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The Effect of Foreign Currency Deposits of Residents on the USD Exchange Rate: The Effects of Dollarization between 1986-2020 *

Yurt İçi Yerleşiklerin Yabancı Para Mevduatlarının USD Kuruna Etkisi: 1986-2020 Yılları Dolarizasyon Etkileri

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MAKALE BİLGİSİ

Makale Geçmişi:

Başvuru tarihi: 30 Haziran 2021

Düzeltilme tarihi: 23 Ağustos 2020

Kabul tarihi: 23 Ağustos 2020

Anahtar Kelimeler:

Dolarizasyon

Mevduat

Döviz

USD

Döviz kuru

ARTICLE INFO

Article history:

Received: June 30, 2021

Received in revised form: August 23, 2020

Accepted: August 23, 2020

Keywords:

Dollarisation

Deposit

Currency

USD

Exchange rate

ÖZ

Bu çalışmanın amacı, 1986:01-2020:12 dönemi için mevduat dolarizasyonunun ABD dolar kuruna çift yönlü etkisini araştırmaktır. Son yıllarda ülkemizde yoğun bir şekilde tekrar gündeme gelen dolarizasyon olgusu, mevduat dolarizasyonu yönünden ele alınmıştır. Mevduat dolarizasyonu ve ABD dolar kuruna etkisi, liberal ekonomiye geçiş sürecinden sonraki dönemlerden başlamak üzere yurtiçi yerleşik mevduatların ve veri setinin oluşmaya başladığı ilk dönemlerden itibaren günümüze kadar kesintisiz olarak incelenmiştir. Buna göre dolarizasyonun USD kurunu önemli ölçüde etkilediği görülmüştür. USD kurunun dolarizasyon üzerinde herhangi bir etkisi bulunmamıştır. Nedensellik ise tek yönlü olarak saptanmıştır. Mevduat dolarizasyonu ve USD kuru kendi değişimlerinden etkilenmişlerdir. Dolarizasyonun etkisi, onuncu ayın sonunda %15'lik değişim ile kendini göstermiştir.

ABSTRACT

This study aims to investigate the bidirectional effect of deposit dollarization on USD exchange rate for the period 1986:01-2020:12. The phenomenon of dollarization, which has been on the agenda again in recent years in our country, has been discussed in terms of deposit dollarization. Deposit dollarization and its effect on the US dollar exchange rate have been studied uninterruptedly, starting from the period after the transition to liberal economy, from the first periods when domestic deposits and the data set began to form, until today. Accordingly, dollarization had a significant effect on USD exchange rate. On the other hand, USD exchange rate was not found to have any effect on dollarization. Therefore, causality was determined to be unidirectional. Their changes influenced deposit dollarization and USD exchange rates. Effect of dollarization showed by the end of the tenth month with 15% of the variation.

1. Introduction

Liberalization started in the 1970s and caused significant increases in the volume and types of financial transactions.

These alterations affected each country differently. The economies of developing countries that wanted to proliferate, weakened against external shocks while their economic instability continued. For this reason, the local

* This article was produced from the master's thesis titled "The Effect of Domestic Foreign Exchange Deposit Accounts on the USD Rate" prepared by Ümit Ustaoglu at İstanbul Ticaret University, Finance Institute and conducted under the supervision of Prof. Dr. Ali İhsan Karacan.

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Atf/Cite as: Ustaoglu, Ü. (2021). The Effect of Foreign Currency Deposits of Residents on The USD Exchange Rate: The Effects of Dollarization Between 1986-2020. *Journal of Emerging Economies and Policy*, 6(2), 162-169.

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currency has begun to lose its savings and means of exchange. Thus, countries started to use the currency of another country, which is convertible and stable. This phenomenon, called "currency substitution" or "dollarization," began to appear in developing countries (Ize and Levy-Yeyati, 1998). Although Dollarization derived from high inflation rate caused by instability in the economy, it was also affected by macroeconomic parameters such as real gross domestic product, money supply, interest rates, and fluctuations in exchange rates (Bennett, Borensztein, and Baliño, 1999).

