İstanbul İktisat Dergisi - Istanbul Journal of Economics 72, 2022/2, s. 625-651
ISSN: 2602-4152
E-ISSN: 2602-3954

RESEARCH ARTICLE

Dollarization and Risk Premium in a Risky Country: An Investigation on Turkiye

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ABSTRACT

In this study, developed from the importance of the deformation caused by dollarization in developing countries, the effect of risk level on financial dollarization is examined. In the research conducted for Turkey, one of the riskiest countries in the world according to the five-year Credit Default Swaps (CDS) premium values as of the date of the study, weekly data between the period of December 14, 2012 and February 11, 2022 are used to determine the effect of the risk level for short periods. The relationship between variables is examined using the Fourier Cointegration Test (FSHIN) cointegration test and the Dynamic Least Squares (DOLS) estimator. The findings show that country risk, exchange rate, and domestic currency deposit interest rates affect financial dollarization positively, while foreign currency deposit interest rates affect it negatively. The study carried out for Turkey sheds light on the factors that should be considered in high-risk countries facing the dollarization problem and presents policy recommendations for developing countries in this direction.

Keywords: Dollarization, Credit default swaps, Risk level, Monetary policy
JEL Classification: C32, E43, E52, E58

DOI: 10.26650/ISTJECON2021-1191952

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Submitted: 20.10.2022
Accepted: 05.12.2022

Citation: Eren, M., Basar, S., & Tosun, B. (2022). Dollarization and risk premium in a risky country: An investigation on Turkiye. *İstanbul İktisat Dergisi - Istanbul Journal of Economics, 72*(2), 625-651. https://doi.org/10.26650/ISTJECON2021-1191952

1. Introduction

On August 15, 1971, the 27-year Bretton Woods period ended with the announcement of President Nixon temporarily suspending the convertibility of the US dollar into gold or other reserve assets (Yaz, 2020). With Nixon's statement, the national currency of each country has turned into a policy tool that provides seigniorage income. National currencies supported by production have been accepted as convertible and have become globally valid. On the other hand, countries that are not aware of the characteristics of the national currency have increased the amount of money for various purposes, causing a decrease in the value of money and therefore its reliability. The loss of confidence in the national currency caused the use of a more reliable foreign currency in economic transactions. The reliability of the American dollar since World War II has led to the fact that foreign currency in most countries is frequently dollars, with the fact that foreign currency is preferred in economic transactions being called "dollarization."

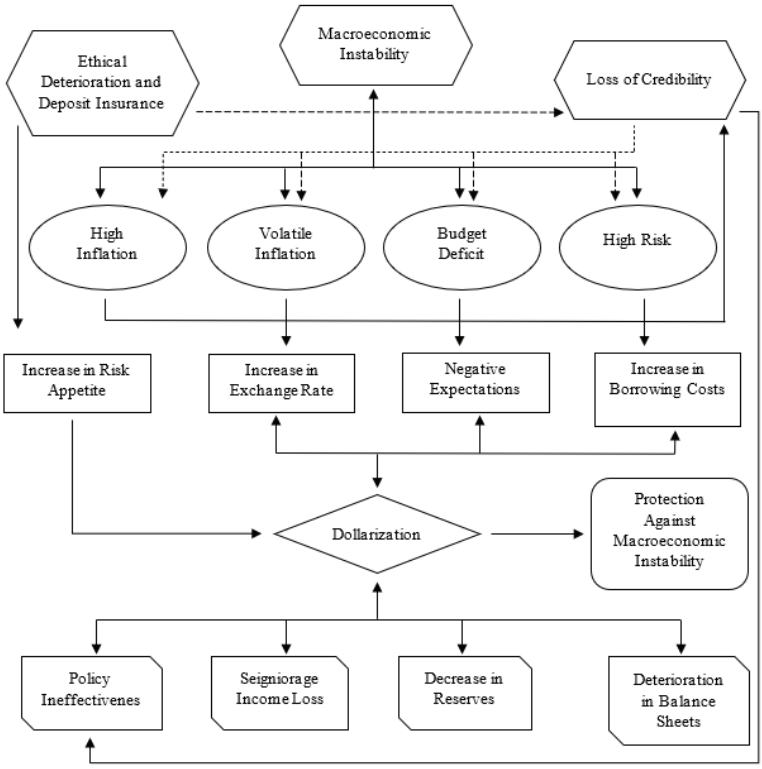
Dollarization occurs when the national currency loses all or some of its functions, such as store of value, unit of account, and medium of exchange. The country abandoning its national currency completely and using a foreign currency as its official currency is called full dollarization. The purpose of full dollarization is to contribute to the economic balance by using a more stable foreign currency instead of an unstable national currency. Full dollarization, where daily transactions are made in foreign currency, including fee and tax payments, is seen in a small and limited number of countries, such as Panama, Ecuador, and El Salvador. Partial dollarization, also known as de facto dollarization, occurs when economic agents tend to foreign currency financial assets due to inflation. In particular, partial dollarization was observed in developing countries such as Argentina, Peru, Bolivia, and Turkey, which have been examined in different ways according to such constraints as reasons for occurrence, subjective conditions of countries, and degree of dollarization (Calvo, 2002; Yeyati, Sturzenegger and Tella, 2002; Serdengeçti, 2005).

