Deposit Dollarization in Turkey: A Rolling Window Analysis

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Abstract: In the recent years deposit dollarization in Turkey has been on the rise, reaching record levels in 2021. This was caused by a series of economic as well as political shocks namely the coup attempt in 2016, the switch to the presidential system in 2018, and the Covid-19 pandemic in 2020. This study contributes to the literature by examining the time varying reactions of deposit dollarization to the changing inflation, interest rate volatility, real exchange rate, and the consumer confidence before and after these shocks experienced by the country. The results based on rolling window maximum entropy bootstrap estimates, and monthly data between 2013 and 2021, reveal that all of the model variables had significant and sometimes asymmetric effects on deposit dollarization during different stages of this turbulent period. In particular, we observe a weakening effect of both inflation and the real exchange rate over time, while the impact of interest rate volatility increases after 2017. Therefore, a policy change toward increasing monetary policy credibility is required for achieving de-dollarization in the Turkish economy.

Key Words: Dollarization, Maximum entropy bootstrap, Monetary policy credibility, Turkey

1. Introduction

Deposit dollarization, which is defined as the denomination of deposits in currencies other than the domestic currency, has been one of the most important problems in the Turkish economy. Although Turkey enjoyed a phase of de-dollarization during the 2000s due to the stabilization program and inflation targeting, dollarization has increased rapidly especially after 2018 and reached almost 55 per cent in 2021. The macroeconomic problems, changes in the institutional structure, the currency crisis in 2018 and the Covid 19 pandemic have all contributed to the problem. It is documented in the literature that deposit dollarization can have various negative effects on the economy by causing a higher exchange rate pass through effect, increasing the vulnerabilities to external shocks, and by reducing the effectiveness of monetary policy. Hence, it is important to assess this unique case of Turkey in order to better understand the drivers of deposit dollarization and their time-varying effects over time.

Due to the important implications of the question at hand, both theoretically as well as practically, there exists a body of literature on the determinants of financial dollarization (Calvo and Veigh, 1992; Alesina and Barro, 2001; Ize and Yeyati, 2003; De Nicoló et al., 2005; Honohan, 2007; Arteta, 2005; Luca and Petrova, 2008; Bocola and Lorenzoni, 2020). In this literature, three different views have been put forward as the determinants of deposit dollarization namely the portfolio view, the market development view, and the institutional view. According to the portfolio view, dollarization is mainly driven by unfavorable macroeconomic conditions such as high inflation rate and real exchange rate (Ize-Yeyati, 2003). Market development view, on the other hand, explains dollarization as a suboptimal response to market imperfections. Thirdly the institutional view, which has become popular in recent years, emphasizes the role of institutional quality and monetary policy credibility in the dollarization process (Levy-Yeyati, 2006). This literature stresses the view that deposit dollarization is affected by inflation rate, interest rate differential between domestic and foreign currency, macroeconomic uncertainty, exchange rate and political stability.

There also exist a number of studies specifically focusing on dollarization in the Turkish economy. Civcir (2003) analyzes the long run determinants of deposit dollarization using a portfolio view approach and by employing a linear cointegration analysis he finds that interest rate differential and expected exchange rates are the main determinants of deposit dollarization. Metin-Özcan and Us (2007) investigate whether macroeconomic uncertainity contributes to deposit dollarization in the Turkish economy between 1985 and 2007, and by applying a VAR approach they show that inflation volatility and exchange rate depreciation volatility are the main explanatory variables. Using the bound test approach, Dumrul (2010) examines the relationship between currency substitution and exchange rate, and shows that there is a positive relation between currency substitution and exchange rate, intrerest rate differential and central bank reserves. Sever (2012) analyzes the relation between dollarization and foreign exchange rate uncertainity using Granger causality analysis and provides evidence for the relation between dollarization and foreign exchange rate uncertainity. In a recent study, Bărbuţă-Mişu et al. (2020) investigate the determinants of deposit dollarization by applying a cointegration approach and conclude that political ambiguity is an important driver of deposit dollarization.

Although the aforementioned studies provide valuable information regarding the drivers of deposit dollarization in Turkey, none of these studies examine the time varying relation between deposit dollarization and its determinants. Hence, our study attempts to contribute to the literature in two ways: First of all, we examine the time varying reaction of deposit dollarization by adopting a rolling window analysis. Because the degree of deposit dollarization may evolve over time based on the macroeconomic environment, monetary policies and institutional factors, the empirical analysis should capture the possible nonlinearities. For this purpose, we employ an advanced bootstrap inference based on maximum entropy bootstrap (meboot) data generation process in a fixed width rolling window framework. This approach allows the parameters to evolve over time and makes it feasible to investigate how deposit dollarization has changed during different phases of the economy.

The second novelty of the present study is to assess the consequences of recent changes in monetary policy stance on financial dollarization by considering different subperiods. Employing a time varying analysis is especially important for the case of Turkey, which has undergone a major institutional change in recent years. The new Presidential system was adopted in 2018.

The beginning of the new presidential system, which grants immense power to the president, presents a natural experiment to explore whether the main factors affecting deposit dollarization has changed over time with the change in institutional structure. The presidential system required a change in the organizational structure of the Central Bank of Turkey (CBRT), which has led to concerns regarding the political independency of the CBRT. President Erdogan publicly criticized the monetary policy followed by Central Bank and dismissed three governors between 2019 and 2021. Moreover, the president kept urging the CBRT to reduce the interest rates despite the rising inflation. Because of the loss of independency, the central bank governors have been reluctant to increase interest rates in Turkey in the recent years causing the actual inflation rate to deviate from the target rate by a large amount. Overall, monetary policy credibility has been declining in Turkey in the last years. Another development which led to an increase in dollarization is the currency crisis in the summer of 2018 which was caused by the tensions with the U.S. due to a U.S. pastor held in Turkey. This led to a record fall in the value of Turkish Lira. Turkish economy has also been affected by the Covid 19 pandemic in 2020. Since then, the value of Turkish Lira has been constantly falling, reaching to record levels in late 2021. These developments have contributed to even deeper deposit dollarization. Therefore, it is important to analyze the effects of these recent changes in monetary policy stance on financial dollarization.

