Research Article

The Effect of Inflation on Currency Substitution (Dollarization): An Analysis on Türkiye NUTS-2 Regions

Fatih DEMİR[1], Aykut SEZGİN [2]

[1] Dr., Süleyman Demirel Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Ekonometri Bölümü, fatihdemir@sdu.edu.tr, ORCID: 0000-0002-6787-3960

[2] Doç. Dr., Süleyman Demirel Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü, aykutsezgin@sdu.edu.tr, ORCID: 0000-0001-7039-8032

Abstract: Dollarization is one of the phenomena that money markets of developing economies frequently experience in the twentieth century. Many studies associate dollarization with inflation through the depreciation of the national currency and compare the results by country and/or region. The aim of this study is to determine the long-run and short-run effects of the inflation rate on dollarization in Türkiye within the scope of regions. In addition to the use of heterogeneous panel data methods in the process of analyzing the subject, obtaining inferences from a regional perspective can be noted as the most important difference from other studies. In the study, quarterly data belonging to 26 statistical regions were used for the period 2007:4-2021:4. According to the DCCE results, the inflation rate in the long run positively affects dollarization in three regions (TRC2, TR42 and TR81). In addition, according to the MG forecast results covering the entire panel, a 10%-point increase in the inflation rate increases dollarization by 2% points in the long run. To determine the short run relationship, Emirmahmutoğlu and Köse (2011) panel causality test was applied. According to the results of the causality test, when the entire panel is considered, the inflation rate is not the reason for dollarization. However, heterogeneous results show that the inflation rate is the reason for dollarization in 13 of the 26 regions.

Keywords: Inflation, Dollarization, Panel Data, Türkiye, NUTS2

Jel Codes: C33, E59, R12

Enflasyonun Para İkamesi (Dolarizasyon) Üzerindeki Etkisi: Türkiye İBBS2 Bölgeleri Üzerine Bir Analiz

Öz: Gelişmekte olan ekonomilerin para piyasalarının yirminci yüzyılda sıklıkla yaşadığı olgulardan bir tanesi dolarizasyondur. Dolarizasyonu ulusal paranın değer kaybı üzerinden enflasyon ile ilişkilendiren ve sonuçları ülke ve/veya bölgeler itibariyle karşılaştıran çok sayıda çalışma mevcuttur. Bu çalışmanın amacı Türkiye'de bölgeler kapsamında enflasyon oranının dolarizasyon üzerindeki uzun ve kısa dönemli etkisini belirlemektir. Konunun analizi sürecinde heterojen panel veri yöntemlerinin kullanılmasının yanı sıra bölgesel perspektif yönüyle çıkarımların elde edilmesi diğer çalışmalardan en önemli farklılık olarak belirtilebilir. Çalışmada 2007:4-2021:4 dönemi için 26 istatistiki bölgeye ait çeyrek yıllık veriler kullanılmıştır. DCCE sonuçlarına göre uzun dönemde enflasyon oranı üç bölgede (TRC2, TR42 ve TR81) dolarizasyonu pozitif etkilemektedir. Ayrıca tüm paneli kapsayan MG tahmin sonuçlarına göre enflasyon oranında %10 puanlık artış, uzun dönemde dolarizasyonu %2 puan arttırmaktadır. Kısa dönemli ilişkiyi belirlemek için Emirmahmutoğlu ve Köse (2011) panel nedensellik testi uygulanmıştır. Nedensellik testi sonuçlarına göre tüm panel dikkate alındığında enflasyon oranı dolarizasyonun nedeni değildir. Ancak heterojen sonuçlarda 26 bölgenin 13'ünde enflasyon oranının dolarizasyonun nedeni olduğu görülmektedir.

Anahtar Kelimeler: Enflasyon, Dolarizasyon, Panel Veri, Türkiye, İBBS2

Jel Kodları: C33, E59, R12

1. Introduction

Dollarization, in other words, currency substitution, is described as preference of foreign currencies with resilient value over local currency by the savers and executers because of the erosion in a local currency's value due to inflationist atmosphere in a local economy (Seyidoğlu, 2001). There could be numbers of factors behind the erosion in the value of a local currency. Decreasing confidence in local currency because of the economic crises, stabilized reserve currency quality of a foreign currency with strong global recognition and increasing advantageous position of keeping such foreign currency on hand are considered among these factors.

Description of dollarization may differ and accordingly may be measured with respect to the relative approach and considered deposit types. One of these descriptions is given as dollarization of asset/ liability. Asset dollarization refers that a foreign currency to replace partial functions of domestic currency while liability dollarization refers foreign currency liabilities of locals to locals or locals to foreigners. These two concepts are investigated over asset or liability statements whereas the financial dollarization concept includes both (Akıncı et al., 2005).

Currency substitution is classified in two different groups called symmetric and non-asymmetric. Symmetric currency substitution occurs when locals and foreigners of a country demand for both domestic and foreign currency at the same time. On the other hand, asymmetric currency substitution occurs when foreigners demand no domestic currency in a country (Ramirez-Rojas, 1985).