Examples of countries faced with partial dollarization show that the displacement of the national currency for the foreign currency occurs gradually in

an environment of high inflation (Savastano, 1996). In the first phase of dollarization, assets of a foreign currency are used as a store of value. In this process, called *asset substitution*, currency substitution occurs when high inflation becomes chronic under conditions of macroeconomic instability. Currency substitution, which refers to the use of foreign currency as a medium of exchange and unit of account in economic transactions, emerges during periods of high and chronic inflation when the cost of using the local currency for transactions is high (Webb and Armas, 2004). Dollarization, which usually starts as asset substitution, turns into currency substitution, starting from durable goods to nondurable goods, in case of persistence of high inflation and unstable macroeconomic conditions (Calvo and Gramont, 1992). Asset substitution focuses on foreign currency assets in economic transactions and for foreign currency savings. On the other hand, *liability dollarization*, which refers to the existence of foreign currency liabilities of economic agents, focuses on the potential of foreign exchange debt to be a source of vulnerability to exchange rate risk and external shocks. *Financial dollarization*, which handles partial dollarization more comprehensively, collects foreign currency assets and liabilities of residents under a single heading. Financial dollarization, which reflects both the supply and demand of assets in foreign currency, includes the financial assets and liabilities of all economic units, including the private and public sectors (Yeyati, 2006). Financial dollarization, which is the subject of this study and examined within the scope of partial dollarization, is briefly expressed as dollarization in the rest of the paper.

Dollarization is mainly fed by three factors: macroeconomic instability, ethical deterioration and deposit insurance, and loss of credibility. As a result of dollarization, negative consequences may occur, such as policy ineffectiveness, seigniorage income loss, decrease in central bank reserves, and deterioration in balance sheets. However, as seen in Figure 1, while most of the factors that cause dollarization are also related to other factors, economic indicators resulting from dollarization also cause an increase in dollarization by affecting the factors that cause dollarization.

Figure 1. Causes and consequences of dollarization



Source: Figure created by authors.

Macroeconomic stability consists of a combination of sustainable economic growth, low-interest rate, a market that supports the economic system, controlled public finances, and a stable exchange rate. Dollarization, on the other hand, reflects the protection mechanisms of economic units against macroeconomic instabilities. Therefore, macroeconomic instability arising from high and volatile inflation causes dollarization. Since high inflation reduces the purchasing power of the national currency and causes the purchasing power of residents to decrease, economic units realize their assets and liabilities with foreign currency. The increase in the demand for foreign currency causes an increase in the exchange rate, and the increase in the exchange rate causes an increase in the perceived risk by causing a further increase in inflation in countries whose production processes

depend on imports (Ize and Yeyati, 1998; Honohan and Shi, 2001). Moreover, while the interaction between high inflation and high exchange rate determines economic transactions, volatile inflation and volatile exchange rate affect expectations. The widening of the difference between expected inflation and actual inflation causes contracts and prices to be determined in foreign currency and increases dollarization. However, the relationship between inflation and dollarization may not be linear. In case of a lack of confidence in the market, high dollarization can be observed despite the decrease in the inflation rate (IADB, 2004). In addition to the interaction on the axis of high inflation and exchange rate, public-based instabilities can also lead to dollarization (Alesina and Barro, 2001). The financing of the budget deficit by emission in Yugoslavia between 1980 and 1994 caused high inflation, with the resulting decrease in the value of the national currency causing high dollarization (Fabris and Vujanović, 2017). Additionally, high public debt increases the level and cost of borrowing from the international market both by increasing the risk perception and crowding-out effect. Increasing foreign exchange debt stock causes an increase in dollarization. In the meantime, governments tend to consciously increase the inflation rate to reduce the debt burden in real terms. In this circumstance, where confidence in the government is damaged, economic units prefer foreign currency to protect their purchasing power, as confidence in fiscal policy is damaged (Yeyati, 2003). Implementations for the private sector are also effective on dollarization. The deposit insurance system, which is applied regardless of currency, causes an increase in risk appetite and ethical deterioration. Insuring foreign currency deposits against currency risk causes banks to increase their foreign currency deposits by taking more risks. However, the expectation that the official authorities will intervene in the high exchange rate may lead to an increase in asset and liability dollarization, as well as raising the issue of credibility (Burnside, Eichenbaum and Rebelo, 2001; Broda and Yeyati, 2006; Cowan and Do, 2003). Loss or lack of credibility arises as a result of policies implemented. The central bank, which causes high and uncertain inflation, damages the credibility of the monetary policy. The loss of reliance on economic policies leads to a decrease in the effectiveness of policies and chronic macroeconomic instability, leading to dollarization (Honohan and Shi, 2001; Ize and Yeyati, 2003; Jeanne, 2003).

Apart from factors such as macroeconomic instability, ethical deterioration and deposit insurances, and loss of credibility that cause dollarization, there are indirect factors which may also cause dollarization, such as dollarization hysteria, original sin, firm behaviors, the currency regime, the level of financial development, and the level of economic openness. Also, the reasons for dollarization are closely related to each other. While the loss of credibility is affected by macroeconomic instabilities, ethical deterioration and the deposit insurance system affect both macroeconomic stability and credibility.