Developing countries generally preferred to use foreign money instead of official currency to avoid inflation. This strategy, which created high-yield alternatives to protect the real value of the assets in hand, also provided an increase in liquidity. In addition, in these economies, when the capital markets were insufficient, it was essential to create foreign currency assets to protect against inflation in creating a financial alternative. As a result, developing economies were expanding foreign exchange to keep inflation under control (Wickham, 1985). By the 1980s, the use of substitute currency and flexible exchange rate systems that emerged with financial liberalization, increased the demand for foreign currency. This increase was reflected as an increase in foreign currency denominated financial assets and foreign currency deposits. Therefore, the amount of foreign currency in savers' portfolios increased (Yılmaz and Uysal, 2019). Dollarization, defined as the residents' holding of assets and liabilities in foreign currency, was divided into "direct currency substitution" and "indirect currency substitution." Direct currency substitution was the use of foreign money instead of local currency in payment; indirect currency substitution referred to the financial assets that result from calculating the values and returns of residents in different currencies (McKinnon, 1982). Indirect currency substitution was usually measured by deposit and loan dollarization. High inflation and price volatility, ethical deterioration and unlimited deposit insurance, dollarization hysteresis, original sin, exchange rate regime, level of financial development, insecurity in macroeconomics and monetary policy, and levels of economic openness were among the causes of financial Dollarization.

The influential factors in Turkey were economic instability, high inflation, exchange rate uncertainties, and financial crises (Domac and Bahmani-Oskooee, 2002). The outcome of the Dollarization might be the fact that the country's vulnerability increased against any economic shocks, and also due to the risks to the ability to pay, the fragility of the financial sectors developed. Because of public foreign currency debts, which had a significant part of its income in the national currency, there was a problem with the debt's sustainability. Additionally, the exchange rate had a high impact on prices. Moreover, Dollarization might lead to

exchange rate mismatches in the firms' balance sheets, thus leading to increased fragility. In this study, the effect of the dollarization phenomenon in Turkey on the USA dollar (USD) exchange rate in the last 35 years was investigated. In addition, it was tried to determine whether the foreign currency deposits of domestic residents used as a dollarization tool influenced the USD currency, the direction of the effect, the causality relationship between these two variables.

2. Literature Review

Investigations about Dollarization began in the 1970s when a flexible currency system replaced the fixed currency. By the 1980s, with financial freedom and globalization, the data from developing countries, where inflationary trends were broader than the developed countries, became the focus of studies on Dollarization. Efforts to determine the effects of Dollarization on the USD currency increased USD exchange rate variability, caused instability, and negatively affected the monetary authority's independent policy setting, causing mutual dependence (Brillembourg and Schadler, 1979; Lapan and Enders, 1983). In the Ratti and Jeong (1994) study, it was determined that real USD exchange rate uncertainty was one of the reasons for Dollarization.

Schuler (1999) also classified 18 countries where foreign currency deposits exceeded 30% of the money supply as "highly dollarized countries." These were Argentina, Azerbaijan, Belarus, Bolivia, Cambodia, Costa Rica, Croatia, Georgia, Guinea, Laos, Latvia, Mozambique, Nicaragua, Peru, Sao Tome, Tajikistan, Turkey, and Uruguay. On the other hand, the study suggested that the 34 countries where this value was in the range of 15-30% were stated as "moderate dollarization" countries. These countries are; Albania, Armenia, Bulgaria, Czech Republic, Dominican, Ecuador, Egypt, El Salvador, Estonia, Guinea, Honduras, Hungary, Jamaica, Jordan, Lithuania, Macedonia, Malawi, Mexico, Moldova, Mongolia, Pakistan, Philippines, Poland, Romania, Russia, Sierra Leone, Slovak Republic, Trinidad and Tobago, Uganda, Ukraine, Uzbekistan, Vietnam, Yemen, and Zambia. Additionally, in the study of Adeniji (2013), the relationship between the currency substitution, exchange rate, and inflation between 1970-2012 in Nigeria was examined, and it was determined that there was a significant relationship between these variables. According to the results, the opinion put forward is that if the exchange rate cannot be controlled by economic policies to curb inflation and interest rates, it would reduce currency substitution.