The outline of the study is as follows: The paper begins with an introduction section. This is followed by Section 2, which explains the methodology used and describes the data. Section 3 presents the empirical results. Finally, Section 4 concludes with a discussion of policy implications.

2. Data and Methodology

Our data covers monthly data between 2013 and 2021. Our dependent variable is deposit dollarization. Deposit dollarization is measured as the ratio of foreign currency deposits to broad money supply. We choose our explanatory variables based on the previous literature. Some studies in the literature focus on the role of real exchange rate on deposit dollarization and suggest that as economic agents try to hedge against the depreciation of the currency, deposit dollarization increases.[1] Therefore, a negative relation is expected between real

[1] Real effective exchange data is obtained from CBRT. According to CBRT definition of real exchange rate, an increase in real exchange rate indicates an increase in the value of Turkish Lira

effective exchange rate and dollarization. Inflation rate has also been identified as one of the key drivers of deposit dollarization. In order to represent monetary policy credibility, we use the deviation of the actual inflation rate from the target inflation rate determined by the CBRT on a yeraly basis. The inflation rate is calculated by consumer price index. The target rate, on the other hand, has been fixed at 5 per cent over the sample period. Volatility of interest rate is also used as another indicator (Us and Metin-Özcan, 2007). Finally, unlike the previous research on this issue, we also use economic confidence index. The data on consumer price index, real exchange rate and interest rate are retrieved from the database of Central Bank of Republic of Turkey (CBRT, 2021).

For the empirical analysis, the following loglinear econometric model is considered:

$$lnDollarize_t = \beta_0 + \beta_1 lnCPI + \beta_2 lniVolatility + \beta_3 lnXreal + \beta_4 lneConfid + \varepsilon_t \quad (1)$$

where t denotes time, β are parameters to be estimated, and ε_t is the error term.

We adopt a maximum entropy bootstrap (meboot) approach proposed by Vinod (2004). It is a novel time series method which is specifically designed to be used with strongly time-dependent nonstationary data. It provides robust statistical estimates under all forms of structural breaks and nonstationarity without the need for differencing or detrending the data. In an extensive simulation study Vinod (2015) and Yalta (2016) show its reliability. In order to obtain the sequential estimates of the model parameters, the meboot algorithm is first employed to construct J = 999 resamples of the series. This "ensemble" results in a set of 999 independent least squares regressions for each parameter in every window. The "resampling cases" procedure employed this way, which involves resampling the regressors as well as the regressand simultaneously, is the prefered approach in the meboot literature since it was also recommended by Vinod and de Lacalle (2009). By using these large numbers of estimates, simulated empirical probability density functions (EPDF) of the model parameters are constructed. Among the alternative methods to construct the EPDFs, the highest density region (HDR) method given by Hyndman (1996) is employed, which is recommended for use with meboot estimation (Vinod, 2015; Yalta, 2016). Various studies show that simulation-based estimation provides more

accurate results in small samples in comparison to conventional inferences based on asymptotic theory (Vinod, 1993; Horowitz 2003; MacKinnon, 2006).

In order to take into account the time-varying nature of the relation, a rolling window analysis is employed that involves running sequential regressions of the model in sub-windows of observations of fixed length taken from the full sample. A window width of 28 observations is used, which yields a total of 75 individual windows. The coefficient interval estimates are computed based on the meboot data-generation process for each of the rolling window[2].

Figure 1 presents the individual time-series plots of the variables. It is evident that deposit dollarization has been constantly increasing in Turkey. Although there was a slight decline at the beginning of 2020, demand for foreign assets increased during the Covid pandemic due to the flight to quality. The uncertainties in monetary policy and economic confidence have contributed to deposit dollarization. Inflation rate has also been increasing and it has always deviated from the target rate, although the deviations increased recently. Real exchange rate has been fluctuating over time. Real effective exchange rate decreased suddenly in 2020 but since the second half of 2020, it has been declining. Interest rate volatility has also been fluctuating during the sample period. Finally, economic confidence index has fallen abruptly in the second half of 2018 and remained low since then.

[2] Analysis are carried out using R version 3.3.1 was used. The R code for rolling-meboot estimation is available from the authors.