Researchers usually regard dollarization as a negative concept because of its devaluing impact on domestic currency. However, there are some studies found in the relevant literature reporting and emphasizing positive impacts of dollarization as well. Even though dollarization is viewed because of devaluation in domestic currency, there are studies suggesting that usage of a prevalent currency has a positive effect on foreign trade of a country (Rose, 2000). Again, it is sometimes seen with countries experiencing a persistent and sticky inflation that a robust foreign currency is utilized as an anchor in a country's money policy (Barro and Gordon, 1983).

In this regard, dollarization turns to an alternative money policy tool for a country to sustain price stability (Alesina and Barro, 2001). Accordingly, dollarization is found in two different ways called official (de jure) and non-official (de facto). Utility of a foreign currency in official means (e.g., government contracts) through a legal status represents its official existence. On the other hand, if foreign currency is utilized because of devaluation in domestic currency, dollarization occurs in non-official way (Alvarez-Plata and Garcia-Herrero, 2008).

Commonly, dollarization is measured as a ratio of bank accounts in a foreign currency to overall bank accounts in a country; or their percentage in extensive-defined money supply. The studies measuring dollarization over liabilities reported in the statements utilize from the variables such as bank loans in foreign currencies, internal debt denominated in foreign currency, and rate of outstanding external debt to gross sales (Akıncı et al., 2005). Besides, in connection with being domestic or not, rate of assets in foreign currency to total assets and the rate of cash foreign currency in circulation to cash in domestic currency are employed as measurement of dollarization (Sarı, 2007).

In the study, the following steps are sequentially followed: after the introduction section, the position and significance of the concept of dollarization in the literature are examined, and Türkiye's experience with dollarization is presented. Subsequently, information is provided about the data used, and the analysis is conducted in the model and method section. In the last part, the analysis findings of the study are given. Summary statistics and study results are also supported by maps.

2. Literature

Dollarization may occur subject to unique dynamics of each country or region and yields different consequences respectively. There are numbers of studies comparing dollarization experiences of individual territories in connection with their inflation levels.

Edwards and Magendzo, in their study published in 2006, compare growth and volatilities of the dollarized (with high dollarization rate) and non-dollarized countries. Researchers utilized regression analysis to discover the effect of dollarization process on geographical, political, and structural variables in the relevant territory. According to their findings, there is no statistically significant difference per capita income between dollarized and non-dollarized countries. However, volatility and growth rates are reported higher with the dollarized countries. Another notable finding with their study is that inflation rates of dollarized economies are found to be significantly low in comparison with the ones administering independent monetary policy.

The study of Larrain and Tavares (2003) investigates the effect of regional monetary unions on dollarization process over the economies of Europe, Far East, South America, and Central America. Each territory is examined in terms of currency usage tendency in three different perspectives of individual, inter-regional and against the US. Researchers explored how these tendencies affect individual domestic foreign exchange volatilities. It is reported that high integration level among the Eastern Europe and low integration level in the America are effective on volatilities of their foreign exchange rates.

Honohan and Shi (2002) have a regression analysis on 58 developing countries including Türkiye over data covering the period of 1990-2000. Researchers report that dollarization has increasing effect on interest rates, increasing nominal risk for the economies and affect consumer prices through foreign exchange rate. Additionally, they concern the difference between currency substitution and operational dollarization concepts; and emphasize how the difference between using domestic banknote and coin substitution and using foreign currency through foreign currency markets could effect on the markets.

De Nicolo et al. (2003) utilizes from 100 developing countries to explain how dollarization would not yield financial development. In their study, dollarization rate is estimated through domestic financial dollarization by classification under onshore and offshore banking operations. The rate of onshore current foreign currency deposit accounts to total deposit accounts in the banking industry is given as domestic financial dollarization rate. The cross-sectional analysis using independent variables e.g., inflation, political and institutional development and legal protection is conducted. The researchers report that reliability of macroeconomic policies and institutional quality are significant estimators of the dollarization differences of countries; that dollarization cause financial depth only in hyper inflationist economies; and that financial instabilities are found common among the countries with high dollarization levels.

Neanidis (2010) studies the effect the EU membership processes of Central and Eastern European countries on their asset and liability dollarization. The findings suggest that decreasing asset dollarization rate of these countries accompanied with increasing liability dollarization rate. In another study of Neanidis and Savva (2013), the FAVAR model is employed to evidence the decrease in dollarization among the Central and Eastern European countries through indirect channels in the post-EU membership period. Again, Neanidis and Savva (2018) investigate the regional spillover effect on financial dollarization for the 23 transitional economies of the Central and Eastern Europe over 20-year period by spatial and econometric analysis. Their results suggest that regional spillovers occur through trade and banking channels; and individual interferences of countries against dollarization affect others.

Türkiye is currently following a path to the EU membership. In this context, Fischer (2006) investigates the dollarization process experienced by Turkiye and the effects of potential EU-membership. Fischer questions why Türkiye is striving for the EU monetary membership whereas it is trying to avoid dollarization process; and emphasizes that EU

membership would indeed introduce some limitations to the certain policies eliminating high dollarization.