Financial freedom reforms were implemented after moving from an inward-oriented (import substitution) development strategy to an outward-oriented (export-based) development strategy in Turkey. Additionally, to solve the foreign exchange problem that occurred after the oil crises of the

1970s, the dollarization process started with the applications of Foreign Exchange Convertible Deposits and Currency Deposit Account with Letter of Credit in Turkey. With these reforms in the 1980s, the relationship between inflation, USD exchange rate uncertainty, and Dollarization became complex. Following the decisions of January 24, 1980, in late 1983, the ability of commercial banks to trade in foreign currency and the deposits of residents in foreign currency followed each other (Serdengeçti, 2005).

In the 1980s and after that, as the foreign trade is liberalized, and exports are encouraged, keeping the real exchange rate low, significant developments have been achieved in exports. With financial liberalization, international capital movements were released (July 1984 and August 1989), a flexible exchange rate regime was adopted (May 1981), and interest rates were liberalized (July 1980). To protect against financial erosion caused by economic instability, economic agents turned to foreign currency, and a rapid dollarization process had started since 1984 when the currency was liberated (Akat, 2000). After the export-led growth model, the real exchange rate was used to promote exports and the continuity of international competition. With this regulation, the dominance over inflation decreased further and became chronic in the 1980s (Ize and Powell, 2005).

The final regulation of financial liberalization reforms was completed with the repeal of Decision No. 32. With this revision in 1989, restrictions on the use of foreign currency on capital movements were lifted. Accordingly, the costs of transactions in foreign currency decreased due to foreign operations. After this period, due to the economic instability, the FX Deposit (FED) Account returns remained lower than the Turkish Lira (TL) denominated assets. However, this did not affect the deposit dollarization.

In the 1990s, however, in the Turkish economy, which became open to external shocks with financial liberalization, inflation increased up to 80% because macroeconomic variables were below expectations, and a significant increase was observed in deposit dollarization.

Turkey's high level of Dollarization is observed, especially during the crisis periods (1994, 1995, and 2001), as it gains momentum (Özen, 2018). Because of all these changes, FED started to be opened in Turkey as of 1984. Thus, the total amount of foreign exchange deposits, which was 2.72 million TL in 1986, doubled the previous year in 1991 and reached 51.98 million TL. However, the most marginal increase was in 1994, tripling the value in 1993 to 598.48 million TL. Similar changes were seen in 2001. As expected, FEDs reached 60.4 billion TL. This value was 190 billion TL in 2011; from 2015 to 2020, it has reached 1.45 trillion TL from 440 billion TL (CBRT, 2021).

According to some economists, Dollarization, which occurs due to high inflation, unstable exchange rates, and reactions

to uncertainty in macroeconomic policies, is shown as the cause of exchange rate volatility (Sever, 2012). The studies on Turkey have also found a relationship between the real exchange rate and Dollarization (Selçuk, 1994). Akçay, Alper, and Karasulu (1997); Bahmani-Oskooee and Domac (2003) found that Dollarization increases the exchange rate. On the other hand, Çetin (2004) showed that this relationship had the opposite effect and argued that the exchange rate increased Dollarization. Accordingly, it can be said that Dollarization and exchange rate are two factors that affect each other in the Turkish economy. This study has been tried to determine whether deposit dollarization is a reason for the USD exchange rate change by examining the monthly FED data and USD/TL parity for the period 1986:01-2020:12.

3. Material and Methods

3.1. Material

To investigate whether the deposit dollarization was a reason for the change in the USD exchange rate. Monthly data of the foreign exchange deposit account and USD exchange rate for the period 1986:01-2020:12 were obtained from the Central Bank of the Republic of Turkey (CBRT, 2021). EViews 10 software (IHS Global Inc., CA, USA, 2019) was used to analyze the data.

