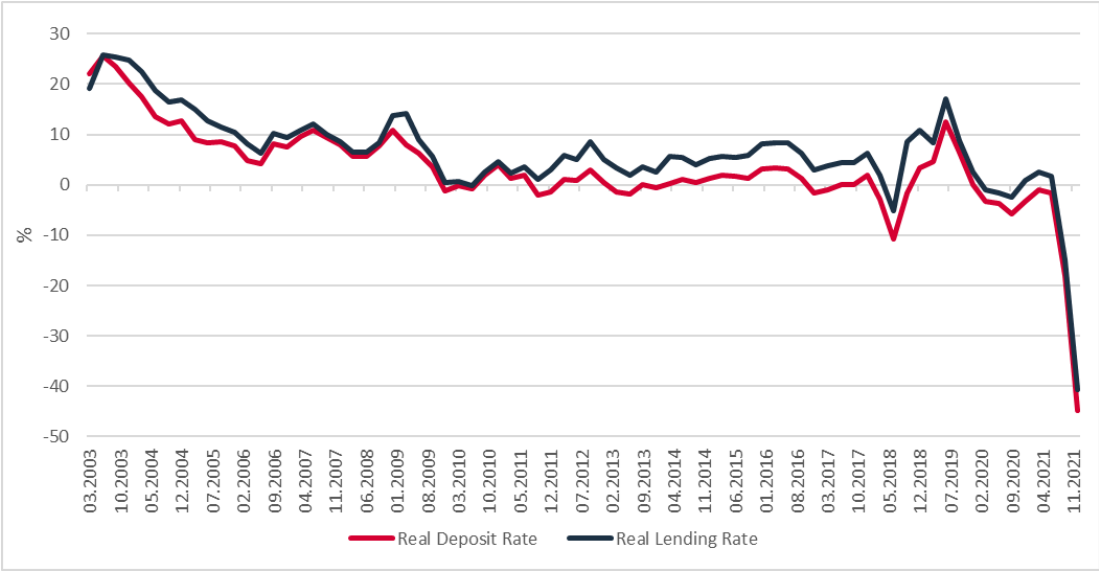


**Figure 4.4 Real Deposit and Lending Rate (Quarterly, %)**

Source: CBRT and TURKSTAT

In the literature the alternative view is currency substitution perspective, which argues that the negative relation between the demand for local currency and inflation will cause dollarization. This perspective is proxied by the inflation rate, nominal exchange rate depreciation and volatility of exchange rate. Heymann & Leijonhufvud (1995), Savastano (1996), Calvo & Vegh (1997), Baliño et al. (1999) and De Nicolo et al. (2005) explains the currency substitution view, which is defined as economic agent's behavior resulting from fiscal imbalances, high inflation, and volatile exchange rate. In our analysis exchange rate depreciation, inflation and volatility variables are used to examine the currency substitution view. Figure 4.5 shows that in times of global and domestic crises, while there were sharp upward and downward movements in the exchange rate depreciation, inflation remained more stable. Implied volatility is a measure of the market expected future volatility of a currency exchange rate from now until the maturity date. USDTRY 3-month ATM implied volatility derived from Black Scholes option pricing model represents the market's view of the likelihood of changes in a USDTRY exchange rate. Expected exchange rate volatility can be used by investors to forecast future movements in exchange rate and is frequently used to price options contracts. It is clear from the Figure 4.5, throughout the period USDTRY 3-month implied volatility increases when USDTRY significantly fluctuates and Turkey experiences global or domestic crisis.

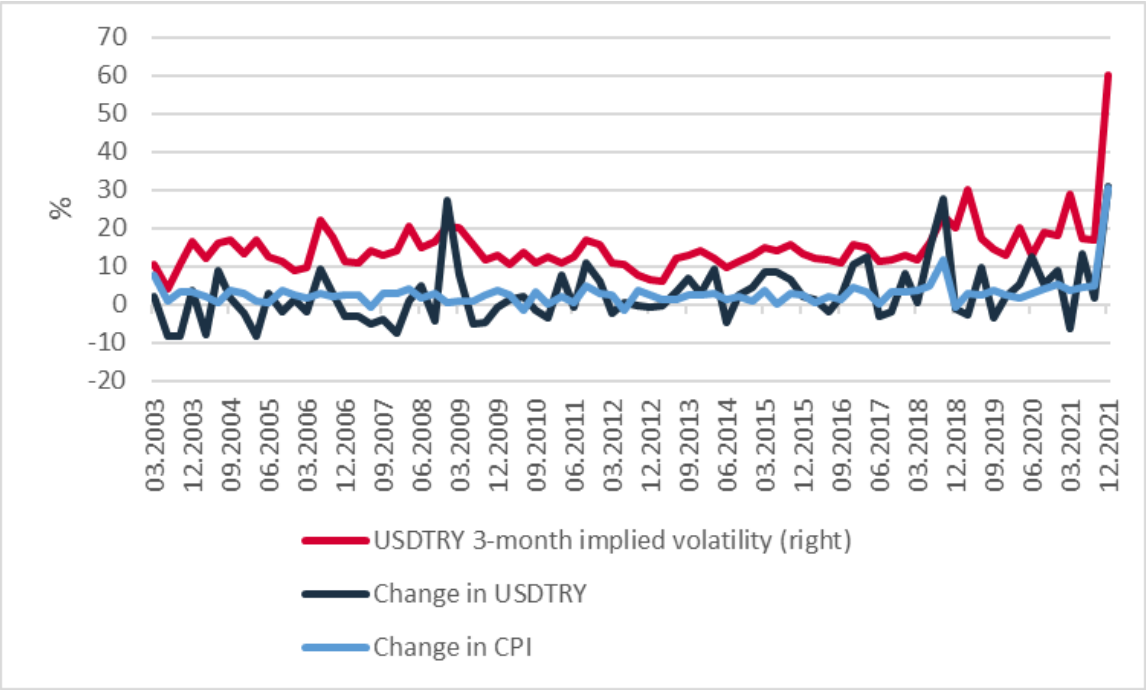


**Figure 4.5 USDTRY 3-month Volatility, Quarterly Change in USDTRY and CPI (Quarterly, %)**

Source: CBRT, TURKSTAT and Bloomberg

Under asset substitution phenomenon, the market development view considered response of households and firms to a market imperfection. A developed financial market provides residents and investors with the opportunity to maintain the real worth of their holdings. A robust financial market also gives investors the chance to quickly adjust to a climate of high inflation and macroeconomic instability by having high-yielding, liquid financial instruments that are priced in domestic currency available. Ize & Yeyati (2003) and Feige (2003) emphasize that a domestic financial market with no financial depth forces them to hold assets denominated in foreign currency and increase dollarization. Also, Ize (2005) underlines that while borrowers (firms) hold foreign currency denominated loans to optimize their objective function in presence of default risk, households prefer foreign currency denominated assets inspired by the safe haven motivation. In this study, the market development view is proxied by the external debt to GDP variable which represents market development and net exports to GDP variable which represents the ease of access to FX. Corrales & Imam (2019) explain that higher external debt to GDP is expected to result in higher foreign

exchange holdings for the corresponding debtor firms and Dooley (1997), Caballero & Krishnamurthy (2002) and Barajas & Morales (2003) point out that development and depth of the financial industry give rise to FX obligations for borrowers and bailout expectations. Also, Corrales & Imam (2019) states that net exports to GDP has an ambiguous influence on deposit dollarization and underline that net exports to GDP is likely to cause reduction on deposit dollarization, whereas Metin Ozcan & Us (2009) underline that after 2001 financial crisis, more external funding opportunities for the banking system thanks to arbitrage opportunities lead to higher asset dollarization and higher loan dollarization. Over the period shown in Figure 4.6, net exports to GDP is negative except in times of domestic crisis. External debt to GDP declines until the end of 2005 to 20.45% and increased thereafter until the end of 2020 up to 34.03%.

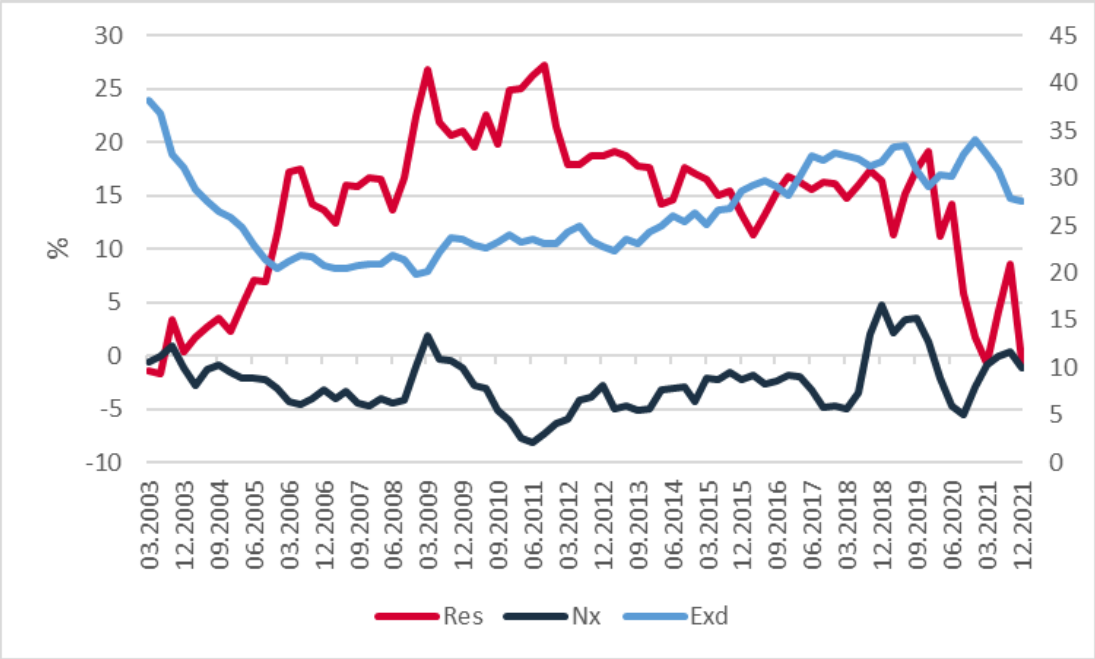


**Figure 4.6 Net International Reserve as a % of GDP, Net Exports as a % of GDP and External Debt as a% of GDP (Quarterly, %)**

Source: CBRT and Ministry of Treasury and Finance

Under asset substitution perspective, the third and the last view is the institutional view which is described that institutional failures triggers dollarization via feeding into new distortions, also when the power and structure of institutions are weak and this behavior exacerbates the level of dollarization. According to Savastano (1996), the institutional structure of the nation has a significant impact on the degree of

dollarization and shapes the dollarization process. Having a strong foreign exchange reserve position in developing economies contributes to eliminating the negative effects of internal and external shocks and increase confidence in the country (CBRT, 2010). Within the framework of the stand-by agreement with IMF covering the period of May 2005-May 2008, net international reserves are one of the performance criteria for 2005 (CBRT, 2005). Kilci (2019) point out that adequate reserve level is a crucial policy choice for preserving financial stability and lowering a nation's susceptibility to financial volatility. Economies may be more susceptible to financial crises due to inadequate reserves, which can increase the risks of investment, volatility of capital flows, and worries about the sustainability of external debt (IMF, 2011). Thus, in this study, net international reserves to GDP is used as a proxy of institutional strength. During the period shown in Figure 4.6, net international reserves to GDP ratio increased in general until Q3-2011 reaching a peak of 27%. However, this trend is reversed in the following period, after remaining fairly stationary between 2011 and 2018 it starts to decline rapidly and it plummeted in 2020.

### 4.1.c. Unit Root Tests

Testing the order of integration is a fundamental procedure in applied econometric studies since the order of integration is crucial to the selection of an appropriate econometric model for the analysis. There are numerous tests to determine the order of integration. These tests are known as unit root tests, and they are typically used as a descriptive tool to determine whether a series is stationary or non-stationary. One of the most widespread tests for order of integration is Augmented Dickey-Fuller (ADF) test. The other most used test for order of integration is Phillips-Perron (PP) test. The null hypothesis ($H_0$) for Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are that the series is non-stationary against the alternative hypothesis ($H_A$) representing that the series is stationary. Elliot et. al., (1996) state that the main reason that their focus on ADF test is that it is simple and there is no uniformly better alternative. Davidson and MacKinnon (2004) report that the PP test performs worse in finite samples than the ADF test. Table 4.4 illustrates ADF and PP Unit Root Test results for all variables.

As it is shown in Table 4.4, Hdol, Fdol, rl, Vol and Res are I(1) (integrated of order one) for both specifications and in both tests at 99% confidence level. rd variable also found as I(1) for both specifications and in both tests at 95% confidence level. The other dependent variable Loandol is I(0) (integrated of order zero) in both tests but just for Intercept and Trend specification at 99% confidence level. De and $\pi$ are I(0) for both specifications and in both tests at 99% confidence level. Exd variable is I(0) in both tests but for just Intercept and Trend specification at %99 confidence level. Similarly, Nx is I(0) for Intercept specification and in just ADF test at 99% confidence level and in PP test for Intercept specification at 90% confidence level.