Galinda and Liederman (2005) investigate the Latin American economies over the importance of financial tools designed to be protected from currency risk and cautious / regulative measures against experienced dollarization process.

Yeyati (2021) studies the fight of Latin American countries against dollarization since 2000, factors effective on their foreign currency preference, market conditions and regulations detaining investors from dollarization. This study includes determining the microeconomic precautions such as reserve currency diversification, limiting borrowing in US dollar, developing domestic currency tools, and the macroeconomic initiatives such as inflation-targeting in connection with fight-against dollarization of 7 Latin American countries as well as respective policy suggestions.

In a thesis study, Mansoor (2018) runs the Granger causality test on the data from Afghanistan for the period between 2007 and 2016; and concludes that dollarization is directly effective on currency rate, inflation rates and money supply. Mansoor also suggests that this relationship is stronger on the short run even though dollarization-inflation relationship lost the significance on the long run.

Whereas Rennhack and Nozaki (2006) report for the Latin American countries that dollarization tends to increase among the countries experiencing high-inflation, Yinusa (2008) suggests significant causality between dollarization and currency rate for Nigeria. Vieira et al. (2012) emphasize for the countries with different development levels that dollarization process is result of the risk caused by inflation, and that its effects persists even if their inflation level tend to decrease.

Corrales and Imam (2019) approach dollarization issue for the countries with both high- and low-income levels at the scales of business and household; and determine that inflation is one of the essential determinants for the countries with low-income level.

Özdemir and Yavuz (2021) mention developments reversing dollarization process across the world recently. The researchers imply that the Bretton Woods system has got harmed due to decreasing superiority of the US in the global trade; alternative payment means such as digital currency have accelerated the pace of the non-dollarization.

There are various other studies exploring the relationship between dollarization and inflation over the case of Türkiye. For example, Saraç (2010) for the period 1994 - 2009, Yılmaz and Uysal (2019) for the period 2012 - 2018 concluded that inflation is the cause of dollarization.

On the other hand, Zeybek (2018) uses the minimum variance portfolio as the determinant of dollarization in the study covering the data from 2000 – 2015. The researcher finds that minimum variance portfolio is the cause of liability dollarization because of the granger causality test. Again, Zeybek (2014) studies the correlation and regression between dollarization, inflation, required reserve ratio, real sector confidence index and cost of finance variables for Türkiye for the period between 1990 and 2013. The author reveals significant and positive relationship between dollarization and cost of finance, and inflation for Türkiye.

Yalçıner and Mutlu (2018) investigate dollarization processes of 18 developed and developing countries in their study for the post-global financial crisis. To estimate the survey of dollarization, the researchers construct a combined dollarization index on the basis of three different indexes of the rate of net foreign assets to monetary supply (asset dollarization), the rate of outstanding external debt to GDP (liability dollarization), and the rate of the outstanding government debt to GDP. The authors conclude that dollarization stress is higher for developing countries; and Türkiye is the country experiencing the highest liability dollarization stress.

Karakaya and Karoglu (2020) investigate dollarization process in Türkiye for the post-global financial crisis. The authors emphasize that confidence in Turkish Lira and inflation are the fundamental determinants of dollarization.

Özkul (2021) investigated the relationship between financial dollarization and inflation, employment in Türkiye by employing Toda-Yamamato causality analysis for the period of 2005 – 2020. The researcher reports that deposit account dollarization is cause of inflation employment; employment is cause of loan dollarization; and loan dollarization is cause of inflation.

Sever (2012) utilizes from Granger causality analysis to explore the causality relationship between dollarization and currency rate instability in Türkiye for the periods of 1989-2010 and 2001-2010. For the first broader period, two-way relationship from dollarization to currency rate instability is determined whereas one-way relationship is found for the second period. The author emphasizes that decrease in dollarization would reduce the instability in currency rate.

Kaya and Açdoyuran (2017), as result of the VAR and Granger causality analyses on the data from the period of 2000 – 2017, suggest for Türkiye that return on stocks is cause of dollarization in loan and deposit accounts. Similarly, Saraç (2010) employs the VAR and Granger causality test model to report inflation as a cause of dollarization in Türkiye for the period of 1994-2019.

Terzi and Kurt (2007), as result of the VAR and Granger causality test conducted for Türkiye for the period of 1995-2006, suggest existence of causality from foreign currency rate to inflation. It is also reported that this causality is stronger for the period when the dollarization rate is higher.

Serel and Darıcı (2006), to determine effect of currency substitution in Türkiye on foreign currency rate, inflation, and real interest variables, employed the least squares method. The researchers suggest for the period of 1990-2002 that foreign currency rate increases, and high inflation are essential determinants.

3. Dollarization Process in Türkiye

Currency substitution has long been issued in Türkiye especially after the change in foreign exchange regime and financial liberalization declared in 1980 (Balaylar and Duygulu, 2004). Afterwards of the financial liberalization process commenced with the Economic Stability package in January 24th, 1980, another substantial phase was the decree with 32nd serial number issued in 1989. This decree was authorizing Turkish banks to execute foreign exchange operations for locals up to the limits of 3,000 USD for a period from 15 days to 6 months whereas foreign currency operation limits were decreased in other areas and operations were simplified (Keyder, 2002).