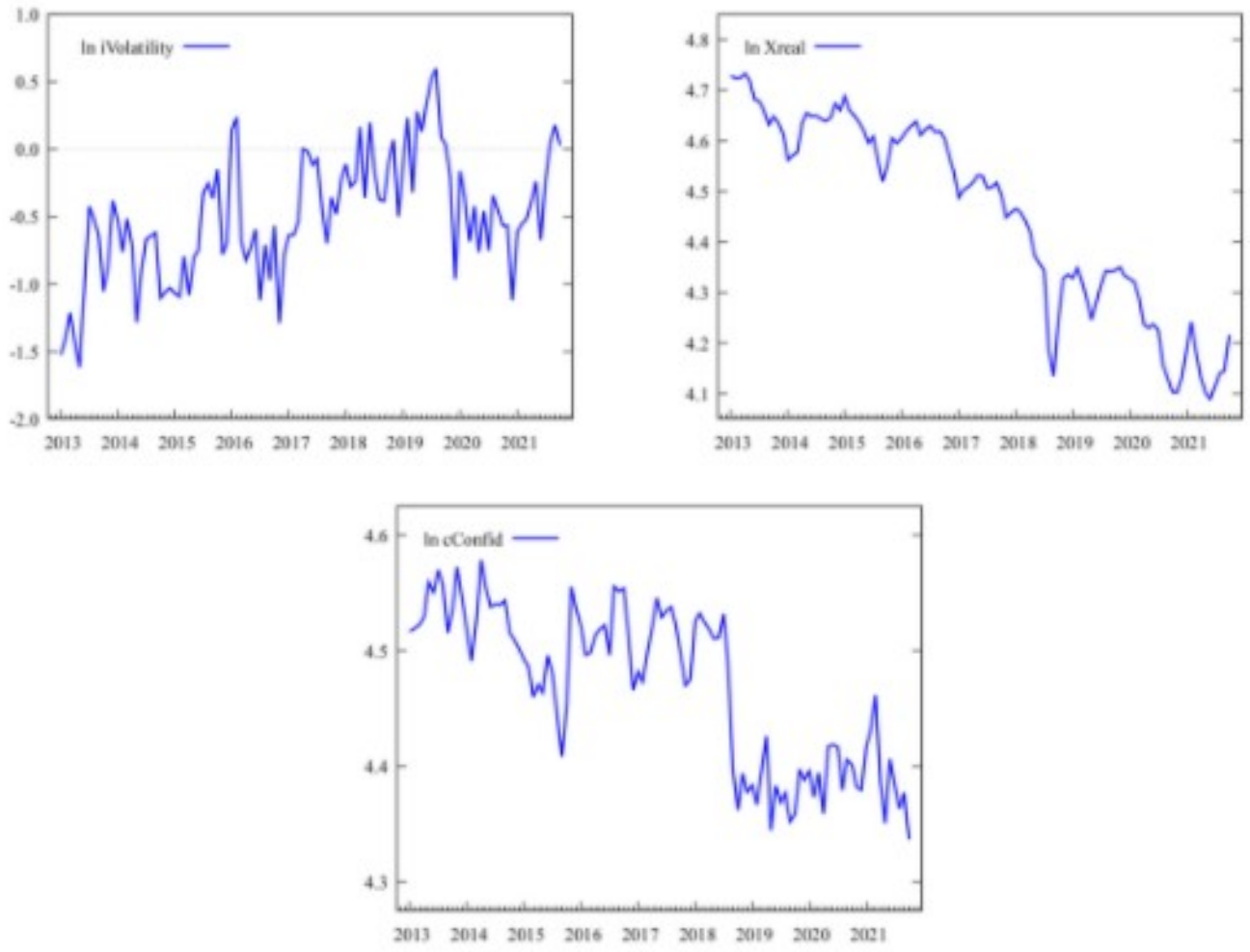


Figure 1: Time series plots of the logs of the Dollarize, CPI, cConfid, iVolatility, and cConfid series.

The investigation of the data reveals that the variables under consideration display considerable variation in response to the changing financial conditions in the Turkish economy. This indicates that parameters are not constant and the use of traditional methods based on asymptotic theory may not reveal robust and reliable results. Parameter inconsistency is also evident in CUSUM and CUSUMSQ plots presented in Figure 2. As it is seen, both plots deviate from the reference lines showing parameter inconsistency. This requires the use of a methodology which makes it possible for parameters to evolve over time.

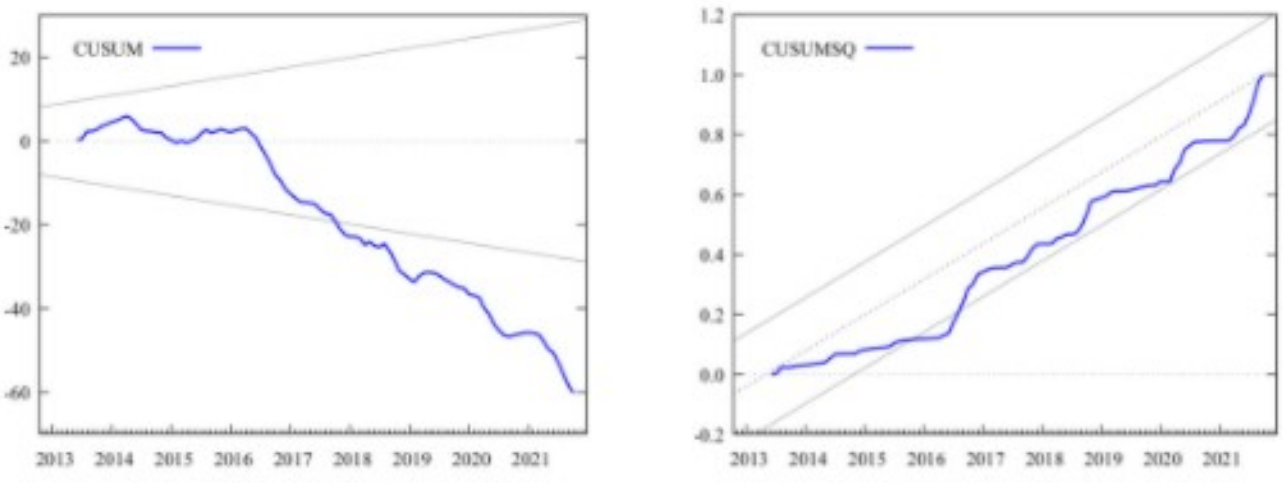


Figure 2: CUSUM and CUSUMSQ plots of the full-sample model estimation with 95% intervals.