**Table 4.4 Unit Root Test Results**

| Variable | Case | Statistics | Level | First Difference |
|---|---|---|---|---|
| Hdol | Intercept | ADF t-statistic | -1.379440 | -6.110228 |
| | | P value | 0.5880 | 0.0000*** |
| | | PP t-statistic | -1.499343 | -6.114578 |
| | | P value | 0.5286 | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -1.624031 | -7.999384 |
| | | P value | 0.7741 | 0.0000*** |
| | | PP t-statistic | -1.704698 | -7.833619 |
| | | P value | 0.7396 | 0.0000*** |
| Fdol | Intercept | ADF t-statistic | 0.785317 | -8.650961 |
| | | P value | 0.9932 | 0.0000*** |
| | | PP t-statistic | 1.200426 | -8.687826 |
| | | P value | 0.9979 | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -2.326558 | -9.01744 |
| | | P value | 0.4146 | 0.0000*** |
| | | PP t-statistic | -2.297068 | -9.015533 |
| | | P value | 0.4301 | 0.0000*** |
| Loandol | Intercept | ADF t-statistic | -2.695058 | -5.541747 |
| | | P value | 0.0796* | 0.0000*** |
| | | PP t-statistic | -2.605022 | -5.931825 |
| | | P value | 0.0965* | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -4.912315 | -6.400065 |
| | | P value | 0.0008*** | 0.0000*** |
| | | PP t-statistic | -4.612705 | -6.893506 |
| | | P value | 0.0020*** | 0.0000*** |
| De | Intercept | ADF t-statistic | -7.100939 | -7.497063 |
| | | P value | 0.0000*** | 0.0000*** |
| | | PP t-statistic | -7.100939 | -27.287240 |
| | | P value | 0.0000*** | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -8.401447 | -7.407300 |
| | | P value | 0.0000*** | 0.0000*** |
| | | PP t-statistic | -9.603972 | -26.536100 |
| | | P value | 0.0000*** | 0.0001*** |

**Table 4.4 (continued)**

| | | | | |
|---|---|---|---|---|
| $\pi$ | Intercept | ADF t-statistic | -3.627889 | -9.552767 |
| | | P value | 0.0073*** | 0.0000*** |
| | | PP t-statistic | -3.929279 | -9.368898 |
| | | P value | 0.0030*** | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -4.199737 | -9.754647 |
| | | P value | 0.0072*** | 0.0000*** |
| | | PP t-statistic | -4.199737 | -9.607748 |
| | | P value | 0.0072*** | 0.0000*** |
| rd | Intercept | ADF t-statistic | 0.375322 | -3.164647 |
| | | P value | 0.9805 | 0.0262** |
| | | PP t-statistic | -0.068845 | -3.439646 |
| | | P value | 0.9484 | 0.0126** |
| | Intercept&Trend | ADF t-statistic | -2.297476 | -3.871289 |
| | | P value | 0.4299 | 0.0184** |
| | | PP t-statistic | -1.362969 | -3.454427 |
| | | P value | 0.8638 | 0.0521* |
| rl | Intercept | ADF t-statistic | 0.418016 | -4.519572 |
| | | P value | 0.9824 | 0.0004*** |
| | | PP t-statistic | 0.703100 | -4.530063 |
| | | P value | 0.9915 | 0.0004*** |
| | Intercept&Trend | ADF t-statistic | -1,854306 | -4.583809 |
| | | P value | 0.6679 | 0.0022*** |
| | | PP t-statistic | -0.361267 | -4.605415 |
| | | P value | 0.9873 | 0.0021*** |
| Exd | Intercept | ADF t-statistic | -2.715753 | -5.242843 |
| | | P value | 0.0761* | 0.0000*** |
| | | PP t-statistic | -2.683534 | -5.947737 |
| | | P value | 0.0816* | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -4.682036 | -5.356055 |
| | | P value | 0.0016*** | 0.0002*** |
| | | PP t-statistic | -4.815408 | -6.087848 |
| | | P value | 0.0011*** | 0.0000*** |
| Nx | Intercept | ADF t-statistic | -3.836380 | -6.444125 |
| | | P value | 0.0040*** | 0.0000*** |
| | | PP t-statistic | -2.653157 | -6.300771 |
| | | P value | 0.0871* | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -3.957544 | -6.416995 |
| | | P value | 0.0144** | 0.0000*** |
| | | PP t-statistic | -2.757579 | -6.176287 |
| | | P value | 0.2175 | 0.0000*** |
| Vol | Intercept | ADF t-statistic | -2.539502 | -7.102853 |
| | | P value | 0.1104 | 0,0000*** |
| | | PP t-statistic | -2.312986 | -7.284908 |
| | | P value | 0.1706 | 0,0000*** |
| | Intercept&Trend | ADF t-statistic | -3.148012 | -7.076956 |
| | | P value | 0.1031 | 0,0000*** |
| | | PP t-statistic | -3.186253 | -7.213906 |
| | | P value | 0.0951* | 0,0000*** |
| Res | Intercept | ADF t-statistic | -2.044867 | -8.389099 |
| | | P value | 0.2675 | 0.0000*** |
| | | PP t-statistic | -1.888879 | -8.354807 |
| | | P value | 0.3358 | 0.0000*** |
| | Intercept&Trend | ADF t-statistic | -1.753328 | -7.121686 |
| | | P value | 0.7173 | 0.0000*** |
| | | PP t-statistic | -1.202351 | -13.16797 |
| | | P value | 0.9026 | 0.0001*** |

Rejection of null hypothesis is shown with * for 90 percent, ** for 95 percent and *** for 99 percent confidence levels.

## 4.2. Methodology

### 4.2.a. ARDL Cointegration Approach

Several cointegration tests have been introduced in the literature over the past two decades. The two most widely utilized cointegration strategies in recent years are Johansen's (1991) system-based reduced rank regression approach and Engle Granger's (1987) two-step residual-based strategy for testing the null of no-cointegration (Narayan et. al., 2003). These require all the variables to be I(1), hence having the same order of integration is crucial for estimation. This rule causes to pre-testing of the variables for unit roots.

Since both I(0) and I(1) variables are included in this study, the Engle Granger and Johansen cointegration tests are not appropriate for our analysis. Alternatively, Pesaran & Shin (1999) and later Pesaran, Shin & Smith (2001) established bounds testing (Autoregressive Distributed Lag (ARDL)) cointegration approach which is applied in this work. There are some justifications so as to choose this procedure. The Bounds testing strategy, in contrast to other multivariate cointegration techniques like Johansen cointegration, allows the cointegration relationship to be calculated by OLS after the ideal lag length of the model is determined. Moreover, in contrast to previous methods like the Engle Granger and Johansen cointegration approach, the Bounds testing procedure does not require pre-testing of the variables for unit roots. Whether the variables are I(0), I(1), or mutually cointegrated ,Bounds test can be used, and this test is invalid if there exists I(2) series. It is statistically superior in small or finite samples and is generally more effective in small data sizes. Therefore having variables with a mixed order of integration (I(1) and I(0)) and having a small sample size features this approach to be the appropriate one.

### 4.2.b. Error Correction Model (ECM)

Multivariate time series models include Error Correction Models. Error Correction Models calculate how quickly a dependent variable reaches equilibrium following a change in an explanatory factor. There are some justifications to use the ECMs. They allow to distinguish the short-term dynamics of the model from the long-term trends. Also, when dealing with both stationary and non-stationary variables, ECMs are

typically the most suitable models. Because it may "induce flexibility by merging the short-run dynamic and long-run equilibrium models in a unified system," ECMs are employed in a lot of studies (Nwachukwu T. E., Egwaikhide F. O., 2007). Since our study includes both stationary and non-stationary variables, ARDL cointegration analysis and ECM will be used to see if there is any evidence of a long-term relationship between dependent and independent variables as well as to analyze the short-term dynamics.

In brief, the ARDL approach's estimation is based on three steps. The bound test is used in the first phase to determine whether there is cointegration between the variables. If cointegration exists, the ARDL model is created for long-term coefficients in the second phase. The error correction model estimates short-term coefficients in the third phase. (Narayan, 2005)

# CHAPTER 5

# EMPRICAL RESULTS

In this section, the empirical results with economic and statistical perspectives are discussed. Determinants of dollarization is examined in three categories: households' deposit dollarization, firms' deposit dollarization and loan dollarization. Eviews 12 software is utilized for the econometric analysis of each empirical model. Models and results for long-term and short-term are described in the subsequent sections.

The empirical models are inspired by Corrales & Imam (2019) which shown as follows;

$$Dollar_{i,t} = \beta_0 + \beta_1 CurrSubs_{i,t} + \beta_2 Portfolio_{i,t} + \beta_3 MktDev_{i,t} + \beta_4 Access_{i,t} + \beta_5 Inst_{i,t} + \beta_6 Controls_{i,t} + \varepsilon_{i,t}$$

As explained in Chapter 4, ARDL approach is preferred for estimation. In addition, it is noted that the ARDL approach (Pesaran and Shin (1999), Pesaran et al. (2001) allows to examine the existence of a long-run relationship between dependent variables and independent variables as well as the short-term dynamics. In the rest of this chapter model specifications and estimation results will be presented for three dependent variables, namely households' deposit dollarization, firms deposit dollarization and loan dollarization.

## 5.1. Households' Deposit Dollarization

### 5.1.a. Model Specification

The empirical model that is used for the households' deposit dollarization are presented below:

$$\mathrm{Hdol}_t = \alpha_0 + \alpha_1 \mathrm{De}_t + \alpha_2 \pi_t + \alpha_3 \mathrm{rd}_t + \alpha_4 \mathrm{Exd}_t + \alpha_5 \mathrm{Nx}_t + \alpha_6 \mathrm{Res}_t + \epsilon_t \quad \textbf{(1)}$$

$$\mathrm{Hdol}_t = \gamma_0 + \gamma_1 \mathrm{De}_t + \gamma_2 \mathrm{Vol}_t + \gamma_3 \mathrm{rd}_t + \gamma_4 \mathrm{Exd}_t + \gamma_5 \mathrm{Nx}_t + \gamma_6 \mathrm{Res}_t + \varphi_t \quad \textbf{(2)}$$

$$\mathrm{Hdol}_t = \delta_0 + \delta_1 \pi_t + \delta_2 \mathrm{Vol}_t + \delta_3 \mathrm{rd}_t + \delta_4 \mathrm{Exd}_t + \delta_5 \mathrm{Nx}_t + \delta_6 \mathrm{Res}_t + \omega_t \quad \textbf{(3)}$$

While establishing the models, attention was paid to include proxies of all views in the literature namely currency substitution, portfolio, market development and institutional view. While De, $\pi$ and Vol proxies currency substitution view, portfolio view is proxied by rd and rl for deposit dollarization and loan dollarization respectively. The market development view is proxied by Exd variable and Nx variables which represents the ease of access to FX. Lastly, Res is Net International Reserve which proxies the institutional view. Additionally, since the currency substitution view dominates the empirical literature for Turkey (Selcuk 1994, Civcir 2001, Metin Ozcan & Us 2007, Terzi & Kurt 2007, Hekim 2008, Dumrul 2010, Saraç 2010) models are modified to capture this view as well and three different models were established for each dependent variable.

### 5.1.b. Lag Length Selection

The calculation of the ideal lag length for each model variable is a crucial step in ARDL modeling. Akaike information criterion (AIC) and Schwarz information criterion (SC) serve as the selection criteria for lag length.

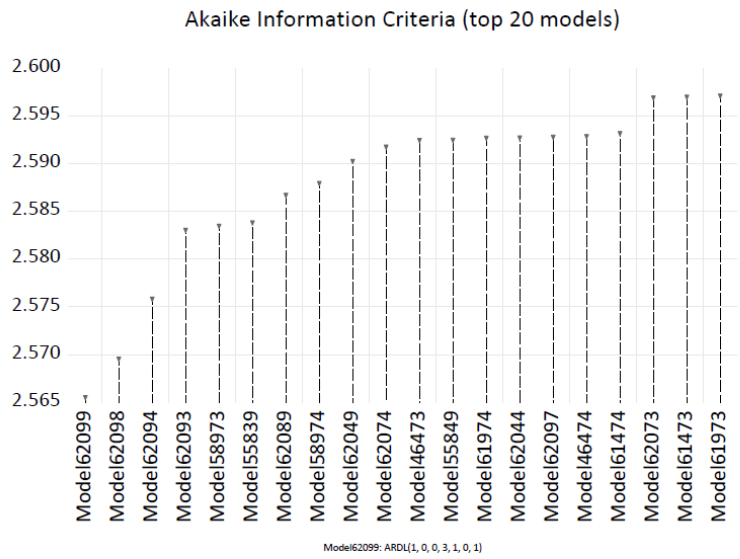


**Figure 5.1 Model Selection for Hdol (1)**

For model (1), lag length is selected by AIC and optimal model is chosen as (1,0,0,3,1,0,1) as illustrated in Figure 5.1.

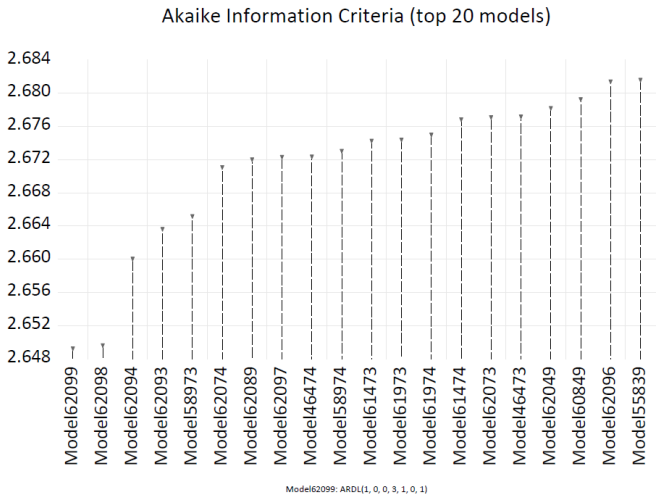


**Figure 5.2 Model Selection for Hdol (2)**

For model (2), lag length is selected by AIC and optimal model is chosen as (1,0,0,3,1,0,1) as illustrated in Figure 5.2.