After the 2001 economic crisis, with the substantial success in fight against the inflation, dollarization process was managed to be reversed (de-dollarization) (Ağaslan and Gayaker, 2019). Hyperinflation stress has been mentioned in the policy documents as an essential reason behind dollarization process experienced in Türkiye. In a public statement of Mr. Serdengecti, former president of the Central Bank of the Republic of Turkiye (CBRT), in 2005, emphasized that transition to the floating currency rate and inflation rate-targeting policy were fundamental factors in success in reversing the dollarization in Türkiye along the post-2001 crisis period.

Similar to other examples around the world, high budget deficit and inflationist deficit were reasons of the dollarization experienced in Türkiye along the aforesaid period. Decreasing credibility of Turkish Lira urged economic actors to hold bank deposits in foreign currency or to demand higher interest rates for their savings in domestic currency (Civcir, 2005).

In Table 1, the most common indicator of dollarization was exhibited as the rate of bank deposits of domestic residents in foreign currency to the overall bank deposit amount for Türkiye. In comparison of the data from 2003 and 2022, as reported from the BRSA (Banking Regulation and Supervision Agency), deposit accounts in foreign currency and participation funds were employed instead of foreign currency. Total bank deposit amount is the totals of deposits in Turkish Lira and foreign currencies. In the respective period, deposit accounts of domestic residents in foreign currency and total

bank deposits increased continuously. The rate of the deposit in foreign currency to total bank deposits decreased from 2003 until 2013. On the other hand, it increased from 28.82% to 51.90% along the period between 2013 and 2021 again.

Table 1. Foreign and Total Deposits of Domestic Residents

Years	(FEDA+PF) - (million TL)	(TD) - (million TL)	FEDA+PF/TD (%)
2003	74,841.61	133,333.64	56.131
2004	65,760.97	149,439.89	44.005
2005	75,609.51	184,020.40	41.088
2006	82,779.47	239,406.54	34.577
2007	110,538.81	303,595.23	36.410
2008	111,506.13	349,402.67	31.913
2009	143,354.34	440,444.66	32.548
2010	149,498.27	496,298.22	30.123
2011	168,174.91	597,375.60	28.152
2012	195,205.51	654,610.41	29.820
2013	212,941.08	738,832.87	28.821
2014	315,782.47	908,675.92	34.752
2015	336,434.01	997,332.89	33.733
2016	446,001.57	1,164,176.72	38.311
2017	550,629.50	1,381,250.82	39.865
2018	630,620.84	1,577,970.24	39.964
2019	846,871.35	1,898,572.15	44.606
2020	1,080,985.98	2,410,643.95	44.842
2021	1,438,604.67	3,213,899.12	44.762

Source: BRSA (2022); Eğilmez (2020)
FEDA: Foreign Exchange Deposit Accounts, PF: Participation Funds, TD: Total Deposits

4. The Data

Dollarization is described by different variables and estimations in the literature. One of these estimations is the percentage of the bank deposits in foreign currency among overall bank deposit amount. In the present study, this description of dollarization was preferred because bank deposits in foreign currency and overall bank deposit amounts could be retracted at regional scale across Türkiye. To that end, bank deposits in foreign currency were gathered from the BRSA with respect to cities as the total of bank deposit amounts and the amounts in the forms of other bank accounts. Then, collected data was agglomerated at regional levels. Additionally, overall bank deposit amounts collected from the same agency summarized at regional level as well besides the overall bank deposit amounts to estimate the percentage of the bank deposits in foreign currency among the overall bank deposits. These obtained ultimate data was to indicate dollarization in bank deposits. For the further sections of this study, bank deposit dollarization rate was taken as dollarization indicator; and it was studied at regional level.

Again, for the objectives of our study, inflation rate was estimated based on annual percentage changes in consumer prices at regional level. Regional consumer price index data is compiled by the Turkish Statistic Agency (TURKSTAT). Study data was obtained from the CBRT Electronic Data Delivery System (EVDS).

Dollarization (DL) and inflation rate (ENF) variables were comprised quarterly based on 26 statistical districts for the period covering 2007:4-2021:4. The reason for the data to start from the 4th quarter of 2007 is that the amount of foreign currency deposits based on provinces required for the calculation of dollarization can be obtained as of this date. And the reason why the data period is until the end of 2021 is the implementation of the currency protected deposit product announced by the government at the end of December 2021 by banks to reduce dollarization. After this new deposit product, a period has entered in which the dollarization rate cannot be determined exactly. The data are in percentage (%) scale and level values are used. Table 2 summarizes variables included in our study. In consideration of our time, the lowest average dollarization rate was 18.61% with TRB2 (Van, Mus, Bitlis and Hakkari), whereas the highest rate was 45.64% with TR10

region (İstanbul). In terms of average inflation rates at regional scale, the variations among regions were found to be lower. The lowest average inflation rate was 10.1% with TR51 (Ankara), whereas the highest was 11.25% with TRC2 (Sanliurfa and Diyarbakir). In terms of overall data, average dollarization rate was found to be 33.14% whereas average inflation rate was 10.72%. Among all panel data, the highest dollarization rate was measured with TRC1 (Gaziantep, Adiyaman and Kilis). The highest inflation rate was measured with TRA2 (Agri, Kars, Igdir and Ardahan).