3.2. Method

Firstly, a descriptive analysis was performed. The analysis showed whether the data being in the normal distribution. Because the stability of the data was another critical assumption for further analysis, it was required to check the existence of unit-roots. Therefore, the unit-roots were investigated with Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), and Phillips Perrons (PP) tests. According to the unit-root test result, it was decided that raw data was used, or it was transformed into the first difference form (first integration) (Mohanty and John, 2015).

Consequently, the first difference of the data was taken to make them stationary. In the second part of the econometric analysis, the Vector Autoregressive Model (VAR) was carried out to explain the direction and influence of the variables in the investigation of the relationship between dollarization and USD exchange rate. The main purpose of VAR modeling was to determine the one-way relationship between variables and reveal the forward and backward connection between them (Kearney and Monadjemi, 1990). This way, the reaction and direction of the variable were observed monthly due to the period of the data. After the VAR model was established, Johansen (1988) and Johansen and Juselius (1990) were utilized to develop VAR approach determining the cointegration between the variables. What makes this method superior to other methods was that the series can be used at the level value in long-term analysis, and therefore the series contains more information. The disadvantage was that the series included in the analysis must be stationary to the same degree (Johansen, 1988). Additionally, the study checked for the correlation between the data before finding any cointegration relationship. As the last step, the impulse response and variance decomposition results were reported for each variable.

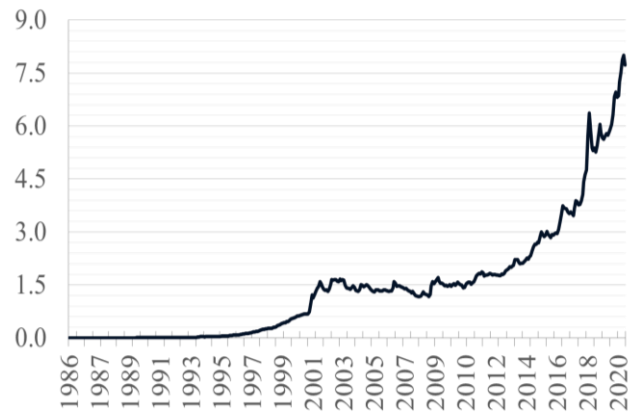
4. Results and Discussion

The variation in the deposit dollarization and USD exchange rate between the period 1986:01 and 2020:12 was illustrated in Figures 1 and 2, respectively. A significant increase was observed in 2001. Similarly, Bahmani-Oskooee and Domac (2003) found that the dollarization rate increased by up to 59.5% during the 2001 crisis. When examined these figures, the trended structure of the graphs related to the series is seen. Therefore, a trend has been added to the model, especially since the USD exchange rate has been increasing over the years.

Figure 1. Deposit Dollarization



Figure 2. USD Exchange Rate



According to Table 1, preliminary data analysis showed quite a bit of variation in the data. Both the mean and the median showed coherence; however, the range of the data exhibited pinnacle difference which was confirmed by the standard deviation. The USD exchange rate as represented by USD and TL exhibited leptokurtic behaviour. It also displayed positive skewness whereas, the data of deposit dollarization was in the normal distribution. The Jarque-Bera value presented that the USD exchange rate was not in a normal distribution ($p=0.00$). The log transformation of the data did not enhance the results; instead, the results worsened, thus taking the visible asymmetric behaviour of the variables. The study further checked the data for its stationarity property. If the data was integrated at the zero-order $I(0)$ or the first order $I(1)$ or a mix of $I(0)$ and $I(1)$, then a relationship amongst the variables could be explored.

Table 1. Descriptive Statistics

	USD Exchange Rate	Deposit Dollarization
Mean	1.4324	0.3546
Median	1.3283	0.3559
Maximum	8.0033	0.5632
Minimum	0.0006	0.1243
Std. Dev.	1.6831	0.0888
Skewness	1.7140	-0.0987
Kurtosis	5.8816	2.8060
Jarque-Bera	350.9483	1.3408
Probability	0.0000	0.5115
Observations	420	420

The null and alternative hypotheses for unit root tests were asserted as the series is non-stationary (contains unit root) and stationary (no unit root), respectively. As shown in Table 2, all the variables had a unit root at level; hence, the null hypothesis was supported. Therefore, raw data could not use for analysis. However, at the first difference, all the variables were found stationary. In other words, the data had a structural break. In case of a structural break, the DF, ADF test sometimes confused the break with the unit root,

whereas the PP test provided a better solution to such a problem (Hamilton, 1994). According to the PP unit root test result, all the variables were integrated of order I(1); thereby,

it became necessary to check whether any cointegration relationship existed among the variables.