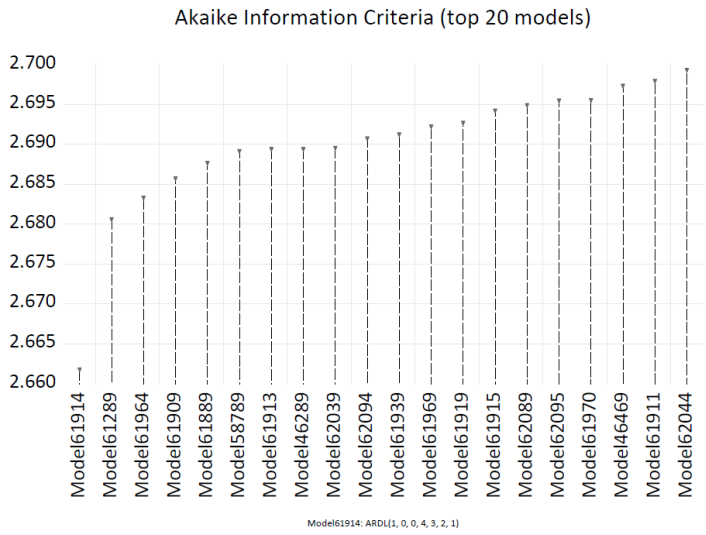


**Figure 5.3 Model Selection for Hdol (3)**

For model (3), lag length is selected by AIC and optimal model is chosen as (1,0,0,4,3,2,1) as illustrated in Figure 5.3.

### 5.1.c. Bounds Test

The hypotheses of cointegration are tested by using the general F-statistics. Comparisons are made between the obtained F-statistics and the critical values given by Peseran et al. (2001). F-statistics are tested according to two types of critical values. The lower level critical values are structured based on the assumption that all series are I(0) (stationary), as opposed to the upper level critical values, which are organized based on the assumption that all series are I(1), (non-stationary). Estimated F-statistics must be compared with the appropriate upper and lower critical values when the series are of mixed orders. There are two scenarios that could result in definite findings. One of them is that when the test statistic for the variables is below the lower critical value, the null of "$H_0$: *no levels relationship (no cointegration)*" cannot be rejected. The null hypothesis will be rejected when the statistic is higher than the upper critical value. It is interpreted that the test result is indecisive if the statistic is between the lower and upper boundaries (Pesaran & Pesaran, 1997).

**Table 5.1 F-Bounds Test Results**

| Model | F-statistics |
|---|---|
| Hdol (1) | 8.971104*** |
| Hdol (2) | 7.581453*** |
| Hdol (3) | 3.854570* |

* indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%.

**Table 5.2 Critical Value for F-Bounds Test**

| | Lower Bound Critical Value | Upper Bound Critical Value |
|---|---|---|
| Significance Level 10% | 2.6830 | 3.8070 |
| Significance Level 5% | 3.1070 | 4.3430 |
| Significance Level 1% | 4.0700 | 5.5340 |

According to the results shown in Table 5.1, the F-statistics of model 1 and 2 show that the null hypothesis is rejected at 99% confidence levels, meaning that there is cointegration among the variables of models 1 and 2. However, for model 3 test results indicate existence of cointegration only at 90% confidence level. Therefore, we concluded that the cointegration relationship is not a significant enough for this model. Hence, we continue to error correction modeling (ECM) for models 1 and 2.

**Table 5.3 Critical Value for t-Bounds Test**

| | Lower Bound Critical Value | Upper Bound Critical Value |
|---|---|---|
| Significance Level 10% | -3.13 | -4.37 |
| Significance Level 5% | -3.41 | -4.69 |
| Significance Level 1% | -3.96 | -5.31 |

**Table 5.4 t-Bounds Test Results**

| Model | t-statistics |
|---|---|
| Hdol (1) | -5.435511*** |
| Hdol (2) | -5.246437** |

* indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%.

Additionally, we can make use of Banerjee, Dolado, Mestre (1998) (BDM) t-bounds test for nonsensical cointegration check. There are two scenarios that could result in definite findings. One of them is that when the test statistic for the variables is below the lower critical value, the null of "$H_0$: *no levels relationship* (*nonsensical cointegration*)" cannot be rejected. The null hypothesis will be rejected when the statistic is higher than the upper critical value. It is interpreted that the test result is indecisive if the statistic is between the lower and upper boundaries. Therefore, these results from Table 5.4 indicate that t-Bounds test null hypothesis should be rejected and meaning that the cointegrating relationship is either of the usual kind, or is valid but degenerate.

### 5.1.d. Results of ARDL Long Run Estimates and ECM

Two separate ECMs based on the ARDL approach are developed to examine the short run and long run relationships. Diagnostics tests for both models are displayed in Table 5.5. Diagnostic tests are crucial because they show the statistical coherence of model

results. Diagnostic tests show that there is no heteroscedasticity (HC), autocorrelation (AC), and instability problems for neither of the models.

**Table 5.5 Diagnostic Test Results for the Model 1 and 2**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Test Name | Test Result | P value | Test Result | P value |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | 0.566866 | 0.8703 | 0.851695 | 0.6057 |
| Breusch-Godfrey Serial Correlation LM Test | 0.295793 | 0.7451 | 0.044318 | 0.9567 |
| Jarque-Bera Normality Test | 0.549878 | 0.7596 | 1.008744 | 0.6039 |
| Ramsey RESET Test | 0.008896 | 0.9929 | 0.057609 | 0.9543 |

**Table 5.6 Estimated Long Run Coefficients using the ARDL Approach for Models 1 and 2**

| | Dependent Variable: Hdol | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | | Model 2 | | |
| Variable Name | Coefficient | T-Statistic | P value | Coefficient | T-Statistic | P value |
| De | 0.519495 | 1.560038 | 0.1241 | 0.530413 | 1.312766 | 0.1943 |
| Vol | - | - | - | 0.288935 | 1.548935 | 0.1267 |
| $\pi$ | 1.129429** | 2.480408 | 0.0160 | - | - | - |
| rd | -0.128119 | -0.37732 | 0.7073 | -0.388494 | -0.754442 | 0.4536 |
| Exd | 0.171317 | 0.498468 | 0.6200 | 0.261417 | 0.703109 | 0.4848 |
| Nx | 0.992233*** | 2.777363 | 0.0073 | 0.966546** | 2.112494 | 0.0389 |
| Res | -0.610995*** | -4.470283 | 0.0000 | -0.640452*** | -3.99077 | 0.0002 |
| * indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%. | | | | | | |

The long-run estimation results are illustrated in Table 5.6 for model 1 and 2. For households' deposit dollarization, the coefficients of Nx and Res are significant at 99% confidence level in model 1. The coefficients of Nx and Res are significant at 95% and

99% confidence level respectively in model 2. As expected, while the coefficient of Nx is positive, the coefficient of Res is negative. Additionally, the coefficient of $\pi$ is significant at 95% confidence level in model 1 inflation has a positive effect on household's deposit dollarization in the long-run. In the long-term analysis, the results are in accordance with the literature, because Heymann & Leijonhufvud (1995), Calvo & Vegh (1997), Savastano (1996), Baliño et al. (1999), De Nicolo et al. (2005) and Metin Ozcan & Us (2007) explains that in the currency substitution higher levels of inflation causes higher deposit dollarization. Additionally, Savastano (1996), Ize & Levy Yeyati (2003), Honohan (2005) and Corrales et al. (2016) advocate the institutional structure also plays a crucial role in dollarization and the results of our long-term analysis is in compliance with the literature. Taking all this into account, we can conclude that for households' deposit dollarization in Turkey during the analysis period, currency substitution and institutional view predominate. Also, access to FX finance is one of the determinants for households' deposit dollarization. Exchange rate depreciation, volatility, real interest rate and external debt to GDP do not seem to have a significant influence on households' deposit dollarization. Therefore, the portfolio view does not explain why households hold FX. However, the results show some evidence for the currency substitution and institutional views explaining households' deposit dollarization.

**Table 5.7 Error Correction Representation for the Models 1 and 2**

| | Dependent Variable: Hdol | | | | Dependent Variable: Hdol | | |
|---|---|---|---|---|---|---|---|
| | Model 1 | | | | Model 2 | | |
| Variable Name | Coefficient | T-Statistic | P value | Variable Name | Coefficient | T-Statistic | P value |
| C | 3.610199*** | 6.288097 | 0.0000 | C | 3.614068*** | 5.809763 | 0.000000 |
| @TREND | 0.001359 | 0.26578 | 0.7913 | @TREND | -0.004366 | -0.751258 | 0.455500 |
| D(RD) | 0.00431 | 0.184319 | 0.8544 | D(RD) | -0.018749 | -0.768057 | 0.445500 |
| D(RD(-1)) | 0.041723 | 1.204128 | 0.2333 | D(RD(-1)) | 0.012398 | 0.356734 | 0.722600 |
| D(RD(-2)) | 0.105464*** | 3.33703 | 0.0015 | D(RD(-2)) | 0.119827*** | 3.614033 | 0.000600 |
| D(EXD) | 0.329743*** | 3.520534 | 0.0008 | D(EXD) | 0.259784*** | 2.688332 | 0.009300 |
| D(RES) | -0.171193*** | -4.805383 | 0.0000 | D(RES) | -0.183893*** | -4.922653 | 0.000000 |
| CointEq(-1)* | -0.123051*** | -8.317688 | 0.0000 | CointEq(-1)* | -0.126834*** | -7.646381 | 0.000000 |
| R-squared | 0.744569 | | | R-squared | 0.722397 | | |
| Adjusted R-squared | 0.717061 | | | Adjusted R-squared | 0.692502 | | |
| * indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%. | | | | | | | |

The short-run estimation results are illustrated in Table 5.7 for model 1 and 2. Net international reserves seem to have negative effect on households' deposit

dollarization in the short run for models 1 and 2 similar to the long run as it is illustrated in Table 5.6. It is observed that 2 quarter lagged effects of real deposit rate is positive for both models. Additionally, external debt to GDP has positive effect on households' deposit dollarization in the short-run, whereas it does not have significant effect in the long-run. The results of the ECM based on ARDL approach show that the coefficient of error correction term is negative (-0.12) and highly significant, indicating that while there may be short-term deviations from the equilibrium, they eventually come back to the long-run equilibrium after approximately 21 quarters. Moreover, the negative coefficient of error correction term supports the cointegration inferring from the Bounds Test Results showed in Table 5.1.

### 5.2. Firms' Deposit Dollarization

#### 5.2.a. Model Specification

The models that are estimated for firms' deposit dollarization are presented in equations 4-6. The independent variables are explained in section 5.1.a.

$$\mathrm{Fdol}_t = \alpha_0 + \alpha_1 \mathrm{De}_t + \alpha_2 \pi_t + \alpha_3 \mathrm{rd}_t + \alpha_4 \mathrm{Exd}_t + \alpha_5 \mathrm{Nx}_t + \alpha_6 \mathrm{Res}_t + \epsilon_t \quad \textbf{(4)}$$

$$\mathrm{Fdol}_t = \gamma_0 + \gamma_1 \mathrm{De}_t + \gamma_2 \mathrm{Vol}_t + \gamma_3 \mathrm{rd}_t + \gamma_4 \mathrm{Exd}_t + \gamma_5 \mathrm{Nx}_t + \gamma_6 \mathrm{Res}_t + \varphi_t \quad \textbf{(5)}$$

$$\mathrm{Fdol}_t = \delta_0 + \delta_1 \pi_t + \delta_2 \mathrm{Vol}_t + \delta_3 \mathrm{rd}_t + \delta_4 \mathrm{Exd}_t + \delta_5 \mathrm{Nx}_t + \delta_6 \mathrm{Res}_t + \omega_t \quad \textbf{(6)}$$

### 5.2.b. Lag Length Selection

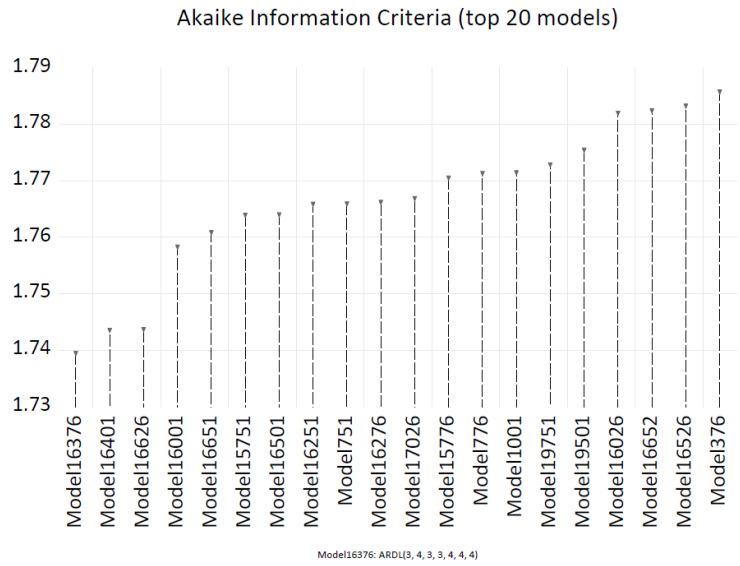


**Figure 5.4 Model Selection for Fdol (4)**

For model (4), lag length is selected by AIC and optimal model is chosen as (3,4,3,3,4,4,4) as illustrated in Figure 5.4.