Table 2. Summary Statistics

Panel Code	Region Code	Mean		Std. Deviation		Minimum		Maximum	
		DL	ENF	DL	ENF	DL	ENF	DL	ENF
1	TRA1	29.302	10.805	8.210	4.849	19.064	3.460	52.863	27.383
2	TRA2	24.192	10.941	7.852	5.116	15.632	4.784	49.126	30.824
3	TRB1	34.768	10.975	9.052	5.076	23.625	5.556	59.933	30.571
4	TRB2	18.607	10.902	8.313	4.774	10.277	5.795	43.021	25.835
5	TRC1	42.608	11.222	11.511	4.698	27.210	5.148	70.140	27.421
6	TRC2	22.675	11.249	8.777	4.923	13.200	5.280	45.752	27.225
7	TRC3	27.272	10.624	8.435	4.862	16.085	4.257	48.334	26.727
8	TR10	45.643	10.238	8.501	4.137	33.609	3.564	67.809	23.604
9	TR21	26.416	10.343	8.433	4.476	17.134	4.136	53.441	26.612
10	TR22	27.429	10.814	8.375	4.328	17.973	4.425	54.639	26.769
11	TR31	31.927	10.595	10.394	4.340	19.623	5.033	60.485	24.374
12	TR32	32.112	10.799	8.610	5.116	21.508	4.329	58.702	28.904
13	TR33	33.643	10.718	7.960	4.800	24.616	5.333	59.756	28.980
14	TR41	34.303	10.312	10.582	4.508	21.568	4.266	64.499	25.819
15	TR42	37.230	10.470	8.499	4.723	25.443	2.945	62.701	27.375
16	TR51	32.738	10.102	7.225	3.761	22.843	4.735	54.796	24.719
17	TR52	38.957	10.584	8.111	4.757	29.428	4.566	63.131	27.957
18	TR61	37.642	10.491	8.648	5.035	27.382	4.676	64.617	28.695
19	TR62	27.490	10.862	8.952	4.542	17.189	4.827	56.169	25.724
20	TR63	38.661	10.733	8.193	4.875	27.038	5.206	61.185	26.714
21	TR71	45.461	10.948	5.999	4.818	37.160	4.724	65.998	29.677
22	TR72	44.821	10.890	7.222	4.660	35.021	4.123	66.620	28.095
23	TR81	32.429	10.677	8.482	5.093	19.957	2.004	62.022	29.218
24	TR82	31.409	10.582	11.967	4.981	17.984	3.857	64.246	29.681
25	TR83	31.718	10.834	7.9846	5.139	22.012	4.336	57.326	29.599
26	TR90	32.132	10.925	7.608	5.173	23.872	5.063	55.972	29.945
Overall Panel		33.138	10.717	10.999	4.732	10.277	2.004	70.14	30.824

Mapping method would provide better understanding of average dollarization and inflation rates at regional scale. According to Figure 1, high dollarization levels of highly industrialized territories could be explained by their foreign currency need to maintain their businesses. However, high dollarization levels of under-industrialized central Anatolian territories could not be explained with any motive but protection of values of savings or investment preference.
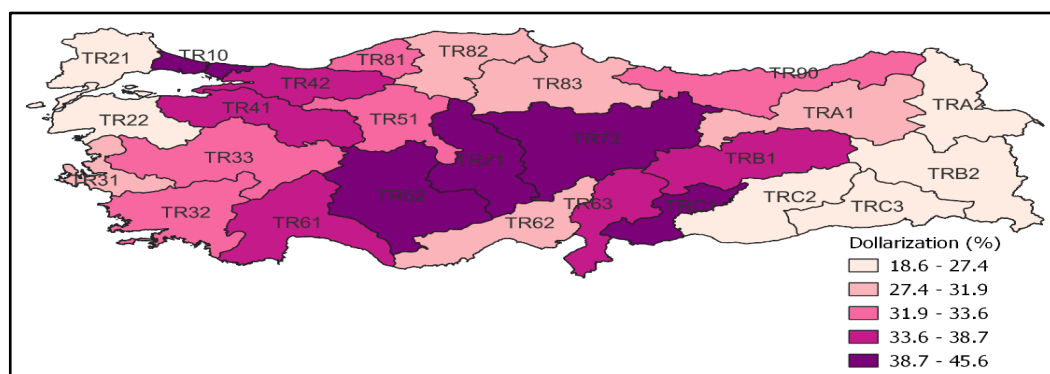

Figure 1. Regional Dollarization Rate (Average Values)