3. Empirical Findings

The coefficient interval estimates obtained using meboot analysis along with the point estimates for each window are presented in Table 1. These results are shown graphically in Figure 3 as well.

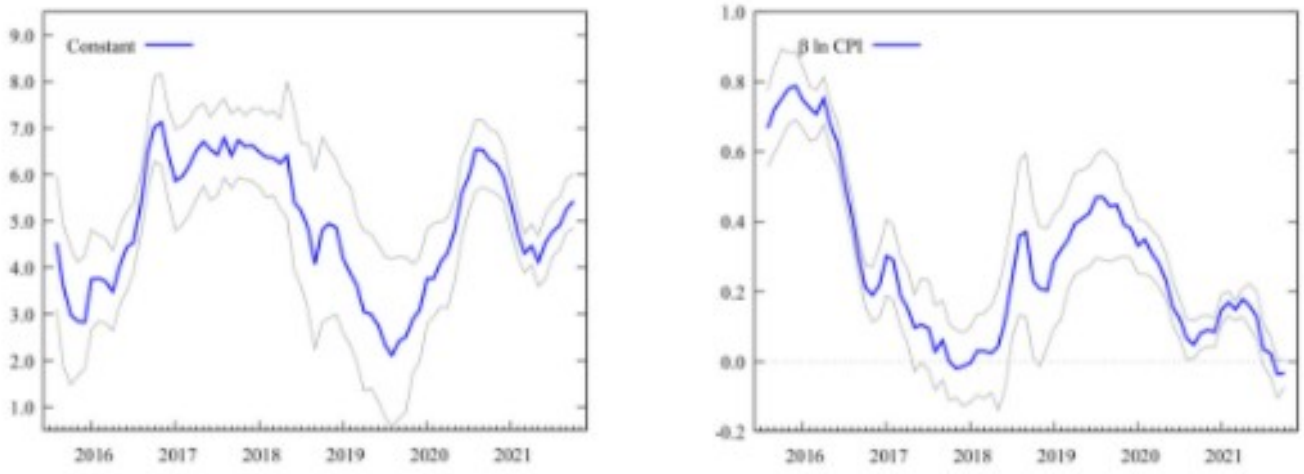
Table 1: Rolling Window Meboot Parameter Interval Estimates

	β1 (Constant)			β2 (CPI)			β3 (Volatility)			β4 (Xreal)			β5 (Confidence)		
Horizon	**lower**	**point**	**upper**	**lower**	**point**	**upper**	**lower**	**point**	**upper**	**lower**	**point**	**upper**	**lower**	**point**	**upper**
2015M08	3.10	4.53	5.96	0.56	0.67	0.77	-0.03	-0.01	0.01	-0.97	-0.82	-0.66	-0.32	-0.16	0.01
2015M09	1.86	3.56	4.89	0.60	0.72	0.84	-0.02	-0.01	0.01	-0.89	-0.75	-0.59	-0.22	-0.05	0.12
2015M10	1.47	2.98	4.42	0.64	0.75	0.90	-0.02	0.00	0.02	-0.94	-0.80	-0.61	-0.15	0.04	0.21
2015M11	1.67	2.85	4.12	0.68	0.78	0.88	-0.02	0.00	0.01	-1.00	-0.84	-0.66	-0.07	0.08	0.19
2015M12	1.82	2.82	4.27	0.69	0.79	0.89	-0.01	0.00	0.02	-1.03	-0.87	-0.71	-0.04	0.08	0.21
2016M01	2.67	3.75	4.81	0.67	0.75	0.84	-0.02	-0.01	0.01	-1.12	-0.99	-0.83	-0.06	0.06	0.19
2016M02	2.85	3.77	4.70	0.63	0.72	0.79	-0.01	0.00	0.01	-1.02	-0.90	-0.78	-0.07	0.03	0.15
2016M03	2.80	3.70	4.63	0.64	0.71	0.78	-0.01	0.00	0.01	-1.00	-0.87	-0.74	-0.08	0.04	0.17
2016M04	2.64	3.48	4.37	0.68	0.75	0.81	-0.02	0.00	0.00	-1.05	-0.88	-0.77	-0.05	0.09	0.18
2016M05	3.17	4.01	4.85	0.61	0.68	0.74	-0.01	0.00	0.01	-0.98	-0.85	-0.73	-0.12	0.03	0.11
2016M06	3.50	4.43	5.20	0.56	0.62	0.68	-0.01	0.00	0.01	-0.96	-0.85	-0.74	-0.14	-0.01	0.11
2016M07	3.89	4.55	5.36	0.46	0.52	0.58	0.00	0.01	0.02	-0.94	-0.85	-0.71	-0.11	0.00	0.12
2016M08	4.68	5.33	6.00	0.36	0.42	0.48	0.01	0.02	0.03	-0.84	-0.76	-0.65	-0.19	-0.11	0.00
2016M09	5.64	6.44	6.99	0.26	0.30	0.36	0.02	0.03	0.04	-0.91	-0.79	-0.68	-0.22	-0.14	-0.05