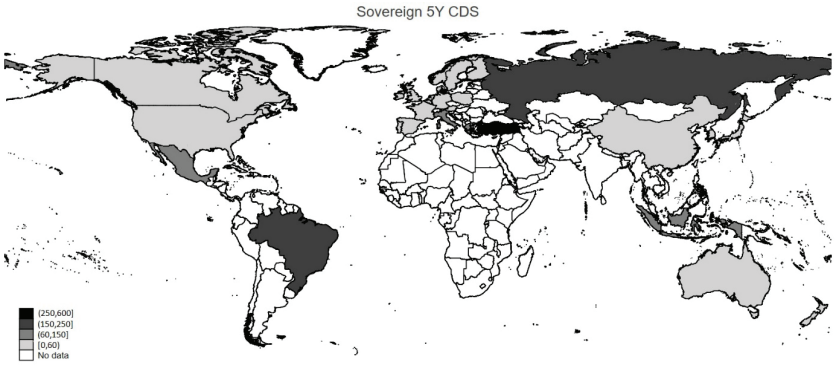
Dollarization, plays an important role in increasing the economic risk by spreading the fragility to all sectors of the economy. Dollarization shows its first effect on the monetary system. In connection with the chosen exchange rate regime, the risk of the ineffectiveness of monetary policy arises and seigniorage income disappears. The loss of policy capability and the chance of intervention with monetary policy in possible economic instability situations disappear. Additionally, depending on the exchange rate regime, central banks faced with dollarization may lead to a reduction in their foreign exchange reserves to intervene in the economy. The decrease in foreign exchange reserves can cause an increase in risk perception and uncontrollable dollarization together with the exchange rate.

Breakdowns arising from currency risk caused by dollarization lead to the emergence of credit, liquidity, and systemic risk. The increasing risk perception, on the other hand, combines with other factors, causing a further increase in dollarization. The diffusion process of the risk arising from dollarization will be determined by the deterioration in the balance sheet structure of firms in the financial sector. As the ratio of foreign currency liabilities within the balance sheets of the firm increases, exchange risk will arise and the risk of failure to fulfill the liabilities will increase. In the case of failure to fulfill the obligations, systemic risk will arise and the financial structure of other companies, markets, sectors, and even countries will be adversely affected. As a matter of fact, the 1982 Mexico and 2002 Argentina financial crises, which originated from dollarization and the fragility of the financial sector, spread to other countries with high dollarization

and led to the examination of the relationship between dollarization and the financial sector (Domaç and Peria, 2003; De Nicoló, Honohan and Ize, 2005).

Especially in countries with high inflation and high volatility in exchange rates, determining assets and liabilities with foreign currency facilitates the protection of economic agents from foreign currency risk. However, if the dollarization rate increases and spreads to the whole economy, unavoidable exchange rate fluctuations and economic risks may arise. In this study, which was developed due to the importance of the deformation caused by dollarization, especially in the economic structures of developing countries. What distinguishes this research from other studies is that the concept of dollarization was examined by considering the economic risks. In this study, in order to examine the factors affecting dollarization, Turkey, one of the riskiest countries in the world as of the date of the study according to the Credit Default Swaps (CDS) criteria (Figure 2), was chosen as an example.[1]

Figure 2. Sovereign 5Y CDS in the World (11 February 2022)



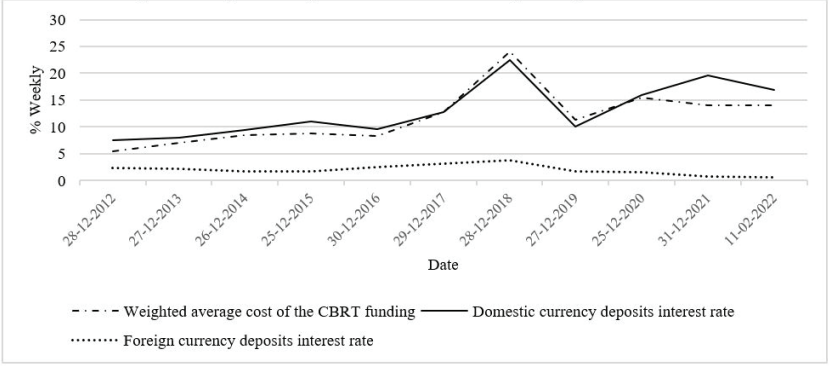
Source: Created by the authors with data obtained from WGB (2022)

As of 2020, Turkey is a country with an increasing budget and current account deficit and a high level of inflation and external debt. The central bank's reserves are insufficient and the independence of the central bank is under debate. There

[1] CDS premium values of the countries as of February 11, 2022, are presented in Annex 2.

are problems in international relations and in terms of institutional indicators, and effective attempts are not made to ensure institutional efficiency. Risks arising from the subjective characteristics of Turkey cause the country to be accepted as one of the riskiest countries according to the CDS premium. Increasing risks cause a decrease in the level of foreign direct investment, a decrease in foreign exchange inflows (except for hot money), and an increase in the exchange rate. The risk increase combined with the deterioration of expectations causes the investments to be delayed and decreases the production level. On the other hand, the increasing exchange rate increases the production costs as the imported input rate is high and the inflation continuously rises. Since macroeconomic instability combined with increasing risks leads to a loss of confidence in policies, economic units that want to preserve their purchasing power prefer foreign exchange in their assets and liabilities, with the increase in borrowing costs increasing the weight of foreign exchange in the debt burden. As the dirty exchange rate system is applied in the country, the Central Bank uses various policy tools to intervene in the high inflation and exchange rate, but the expectations and loss of credibility reduce the effect of the policies and prevent the expected results. However, as a result of the implemented policies, the Central Bank's foreign exchange reserves are decreasing, which increases the country's risk.

Figure 3. Weighted average cost of the CBRT funding and Deposit interest rates



Source: CBRT (2022).