Figure 2 illustrates the mapping on the basis average regional inflation rates. It was notably seen that Marmara region and surrounding territories experienced relatively lower average inflation rate with respect to others. However, as illustrated by Figure 1, higher dollarization rate of aforesaid territory could be clearly explained by higher industrial concentration. Moreover, high dollarization rates seen with the central regions could be explained with a motive to preserve the value of investments from the effect of the inflation.
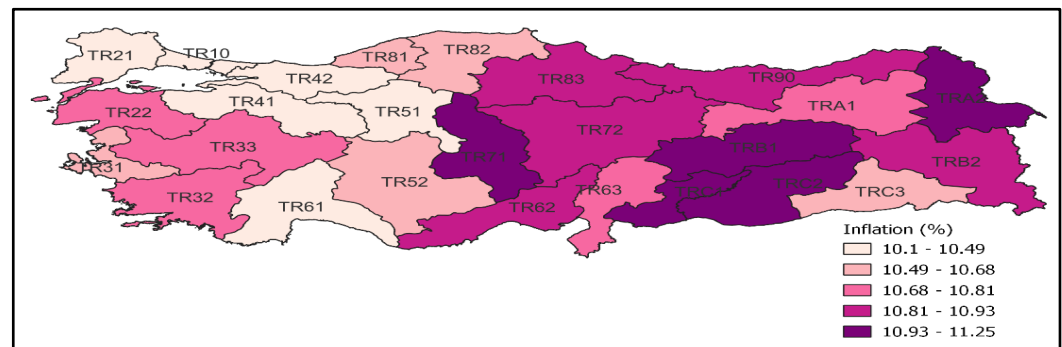

Figure 2. Regional Inflation Rate (Average Values)

5.   Model and Methods

An increase in domestic inflation will direct individuals to foreign currency (Dollar, Euro, etc.) with the motive of protecting the value, but this process will reverse when there is a decrease in inflation (Guidotti and Rodriguez, 1992, 519). The aim of this study is to investigate the effect of inflation on dollarization in Türkiye at the regional level. For this purpose, the econometric model used in the study was created like Saraç (2010) and Yılmaz and Uysal (2019) and defined as follows:

$$DL_{it} = \alpha_i + \theta_i DL_{it-1} + \beta_i ENF_{it} + \varepsilon_{it} \tag{1}$$

Where, α is fixed coefficient; θ is the coefficient of lagged dependent variable; and β is the coefficient of inflation rate. All coefficients included in our model were estimated with respect to relevant units under the assumption of individual effect. The dynamic structure of the model was because of high stability of variables in time in economic studies and they react slowly to the variations. Therefore, dynamic models are utilized commonly in economic studies. A way of inclusion of dynamic process into model is to contain lagged dependent variable into model (Vos and Everaert, 2019).

Prior to utility of the study model, there are some necessary statistical tests e.g. cross-sectional dependency, unit-root, slope homogeneity, and co-integration tests. The appropriate estimation method is determined according to preliminary test results. The next chapter displayed the results of the aforesaid preliminary tests. As a result of the preliminary tests, Dynamic Common Correlation Effects (DCCE) estimator and bootstrap panel causality test developed by Emirmahmutoglu and Kose (2011) (hereafter E-K) for examining short-run relationship were preferred to estimate the model given in Equation (1). Thus, DCCE and E-K approaches were briefly introduced in the further sections of this chapter.

In the dynamic panel data models, an endogeneity issue may arise due to dynamic factors. As a solution to this addressed issue, GMM method based on instrumental variable is commonly used in dynamic panel data analyses. However, this and similar methods are founded on the homogeneity assumption. Heterogeneity is rather common characteristic in practice. At this point, MG and PMG estimators taking heterogeneity into

consideration could be preferred. But these estimators are not consistent because they ignore cross-sectional dependency (Turkay, 2017).

At this point, another crucial point in the analysis of panel data is to test whether there is cross-sectional dependency. Whereas the conventional methods ignore cross-sectional dependency, recent panel data analysis methods take this characteristic into consideration. One of these novel methods is the DCCE, the one preferred in this study. Having cross-sectional dependency into consideration, the DCCE estimates dynamic and heterogenic panel data model; and developed by Chudik and Pesaran (2015). This method relies on the MG developed by Pesaran and Smith (1995), PMG developed by Pesaran et al. (1999), and the CCE methods developed by Pesaran (2006) (Arain et al., 2019). The CCE estimator is resilient against non-stationarity, co-integration, structural-breaks, and serial correlations. Nevertheless, it is not suitable for a dynamic model structure (Chaudhry et al., 2022) because the CCE estimator is not consistent with dynamic panel data models since lagged dependent variable is not exogen in a dynamic model (Liddle; Huntington, 2020). Chudik and Pesaran (2015) expanded the CCE and adapted its dynamic model structure (Turkay, 2017). The DCCE can yield consistent estimations by adding cross-sectional averages. In this regard, the DCCE could be given as below:

$$DL_{it} = \theta_i DL_{it-1} + \beta_i ENF_{it} + \sum_{p=0}^{p_T} \delta_{pi}\overline{ENF}_{t-p} + \sum_{p=0}^{p_T} \gamma_{pi}\overline{DL}_{t-p} + u_{it} \qquad (2)$$

here, cross-sectional averages are given as $\overline{ENF}$ and $\overline{DL}$. Moreover, p_T is the lag-length of cross-sectional average. In the light of all these, the DCCE was found appropriate for the estimation of the structured model in our study. Thus, heterogenic estimations were conducted on regional basis. Results given by the DCCE yielded long-run relationships. In order to examine short-run effect of inflation rate on dollarization, E-K panel causality test was conducted.