2016M10	6.28	7.03	8.10	0.15	0.21	0.28	0.02	0.03	0.04	-0.90	-0.80	-0.66	-0.32	-0.23	-0.14
2016M11	6.19	7.13	8.17	0.11	0.19	0.27	0.02	0.03	0.04	-0.90	-0.77	-0.65	-0.29	-0.21	-0.12
2016M12	5.44	6.41	7.41	0.13	0.22	0.33	0.03	0.04	0.05	-0.70	-0.57	-0.46	-0.34	-0.26	-0.19
2017M01	4.79	5.86	6.97	0.19	0.30	0.41	0.03	0.04	0.05	-0.61	-0.47	-0.35	-0.42	-0.36	-0.27
2017M02	4.93	5.96	7.04	0.17	0.29	0.39	0.04	0.05	0.05	-0.61	-0.50	-0.36	-0.42	-0.34	-0.26
2017M03	5.16	6.21	7.20	0.10	0.19	0.30	0.04	0.05	0.06	-0.65	-0.53	-0.40	-0.33	-0.25	-0.17
2017M04	5.46	6.51	7.43	0.06	0.15	0.27	0.04	0.05	0.06	-0.71	-0.57	-0.44	-0.30	-0.20	-0.11
2017M05	5.76	6.71	7.53	-0.03	0.10	0.19	0.04	0.05	0.06	-0.75	-0.64	-0.49	-0.22	-0.09	0.02
2017M06	5.45	6.54	7.23	0.00	0.10	0.24	0.05	0.05	0.06	-0.72	-0.58	-0.45	-0.24	-0.12	0.00
2017M07	5.55	6.43	7.46	-0.03	0.10	0.23	0.04	0.05	0.06	-0.71	-0.56	-0.42	-0.27	-0.18	-0.02
2017M08	5.94	6.79	7.63	-0.08	0.03	0.16	0.04	0.05	0.06	-0.72	-0.55	-0.45	-0.25	-0.12	0.01
2017M09	5.71	6.41	7.30	-0.05	0.06	0.17	0.04	0.05	0.06	-0.67	-0.53	-0.41	-0.25	-0.13	-0.01
2017M10	5.93	6.75	7.45	-0.11	0.00	0.11	0.04	0.04	0.05	-0.67	-0.54	-0.40	-0.22	-0.10	0.03
2017M11	5.88	6.60	7.27	-0.10	-0.02	0.09	0.04	0.05	0.05	-0.62	-0.49	-0.37	-0.21	-0.10	0.01
2017M12	5.87	6.63	7.42	-0.13	-0.01	0.08	0.04	0.04	0.05	-0.62	-0.48	-0.35	-0.23	-0.09	0.00
2018M01	5.73	6.49	7.44	-0.12	-0.01	0.10	0.04	0.05	0.05	-0.61	-0.47	-0.34	-0.23	-0.12	-0.01
2018M02	5.51	6.37	7.30	-0.10	0.03	0.13	0.04	0.05	0.05	-0.63	-0.47	-0.33	-0.24	-0.12	0.00
2018M03	5.55	6.36	7.38	-0.11	0.03	0.14	0.04	0.04	0.05	-0.64	-0.48	-0.34	-0.24	-0.11	0.01
2018M04	5.26	6.23	7.19	-0.09	0.02	0.16	0.04	0.04	0.05	-0.60	-0.45	-0.30	-0.24	-0.12	0.00
2018M05	5.07	6.41	8.01	-0.14	0.04	0.21	0.03	0.04	0.05	-0.68	-0.49	-0.31	-0.27	-0.13	0.00
2018M06	3.93	5.40	7.40	-0.08	0.12	0.30	0.03	0.04	0.05	-0.61	-0.41	-0.24	-0.24	-0.12	0.02
2018M07	3.61	5.22	6.66	0.07	0.24	0.41	0.03	0.04	0.05	-0.48	-0.31	-0.14	-0.41	-0.24	-0.12
2018M08	3.05	4.82	6.67	0.13	0.36	0.57	0.03	0.04	0.05	-0.47	-0.24	-0.07	-0.58	-0.39	-0.20
2018M09	2.24	4.07	6.09	0.13	0.37	0.59	0.02	0.04	0.05	-0.43	-0.24	-0.04	-0.48	-0.30	-0.07
2018M10	2.82	4.81	6.80	0.01	0.23	0.44	0.02	0.04	0.06	-0.50	-0.34	-0.18	-0.28	-0.14	0.00
2018M11	2.92	4.94	6.54	-0.01	0.21	0.39	0.01	0.03	0.05	-0.56	-0.40	-0.27	-0.15	-0.01	0.12
2018M12	2.98	4.87	6.32	0.04	0.20	0.38	0.01	0.03	0.05	-0.55	-0.40	-0.30	-0.14	-0.02	0.10
2019M01	2.60	4.20	5.93	0.09	0.29	0.42	0.01	0.02	0.04	-0.53	-0.40	-0.28	-0.14	-0.01	0.11
2019M02	2.34	3.88	5.74	0.12	0.32	0.44	0.01	0.04	0.05	-0.51	-0.39	-0.28	-0.15	-0.02	0.11
2019M03	1.96	3.61	5.10	0.21	0.35	0.49	0.00	0.02	0.04	-0.48	-0.37	-0.27	-0.15	0.00	0.14
2019M04	1.35	3.04	4.78	0.25	0.39	0.54	0.01	0.02	0.05	-0.46	-0.35	-0.24	-0.14	0.02	0.18
2019M05	1.40	3.00	4.73	0.26	0.41	0.55	0.00	0.02	0.04	-0.44	-0.34	-0.24	-0.17	0.00	0.17
2019M06	1.14	2.76	4.49	0.27	0.42	0.56	0.00	0.02	0.04	-0.42	-0.33	-0.21	-0.18	0.00	0.16
2019M07	0.79	2.34	4.23	0.30	0.47	0.59	0.00	0.02	0.04	-0.39	-0.29	-0.20	-0.18	0.01	0.19
2019M08	0.58	2.11	4.19	0.29	0.47	0.60	-0.01	0.02	0.04	-0.41	-0.32	-0.21	-0.16	0.04	0.21
2019M09	0.75	2.41	4.24	0.29	0.44	0.59	0.00	0.02	0.04	-0.41	-0.32	-0.22	-0.14	0.06	0.24
2019M10	0.88	2.51	4.22	0.29	0.45	0.57	0.00	0.02	0.04	-0.42	-0.34	-0.25	-0.12	0.07	0.25
2019M11	1.74	2.89	4.08	0.30	0.39	0.49	0.01	0.02	0.04	-0.42	-0.34	-0.26	-0.10	0.04	0.21
2019M12	1.98	3.09	4.23	0.29	0.38	0.47	0.02	0.03	0.04	-0.45	-0.34	-0.29	-0.10	0.07	0.21
2020M01	2.78	3.76	4.82	0.25	0.33	0.41	0.02	0.03	0.04	-0.46	-0.40	-0.30	-0.16	-0.01	0.12
2020M02	2.95	3.76	4.94	0.25	0.35	0.40	0.02	0.03	0.04	-0.48	-0.39	-0.32	-0.15	-0.01	0.13
2020M03	3.16	4.13	4.99	0.24	0.31	0.38	0.02	0.03	0.04	-0.49	-0.41	-0.33	-0.14	-0.03	0.11
2020M04	3.13	4.32	5.06	0.21	0.28	0.36	0.03	0.04	0.05	-0.46	-0.38	-0.30	-0.17	-0.06	0.10
2020M05	3.74	4.81	5.49	0.18	0.23	0.31	0.04	0.05	0.06	-0.45	-0.38	-0.31	-0.21	-0.08	0.02
2020M06	4.61	5.59	6.34	0.11	0.16	0.24	0.04	0.05	0.06	-0.41	-0.35	-0.28	-0.33	-0.23	-0.11
2020M07	5.22	5.96	6.72	0.06	0.12	0.18	0.04	0.04	0.06	-0.39	-0.33	-0.27	-0.38	-0.29	-0.18
2020M08	5.65	6.54	7.19	0.00	0.07	0.12	0.03	0.04	0.05	-0.35	-0.29	-0.24	-0.47	-0.34	-0.22
2020M09	5.72	6.53	7.16	0.01	0.05	0.12	0.03	0.04	0.05	-0.35	-0.29	-0.24	-0.44	-0.36	-0.22
2020M10	5.66	6.32	6.98	0.04	0.08	0.13	0.03	0.04	0.05	-0.39	-0.33	-0.28	-0.41	-0.30	-0.20
2020M11	5.58	6.21	6.91	0.04	0.09	0.13	0.03	0.04	0.05	-0.41	-0.36	-0.30	-0.38	-0.26	-0.17