Especially in the last quarter-century, the number of financial instruments, which increased with the developing technology, caused the effects of risks and monetary

indicators on economies to emerge in a shorter time and on a wider scale. Therefore, this study examining the effects of monetary policy, exchange rate, and risk level on dollarization was conducted using weekly data. Deposit interest rates were used to represent the monetary policy in order to examine the credibility of the Central Bank, the effectiveness of the policies implemented, and its ability to manage expectations. Ceteris paribus, deposit interest rates, can be determinant on the preference of economic units to hold national currency or foreign currency. Although deposit interest rates are determined within the market mechanism, they are greatly affected by the weighted average funding cost determined by the Central Bank of the Republic of Turkey (CBRT) and reflect the monetary policy adopted by the Central Bank (see Figure 3). The exchange rate plays an important role in terms of both the causes and consequences of dollarization. In addition, it is one of the main indicators affecting inflation in countries where the dual currency system is implemented and whose economic structure is highly dependent on imports. For this reason, the exchange rate variable is included in the analysis as an independent variable, since there is no weekly inflation data and it is effective on the foreign exchange holding preferences of economic agents. As a risk level, the CDS indicator was used, as it can show the economic risk level for short periods. CDS is a financial derivative or contract that allows an investor to swap his or her credit risk with that of another investor. The CDS premium, on the other hand, shows the return an investor will receive if he/she undertakes the risk of non-payment against a certain ratio of the debt. Since the CDS premium is determined according to supply and demand in the market, it is accepted as the most objective measure in the measurement of country risk (Katyaayun and Krause, 2017; Rodríguez, Dandapani and Lawrence, 2019).

Dollarization is frequently discussed in the literature. In the studies on dollarization, it is seen that developing countries exposed to fragility and crises as a result of the collapse of the Bretton Woods system and subsequent financial liberalization stand out. The studies reviewed mainly examine asset and liability dollarization and financial dollarization, which includes both. A summary of the literature regarding the studies investigating the dollarization phenomenon is presented in Annex 1. These studies include such variables as: the share of foreign

currency deposits in total deposits (Ponomarenko, Solovyeva and Vasilieva, 2013; Vieira, Holland and Resend., 2012); the share of foreign currency deposits in the money supply (Hekim, 2008; Olayungbo and Ajuwon, 2015); the share of foreign currency deposits in the GDP (Dumrul, 2010); the share of foreign currency loans in total loans (Bednarik, 2007; Rosenberg and Tirpák, 2008). In the analyzes, in addition to examining the factors affecting dollarization, there are studies (Lay, Kakinata and Kokani, 2012) that include dollarization in the models as an independent variable. Factors affecting dollarization are discussed in a very broad framework in the literature. Studies examining the relationship with the variables used in this study are presented in the table. There is no consensus in the literature in the context of these variables, with it being possible to obtain different results even in analyzes performed for the same country. Accordingly, there are studies in the literature showing that the exchange rate affects dollarization positively (Neanidis and Savva, 2009; Srithilat, Sun, Chanthanivong and Thavisay, 2018) or negatively (Bednarik, 2007; Hekim, 2008). On the other hand, there are studies (Lay et al., 2012) showing that there is no relationship between exchange rate and dollarization. In the reviewed studies, it is seen that foreign and domestic currency interest rates and the differences between these interest rates are used to represent the interest rate. There are studies that show that the effect of foreign currency interest rates on dollarization is positive (Komárek and Melecký, 2003), as well as studies that find it to be negative (Bednarik, 2007). Similarly, different results were obtained in studies where the difference between interest rates was used. While some studies (Hekim, 2008; Rosenberg and Tirpák, 2008) indicate that the relationship between the difference between interest rates and dollarization is positive, some studies (Civcir, 2005; Adeniji, 2013) indicate that it is negative. However, there are also studies (Ponomarenko et al., 2013; Olayungbo and Ajuwon, 2015) that found no statistically significant relationship between interest rates and dollarization. Finally, in the relevant literature, the risks of countries are discussed within the framework of political risk, exchange rate risk, and systemic risk, with the results differing like other variables. In studies (Civcir, 2005; Vieira et al., 2012; Yinusa, 2009) performed in this context, it is indicated that the political risk and exchange rate risk affect dollarization negatively and systemic risk affects it positively.

In this study, the effect of risk level on financial dollarization is examined by including monetary policy and exchange rates. The originality of the article lies in the examination of the dollarization for a high-risk country by considering economic indicators and risks for short periods. Accordingly, it is aimed to fill the gap in the literature on the relationship between dollarization, risks, and economic policies. In the remaining sections of the study, information on the data set and methodology used in the econometric analysis will be given and model findings will be discussed.

2. Methods

2.1. Data and model specification

In the study, the relationship between financial dollarization and exchange rate, country risk, and interest rate were investigated. As the widespread use of financial instruments and developing technology cause financial transactions to affect economic indicators in a shorter period of time, the relationships between variables were analyzed with weekly data. In order to determine the effect of the risk indicator on dollarization, the study was analyzed with the data of Turkey, which is the riskiest country according to the CDS indicator, as of February 11, 2022. In the study conducted between December 14, 2012 and February 11, 2022, financial dollarization representing dollarization, CDS representing country risk, and deposit interest rates applied to domestic and foreign currencies representing monetary policy were used. Also, since the production structure in Turkey is highly dependent on imports, the increase in the exchange rate is closely related to inflation. For this reason, the exchange rate variable is included in the study, since there is no weekly inflation data to determine the effect of the inflation rate. Definitions, explanations, and descriptive statistics of the variables used in the analysis are shown in Table 1.