E-K panel causality test was developed by Emirmahmutoglu and Kose (2011). E-K panel causality test is one of the new generation tests taking heterogeneity into consideration. This test is the version, developed on panel data analysis, of the approach depended on VAR model with higher lag-length introduced by Toda and Yamamoto (1995). Accordingly, E-K panel causality test does not require stationarity of series; and allows using stationary series from the same or different levels (I(0) and/or I(1)) together. Another advantage of the E-K panel causality test is that it does not require testing existence of co-integration relationship. In a basic way, VAR model with larger lag used in the E-K panel causality test could be described as below:

$$DL_{it} = \alpha_i^{DL} + \sum_{j=1}^{k_i+dmax_i} A_{11,ij}DL_{it-j} + \sum_{j=1}^{k_i+dmax_i} A_{12,ij}ENF_{it-j} + u_{it}^{DL} \qquad (3)$$

$$ENF_{it} = \alpha_i^{ENF} + \sum_{j=1}^{k_i+dmax_i} A_{21,ij}DL_{it-j} + \sum_{j=1}^{k_i+dmax_i} A_{22,ij}ENF_{it-j} + u_{it}^{ENF} \qquad (4)$$

where, k_i is unit-specific lag value; $dmax_i$ is unit-specific maximum degree of integration. In the present study, within the scope of E-K panel causality test, only Equation (4) was taken into consideration because of our objective to determine the effect of inflation rate on dollarization. In this regard, basic hypothesis of the E-K panel causality test was the equality of each A_{12} and it was structured as "inflation rate is not reason of dollarization".

For the panel analysis, probability value of unit-specific causality results rely on their agglomeration as it is suggested by Fisher (1932). Fisher test statistic is described as follows:

$$\lambda = -2 \sum_{i=1}^{N} \ln(p_i) \quad , \quad i = 1,2,\dots,N$$

Where, p_i is the probability value based on Wald statistic of the ith unit. In addition, E-K panel causality test reaches resistant critical value over bootstrap by considering cross-sectional dependency.

6. Results

During the analysis phase, it is first required to evaluate cross-sectional dependency of variables. Cross-sectional dependency is used to prefer type of panel unit root test. Table 3 exhibits results of the Breusch-Pagan LM and Pesaran CD tests on variables. According to the test results, our basic hypothesis of "there is no cross-sectional dependency" was rejected for both variables.

Table 3. Cross Section Dependency Tests

Variables	Test	Statistics	Probability
DL	Breusch-Pagan LM	16019.41	0.000
	Pesaran CD	126.356	0.000
ENF	Breusch-Pagan LM	17389.41	0.000
	Pesaran CD	131.856	0.000

Because of cross-sectional dependency among variables, it was necessary to use second generation panel unit root tests. To that end, Im-Pesaran-Shin (CIPS) test expanded by considering cross-sectional dependency was utilized. According to the results of the CIPS test developed by Pesaran (2007), variables were found to be stationary at level as seen in Table 4.

Table 4. Pesaran (2007) CIPS Panel Unit Root Test

Variables	Lag	No Trend		Trend		Result
		Statistics	Probability	Statistics	Probability	
DL	0	-5.168	0.000	-7.266	0.000	I(0)
	1	-1.878	0.000	-2.864	0.002	
ENF	0	-6.273	0.000	-5.443	0.000	I(0)
	1	-7.393	0.000	-6.787	0.000	

Before the model estimation phase, heterogeneity of slope coefficients is required to be tested. To this purpose, S test introduced by Swamy (1970), $\widetilde{\Delta}$ and adjusted $\widetilde{\Delta}$ ($\widetilde{\Delta}_{adj}$) tests developed by Pesaran and Yamagaya (2008) through modifications on the S test were employed. According to the results exhibited on Table 5, the basic hypothesis of "slope coefficients are homogenous" was rejected. Hence, approaches considering heterogeneous coefficients are required to be preferred for model estimation.

Table 5. Slope Homogeneity Test

Test	Statistics	Probability
S	2410.28	0.000
$\widetilde{\Delta}$	4.264	0.000
$\widetilde{\Delta}_{adj}$	4.381	0.000

Up to this point, important conditions were taken into consideration about selection of the method that would be employed for estimation of panel data model. In sum, stationary variables display cross-sectional dependency, and their slope coefficients were found to be heterogeneous. Thus, estimation methods taking these characteristics were

required to be preferred. Accordingly, the DCCE estimator introduced by Chudik and Pesaran (2015) was utilized to estimate long-run coefficients. Table 6 summarizes MG estimation results for all regions and panel data.