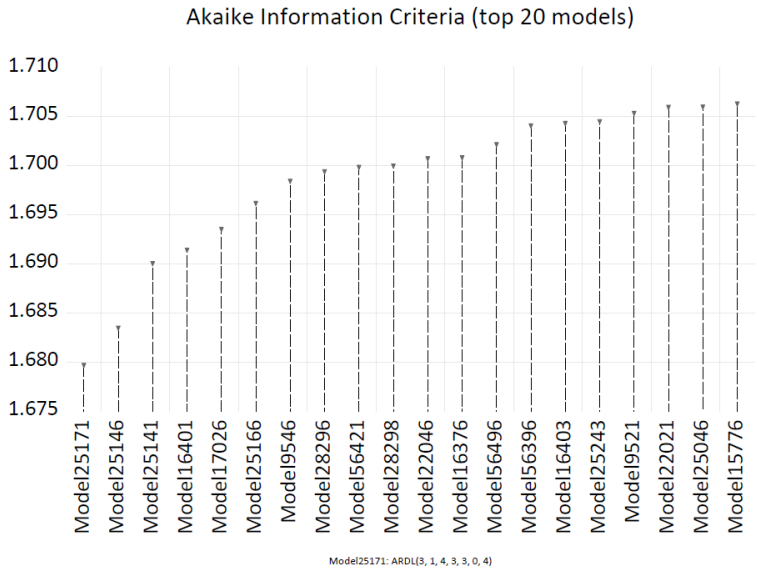


**Figure 5.5 Model Selection for Fdol (5)**

For model (5), lag length is selected by AIC and optimal model is chosen as (3,1,4,3,3,0,4) as illustrated in Figure 5.5.

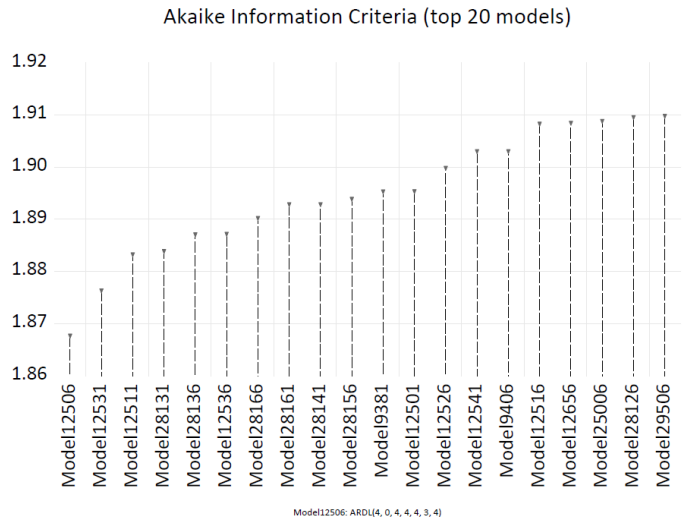


**Figure 5.6 Model Selection for Fdol (6)**

For model (6), lag length is selected by AIC and optimal model is chosen as (4,0,4,4,4,3,4) as illustrated in Figure 5.6.

### 5.2.c. Bounds Test

**Table 5.8 F-Bounds Test Results**

| Model | F-statistics |
|---|---|
| Fdol (4) | 4.328856* |
| Fdol (5) | 8.069169*** |
| Fdol (6) | 4.772798** |

* indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%.

**Table 5.9 t-Bounds Test Results**

| Model | t-statistics |
|---|---|
| Fdol (5) | -4.642775* |
| Fdol (6) | -4.432621* |

* indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%.

According to the results shown in Table 5.8, the F-statistics of model 5 and 6 show that the null hypothesis is rejected at 99% and 95% confidence levels respectively, implying that there is cointegration among the variables of models 5 and 6. However, for model 4 test results indicate existence of cointegration only at 90% confidence level. Therefore, we concluded that the cointegration relationship is not significant enough for this model. Thus, we continue to error correction modeling (ECM) for models 5 and 6. Also, Table 5.9 shows that that t-Bounds test null hypothesis should be rejected for both models at 90% confidence levels.

### 5.2.d. Results of ARDL Long Run Estimates and ECM

**Table 5.10 Diagnostic Test Results for the Model 5 and 6**

| | Model 5 | | Model 6 | |
|---|---|---|---|---|
| Test Name | Test Result | P value | Test Result | P value |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | 0.967945 | 0.5228 | 0.534611 | 0.9616 |
| Breusch-Godfrey Serial Correlation LM Test | 0.039641 | 0.9612 | 0.274369 | 0.7615 |
| Jarque-Bera Normality Test | 0.253279 | 0.8810 | 3.197398 | 0.6039 |
| Ramsey RESET Test | 1.503011 | 0.1398 | 0.057609 | 0.2022 |

Diagnostic tests display that there is no heteroscedasticity (HC), autocorrelation (AC), and instability problems for models 5 and 6 (Table 5.10).

**Table 5.11 Estimated Long Run Coefficients using the ARDL Approach for the Model 5 and 6**

| | Dependent Variable: Fdol | | | | | |
|---|---|---|---|---|---|---|
| | Model 5 | | | Model 6 | | |
| Variable Name | Coefficient | T-Statistic | P value | Coefficient | T-Statistic | P value |
| De | 0.152564*** | 3.379006 | 0.0015 | - | - | - |
| Vol | 0.1987*** | 3.892113 | 0.0003 | 0.148111*** | 3.526044 | 0.0011 |
| $\pi$ | - | - | - | 0.124162*** | 2.700706 | 0.0100 |
| rd | -0.032026 | -0.615535 | 0.5412 | 0.039432 | 0.809437 | 0.4229 |
| Exd | 0.130177** | 2.401929 | 0.0204 | 0.065064 | 1.440858 | 0.1572 |
| Nx | 0.009282 | 0.170846 | 0.8651 | 0.077962 | 1.215902 | 0.2310 |
| Res | -0.051688** | -2.297872 | 0.0262 | -0.029163 | -1.47855 | 0.1469 |
| * indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%. | | | | | | |

The long-run estimation results are illustrated in Table 5.11 for model 5 and 6. For firms' deposit dollarization, the coefficients of De and Vol are significant at 99% confidence level in model 5. The coefficient of Vol is significant at 99% confidence level in model 6. Additionally, Table 5.11 indicates that $\pi$ is significant at 99% confidence level with Vol in model 6. As expected, the coefficients of De, Vol and $\pi$ are positive. Thus, it is observed that currency substitution view predominates for firms' deposit dollarization similar to households' deposit dollarization. According to model 5 results, the coefficients of Exd and Res are significant at 95% confidence level and as expected, the coefficient of Exd is positive, while the coefficient of Res is negative. Thus, it is found that external debt to GDP has a positive impact on firms' deposit dollarization, whereas net international reserves has a negative effect on it in the long-run. In compliance with the literature (Levy-Yeyati, 2006 and Corrales &

Imam, 2019), our long-run results indicate that larger levels of external debt to GDP has positive effect on firms' deposit dollarization. Therefore, in addition to currency substitution perspective, market development and institutional views are among the determinants of firms' deposit dollarization. Real interest rate and net exports to GDP does not seem to have a significant influence on firms' deposit dollarization. Thus, the portfolio view and access to FX finance cannot explain why firms hold FX deposits.

**Table 5.12 Error Correction Representation for the Model 5 and 6**

| | Dependent Variable: Fdol | | | | Dependent Variable: Fdol | | |
|---|---|---|---|---|---|---|---|
| | Model 5 | | | | Model 6 | | |
| Variable Name | Coefficient | T-Statistic | P value | Variable Name | Coefficient | T-Statistic | P value |
| C | 2.583865*** | 6.983908 | 0.0000 | C | 4.048868*** | 5.862521 | 0.0000 |
| @TREND | 0.060417*** | 7.963673 | 0.0000 | @TREND | 0.118849*** | 6.363533 | 0.0000 |
| D(FDOL(-1)) | 0.09488 | 0.997344 | 0.3238 | D(FDOL(-1)) | 0.381906*** | 2.888927 | 0.0061 |
| D(FDOL(-2)) | 0.218352** | 2.371137 | 0.0220 | D(FDOL(-2)) | 0.45836*** | 3.654233 | 0.0007 |
| D(DE) | 0.070669*** | 6.929722 | 0.0000 | D(FDOL(-3)) | 0.187821 | 1.597212 | 0.1179 |
| D(VOL) | 0.040418*** | 3.247655 | 0.0022 | D(VOL) | 0.045681*** | 3.128927 | 0.0032 |
| D(VOL(-1)) | -0.098272*** | -3.985222 | 0.0002 | D(VOL(-1)) | -0.066271** | -2.340844 | 0.0242 |
| D(VOL(-2)) | -0.034517 | -1.495977 | 0.1415 | D(VOL(-2)) | -0.025544 | -0.988877 | 0.3285 |
| D(VOL(-3)) | -0.058942*** | -3.090063 | 0.0034 | D(VOL(-3)) | -0.058905** | -2.44321 | 0.019 |
| D(RD) | 0.011815 | 0.631488 | 0.5308 | D(RD) | 0.048932** | 2.202852 | 0.0333 |
| D(RD(-1)) | -0.005108 | -0.188126 | 0.8516 | D(RD(-1)) | -0.04788 | -1.59836 | 0.1176 |
| D(RD(-2)) | 0.125494*** | 4.774075 | 0.0000 | D(RD(-2)) | 0.09545*** | 3.007232 | 0.0045 |
| D(EXD) | 0.061835 | 0.944182 | 0.3500 | D(RD(-3)) | -0.060164** | -2.176375 | 0.0353 |
| D(EXD(-1)) | -0.105066 | -1.595397 | 0.1175 | D(EXD) | 0.092413 | 1.209812 | 0.2333 |
| D(EXD(-2)) | -0.134328** | -2.266054 | 0.0282 | D(EXD(-1)) | -0.250947*** | -3.232775 | 0.0024 |
| D(RES) | -0.054116* | -1.980042 | 0.0537 | D(EXD(-2)) | -0.259388*** | -3.44134 | 0.0013 |
| D(RES(-1)) | -0.073422*** | -2.706954 | 0.0095 | D(EXD(-3)) | 0.100233 | 1.404502 | 0.1677 |
| D(RES(-2)) | -0.013522 | -0.523775 | 0.6029 | D(NX) | 0.141374** | 2.269905 | 0.0285 |
| D(RES(-3)) | 0.051596** | 2.113468 | 0.0400 | D(NX(-1)) | -0.109595* | -1.822989 | 0.0756 |
| CointEq(-1)* | -0.616519*** | -7.990725 | 0.0000 | D(NX(-2)) | -0.093254* | -1.706862 | 0.0954 |
| | | | | D(RES) | -0.015724 | -0.503622 | 0.6172 |
| | | | | D(RES(-1)) | -0.03898 | -1.31094 | 0.1972 |
| | | | | D(RES(-2)) | -0.037527 | -1.275838 | 0.2092 |
| | | | | D(RES(-3)) | 0.071262** | 2.511833 | 0.016 |
| | | | | CointEq(-1)* | -0.874081*** | -6.188602 | 0.0000 |
| R-squared | 0.787222 | | | R-squared | 0.776509 | | |
| Adjusted R-squared | 0.709476 | | | Adjusted R-squared | 0.662385 | | |
| * indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%. | | | | | | | |

The short-run estimation results are illustrated in Table 5.12 for models 5 and 6. Increase in firms' dollarization two quarters ago influences firms' dollarization positively in model 5, while increase in firms' dollarization one and two quarters ago influences firms' dollarization positively in model 6. Depreciation in exchange rate seem to have positive effect on firms' deposit dollarization in the short run in model 5, whereas it does not have a significant impact in model 6. Volatility in the short-run has positive impact on firms' dollarization similar to long-run and the coefficient of volatility turns negative for one quarter ago and the coefficients of volatility one and

three quarters back are significant and affects firms' dollarization negatively for both models. Real deposit rate affects firms' dollarization positively in short-run and real deposit rate two quarters ago has positive impact on it, however, its coefficient turns negative for three quarters back in model 6. In model 5, real deposit rate two quarters ago just affects firms' dollarization positively. External debt to GDP two quarter back influences negatively firms' dollarization, while external debt to GDP one and two quarter ago affects negatively it. For model 5, net intranational reserves one quarter back affects negatively firms' dollarization, its coefficient turns positive for three quarters ago. For model 6, net international reserves three quarters ago just stimulate firms' dollarization. Additionally, the results of the ECM based on ARDL approach show that the coefficient of error correction term is determined to be negative (-0.62 for model 5 and -0.87 for model 6) and highly significant, indicating that while there may be short-term deviations from equilibrium, they return to the long-run equilibrium shortly. Moreover, the negative coefficient of the error correction term supports the Bounds Test Results showed in Table 5.8.