Table 1: Variables and descriptive statistics

Variable	Definition	Explanation	Obs.	Mean	Min	Max	Std. Dev.
dol	Financial dollarization	Financial dollarization, was created using deposit and credit dollarization indicators.	479	0.0006	-1.793	2.786	0.913
er	Exchange rate	USD (United States Dollar)/TL (Turkish Lira) exchange rate	479	4.529	1.751	15.212	2.547
intfc	Foreign currency deposits interest rate	Weighted average interest rates for deposits in USD	479	12.232	5.590	24.990	4.468
intdc	Domestic currency deposits interest rate	Weighted average interest rates for deposits in Turkish Lira	479	2.047	0.530	5.290	0.841
lcds	Natural logarithm of Credit Default Swaps (CDS)	5 Years Credit Default Swaps	479	5.601	4.729	6.466	0.390

While the CDS data were obtained from Bloomberg, all other data were obtained from the Electronic Data Delivery System of the CBRT.
The equation is as follows:

$$dol_t = \beta_0 + \beta_1 er_t + \beta_2 intfc_t + \beta_3 intdc_t + \beta_4 lcds_t + \varepsilon_t \qquad (1)$$

In the model, β_0 shows the constant term and ε_t shows the error term. Also, *l* denotes the natural logarithm of the variable and t symbolizations the time dimension (t=1,2, 3, …, n.).

The *dol* variable, used to represent financial dollarization, was created using deposit and credit dollarization indicators to represent the asset and liability aspects of dollarization:

$$Deposit\ dollarization = \frac{Foreign\ currency deposits}{Total\ deposits} \qquad (2)$$

$$Credit\ dollarization = \frac{Foreign\ currency loans}{Total\ loans} \qquad (3)$$

When combining the deposit and credit dollarization variables, the Principal Component Analysis (PCA) method was used. While applying the PCA, it is necessary to determine the correlation states of the variables used and their suitability for the analysis. For this purpose, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were used. It is indicated that the KMO criterion should take a value of 0.50 and above, otherwise the analysis is not suitable. The basic hypothesis of the Bartlett test, which shows whether there is a certain level of relationship between variables, tests the equality of the correlation matrix to the unit matrix. The rejection of the basic hypothesis shows that there is a correlation between the variables (Hair, Black, Babin and Anderson 2014). After determining the suitability of the variables for the analysis, the weights for both standardized dollarization indicators were determined as 0.962 as a result of PCA. So, while calculating the degree of financial dollarization, deposit and credit dollarization indicators were given equal weight.[2]

3. Results and Discussion

3.1. Statistical and econometric characteristics of variables

After the financial dollarization indicator was calculated, pre-tests were applied in order to determine the relationship between variables. In line with the results of the pre-tests, appropriate models were estimated. When working with non-stationary series spurious regression, problems can arise in the time series analysis. This situation may lead to obtaining deviating results. In addition to the stationarity analysis, it can be determined whether the series has a linear structure or not by applying some tests. Thus, appropriate unit root tests can be used in line with the determined structure. By applying traditional unit root tests to

[2] While conducting the principal component analysis, the approach of determining the components with eigenvalues greater than 1 has been adopted and no rotation process has been applied. In determining the weights, the loads belonging to the first principal component were taken into consideration. It has been determined that the first principal component explains approximately 93% of the total variance. The results of the analysis are presented in Annex 3.

nonlinear series, it can be concluded that series that are actually stationary contain a unit root. For this reason, the first differences of the series are used, which may cause observation losses. From this point, whether the series is linear or not was examined first by using the Harvey, Leybourne and Xiao. (2008) linearity test in the analysis. In this test, whether the series is stationary or not is considered by using regression models created for level and difference values:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-1}^2 + \beta_3 y_{t-1}^3 + \sum_{j=1}^{p} \beta_{4,j} \Delta y_{t-j} + \varepsilon_t \quad (4)$$

$$\Delta y_t = \lambda_1 \Delta y_{t-1} + \lambda_2 (\Delta y_{t-1})^2 + \lambda_3 (\Delta y_{t-1})^3 + \sum_{j=1}^{p} \lambda_{4,j} \Delta y_{t-j} + \varepsilon_t \quad (5)$$

Three test statistics were calculated: The W_s test statistic was calculated from the equation numbered (4), which was written under the assumption that the series is stationary and the W_u test statistic was calculated from the equation numbered (5), which was written with the assumption that the series is not stationary. Then, the W_λ statistic was obtained by taking the weighted average of both statistics. The W_λ statistic is suitable for the two degrees of freedom X^2 distribution. While the basic hypothesis of the test shows that the series has a linear structure, the alternative hypothesis indicates that the series is nonlinear (Harvey et al. 2008). The linearity test results are included in Table 2.

Table 2: Harvey et al. (2008) Linearity Test Results

Variable	Test stat.
dol	77.853*
er	55.116*
intfc	37.174*
intdc	3.630
lcds	19.025*

Note: The critical value for the Harvey et al. (2008) linearity test is 5.99 for the 5% significance level. *, indicates statistical significance at the 5% level.