2020M12	5.44	5.93	6.61	0.04	0.08	0.12	0.03	0.04	0.05	-0.40	-0.36	-0.30	-0.29	-0.21	-0.14
2021M01	4.80	5.40	5.96	0.11	0.15	0.19	0.04	0.05	0.05	-0.39	-0.35	-0.30	-0.25	-0.18	-0.09
2021M02	4.25	4.74	5.24	0.13	0.17	0.20	0.04	0.05	0.06	-0.36	-0.32	-0.28	-0.16	-0.07	0.00
2021M03	3.89	4.30	4.73	0.12	0.15	0.17	0.04	0.05	0.06	-0.35	-0.31	-0.27	-0.04	0.04	0.11
2021M04	4.06	4.47	4.94	0.13	0.18	0.21	0.04	0.05	0.05	-0.33	-0.28	-0.24	-0.17	-0.07	0.03
2021M05	3.59	4.12	4.69	0.10	0.16	0.22	0.04	0.04	0.05	-0.33	-0.27	-0.19	-0.11	-0.01	0.10
2021M06	3.77	4.54	5.15	0.06	0.13	0.20	0.03	0.04	0.05	-0.35	-0.28	-0.19	-0.15	-0.04	0.05
2021M07	4.22	4.77	5.39	-0.01	0.03	0.11	0.03	0.04	0.05	-0.37	-0.30	-0.23	-0.08	0.02	0.13
2021M08	4.40	4.91	5.52	-0.05	0.02	0.07	0.03	0.03	0.04	-0.38	-0.32	-0.24	-0.04	0.04	0.15
2021M09	4.75	5.25	5.90	-0.11	-0.04	0.00	0.03	0.03	0.04	-0.40	-0.35	-0.26	-0.02	0.08	0.18
2021M10	4.86	5.43	6.01	-0.07	-0.03	0.00	0.03	0.03	0.04	-0.37	-0.31	-0.26	-0.05	0.03	0.11

Figure 3 presents that deposit dollarization seems to give a time varying response to the changes in the inflation rate. In most of the sample period, there is a positive relation between inflation rate and deposit dollarization. One interesting observation is that the effect of inflation rate on deposit dollarization show variations before and after the new presidential system. While the effect of inflation was greater before the new presidential system, the effect of inflation on deposit dollarization was insignificant during 2017-2019. Overall, it is evident that the effect of inflation rate on deposit dollarization loses its influence over time. This may be explained with the lack of monetary policy credibility in recent years. Central Bank governors have changed three times between 2020 and 2021, which caused a financial turmoil in the economy and increased uncertainty. Therefore, we can argue that the effect of monetary policy dis-credibility was the dominant factor. This finding is in line with the findings of De Nicoló et al. (2005) who find that the relation between inflation and dollarization weakens when monetary policy credibility decreases.