Table 2. Test of Unit Roots

Test	Variables	At Level		At 1 st Difference	
		(c)	(c&t)	(c)	(c&t)
DF-GLS	Deposit dollarization	0.3737 [^]	-1.1065 [^]	-3.7808*	-11.5656*
	USD exchange rate	5.8153*	0.6737 [^]	-9.5603*	-8.9964*
ADF	Deposit dollarization	-2.2358 [^]	-2.1431 [^]	-11.7212*	-11.7306*
	USD exchange rate	4.8742 [^]	2.993 [^]	-10.1146*	-10.7303*
PP	Deposit dollarization	-2.2807 [^]	-2.201 [^]	-18.5501*	-18.5372*
	USD exchange rate	6.6065 [^]	4.0837 [^]	-12.3986*	-12.2832*

c = At constant, c & t = constant and trend.

DF-GLS = Dickey-Fuller test, ADF = Augmented Dickey-Fuller Test and PP = Phillips & Perrons test.

* represents values are significant at one per cent using MacKinnon (1996) one-sided *p*-values.

[^] represents values are insignificant.

Table 3. Cointegration Test (Johansen & Juselius)

Hypothesized No. of Cointegrating Equations	Eigenvalue	Trace Statistic	Critical Value	Probability
k = 0*	0.0410	23.6437	15.4948	0.0024
k = 1*	0.0149	6.2385	3.8415	0.0125

Based on trace statistics. k = number of cointegrating vectors. * denotes rejection of the hypothesis at the 0.05 level.

The cointegration relationship was investigated between the variables and indicates that at least two integrating equations were detected in Table 3. The trace statistics and the maximum value statistics provided two cointegrating equations at 5% of significance, i.e., trace statistics had a higher value than the critical value. The study decided the lags using the VAR lag structure criterion, and the criterion selected three lags using the SIC criterion. Consequently, three lags were used for further investigation. A further investigation into the data exhibited a uni-directional causality between deposit dollarization and USD exchange rate, thus indicating that Dollarization brought about a

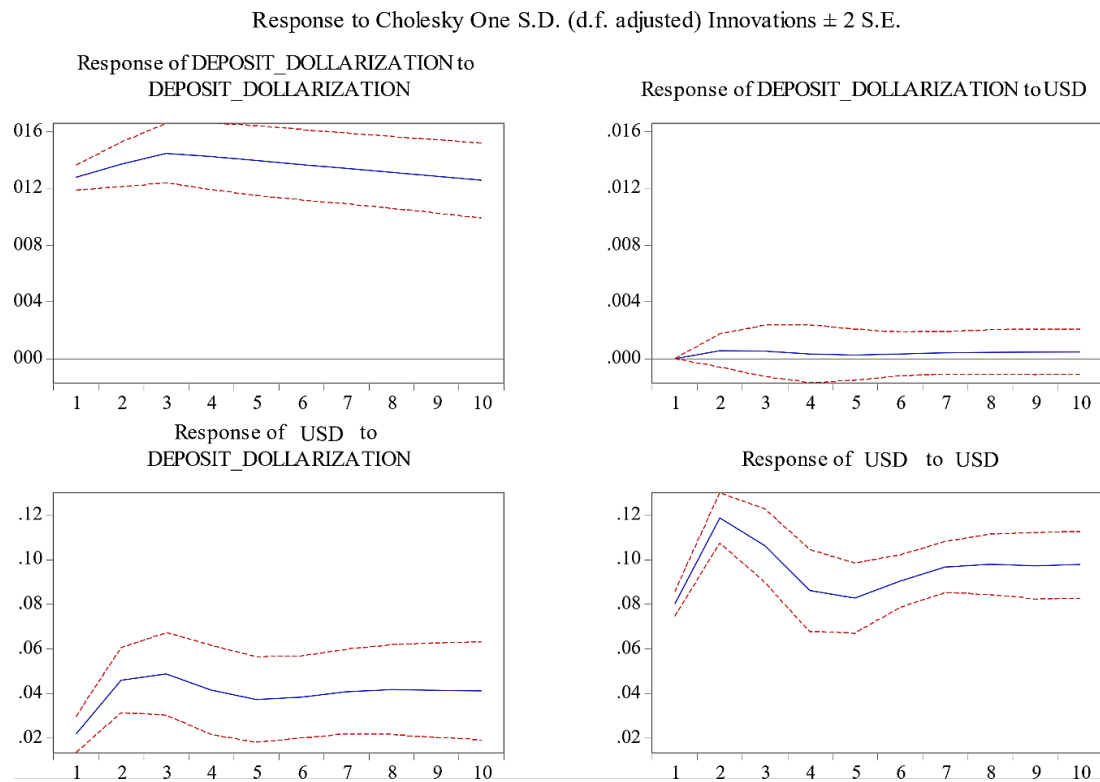
change in the USD exchange rate. As declared by Hamilton (1994) accepted the null hypothesis if the *p*-value > 0.05, as shown in Table 4.