The linearity test results show that the *dol*, *er*, *intfc*, and *lcds* variables are nonlinear and the *intdc* variable is linear. After the linearity test, it was investigated

whether the series contains a unit root or not. For this purpose, while the Kwiatkowski, Phillips, Schmidt and Shin (1992) (KPSS) unit root test was used for linear variables, the Fourier KPSS (FKPSS) unit root test was used for the nonlinear variables. The KPSS test was carried out using equations (6) and (7):

$$Y_t = \xi_t + r_t + \varepsilon_t \tag{6}$$

$$r_t = r_{t-1} + u_t \tag{7}$$

In the KPSS test, unlike other the tests, while the basic hypothesis indicates that the series is stationary, the alternative hypothesis shows that the series contains a unit root. When the KPSS test statistic is compared with the critical values, rejecting the basic hypothesis means that the series contains a unit root. Becker, Enders and Lee (2006) developed a new KPSS type unit root test, extended with Fourier terms, to take the unknown structural breaks and nonlinearity into account. The standard equation of the FKPSS test is as follows:

$$y_t = \alpha + \gamma_1 sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 cos\left(\frac{2\pi kt}{T}\right) + \varepsilon_t \tag{8}$$

In the FKPSS test, like the KPSS test, while the basic hypothesis indicates that the series is stationary, the alternative hypothesis shows that the series contain a unit root. The distribution of the test depends on the number of frequencies (k) and the critical values were determined according to the k. The optimal number of frequencies is expressed as the number of frequencies at which the residual sum of squares of the estimated models is the lowest. The critical values of the test were obtained from Becker et al. (2006). If the series is determined to be stationary as a result of the test, the significance of the trigonometric terms should be tested. If it is determined that the trigonometric terms are not significant, it is concluded that there is no need to apply the FKPSS test and it is decided to use the standard KPSS test. The significance of the trigonometric terms was tested with the F test, with the F statistic calculated as follows:

$$F(k) = \left(\frac{SSR_0 - SSR_1(k)/2}{SSR_1(k)/(T-k)} \right) \quad (9)$$

Hypotheses regarding the significance of trigonometric terms are established as follows:

$$H_0: \gamma_1 = \gamma_2 = 0 \quad (10)$$

$$H_1: \gamma_1 \neq \gamma_2 \neq 0 \quad (11)$$

The critical values for the calculated F statistic were obtained from Becker et al. (2006). While the basic hypothesis indicates that trigonometric terms are not significant, the alternative hypothesis shows that trigonometric terms are significant. The results of the KPSS and FKPSS tests are given in Table 3.

Table 3: KPSS and FKPSS Test Results

Variable	k	FKPSS Test Stat.	KPSS Test Stat.
dol	1	0.844*	
Δdol			0.080
er	1	1.187*	
Δer			0.446
intfc	2	0.695*	
Δintfc			0.166
intdc			1.293*
Δintdc			0.052
lcds	1	0.493*	
Δlcds			0.029

Note: The critical value for the FKPSS test is 0.172 for k=1;0.415 for k=2 and the 5% significance level. The critical value for the KPSS test is 0.463 for the 5% significance level. *, indicates statistical significance at the 5% level.

When the findings were examined, the FKPSS unit root test was applied to the *dol*, *er*, *intfc,* and *lcds* variables, and it was determined that the variables were not stationary. As the variables were not stationary, the trigonometric terms were not tested. However, it was necessary to determine at what level the variables are stationary. For this purpose, the standard KPSS unit root test was applied to the *dol*, *er*, *intfc,* and *lcds* variables by taking their first difference. It was observed that they became stationary in the first difference. On the other hand, the standard

KPSS unit root test was applied to the *intdc* variable, and it was found that the variable was not stationary in its level values, but became stationary when its first difference was taken.

3.2. Examining the determinants of dollarization

Since it was determined that all the variables used in the analysis become stationary when their first differences are taken, the existence of a long-term relationship between the variables was investigated with the Fourier Cointegration Test (FSHIN) developed by Tsong, Lee, Tsai and Hu (2016). The basic equation of the FSHIN test can be expressed as follows (Yılancı, 2017):

$$y_t = \delta_0 + \alpha_k sin\left(\frac{2\pi kt}{T}\right) + \beta_k cos\left(\frac{2\pi kt}{T}\right) + x_t'\beta + \upsilon_{1t} \qquad (12)$$

While the basic hypothesis of the FSHIN test indicates the existence of cointegration relationship, the alternative hypothesis shows that there is no cointegration relationship. The test statistic is compared with the critical values in Tsong et al. (2016). If the existence of a cointegration relationship between variables is determined, the significance of trigonometric terms should be tested. If it is determined that the trigonometric terms are insignificant, it is concluded that there is no need to apply the FSHIN test and it is decided to use the Shin (1994) cointegration test. The significance of the trigonometric terms is tested with the F test. The hypotheses regarding the F test were established as follows:

$$H_0: \gamma_1 = \gamma_2 = 0 \qquad (13)$$

$$H_1: \gamma_1 \neq \gamma_2 \neq 0 \qquad (14)$$

The critical values for the calculated F statistic can be obtained from Tsong et al. (2016). While the basic hypothesis indicates that trigonometric terms are not significant, the alternative hypothesis shows that trigonometric terms are significant. The results of the FSHIN test are given in Table 4.

Table 4: FSHIN Cointegration Test Results

k_{min}	FSHIN Cointegration Stat.	F Stat.
1	0.049	11.830*

Note: The critical value for the FSHIN test is 0.061, for k=1 and the 5% significance level. The critical value for the F test is 4.066 for the 5% significance level. *, indicates statistical significance at the 5% level.

According to the FSHIN test, the basic hypothesis indicating the existence of cointegration could not be rejected and it was determined that there is a long-term relationship between the variables. Since there is a cointegration relationship between variables, the trigonometric terms should be tested. The F statistic shows that the trigonometric terms are significant. The long-term coefficients of the variables were estimated using the Dynamic Least Squares (DOLS) estimator including the Fourier functions. The estimation results are presented in Table 5.