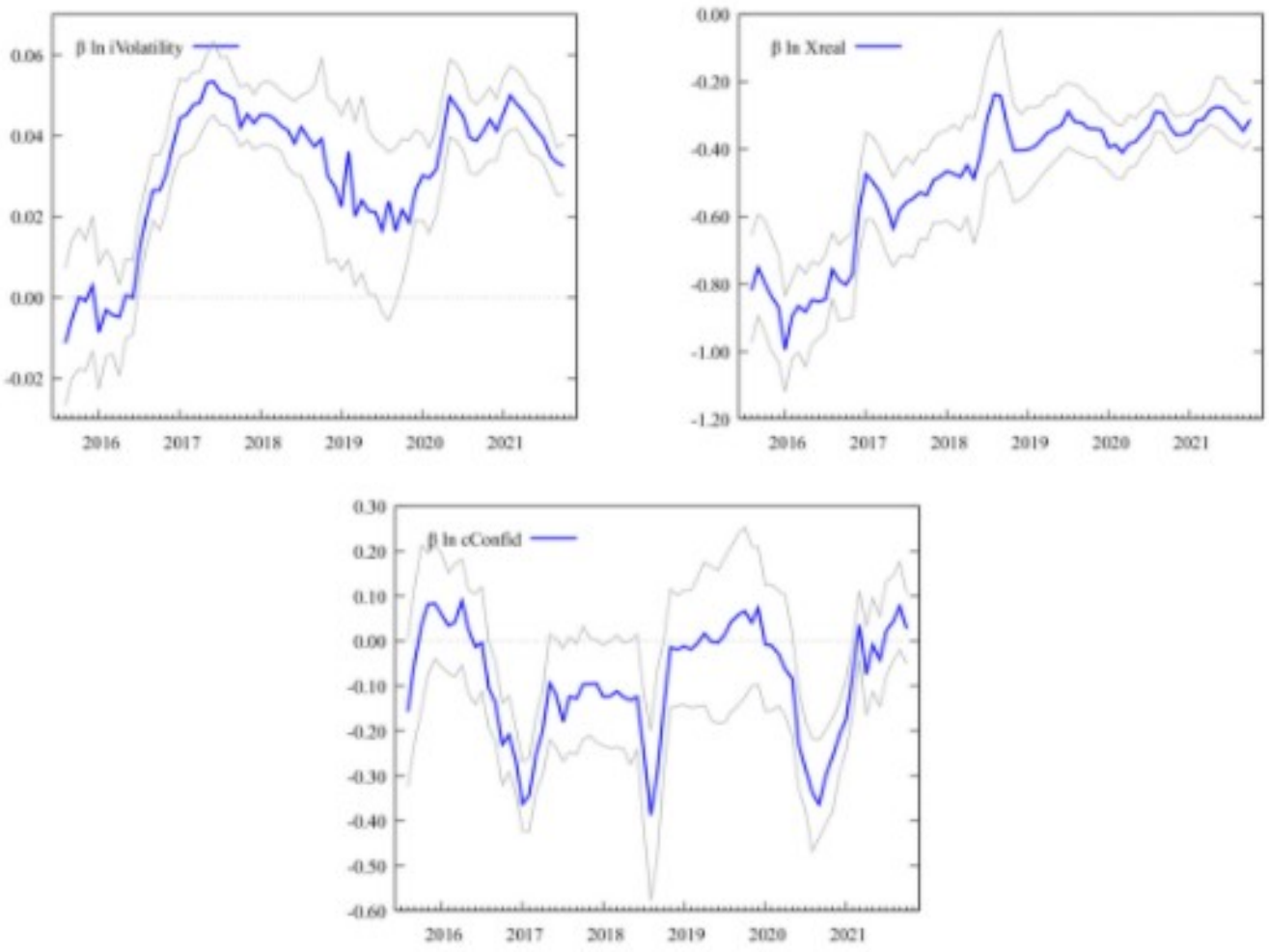


Figure 3: Rolling window coefficient estimates with 80% meboot confidence intervals.

The second graph depicts the relation between deposit dollarization and interest rate volatility. Interest rate volatility was lower before the new presidential system and it did not have a significant impact on deposit dollarization. However, volatility increased after 2017 and had a positive and significant effect on deposit dollarization.

The results indicate the existence of a negative relation between real exchange rate and deposit dollarization as expected. As Turkish lira lost value, deposit dollarization increased. However, similar to the case of inflation, the effect of exchange rate on dollarization weakens over time. This finding is similar to that of Kesimal (2021) who argue that lack of monetary policy credibility muted the effect of exchange rate and inflation rate in this period.

The last plot shows the influence of economic confidence index on deposit dollarization. This effect was significant in the first part of 2017, second part of 2018 and 2020. The deterioration on economic confidence led to higher deposit dollarization. There was a currency crisis in 2018, which led to a fall in economic confidence index. The fall in 2020 was associated with the Covid 19 pandemic.

4. Conclusion

Deposit dollarization has steadily increased in Turkey in the last decade, reaching record levels in 2021. To formulate necessary policies to reduce deposit dollarization, it is important to identify the drivers of deposit dollarization. Although several studies examine the determinants of deposit dollarization, they do not emphasize the time varying response of deposit dollarization. However, with the transition to the presidential system in 2017, there has been changes in the institutional structure as well as monetary policy in Turkey. Hence, there is a need to analyze whether the determinants of deposit dollarization have differed after these institutional changes. For this purpose, we examine the time varying reaction of deposit dollarization by adopting a rolling window analysis based on the maximum entropy bootstrap data generation process. Our findings based on monthly data between 2013 and 2021 reveal that deposit dollarization seems to give a time varying response to the changes in the inflation rate and the impact of inflation rate on deposit dollarization shows variations before and after the new presidential system. The results indicate that the effect of inflation rate and exchange rate on deposit dollarization has weakened over time. Furthermore, interest rate volatility and economic confidence have also been found as important determinants of deposit dollarization.