Table 4. Granger Causality Test

Causality Statement	F-statistic	<i>p</i> -value
USD exchange rate does not Granger cause deposit dollarization	0.5903	0.6217
Deposit dollarization does not Granger cause USD exchange rate	3.6363	0.013

VAR was performed to test the relationship between Dollarization and the USD exchange rate. The impulse response function indicated USD exchange rate response/dollarization response to the explanatory variable for the next ten months to one standard deviation shock. Figure 3 demonstrated that one standard deviation innovation to the deposit dollarization brought a change in the deposit dollarization and made the deposits rise. The effect reached its peak in the third month. Afterward, the deposit dollarization started declining. These findings were also supported with results in Table 5. The USD exchange rate had almost zero effect on the deposit dollarization.

Figure 3: Impulse Response



In contrast, the USD exchange rate immediately reacts to one standard deviation innovation to the USD exchange rate and the deposit dollarization. Home currency (TL) depreciated with one standard deviation innovation to the USD exchange rate and deposit dollarization. The response was immediate and attained its peak in the second month. After that the influence started fading out. Another investigation using variance decomposition showed in Figure 4 that the USD exchange rate had no significant role on Dollarization. The deposit dollarization clarified wide variation in the deposit dollarization, with peak impact coming immediately in the first month.

Table 5. Variance Decomposition – Deposit Dollarization

Period	Std.Err.	Deposit Dollarization	USD Exchange Rate
1	0.0128	100	0
2	0.0187	99.9061	0.094
3	0.0237	99.8882	0.1119
4	0.0276	99.9023	0.0978
5	0.031	99.9148	0.0853
6	0.0338	99.9189	0.0812
7	0.0364	99.9162	0.0839
8	0.0387	99.9113	0.0888
9	0.0408	99.9063	0.0938