Table 5: DOLS Estimator Results

Variable	Coefficient	p -Value
er	0.038*	0.044
intfc	-0.270*	0.000
intdc	0.070*	0.000
lcds	0.740*	0.000
C	-4.689*	0.000
SS	-0.364*	0.001
CC	-0.403*	0.000

Note: SS and CC denote the Sinus and Cosine functions, respectively. *, indicates statistical significance at the 5% level.

The DOLS estimation results show that all variables are statistically significant. While there is a positive relationship between dollarization and exchange rate, risk premium, and domestic currency deposit interest rates, there is a negative relationship between dollarization and foreign currency deposit interest rates. According to this result, one unit increase in the *er* and *intdc* variables increases dollarization by 0.038 and 0.070 units, respectively. On the other hand, it was observed that a 1% increase in the *lcds* variable increased dollarization by 0.740 units. Finally, a one unit increase in the *intfc* variable decreases dollarization by 0.270 units.

4. Conclusion

The implementation of fiat money in national and international economic transactions has created a credibility problem of national currencies. Especially in economies where macroeconomic instabilities prevail, the loss of confidence in national currencies causes the use of foreign currency in economic transactions. Dollarization, which emerged with the widespread use of foreign currency in economic transactions, has become one of the main problems of economic authorities in terms of its causes and consequences.

In this study, which was developed due to the importance of the deformation caused by dollarization, especially in the economic indicators of developing countries, the dollarization problem was discussed within the framework of monetary policy, exchange rate, and country risk. The relationship between variables was examined using the FSHIN cointegration test and DOLS estimator. While there is a positive relationship between dollarization and exchange rate, risk premium, and domestic currency deposit interest rates, there is a negative relationship between dollarization and foreign currency deposit interest rates.

The outcomes of this study provide new insights into the literature on the factors causing dollarization, especially in risky countries. Firstly, the findings reveal that country risk and exchange rate positively affect financial dollarization. In Turkey, where the current account deficit is high and there is a dependence on the flow of hot money, the increase in country risk causes hot money to leave the country, thus the increase in risk causes an increase in the exchange rate and dollarization. In this respect, the positive results were in the expected direction and similar to Vieira et al. (2012), Adeniji (2013), and Aigheyisi and Isikhuemen (2019). Secondly, when analyzed in terms of interest rates, it was concluded that domestic currency deposit interest rates affect dollarization positively, while foreign currency deposit interest rates affect it negatively. The findings reveal that the increase in domestic currency deposit interest rates and the decrease in foreign currency deposit interest rates may not decrease dollarization in Turkey in the expected direction. Although the unexpected findings in terms of economic

theory are consistent with the findings of Rosenberg and Tirpák (2008) and Bednarik (2007), this situation is thought to be specific to Turkey and countries with similar characteristics. Also, it should be considered that the fact that the real interest rates were below the level that would satisfy economic units in the said period may also be one of the reasons for this situation. In Turkey, central bank governors were changed frequently during the period that was the subject of the study, with five different governors serving in this period. This situation led to the discussion of the independence of the central bank, both nationally and internationally. Therefore, the findings are considered to be consistent when the credibility of the central bank and social perception is taken into account. Finally, although the results do not directly demonstrate country risks and central bank independence, they show that the indirect relationship between independence and risks has an effect on dollarization. Therefore, the results show that the decrease in the credibility of the central banks renders the policies to be implemented to reduce dollarization ineffective.

Although the findings show that the increase in risk positively affects dollarization, we think that this effect cannot be determined completely. This is because, in case of an increase in the risk, economic units that want to be protected from the risk of confiscation of their deposits may prefer to withdraw their deposits from the banking system. This means that the dollarization level may be higher than detected. Further studies should considering institutional indicators and deposits excluded from the banking system to contribute to the literature.

Acknowledgements: We would like to offer our special thanks to Assoc. Prof. Aycan Hepsağ for the WinRATS codes he developed and shared.
Ethics Committee Approval: Ethics committee approval was not obtained because there was no “human” element in the method of the study.
Peer-review: Externally peer-reviewed.
Author Contributions: Conception/Design of Study- M.E., S.B., B.T.; Data Acquisition- B.T.; Data Analysis/Interpretation- M.E., B.T.; Drafting Manuscript- M.E.; Critical Revision of Manuscript- S.B., B.T.; Final Approval and Accountability- M.E., S.B., B.T.
Conflict of Interest: The authors have no conflict of interest to declare.
Grant Support: The authors declared that this study has received no financial support.

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Annex 1: Literature Review

Authors (Year)	Countries – Regions – Organization, Period	Dependent Var.	Independent Var.	Econometric Method	Results
Komárek and Melecký (2003)	Czech Republic, 1994: Q1-2001: Q2	Foreign currency deposits / Domestic currency deposits (Foreign currency deposits -Broad money (M2))	Consumer price index, Exchange rates, domestic absorption, returns of foreign bills (German and USA)	Johansen Cointegration	Exchange rate and foreign bond yields increase dollarization.
Civcir (2005)	Turkey, 1986:1-1999:12	Foreign currency deposits / M2	Expected exchange rate, Difference between the real rate of return on the domestic currency and foreign currency, Exchange rate risk, Credibility	Johansen Cointegration	There is a negative relationship between the dollarization ratio and interest rate differential and credibility; a positive relationship between the dollarization ratio and exchange rate and exchange rate risk.
Bednarik (2007)	Czech Republic, Slovakia, Poland, Hungary, 1997-2006	Foreign currency loans/ Total loans	Foreign currency loans interest rate, Inflation rate, Exchange rate	Ordinary Least Squares (OLS)	Foreign currency loans interest rate affects dollarization negatively.
Hekim (2008)	Turkey, 1992:1-2007:12	Foreign currency deposits / M2	Difference between interest rates on domestic and foreign currency deposits, the Real effective exchange rates	OLS	Effects of the real exchange rate and difference of interest rates on dollarization are negative and positive, respectively.