The evidence obtained in this study has significant policy implications for the formulation of monetary policies not only in Turkey but also in many developing countries having similar problems in terms of monetary policy credibility. The results imply that reducing inflation rate and the volatility of interest rates, as well as improving economic confidence may help reduce deposit dollarization. However, these are also the results of declining confidence and the volatility of exchange rates are caused by the loss of central bank independence in recent

years. Central bank's main focus, therefore, should be to enhance monetary policy credibility in Turkey. To this end, a legislative change towards enforcing the job security of governors should be the first attempt. Moreover, the Central Bank of Republic of Turkey should improve its communication with the public and increase transparency and clarity regarding its exchange rate and reserve policy. Therefore, as stated by OECD (2021) "central bank should maintain an active communication in terms of public concerns regarding the statistical methodology and data quality should be addressed."

References

Alesina Alberto, Robert J. Barro (2001). Dollarization. *The American Economic Review*, 91(2), 381–385.

Arteta C. O. (2005). Exchange rate regimes and financial dollarization: does flexibility reduce currency mismatches in bank intermediation? *B.E. Journal of Macroeconomics: Topics in Macroeconomics*, 5(1), 1–28.

Bărbuţă-Mişu, Nicoleta & Güleç, Tuna & Duramaz, Selim & Virlanuta, Florina. (2020). Determinants of Dollarization of Savings in the Turkish Economy. *Sustainability*. 12. 6141. 10.3390/su12156141.

Bocola, Luigi, and Guido Lorenzoni. (2020). Financial Crises, Dollarization, and Lending of Last Resort in Open Economies. *American Economic Review*, 110 (8), 2524-57.

Calvo, G. and Vegh, C. (1992). Currency substitution in developing countries: An introduction. *Revista de Analisis Economico*, 7: 3–28.

Civcir, İrfan (2003). Dollarization and Its Long-run Determinants in Turkey. *Middle East Economics Series*, www.ecomod.net/conferences/ecomod2002/papers/civcir.pdf

De Nicoló, Gianni, Patrick Honohan and Alain Ize (2005). Dollarization of the Banking System:

Good or Bad?, *Journal of Banking and Finance,* 29(7), 1697-1727.

Dumrul, C . (2010). "Türk Ekonomisinde Para İkamesinin Belirleyicilerinin Sınır Testi Yaklaşımı İle Eş-Bütünleşme Analizi".Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 0 (35) , 199-231. Retrieved from https://dergipark.org.tr/en/pub/erciyesiibd/issue/5892/77934

Gianni De Nicoló, Patrick Honohan, Alain Ize (2005). Dollarization of bank deposits: Causes and Consequences. *Journal of Banking & Finance*, 29 (7), 1697-1727, https://doi.org/10.1016/j.jbankfin.2004.06.033.

Honohan, Patrick (2007). Dollarization and Exchange Rate Fluctuations. IIIS Discussion Paper, No. 201, Available at SSRN: https://ssrn.com/abstract=958052 or http://dx.doi.org/10.2139/ssrn.958052

Horowitz JL. (2003). The bootstrap in econometrics. *Statistical Science,* 18:211–218.

Ize, A.Eduardo Levy Yeyati, Financial dollarization (2003). *Journal of International Economics,*
59 (2), 323-34. https://doi.org/10.1016/S0022-1996(02)00017-X

Kesimal, Necmiye Damla (2021). Reflections on Recent Trends in Deposit Dollarization in Turkey, Unpublished Master's Thesis, Bilkent University.

Levy-Yeyati, Eduardo. (2006). "Financial Dollarization: Evaluating the Consequences," *Economic*
Policy 45: 63-118. http://200.32.4.58/~ely/papers.html

Luca, A. Iva Petrova (2008). What drives credit dollarization in transition economies? *Journal of Banking & Finance*, 32 (5), 858-869. https://doi.org/10.1016/j.jbankfin.2007.06.003

MacKinnon JG (2006). Bootstrap methods in econometrics. Economic Record, 82:2–18.

Organization for Economic Development and Cooperation (2021).
https://www.oecd.org/economy/surveys/TURKEY-2021-OECD-economic-survey-overview.pdf

Metin-Özcan, Kıvılcım, Vuslat Us (2007). Dedollarization in Turkey After Decades of Dollarization: A Myth or Reality? *Physica A*, 385 (1), 292–306.

Sever, E. (2012). Türkiye'de Dolarizasyon Süreci ve Döviz Kuru Belirsizliği İlişkisi .
Sosyoekonomi, 17 (17). Retrieved from
https://dergipark.org.tr/tr/pub/sosyoekonomi/issue/21077/226927

Wenéyam Hippolyte Balima (2017). Do domestic bond markets participation help reduce financial dollarization in developing countries? *Economic Modelling*, 66, 146-155.

Vinod HD (1993) Bootstrap methods: applications in econometrics. In: Maddala GS, Rao CR, Vinod HD (eds) Handbook of statistics: econometrics, vol 11. North Holland, Elsevier, New York, 629–661.

Vinod, H. D. (2004). “Ranking Mutual Funds Using Unconventional Utility Theory and Stochastic Dominance.” *Journal of Empirical Finance* 11: 353–377. https://doi.org/10.1016/j.jempfin.2003.06.002

Vinod, H. D. 2015. “New Bootstrap Inference for Spurious Regression Problems.*”* *Journal of Applied Statistics* 43 (2), 317–335. https://doi.org10.1080/02664763.2015.1049939

Yalta, A. T. (2016). “Bootstrap Inference of Level Relationships in the Presence of Serially Correlated Errors: A Large Scale Simulation Study and an Application in Energy Demand.” Computational Economics 48: 339–366. https://doi.org/10.1007/s10614-015-9530-7