### 5.3. Loan Dollarization

#### 5.3.a. Model Specification

The models that are estimated for loan dollarization are presented in equations 7-9. The independent variables are explained in section 5.1.a.

$$\text{Loandol}_t = \alpha_0 + \alpha_1 \text{De}_t + \alpha_2 \pi_t + \alpha_3 \text{rl}_t + \alpha_4 \text{Exd}_t + \alpha_5 \text{Nx}_t + \alpha_6 \text{Res}_t + \epsilon_t \quad \textbf{(7)}$$

$$\text{Loandol}_t = \gamma_0 + \gamma_1 \text{De}_t + \gamma_2 \text{Vol}_t + \gamma_3 \text{rl}_t + \gamma_4 \text{Exd}_t + \gamma_5 \text{Nx}_t + \gamma_6 \text{Res}_t + \varphi_t \quad \textbf{(8)}$$

$$\text{Loandol}_t = \delta_0 + \delta_1 \pi_t + \delta_2 \text{Vol}_t + \delta_3 \text{rl}_t + \delta_4 \text{Exd}_t + \delta_5 \text{Nx}_t + \delta_6 \text{Res}_t + \omega_t \quad \textbf{(9)}$$

### 5.3.b. Lag Length Selection

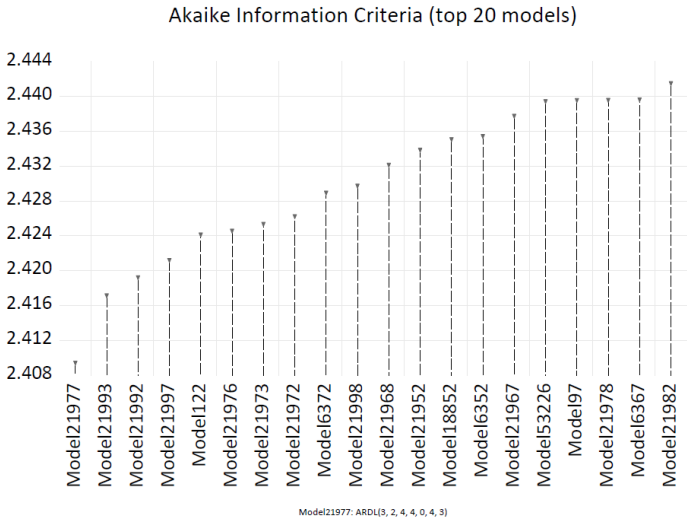


**Figure 5.7 Model Selection for Loandol (7)**

For model (7), lag length is selected by AIC and optimal model is chosen as (3,2,4,4,0,4,3) as illustrated in Figure 5.7.

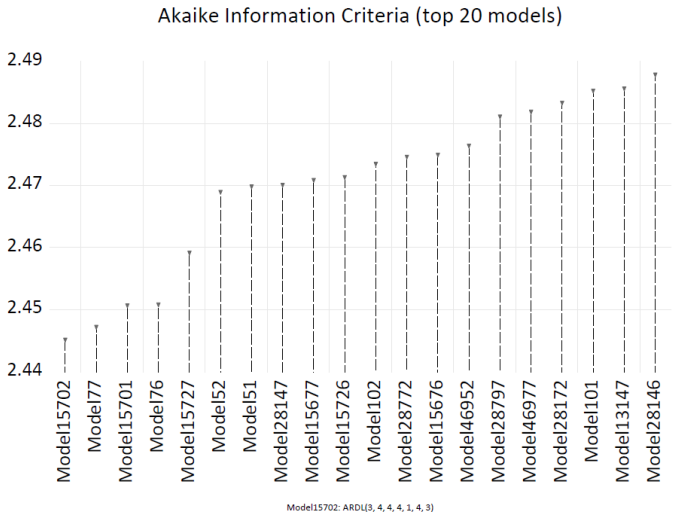


**Figure 5.8 Model Selection for Loandol (8)**

For model (8), lag length is selected by AIC and optimal model is chosen as (3,4,4,4,1,4,3) as illustrated in Figure 5.8.

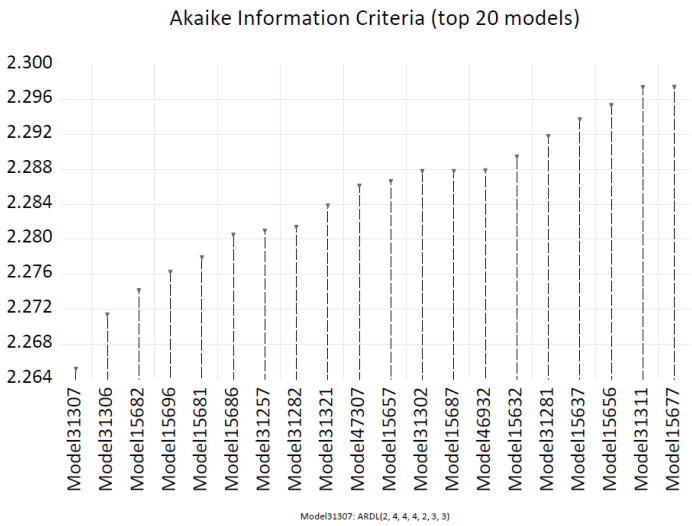


**Figure 5.9 Model Selection for Loandol (9)**

For model (9), lag length is selected by AIC and optimal model is chosen as (2,4,4,4,2,3,3) as illustrated in Figure 5.9.

### 5.3.c. Bounds Test

**Table 5.13 F-Bounds Test Results**

| Model | F-statistics |
|---|---|
| Loandol (7) | 4.628644** |
| Loandol (8) | 4.616477** |
| Loandol (9) | 12.47263*** |

* indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%.

**Table 5.14 t-Bounds Test Results**

| Model | t-statistics |
|---|---|
| Loandol (7) | -2.875216 |
| Loandol (8) | -4.561592* |
| Loandol (9) | -4.902078** |

* indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%.

The F-statistics for models 7, 8 and 9 show that the null hypothesis is rejected at 99% confidence levels for model 9 and 95% confidence levels for model 7 and 8. These results which are presented in Table 5.13 imply that there is cointegration among the variables of all models. Accordingly, we continue to error correction modeling (ECM) for all models. Additionally, Table 5.14 indicates that for Model 7, we fail to reject the t-Bounds test null hypothesis and resulting that the cointegration relationship is nonsensical. t-Bounds test null hypothesis should be rejected at 90% and 95% confidence levels for model 8 and 9 respectively.

### 5.3.d. Results of ARDL Long Run Estimates and ECM

**Table 5.15 Diagnostic Test Results for the Model 7, 8 and 9**

| | Model 7 | | Model 8 | | Model 9 | |
|---|---|---|---|---|---|---|
| Test Name | Test Result | P value | Test Result | P value | Test Result | P value |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | 0.799323 | 0.7288 | 0.606227 | 0.9221 | 0.577198 | 0.9385 |
| Breusch-Godfrey Serial Correlation LM Test | 0.869913 | 0.4264 | 0.410113 | 0.6664 | 0.115298 | 0.8914 |
| Jarque-Bera Normality Test | 4.526213 | 0.1040 | 1.158280 | 0.5604 | 2.306949 | 0.3155 |
| Ramsey RESET Test | 0.498645 | 0.6206 | 1.132042 | 0.2644 | 0.287864 | 0.7749 |

Diagnostic tests show that there is no heteroscedasticity (HC), autocorrelation (AC), and instability problems for models 7, 8 and 9 (Table 5.15).

**Table 5.16 Estimated Long Run Coefficients using the ARDL Approach for the Model 7, 8 and 9**

| | Dependent Variable: Loandol | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model 7 | | | Model 8 | | | Model 9 | | |
| Variable Name | Coefficient | T-Statistic | P value | Coefficient | T-Statistic | P value | Coefficient | T-Statistic | P value |
| De | -1.493466 | -0.619334 | 0.5389 | 1.284436** | 2.522915 | 0.0156 | - | - | - |
| Vol | - | - | - | -2.12561*** | -4.246709 | 0.0001 | -1.031925** | -2.233569 | 0.0309 |
| $\pi$ | -20.65667 | -1.006088 | 0.3199 | - | - | - | -9.318814** | -2.49366 | 0.0167 |
| rl | -9.120067 | -0.913175 | 0.3661 | -1.194528 | -1.373814 | 0.1770 | -2.778977** | -2.676408 | 0.0106 |
| Exd | 7.376246 | 1.221646 | 0.2283 | 0.759851 | 1.121032 | 0.2688 | 2.640201*** | 3.495581 | 0.0011 |
| Nx | 9.914383 | 0.91552 | 0.3649 | 2.577176** | 2.021666 | 0.0498 | 3.398514*** | 2.83242 | 0.0071 |
| Res | 2.283831 | 0.83115 | 0.4104 | 0.593473 | 1.532193 | 0.1332 | 1.024522*** | 3.400533 | 0.0015 |
| * indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%. | | | | | | | | | |

The long-run estimation results are illustrated in Table 5.16 for all models. For model 7, none of the coefficients are significant in the long-run. For model 8, the coefficients of De and Vol are significant at 95% and 99% confidence levels respectively. Additionally, Table 5.16 indicates that Nx is significant at 95% confidence level in model 8. As expected, Nx and De have positive effect on loan dollarization, while Vol has negative impact on loan dollarization. As previously found in the literature (Corrales et al., 2015 and Corrales & Imam, 2019), long-run results indicates that larger levels of net exports to GDP has positive effect on loan dollarization as the availability of the FX or potential to earn FX reduces the FX risks and induces FX borrowing. Additionally, long-run results show that larger levels of expected volatility in the exchange rate has negative impact on loan dollarization as it implies an increase in the expected risks of borrowing in FX. For model 9, in addition to Vol and Nx, the coefficients of Res and Exd are significant at 99% confidence level and the coefficients of rl and $\pi$ are significant at 95% confidence level. Net international reserves and external debt to GDP have positive effect on loan dollarization, whereas inflation and real lending rate have negative effect on loan dollarization. As a result, for both models, the coefficients of Vol and Nx are significant, thus, it is observed that currency substitution and institutional views seems to explain loan dollarization. However, estimation results of model 9 finds evidence for all of the views as all the coefficients are significant and all have the expected effect on dollarization.

**Table 5.17 Error Correction Representation for the Model 7, 8 and 9**

| | Dependent Variable: Loandol | | | | Dependent Variable: Loandol | | | | Dependent Variable: Loandol | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 7 | | | | Model 8 | | | | Model 9 | | |
| Variable Name | Coefficient | T-Statistic | P value | Variable Name | Coefficient | T-Statistic | P value | Variable Name | Coefficient | T-Statistic | P value |
| C | 0.255034 | 1.152008 | 0.2555 | C | 3.968093*** | 5.738658 | 0.0000 | C | 1.478846*** | 5.81641 | 0.0000 |
| @TREND | -0.047162*** | -5.175742 | 0.0000 | @TREND | -0.008917 | -1.669236 | 0.1027 | @TREND | -0.030825*** | -5.49096 | 0.0000 |
| D(LOANDOL(-1)) | -0.104814 | -0.969521 | 0.3376 | D(LOANDOL(-1)) | -0.069608 | -0.667294 | 0.5083 | D(LOANDOL(-1)) | -0.169311* | -1.804874 | 0.0783 |
| D(LOANDOL(-2)) | 0.213537** | 2.52912 | 0.0151 | D(LOANDOL(-2)) | 0.22815** | 2.296917 | 0.0268 | D(VOL) | 0.04255 | 0.823722 | 0.4148 |
| D(DE) | 0.067834*** | 4.132949 | 0.0002 | D(DE) | 0.068131*** | 3.269158 | 0.0022 | D(VOL(-1)) | 0.646694*** | 7.510295 | 0.0000 |
| D(DE(-1)) | 0.058633*** | 3.015163 | 0.0043 | D(DE(-1)) | -0.087173*** | -3.403121 | 0.0015 | D(VOL(-2)) | 0.459495*** | 6.231657 | 0.0000 |
| D($\pi$) | 0.146849*** | 3.064156 | 0.0037 | D(DE(-2)) | -0.094019*** | -4.100021 | 0.0002 | D(VOL(-3)) | 0.188959*** | 3.287195 | 0.0020 |
| D($\pi$(-1)) | 0.447751*** | 4.65682 | 0.0000 | D(DE(-3)) | -0.036451** | -2.332691 | 0.0247 | D($\pi$) | 0.091765*** | 4.622049 | 0.0000 |
| D($\pi$(-2)) | 0.366026*** | 4.379644 | 0.0001 | D(VOL) | 0.058465*** | 2.962047 | 0.0051 | D($\pi$(-1)) | 0.204433*** | 6.614464 | 0.0000 |
| D($\pi$(-3)) | 0.204074*** | 3.475293 | 0.0012 | D(VOL(-1)) | 0.213156*** | 5.114418 | 0.0000 | D($\pi$(-2)) | 0.115404*** | 4.151265 | 0.0002 |
| D(RL) | -0.012269 | -0.45565 | 0.6509 | D(VOL(-2)) | 0.153897*** | 3.952435 | 0.0003 | D($\pi$(-3)) | 0.08246*** | 3.153825 | 0.0030 |
| D(RL(-1)) | 0.115327* | 1.983767 | 0.0535 | D(VOL(-3)) | 0.09442*** | 2.809037 | 0.0076 | D(RL) | -0.011077 | -0.404592 | 0.6878 |
| D(RL(-2)) | 0.04634 | 1.275051 | 0.2090 | D(RL) | -0.027731 | -0.964764 | 0.3403 | D(RL(-1)) | 0.066458 | 1.490783 | 0.1435 |
| D(RL(-3)) | 0.091696** | 2.651646 | 0.0111 | D(RL(-1)) | -0.066213 | -1.480154 | 0.1465 | D(RL(-2)) | 0.043303 | 1.274035 | 0.2097 |
| D(NX) | 0.366913*** | 4.033131 | 0.0002 | D(RL(-2)) | 0.013343 | 0.341112 | 0.7348 | D(RL(-3)) | 0.08592*** | 2.761459 | 0.0085 |
| D(NX(-1)) | -0.025742 | -0.279257 | 0.7814 | D(RL(-3)) | 0.112811*** | 3.050907 | 0.0040 | D(EXD) | -0.064027 | -0.675532 | 0.5030 |
| D(NX(-2)) | 0.136287 | 1.532614 | 0.1325 | D(EXD) | -0.100764 | -0.921597 | 0.3621 | D(EXD(-1)) | -0.266302*** | -2.761202 | 0.0085 |
| D(NX(-3)) | -0.137794* | -2.009332 | 0.0507 | D(NX) | 0.202201** | 2.196432 | 0.0338 | D(NX) | 0.423511*** | 5.378753 | 0.0000 |
| D(RES) | 0.031834 | 0.954877 | 0.3449 | D(NX(-1)) | -0.050572 | -0.533106 | 0.5968 | D(NX(-1)) | -0.152355* | -1.834102 | 0.0737 |
| D(RES(-1)) | 0.068458* | 1.894064 | 0.0648 | D(NX(-2)) | -0.020787 | -0.231716 | 0.8179 | D(NX(-2)) | 0.166765** | 2.396052 | 0.0211 |
| D(RES(-2)) | -0.074513* | -2.0753 | 0.0438 | D(NX(-3)) | -0.310662*** | -3.889007 | 0.0004 | D(RES) | 0.071613** | 2.087984 | 0.0429 |
| CointEq(-1)* | -0.026135*** | -6.067846 | 0.0000 | D(RES) | 0.04979 | 1.25312 | 0.2173 | D(RES(-1)) | 0.043694 | 1.236227 | 0.2232 |
| | | | | D(RES(-1)) | 0.058154 | 1.37909 | 0.1753 | D(RES(-2)) | -0.151375*** | -4.368867 | 0.0001 |
| | | | | D(RES(-2)) | -0.119092*** | -2.722319 | 0.0095 | CointEq(-1)* | -0.097049*** | -9.989048 | 0.0000 |
| | | | | CointEq(-1)* | -0.10332*** | -6.086412 | 0.0000 | | | | |
| R-squared | 0.897967 | | | R-squared | 0.902708 | | | R-squared | 0.916447 | | |
| Adjusted R-squared | 0.855113 | | | Adjusted R-squared | 0.853028 | | | Adjusted R-squared | 0.876411 | | |
| * indicates significance for confidence levels of 90%, ** for 95%, and *** for 99%. | | | | | | | | | | | |