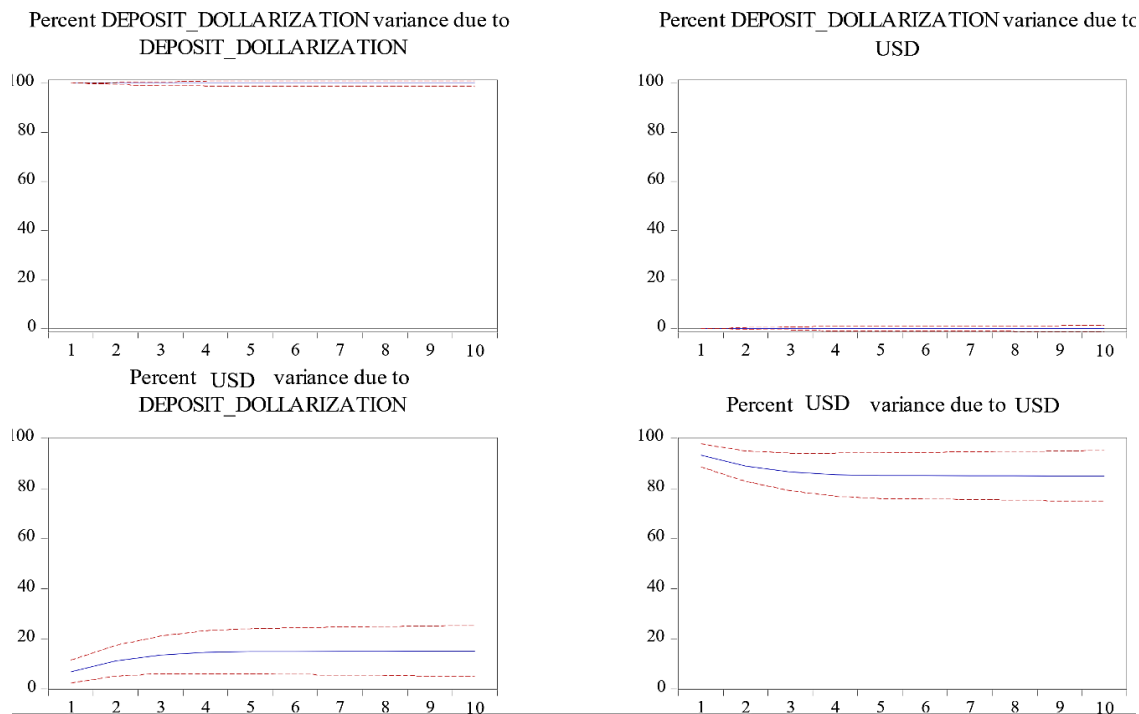
Figure 4: Variance Decomposition

10	0.0427	99.9011	0.099
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Additionally, the USD exchange rate was affected by the USD exchange rate itself. Therefore, the USD exchange rate mainly explained the variance in the USD exchange rate according to the result in Table 6. However, lately, the effect of Dollarization started increasing over time, and by the end of the tenth month, it captured 15% of the variation.

Table 6. Variance Decomposition – USD Exchange Rate

Period	Std.Err.	Deposit Dollarization	USD Exchange Rate
1	0.083	6.8671	93.133
2	0.1519	11.2116	88.7885
3	0.1916	13.5185	86.4816
4	0.2142	14.5945	85.4056
5	0.2326	14.944	85.0561
6	0.2524	14.9947	85.0054
7	0.2733	15.0166	84.9835
8	0.2933	15.069	84.9311
9	0.3117	15.1062	84.8939
10	0.3293	15.1023	84.8978

Variance Decomposition using Cholesky (d.f. adjusted) Factors ± 2 S.E.

5. Conclusion

In the study, the effect of deposit dollarization as a determinant of the USD exchange rate was tried to be measured. The bidirectional causality relationship between the USD exchange rate and deposit dollarization was investigated within the framework of the model created using the USD exchange rate data and FED accounts for the period 1986:01-2020:12. According to the model created, it was determined that Dollarization had a significant effect on the USD exchange rate. The date when this effect was most evident was found to be 2001. In contrast, according to the data in the specified date range, it was not determined that the USD exchange rate affected Dollarization. Therefore, it was reported that the causality relationship between the two variables was found uni-directional from Dollarization to the USD exchange rate.

Moreover, one standard deviation innovation to the deposit dollarization changed deposit dollarization and made the deposits rise. The USD exchange rate had almost zero effect on the deposit dollarization. In contrast, the USD exchange rate immediately reacted to one standard deviation innovation to the USD exchange rate and the deposit dollarization. Home currency depreciated with one standard deviation innovation to the USD exchange rate and deposit dollarization. Furthermore, variance decomposition showed the wide variation in the deposit dollarization. The deposit dollarization itself clarified it.

Similarly, the USD exchange rate was also influenced by the USD exchange rate itself. In other words, the variance in the USD exchange rate was mainly explained by the USD exchange rate. However, lately, the effect of Dollarization started increasing over time, and by the end of the tenth month, it captured 15% of the variation.

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