Rosenberg and Tirpák (2008)	10 new EU member countries, 1999-2007	Foreign currency loans/ Total loans	The difference of interest rates between domestic and foreign currency, loan to deposit ratio, openness, restrictions	Panel regression	The relationship between dollarization and interest rate differential is positive and statistically significant.
Yinusa (2009)	18 Sub-Saharan Countries, 1980-2004	Foreign currency deposits / M2	Inflation, Capital account restrictions, Real Gross Domestic Product (GDP), domestic and policy interest rates, Excepted exchange rates, Political Risk	Panel	Interaction between capital account restrictions and domestic inflation,
Neanidis and Savva (2009)	11 Transition Economics, 1993:02-2006:12	Foreign currency deposits/ Total deposits, Foreign currency loans/ Total loans	Difference between interest rates on domestic and foreign currency, exchange rate, monetary base, change in dollarization	OLS, Fixed Effects (FE), Random Effects (RE), Feasible Generalized Least Squares (FGLS)	Exchange rate positively affects loan and deposit dollarization. While the interest rate differential affects deposit dollarization negatively, it positively affects loan dollarization.
Dumrul (2010)	Turkey, 1988-2009	Foreign currency deposits/ GDP	Domestic and foreign interest rate differential, Expected exchange rates	Autoregressive Distributed Lag (ARDL)	Expected exchange rates and interest rates positively affect to currency substitution.
Lay et al. (2012)	Cambodia, 1998:06-2008:01	Exchange rate	Foreign currency deposits/ M2	GARCH, Granger Causality	Dollarization is a major cause of exchange rate instability. There is Granger causality from dollarization to exchange rate.

Vieira et al. (2012)	79 countries, 1996-2006	Foreign currency deposits/ Total deposits	Institutional variables, US interest rate, Real exchange rate, Debt to GDP ratio	System Generalized Method of Moments (GMM)	Increasing systemic risk affects dollarization positively.
Ponomarenko et al. (2013)	Russia, 2001:01-2011:06	Foreign currency deposits/ Total deposits, Foreign currency loans/ Total loans	Deposits and loans interest rates, Exchange rate, monetary base, foreign liabilities to total liabilities	OLS, GMM	The domestic currency appreciation rate is the main factor for the deposit de-dollarization. The relationship between the interest rate differential and dollarization is statistically insignificant.
Adeniji (2013)	Nigeria, 1970-2012	(Foreign currency demand deposits/ M1) + (Foreign currency deposits excluding demand deposits/ M2)	Interest rate, Inflation, Exchange rate	ARDL	There is a positive relationship between dollarization and exchange rate and a negative relationship between dollarization and interest rate.
Olayungbo and Ajuwon (2015)	Nigeria, 1986: Q1-2015: Q1	Foreign currency deposits/ M2	Interest rates	Granger causality	There is no causal relationship between interest rates and dollarization.
Srithilat et al. (2018)	5 ASEAN countries, 1995-2015	Foreign currency deposits/ M2	Inflation, Real exchange rate	Fully Modified Ordinary Least Squares (FMOLS), Panel Causality	Real exchange rate has a positive effect on the dollarization.
Aigheyisi and Isikhuemen (2019)	Nigeria, 1994-2015	Foreign currency deposits / M2	Exchange rate, Foreign direct investments, inflation, gross fixed capital formation	FMOLS, Robust Ordinary Least Squares (ROLS)	The relationship between exchange rate and dollarization is positive and statistically significant.

Annex 2: 5Y CDS premium values of the countries (11 February 2022)

Rank	Country	CDS	Rank	Country	CDS
1	Germany	7.10	**16**	South Korea	27.25
2	Denmark	7.96	**17**	Hong Kong	28.40
3	Austria	8.21	**18**	Canada	29.80
4	Sweden	8.93	**19**	Portugal	38.80
5	Finland	9.30	**20**	Spain	39.00
6	Netherlands	9.50	**21**	Poland	44.20
7	United Kingdom	9.97	**22**	China	53.18
8	Norway	10.10	**23**	Indonesia	94.96
9	Belgium	10.70	**24**	Italy	101.80
10	United States	11.70	**25**	Mexico	107.87
11	Ireland	14.50	**26**	Greece	121.40
12	New Zealand	15.50	**27**	Russia	193.03
13	Australia	15.66	**28**	Brazil	221.00
14	Japan	17.60	**29**	Turkey	534.16
15	France	20.00			

Annex 3: Principal Component Analysis Results

KMO Criterion Value and Bartlett Test Results			
KMO	0.500	**Bartlett Test**	615.878* (0.000)
Explained Total Variance			
Component	**Total**	**Variance (%)**	**Cumulative (%)**
1	1.852	92.586	92.586
2	0.148	7.414	100.000
Component Matrix			
Deposit Dollarization			0.962
Credit Dollarization			0.962

Note: *, indicates statistical significance at the 5% level.