The short-run estimation results are illustrated in Table 5.17 for models 7, 8 and 9. It is observed that 2 quarters lagged effects of loan dollarization rate are significant and positive for models 7 and 8, whereas 1 quarter lagged effect is significant and negative for model 9. Exchange rate depreciation and its lagged value are significant and positive in model 7, while its effects last for 3 lags and its direction changes to negative as it goes back in model 8. Inflation coefficients in models 7 and 9 are all positive in the short-run and its effects goes back to 3 lags. Similarly, all volatility coefficients are positive in the short-run (models 8 and 9) despite the fact that volatility affects negatively in the long-run. For all models, change in real lending rate three quarter back has positive effect on loan dollarization. While the change in external debt to GDP 1 quarter back affects positively in model 9, net exports to GDP three quarters ago affects negatively despite the fact that it has positive effects on loan dollarization in the long-run. For model 9, the change in net exports to GDP affects positively and constantly changes sign between the lags. Net international reserves to GDP two quarter back has negative influence on loan dollarization, whereas it affects positively in the long-run. Additionally, the results of the ECM based on ARDL approach show that the coefficient of error correction term is determined to be negative (-0.02 for model 7, -0.10 for model 8 and -0.09 for model 9) and highly significant, indicating

that while there may be short-term deviations from the equilibrium, they eventually revert to long-run equilibrium after a relatively long time.

### 5.4. Overview of Findings

When the long-run determinants of three types of dollarization namely households' deposit dollarization, firms' deposit dollarization and loan dollarization are compared, it is clearly deduced that the currency substitution view is a valid explanation for all types of dollarization despite the fact that different proxies are effective for different types of dollarization. One of the most important inferences of the findings is that expected volatility of exchange rate has a dominant determinant of firms' deposit and loan dollarization. Additionally, exchange rate depreciation and inflation affect firms' deposit and loan dollarization in some models. Thus, increase in expected exchange rate volatility can explain why firms hold more FX and why firms keep away from FX loans. However, while volatility does not have significant effect on households' deposit dollarization, inflation is a major determinant for households' deposit dollarization. Moreover, it is found that access to FX is one of the determinants of households' deposit dollarization and loan dollarization, whereas it does not have significant effect on firms' deposit dollarization. Additionally, external debt to GDP which proxies the market development view is dominant for firms' deposit dollarization and loan dollarization, while it does not have considerable effects on households' dollarization and it is inferred that the larger external debt of the country exacerbates the deposit and loan dollarization for firms. It is also found that institutional view which is proxied by net international reserves negatively affects deposit dollarization for households' and firms', positively affects the loan dollarization. With the increase in CBRT's net international reserves, companies are more comfortable in borrowing FX.

When the short-run and long-run results are compared, it is inferred that while inflation and net exports to GDP are determinants of households' deposit dollarization in the long-run, they are not effective in the short-run. Additionally, external debt to GDP positively effects households' deposit dollarization in the short-run. For firms' deposit dollarization, while inflation is one of the determinants in the long-run, it is not effective in the short-run. Moreover, it is deduced that volatility's, external debt to

GDP's and net international reserves' direction changes to other side in the short-run for a few quarters back. In addition, inflation and volatility which are proxies of the currency substitution view affect negatively loan dollarization in the long-run, but, they affect positively in the short-run. Similarly, net international reserves have positive effect on loan dollarization, however, it affects negatively in the short-run. On the other hand, net exports to GDP affects positively both in the short-run and in the long-run.

# CHAPTER 6

# CONCLUSION

Deposit and loan dollarization, particularly for the emerging markets have been an imperative phenomenon until today and will probably continue to be for years to come, even under the best economic management. The dollarization notion has been studied extensively in the literature. The probable drivers of dollarization are typically examined in two major categories namely the currency substitution view and the asset substitution view. The asset substitution view is further divided into three; the portfolio view, the market development view and the institutional view. The currency substitution view argues that economic agents are mainly triggered by high inflation, exchange rate depreciation and high volatility of exchange rates towards more dollarization. On the other hand, under the asset substitution perspective, the portfolio view describes dollarization as the best portfolio option given a particular distribution of real returns in each currency. The market development view underlines that a financial market with lower financial depth causes economic agents to hold assets denominated in foreign currency and exacerbates dollarization. Lastly, the institutional view states that when the power and structure of institutions are weak these institutional failures aggravate dollarization by feeding into new distortions in the economy.

In our empirical analysis we utilize all these perspectives to analyze the determinants of dollarization for Turkey from Q1-2003 to Q4-2021. We model three types of dollarization separately: households' and firms' deposit dollarization and loan dollarization. The empirical analysis utilizes ECM based on ARDL approach of Pesaran & Shin (1999) and Pesaran et al. (2001). This way we are able to look into the short-run dynamics as well as the long-run trends.

Our empirical findings indicate that there is a long-run relationship between proxies of the currency substitution view namely exchange rate depreciation, inflation and expected volatility of exchange rate and all types of dollarization, though different proxies affect different types of dollarization. One of the most significant findings is that, despite the fact that exchange rate depreciation and inflation have an impact on firms' and loans' dollarization, expected volatility of exchange rate mainly affects deposit dollarization of firms and loan dollarization. Therefore, higher expected volatility of exchange rate induces firms to hold more FX and deters borrowing in FX terms due to uncertainty. Additionally, higher inflation causes higher households' deposit dollarization, thus, it is deduced that the currency substitution view also dominates for households via inflation rather than volatility and exchange rate depreciation.

Another important finding of this study is that access to FX finance which is proxied by net exports to GDP is one of the determinants of households' deposit dollarization and loan dollarization, whereas it does not affect firms' deposit dollarization. As the FX supply increases in the country, it is kept in FX deposits by households. But at the same time as firms that are prone to earning FX are inclined to borrow in FX terms more, it also causes more loan dollarization as well. Moreover, external debt to GDP which serves as a proxy for the market development view causes higher firms' deposit dollarization. The higher foreign debt of the country means higher foreign debt for firms, naturally firms will be prone to hold more FX deposits. Furthermore, it is found that net international reserves of CBRT affect all types of dollarization in the long-run: decrease in CBRT's net international reserves leads firms and households to hold more FX deposits, while keeping firms away from FX borrowing. When we analyze the short-term results, it is found that volatility's, external debt to GDP's and net international reserves' effects' direction are reversed in the short-run for firms' deposit dollarization in comparison with long-run results. In addition, inflation and volatility which are proxies of the currency substitution view affect loan dollarization negatively in the long-run, but, they affect positively in the short-run. Similarly, net international reserves have positive effect on loan dollarization, however, it affects negatively in the short-run.

In contrast to this study, all studies for Turkey analyzed deposit dollarization in total. When firms deposit dollarization is separated from household's deposit dollarization, it is shown in this study that the determinants of dollarization are different. Additionally, the majority of Turkish literature on dollarization was focused on the currency substitution view, and utilized inflation, exchange rate depreciation or money supply as explanatory variables. However, this study also looked at the currency substitution view in terms of expected volatility and reveals the importance of expected volatility for firms' deposit dollarization and loan dollarization. Moreover, while a few studies have analyzed dollarization in the framework of the asset substitution view for Turkey's data, this study includes three alternative perspectives of the asset substitution view and discloses the importance of net international reserves as the proxy of the institutional view for all types of dollarization.

An important policy implication that can be drawn from this study is that policies aimed toward the reversal of dollarization in the Turkish economy should take into account the fact that different actors in the economy are receptive to different factors. All in all, our findings indicate that economic agents are responding to general macroeconomic indicators as anticipated and thus behave rationally in general. Reversal of dollarization behavior of both households and firms requires an all-inclusive approach that will focus on stabilizing prices and markets, reducing uncertainties as well as improving the institutional structures simultaneously.

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# APPENDICES

## A. TURKISH SUMMARY / TÜRKÇE ÖZET

Konfüçyüs'ün tarihte çok takdir edilen ünlü bir sözü vardır: "Geleceği belirlemek istiyorsanız geçmişi inceleyin". Bu ifadeden, geleceği aydınlatmak için geçmiş deneyimleri araştırmak, analiz etmek ve bir sorunun nedenlerini belirlemenin önemli olduğu sonucuna varılabilir.

Günümüz akademik dünyasında dolarizasyon, özellikle korona virüs salgını sonrasında genişletici para politikaları ve yükselen enflasyon nedeniyle dikkat çekici bir ilgiye konu olmuştur. Korona virüs pandemisinin başlangıcından bu yana merkez bankaları ve finans otoritelerinin kullandığı araçlar dünya genelinde enflasyonu hızlandırdı ve özellikle gelişmekte olan piyasalarda dolarizasyonun artmasına neden oldu. Dolarizasyonun nedenleri ortadan kalksa bile dolarizasyonun tersine dönmesinin kolay olmadığı literatürdeki çalışmalarca bilinmektedir (Honohan ve Shi, (2002), Reinhart ve diğerleri (2003) ve Imam ve diğerleri (2016)). Bu nedenle dolarizasyonun belirleyicilerini gösteren çalışmalar özellikle son yıllarda daha fazla önem kazanmıştır.

Literatürde, mevduat dolarizasyonunu toplam olarak araştıran birçok çalışma, Ize (2005) ve Corrales & Imam (2019) dışında hanehalkı ve firma ayrımını ihmal etmiştir. Hanehalkı ve firmalar farklı nedenlerle döviz (YP) mevduat bulunduruyor veya döviz cinsinden borçlanıyor mu ve neden? Bu çalışma, Türkiye için hanehalkı ve firma düzeyinde dolarizasyon belirleyicilerine odaklanarak dolarizasyon olgusuna yeni bir anlayış kazandırmayı amaçlamaktadır. Bu nedenle ampirik modellerde hanehalkı mevduat dolarizasyonu, firmaların mevduat dolarizasyonu ve kredi dolarizasyonu olmak üzere üç bağımlı değişken kullanılmış ve analiz 2003 Ç1 ile 2021 Ç4 arasındaki dönemi kapsamaktadır. Bu yeni bakış açısı, farklı dolarizasyon türlerinin belirleyicilerinin belirlenmesine ilişkin yeni görüşler sağlayacak ve dolayısıyla ters dolarizasyon için değerli politika çıkarımları sağlayacaktır.

Dolarizasyon çalışmaları literatürde para ikamesi ve varlık ikamesi görüşü olarak ikiye ayrılmaktadır. Para ikamesi görüşüne göre, yüksek enflasyon, döviz kurundaki değer kaybı ve yüksek döviz kuru oynaklığı ekonomik birimleri etkileyerek dolarizasyona yönlendirir ve bu da ekonominin daha fazla dolarizasyonuna yol açar. Varlık ikamesi görüşü ise, halkın portföylerini yerli ve yabancı varlıkların risk ve getiri özelliklerini dikkate alarak dağıtma kararlarının sonucu olarak ortaya çıkmıştır. Gelişmekte olan literatürde, varlık ikamesi görüşü, para ikamesi görüşüne ek olarak portföy görüşü, piyasa gelişimi görüşü ve kurumsal görüş olmak üzere üç ana kategoride gruplandırılmaktadır (Levy-Yeyati (2006)). Portföy görünümüne göre, her para biriminde belirli bir reel getiri dağılımı verildiğinde dolarizasyon optimum portföy seçeneğidir. Piyasa gelişimi görüşü, daha az finansal derinliğe sahip bir finansal piyasanın, yabancı para cinsinden varlıkları elde tutmasına ve dolarizasyonun artmasına neden olduğunu vurgular. Son olarak, kurumsal görüş, kurumların gücü ve yapısı zayıf olduğunda, bu davranışın daha yüksek düzeyde dolarizasyonla sonuçlandığını ve bunun da yeni ekonomik çarpıklıkları beslediğini iddia eder. Türkiye için birçok çalışma para ikamesi görüşüne odaklanmış ve birkaç çalışma dolarizasyonu varlık ikamesi görüşü çerçevesinde araştırmıştır, ancak Türkiye için bu ortaya çıkan literatürü ve varlık dolarizasyonu görüşünün üç ayrı perspektifini, para ikamesi görünümü ile birlikte ele alan bir çalışma bulunmamaktadır. Literatürdeki bu görüşleri göz ardı etmeyen bu çalışmada ve üç tür dolarizasyon için ayrı ayrı analiz yapılmış ve çalışma Türkiye için dolarizasyon olgusuna da ışık tutmaktadır.

Üç tür dolarizasyonun kısa vadeli ve uzun vadeli dinamiklerini analiz etmek için Pesaran, Shin & Smith'in (2001) ARDL sınır testi yaklaşımı olarak adlandırılan Otoregresif Dağıtılmış Gecikme (ARDL) yaklaşımı uygulanmıştır. ARDL sınır testi yaklaşımı, değişkenlerin durağan olup olmadıklarına bakılmaksızın zaman serisi değişkenlerine uyarlanabilir. Sınır testi sonucunda değişkenler arasında eş-bütünleşme olduğu tespit edilen modeller için ARDL modelinin uzun dönem katsayıları belirlenmiş ve kısa dönem katsayılarını belirlemek için Hata Düzeltme Modeli (ECM) uygulanmıştır Dahası açıklayıcı değişkendeki bir değişim sonrası bağımlı değişkenin dengeye ne sürede ulaştığı analiz edilmiştir.

Çalışmanın geri kalanı şu şekilde organize edilmiştir. Bölüm 2, 1967 yılındaki Dövize Çevrilebilir Mevduat (DÇM) kararı ile başlayan dolarizasyonun Türkiye tarihçesini

gözden geçirmekte, daha sonra 1986'dan günümüze kadar tutulan dolarizasyon verileri ışığında dolarizasyonun tarihsel olaylarla analizi ile devam etmekte ve 2021 yılı sonunda uygulamaya konulan ve DÇM ile benzer şekilde çalışan Kur Korumalı Mevduat (KKM) uygulaması ile sona ermektedir. Bölüm 3, dünyadaki ve Türkiye'deki başlıca çalışmaları içeren dolarizasyon üzerine teorik ve ampirik literatürü gözden geçirmektedir. Bölüm 4, ampirik analizde kullanılan değişkenlerin tanımlayıcı istatistiklerini de içeren veri seti ve kaynaklarını sunmakta ve değişkenlerin birim kök testleri ve sonuçlarını tartışmaktadır. Beşinci bölümde, literatürdeki dolarizasyon olgusuna ilişkin görüşler ışığında sonuçlar üç farklı bağımlı değişken için tartışılmış ve karşılaştırılmıştır.

1967 yılında Dövize Çevrilebilir Mevduat'ın kullanılmaya başlanmasıyla bu hesaplar, ilk dönemde ağırlıklı olarak para arzını ve kredi hacmini artırmak, ikinci döneminde ise cari açığı kapatmak için kullanılmıştır. 1983 yılı sonunda yürürlüğe giren 28 Sayılı Karar hanehalkları için de mevduat dolarizasyonunu mümkün kılmıştır. Bu dönem boyunca siyasi istikrarsızlık, yüksek enflasyon ve döviz kurunda sürekli devalüasyonlar ve ekonomik sıkıntılar yaşandı. 1980'den 1989'da 32 Sayılı Kararı kapsayan dönemde ise, Türkiye'de sermaye hareketleri nispeten sınırlı ve siyasi yapı nispeten istikrarlıydı, ancak mevduat dolarizasyon verilerinin yayınlanmaya başladığı 1986'dan 1989'a kadar bu oran arttı. 1989'dan 2001 krizine kadar olan süreçte yurt dışından istikrarsız portföy akımları, siyasi istikrarsızlık, kamu açıklarının TCMB kaynaklarından kapatılması, yüksek enflasyon, sürekli yükselen döviz kuru ve bunun sonucunda yüksek dolarizasyon yaşanmıştır. 1989'dan sonra finansal sermaye serbestleşmesi ortamında Türkiye, 1994 ve 2001 yıllarında finansal krizler yaşadı. Her iki krizin ortak özelliği, kriz öncesi yıllarda çok miktarda kısa vadeli sermaye girişinin ve ardına büyük ölçekli sermaye kaçışının yaşanması kriz yılında ekonominin daralmasına neden olmuştur (Celasun, 2002). TCMB'nin artan bağımsızlığı, hükümetin sıkı maliye politikası uygulama çabaları, istikrarlı siyasi yapı, düşük faiz, döviz kuru ve enflasyon seviyesi, yurt dışından portföy akımlarının istikrarlı seyri ve buna bağlı olarak nispeten düşük dolarizasyon oranı, 2001'den 2018'e kadar olan döneme damgasını vurdu. Bu dönemde para politikasının öne çıkan özellikleri, TCMB'nin bağımsızlığı, dalgalı kura geçiş ve başlangıçta örtük, daha sonra açık enflasyon hedeflemesi olmuştur. Maliye politikasındaki değişiklikler, "Güçlü Ekonomiye Geçiş Planı"nda ortaya konulduğu gibi, bütçe açığının ve genel devlet borç

stokunun GSYİH'ya oranının düşürülmesi, faiz oranlarının düşürülmesi ve dış borç vadelerinin uzatılmasıydı (Ekinci, 2013). 2018 sonrasında yurt dışından portföy akımlarının istikrarsızlaşması, yüksek döviz kurları ve enflasyon dönemin ana göstergeleri olmuş ve mevduat dolarizasyon oranı 2021 sonunda %63 ile zirveye ulaşmıştır. Türkiye'de 1967 yılında DÇM ile başlayan dolarizasyon hikayesi, benzer bir mantığa dayalı olarak 2021 yılında KKM'nin devreye girmesiyle bu çalışma kapsamında sona ermektedir.

Literatürde dolarizasyonla ilgili ilk yaklaşım, ekonomik birimlerin davranışının mali dengesizlikler, yüksek enflasyon, yüksek döviz kuru ve volatil döviz kurundan kaynaklandığını tanımlayan para ikamesi görüşüydü (Calvo & Vegh (1997); Savastano (1996); Baliño ve diğerleri (1999); De Nicolo ve diğerleri (2005)). Literatürde dolarizasyon terimi, para ikamesi ile eşanlamlı olarak da kullanılmaktadır. Bununla birlikte, Calvo ve Vegh (1992), dolarizasyon teriminin genellikle bir yabancı para biriminin bir hesap birimi veya bir değer saklama aracı olarak hizmet etmesi olarak açıklar ve bir değişim aracı görevi olmasının zaruri olmadığını söyler. Para ikamesi ise sadece yabancı para biriminin değişim aracı olarak kullanılmasıdır. Buna karşılık, Bennett ve diğerleri (1999), para ikamesinin yabancı para cinsinden varlıklar bir ödeme aracı olarak kullanıldığında gerçekleştiğini, varlık ikamesinin ise yabancı para cinsinden varlıklar bir ödeme aracı olarak değil finansal varlık (değer saklama aracı) veya hesap birimi olarak hizmet ettiğinde gerçekleştiğini vurgulamaktadır. Sonuç olarak dolarizasyon, paranın temel işlevlerini yerine getirmek için yerli paranın yabancı paranın yerini alması süreci olarak kabul edilir (Montoro ve diğerleri, 2013).

Varlık ikamesi görüşü ise, ekonomik birimlerin portföylerini yerli ve yabancı varlıkların risk ve getiri özelliklerini dikkate alarak dağıtma kararlarından kaynaklanmaktadır. Özellikle küresel ortamda bol miktarda likiditenin olmadığı birçok gelişmekte olan ülkede genellikle gözlenen finansal istikrarsızlık veya makroekonomik risklere karşı portföylerini koruma şansına sahip olmak için yerli yatırımcılar veya yerleşikler, son on yıllar boyunca yabancı para cinsinden varlıkları tercih etmektedirler. Varlık ikamesi görüşüne göre, yatırımcılar ve yerleşikler varlıklarını korumak için bir alternatif aramaktadır ve bazı nedenler onları yerli para yerine yabancı para bulundurmaya yöneltmektedir. Genel olarak portföy görüşü, bu nedenleri bazı çarpıklıkların tetiklediği makroekonomik istikrarsızlığa bir tepki olarak,

yerleşiklerin ve yatırımcıların portföylerinde döviz tutma ve satın alması olarak açıklamaktadır. Daha spesifik olarak, optimal portföy seçimi bu fenomene ışık tutuyor. Bu görüşe göre, yurt içi yerleşikler ve yatırımcılar, reel olarak yabancı para mevduat faizinin yerli para mevduat faizini aşması durumunda varlıklarını yabancı varlıklara dönüştürmekte veya yabancı para varlık biriktirme yoluna gitmektedir. Ize ve Levy Yeyati (2003), bu davranışları yurtiçi fiyat düzeyine ve reel döviz kurunun istikrarına ve bunların korelasyonuna bağlı olarak varyansı minimize eden portföyde doların payı ile açıklamaktadır. Varyansı minimize eden portföy modelinde, yatırımcılar ve yerleşikler, özellikle döviz kurunda büyük bir değer kaybı veya yüksek enflasyon meydana geldiğinde varlıklarını elde tutmak için uygun görülen döviz kurundaki oynaklığı ve para birimleri arasındaki oynaklığı göz önünde bulundurarak, beklenen getirilerin varyansını en aza indirecek portföy arayışındadırlar. (Kiguel ve diğerleri (2005)).

Bir başka literatür görüşüne göre, Savastano (1996) ve Honohan (2005), enflasyondan korunma olarak döviz veya döviz cinsinden varlıkların göreceli öneminin ekonominin finansal gelişme düzeyi ile ters orantılı olduğu yönündeki piyasa geliştirme görüşünü savunmaktadır. Gelişmiş bir finansal piyasayı içeren bir ekonomi, yatırımcılara ve yerleşiklere portföylerinin gerçek değerini koruma şansı verir. Derin bir finansal piyasa, aynı zamanda, yüksek getirili ve likit finansal enstrümanı yerel para birimi cinsinden erişilebilir kılarak, yatırımcının yüksek enflasyon ortamına ve makroekonomik istikrarsızlığa hızla uyum sağlaması için bir fırsat sağlar. Buna karşılık, sığ bir finans piyasasına sahip az gelişmiş bir ekonomi, ekonomik birimlere daha az seçenek sunar ve yatırımcıları yabancı para cinsinden varlık ve araçlarda koruma aramaya yönlendirir. Bunların yanı sıra, Ize ve Yeyati (2003) ve Feige (2003) finansal derinliği olmayan bir yurt içi finansal piyasanın, yerli yerleşiklere portföylerini korumaları için yeterli fırsatlar sunmadığı ve onları yabancı sermayeyi elinde tutmaya teşvik ettiği için dolarizasyonu artırdığını vurgulamaktadır. Ayrıca, Honohan (2005) ise enflasyonist ekonomilerde dolarizasyona izin verilmesinin yurtiçi finansal sistemin daha derinleşmesini desteklediğini ve enflasyonun finansal derinlik üzerindeki zararlı etkisini dengelediğini tespit etmiştir.

Kurumsal görüşe göre, yerli yatırımcılar ve yerleşikler, kurumların gücü ve yapısı zayıf olduğunda yatırımlarını yabancı para varlıklara yönlendirmekte ve bu davranış,

diğer varlık ikamesi görüşlerinde açıklanan kanallar aracılığıyla dolarizasyon düzeyini artırmaktadır. Ize & Levy Yeyati (2003) ve Honohan (2005) varyansı minimize eden portföyde makroekonomik politikaya ek olarak kurumsal yapının da dolarizasyondaki değişkenlikte önemli bir rol oynadığını göstermektedir. Savastano (1996), ülkenin kurumsal çerçevesinin dolarizasyon düzeyi üzerinde derin bir etkisi olduğunu ve dolarizasyon sürecine şekil verdiğini savunmaktadır. Ayrıca, daha az finansal piyasa derinliği sağlayan finansal olarak bastırılmış bir ekonomi durumunda bile, dolarizasyon süreci, yabancı para bulundurma, para politikası veya yabancı para dolaşımını düzenleyen kurumsal faktörlerden olumsuz bir şekilde etkilenir. Corrales ve diğerleri (2016), makroekonomik kurumun güvenilirlik kazanmaya başladığında, yerli ekonomik birimlerin ve yatırımcıların yabancı para dışındaki diğer finansal araçları tercih ettiğini ve bu ilerlemenin birçok durumda dolarizasyonun çekiciliğini azalttığını savunmaktadır.

Türkiye'de bugüne kadar dolarizasyonun belirleyicilerini anlamak için çeşitli çalışmalar yapılmıştır. Selçuk (1994), Türkiye'de dolarizasyon üzerine yapılan ilk çalışmalardan biridir. Selçuk, 1986-1992 yılları arasında Türkiye'de dolarizasyon oranını belirlemek için En Küçük Kareler (OLS) uygulayarak bir denklem geliştirmiştir. Formülde para arzı, TCMB tarafından belirlenen aylık ortalama döviz kurları ve döviz mevduatları dikkate alınmaktadır. Analiz, dolarizasyon ve TL değer kaybının pozitif olarak ilişkili olduğu sonucuna varmaktadır. Selçuk'un analizi, dolarizasyon arttıkça senyoraj gelirinin düştüğünü ve bunun da yüksek enflasyona yol açabileceğini öne sürmektedir.

Bu alandaki bir diğer çalışma ise 1986 ve 1999 yılları arasında Johansen Eş-bütünleşme Yaklaşımını uygulayarak dolarizasyonu genişletilmiş portföy modeli ile açıklayan Civcir'dir (2001). Bu portföy modeli, dövizde beklenen değişimi, kur riski ve mevcut ekonomik politikaların güvenilirliğini dahil ederek sadece faiz oranı farklarını kapsayan basit portföy modelini genişletmektedir. Civcir (2001), Türkiye'de dolarizasyonun en önemli belirleyicilerinin yerli para ile yabancı para arasındaki faiz farkı ve beklenen döviz kurları olduğuna işaret etmektedir.

Metin Özcan ve Us (2007), döviz kuru oynaklığı, enflasyon oynaklığı ve beklentiden kaynaklanan makroekonomik dengesizliklerin şekillendirdiği dolarizasyonu analiz

etmekte ve Otoregresif Dağıtılmış Gecikme Sınır Testi (ARDL) uygulayarak tüm bunların dolarizasyon üzerinde etkili olduğunu tespit etmektedir. Ayrıca dolarizasyonun kalıcı doğasını sürdürdüğünü, dolayısıyla histerezisin hala geçerli olduğunu göstermek için dürtü yanıtı analizi ve varyans ayrıştırma analizini uygulamaktadır. Böylece, çalışma olumsuz makroekonomik koşulların dolarizasyon ataletine katkıda bulunduğunu göstermektedir.

Literatürdeki en önemli çalışmalardan biri, konunun daha önce göz ardı edilen yönlerini vurgulayarak 1996'dan 2006'ya kadar olan dönem için dolarizasyonu analiz yapan Metin Özcan & Us (2009)'dur. Metin Özcan ve Us (2009) dolarizasyonu sadece talep (varlık dolarizasyonu) açısından değil, aynı zamanda arz (yükümlülük dolarizasyonu) açısından da analiz etmekte ve dolarizasyonu Johansen Eş-bütünleşme Yaklaşımı'nı uygulayarak sadece yurtiçinde değil aynı zamanda off-shore dolarizasyonu da içerecek şekilde incelemektedir. 2001 mali krizinden önce dolarizasyonun ekonomik birimlerin taleplerinden kaynaklandığını ve yükseliş eğilimi gösterdiğini, ancak kriz sonrası dönemde arz yönlü ve azalan bir dolarizasyon oranı bulunmuştur. Ancak kriz döneminden sonra küresel likidite bolluğu offshore dolarizasyonu tetiklemiş ve off-shore dolarizasyon yoluyla daha yüksek varlık dolarizasyonuna yol açmıştır. Ayrıca, çalışmada enflasyon hedeflemesi çerçevesinin, dünyanın geri kalanına göre nispeten daha yüksek reel faiz oranları sayesinde oluşan arbitraj fırsatları nedeniyle daha fazla dış finansmana neden olduğunu belirtilmektedir.

Dumrul (2010), para ikamesini (yerli yerleşiklerin döviz mevduatı/GSYİH) ticari açıklık, beklenen enflasyon oranları, beklenen reel döviz kurları ve Türkiye ile ABD arasındaki faiz oranı farkları ile 1988'den 2009'a ARDL yaklaşımıyla açıklamaktadır. Dumrul ayrıca Merkez Bankası brüt döviz rezervleri ile para ikamesi arasındaki ilişkiyi incelemekte ve ticari açıklık dışında tüm değişkenlerin para ikamesi üzerinde %10 anlamlılık düzeyinde pozitif bir etkiye sahip olduğunu tespit etmektedir.

Literatürde son yirmi yılda çeşitli eş-bütünleşme testleri tanıtılmıştır. Son yıllarda en yaygın olarak kullanılan iki eş bütünleşme stratejisi, Johansen'in (1991) durağan olmayan en az iki serinin durağan bir bileşimi olduğunu ifade eden eş-bütünleşme kavramını test etmek amacıyla geliştirdiği modeli ve Engle Granger'ın (1987) iki aşamalı eş-bütünleşme yöntemidir. (Narayan ve diğerleri, 2003). Bu yöntemler, tüm

değişkenlerin I(1) olmasını gerektirir, dolayısıyla aynı durağanlık seviyesine sahip olmak, tahmin için çok önemlidir. Bu kural, değişkenlere birim kök ön testi uygulanmasına neden olur.

Bu çalışmaya hem I(0) hem de I(1) değişkenleri dahil edildiğinden, Engle Granger ve Johansen eşbütünleşme testleri analizimiz için uygun değildir. Alternatif olarak, Pesaran ve Shin (1999) ve daha sonra Pesaran, Shin ve Smith (2001) bu çalışmada uygulanan sınır testi (Autoregresif Dağıtılmış Gecikme (ARDL)) eş-bütünleşme yaklaşımını kurmuştur. Bu yöntemi uygulamak için bu çalışmanın bazı gerekçeleri vardır. Sınır testi stratejisi, Johansen eş-bütünleşme gibi diğer çok değişkenli eş-bütünleşme tekniklerinin aksine, modelin ideal gecikme uzunluğu belirlendikten sonra eş-bütünleşme ilişkisinin OLS tarafından hesaplanmasına izin verir. Ayrıca, Engle Granger ve Johansen eş-bütünleşme yaklaşımı gibi önceki yöntemlerin aksine, sınır testi prosedürü, değişkenleri birim kök ön testine tabii tutulmasını gerektirmez. Değişkenler I(0), I(1) veya her ikini karışık durumlar için sınır testi kullanılabilir, eğer I(2) serisi varsa bu test geçersizdir. Küçük veya sonlu veri setinde sınır testi uygulaması istatistiksel olarak üstündür ve genellikle küçük veri boyutlarında daha etkilidir. Bu nedenle, karma bir entegrasyon sırasına sahip (I(1) ve I(0)) değişkenlere sahip olmak ve küçük bir örneklem büyüklüğüne sahip olmak, bu yaklaşımın uygun olduğunu göstermektedir.

Çok değişkenli zaman serisi analizi, Hata Düzeltme Modellerini (ECM) içermektedir. Hata Düzeltme Modelleri, açıklayıcı bir faktördeki bir değişikliğin ardından bağımlı bir değişkenin ne kadar hızlı dengeye ulaştığını hesaplar. ECM'leri kullanmak için bazı gerekçeler vardır. Modelin kısa vadeli dinamiklerini uzun vadeli trendlerden ayırt etmeyi sağlarlar. Ayrıca hem durağan hem de durağan olmayan değişkenlerle uğraşırken, ECM'ler tipik olarak en uygun modellerdir. Çalışmamız hem durağan hem de durağan olmayan değişkenleri içerdiğinden, kısa vadeli dinamikleri analiz etmenin yanı sıra bağımlı ve bağımsız değişkenler arasında uzun vadeli bir ilişki olduğuna dair herhangi bir kanıt olup olmadığını görmek için ARDL eş-bütünleşme analizi ve ECM kullanılacaktır.

Özetle, ARDL yaklaşımının tahmini üç adıma dayanmaktadır. İlk aşamada değişkenler arasında eş-bütünleşme olup olmadığını belirlemek için sınır testi

kullanılır. Eğer eş-bütünleşme varsa, ikinci aşamada uzun dönemli katsayılar için ARDL modeli oluşturulur. Hata düzeltme modeli, üçüncü aşamada kısa vadeli katsayıları tahmin eder. (Narayan, 2005)

Hanehalkının mevduat dolarizasyonu, firmaların mevduat dolarizasyonu ve kredi dolarizasyonu olmak üzere üç tür dolarizasyonun uzun dönemli belirleyicileri karşılaştırıldığında, farklı vekillerin farklı dolarizasyon türleri için etkili olmasına rağmen para ikamesi görüşünün her tür dolarizasyon için geçerli bir belirleyici olduğu açıkça görülmektedir. Bulguların en önemli çıkarımlarından biri, döviz kurunun beklenen oynaklığının firmaların mevduat ve kredi dolarizasyonu üzerinde baskın bir belirleyici özelliğe sahip olmasıdır. Ayrıca bazı modellerde döviz kurundaki değer kaybı ve enflasyon firmaların mevduat ve kredi dolarizasyonunu etkilemektedir. Dolayısıyla, beklenen döviz kuru oynaklığındaki artış, firmaların neden daha fazla YP elinde tuttuğunu ve firmaların neden YP kredilerden uzak durduklarını açıklamaktadır. Ancak, oynaklığın hanehalkı mevduat dolarizasyonu enflasyonu üzerinde önemli bir etkisi olmasa da enflasyon hanehalkı mevduat dolarizasyonu için önemli bir belirleyicidir. Ayrıca, dövize erişimin hanehalkının mevduat dolarizasyonu ve kredi dolarizasyonunun belirleyicilerinden biri olduğu, firmaların mevduat dolarizasyonu üzerinde ise anlamlı bir etkisinin olmadığı tespit edilmiştir. Ayrıca, piyasa geliştirme görüşünü temsil eden dış borcun GSYİH'ye oranı sadece firmaların mevduat dolarizasyonu için baskınken, hanehalkı ve kredi dolarizasyonu üzerinde önemli bir etkisi olmadığı ve ülkenin daha büyük dış borcunun firmalar için mevduat dolarizasyonunu şiddetlendirdiği sonucuna varılmıştır. Net uluslararası rezervlerin temsil ettiği kurumsal görünümün hanehalkı ve firmalar için mevduat dolarizasyonunu olumsuz, kredi dolarizasyonunu olumlu etkilediği tespit edilmiştir. TCMB'nin net uluslararası rezervlerindeki artışla birlikte şirketler daha rahat döviz borçlanabilmektedir.

Kısa ve uzun dönem sonuçları karşılaştırıldığında ise, uzun dönemde enflasyon ve net ihracatın GSYİH'ye oranı hanehalkının mevduat dolarizasyonunun belirleyicisi iken, kısa dönemde etkili olmadığı sonucuna varılmıştır. Ek olarak, dış borcun GSYİH'ye oranı, kısa vadede hanehalkının mevduat dolarizasyonunu olumlu yönde etkilemektedir. Firmaların mevduat dolarizasyonu açısından ise enflasyon uzun dönemde belirleyici olurken, kısa dönemde etkili değildir. Ayrıca, oynaklığın, dış

borcun GSYİH'ye oranı ve net uluslararası rezervlerin yönünün birkaç çeyrek öncesine kadar kısa vadede diğer tarafa doğru değiştiği çıkarımına varılmıştır. Ayrıca, para ikamesi görüşünün vekilleri olan enflasyon ve oynaklık, uzun vadede kredi dolarizasyonunu olumsuz etkilerken, kısa vadede olumlu yönde etkilemektedir. Benzer şekilde, net uluslararası rezervler de kredi dolarizasyonunu olumlu yönde etkilerken, kısa vadede olumsuz etkilemektedir. Öte yandan, net ihracatın GSYİH'ya oranı hem kısa hem de uzun vadede olumlu yönde etkilenmektedir.

Mevduat ve kredi dolarizasyonu, özellikle gelişmekte olan piyasalar için bugüne kadar kaçınılmaz bir olgu olmuş ve en iyi ekonomik yönetim altında bile muhtemelen önümüzdeki yıllarda da olmaya devam edecektir. Dolarizasyon kavramı literatürde kapsamlı bir şekilde incelenmiştir. Dolarizasyonun olası belirleyicileri, çoğunlukla para ikamesi görüşü ve varlık ikamesi görüşü olmak üzere iki ana kategoride incelenmektedir. Varlık ikamesi görünümü ayrıca üçe ayrılır; portföy görüşü, piyasa geliştirme görüşü ve kurumsal görüş. Para ikamesi görüşü, ekonomik birimlerin temel olarak yüksek enflasyon, döviz kurundaki değer kaybı ve döviz kurlarının oynaklığının daha fazla dolarizasyona yol açtığını savunmaktadır. Öte yandan, varlık ikamesi perspektifi altında, portföy görünümü dolarizasyonu, her para biriminde belirli bir reel getiri dağılımı altında verilen en iyi portföy seçeneği olarak tanımlar. Piyasa geliştirme görüşü, daha düşük finansal derinliğe sahip bir finansal piyasanın, ekonomik birimlerin döviz cinsinden varlıkları elinde tutmasına neden olduğunu ve dolarizasyonu şiddetlendirdiğini vurgulamaktadır. Son olarak, kurumsal görüş, kurumsal başarısızlıkların ekonomide yeni çarpıklıkları besleyerek dolarizasyonu şiddetlendirdiğini savunmaktadır.

Bu çalışmanın aksine, Türkiye verileriyle yapılan tüm çalışmalarda mevduat dolarizasyonu toplam olarak incelenmiş, ancak bu çalışmada hanehalkı ve firmaların dolarizasyon belirleyicilerinin farklı olabileceği gösterilmiştir. Türkiye verilerini inceleyen diğer çalışmaların çoğu genellikle para ikamesi görüşüne odaklanmış ve analizler enflasyon, döviz kurundaki değer kaybı veya para arzı üzerine yapılmıştır. Ancak bu çalışma aynı zamanda beklenen oynaklık açısından para ikamesi görüşüne de bakmakta ve beklenen oynaklığın firmaların mevduat dolarizasyonu ve kredi dolarizasyonu için önemini ortaya koymaktadır. Ayrıca, dolarizasyonu Türkiye verileri için varlık ikamesi görüşü çerçevesinde birkaç çalışma incelerken, bu çalışma

varlık ikamesi görüşünün üç ana grubunu içermekte ve kurumsal görüşün temsilcisi olan net uluslararası rezervlerin dolarizasyon için önemini ortaya koymaktadır. Diğer önemli bulguların yanı sıra, bu sonuçların önemli politika çıkarımları olacaktır, çünkü çalışma güncel olan 2003 Ç1'den 2021 Ç4'e kadar olan dönemi kapsamakta ve dolarizasyonu tersine çevirmek için literatürdeki çalışmalardan farklı bir bakış açısı sunmaktadır.

## B. THESIS PERMISSION FORM / TEZ İZİN FORMU

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**Bölümü** / Department : İktisat / Economics

**TEZİN ADI /** TITLE OF THE THESIS (**İngilizce** / English): Determinants of the Dollarization in Turkey: Does It Differ for Households and Firms?

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