Table 6. Dynamic Common Correlation Effects Estimation Results

Region Code	DL_{t-1}	ENF_t	C
TRA1	0.565***	0.012	-0.678
TRA2	0.675***	0.472	-2.678**
TRB1	0.753***	0.123	0.528
TRB2	0.805***	0.330	-3.727**
TRC1	0.894***	-0.315	1.096
TRC2	0.717***	0.494**	-2.756
TRC3	0.388**	-0.248	-1.481
TR10	0.919***	0.008	0.980
TR21	0.580***	0.232	-3.367***
TR22	0.639***	0.059	-2.633***
TR31	0.871***	0.304	-1.886*
TR32	0.594***	0.213	-1.078**
TR33	0.917***	0.259	-0.195
TR41	0.858***	0.285	-1.147
TR42	0.475***	1.890**	8.166***
TR51	0.487***	-0.238	5.274**
TR52	0.854***	0.038	0.598
TR61	0.258*	0.460	3.978***
TR62	0.707***	0.045	-3.443***
TR63	0.662***	-0.344	3.408**
TR71	0.935***	0.146	1.163
TR72	0.794***	0.083	3.053**
TR81	0.367***	1.238***	3.699*
TR82	0.794***	0.018	-2.801
TR83	0.690***	0.460	0.682
TR90	0.795***	-0.095	-0.228
Overall Panel (MG) Estimation	0.692***	0.228**	0.174

Note: (*), (**) and (***) show the significance level at 10%, 5% and 1% respectively.

According to regional DCCE estimation results, significant and positive effect was determined with inflation rate on dollarization for the regions of TRC2 (Sanliurfa and Diyarbakır), TR42 (Kocaeli, Sakarya, Duzce, Bolu and Yalova) and TR81 (Zonguldak, Karabuk and Bartin). In this long run effect, 1% increase with inflation rate resulted in 0.5%, 1.9% and 1.2% increase in dollarization, respectively. Moreover, it was seen that inflation rate did not have significant effect; and that dollarization was persisted from the previous periods for some regions. Especially, TR10 (Istanbul), TR33 (Manisa, Afyonkarahisar, Kutahya and Usak) and TR71 (Kirikkale, Aksaray, Nigde, Nevsehir and Kirsehir) regions were found to have highly dynamic dollarization process. According to overall panel data analysis results, inflation rate was found to have significant positive effect on dollarization. Our findings suggested that 1% increase in inflation rate caused 0.2% increase in dollarization.

Table 7. Emirmahmutoğlu and Kose (2011) Panel Causality Test Results

Region Code	Wald Statistics	Probability
TRA1	4.981**	0.026
TRA2	1.823	0.177
TRB1	3.620*	0.057
TRB2	2.062	0.151
TRC1	3.195*	0.074
TRC2	3.465*	0.063
TRC3	8.976***	0.003
TR10	2.571	0.109
TR21	2.094	0.148
TR22	1.794	0.180
TR31	1.791	0.181
TR32	1.169	0.280
TR33	3.732**	0.053
TR41	2.450	0.118
TR42	4.237**	0.040
TR51	5.138**	0.023
TR52	2.973*	0.085
TR61	3.268*	0.071
TR62	1.752	0.186
TR63	2.954*	0.086
TR71	6.514**	0.011
TR72	1.944	0.163
TR81	0.824	0.364
TR82	0.807	0.369
TR83	2.427	0.119
TR90	2.884*	0.089
Overall Panel	128.93	0.999

Note: (*), (**) and (***) show the significance level at 10%, 5% and 1% respectively.

Causality test was applied to examine the short-run relationship among the variables. The causality test needs to be an approach taking cross-sectional dependency and slope heterogeneity into consideration. Therefore, panel causality test developed by Emirmahmutoglu and Kose (2011) was preferred. Table 7 exhibits the results of the causality test. According to the test results, for all panel data, inflation rate was not found as cause of dollarization. This finding was obtained through bootstrap critical value. In consideration of region-specific findings, inflation rate was found as the cause of dollarization for half of the 26 regions. Figure 3 exhibits the respective mapping for these findings. White-colored regions display no causality from inflation rate to dollarization. Within the regions with other colors, this causality relationship was determined up to 10% level.
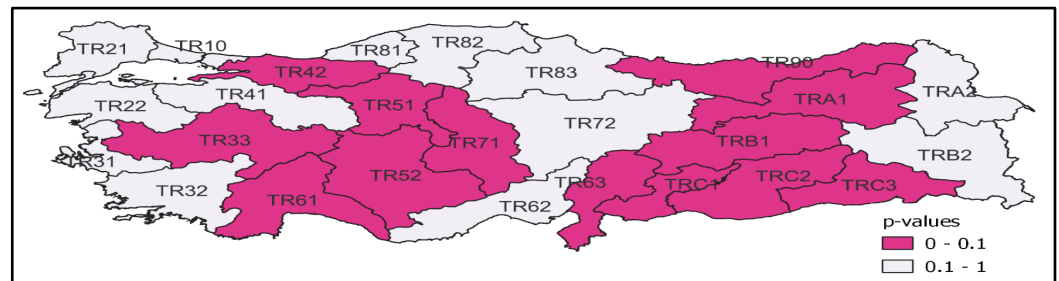
Figure 3. Regional Causality Test Results

7. Conclusions

In the relevant literature, dollarization has been shown to be correlated with numbers of different macroeconomic indicators and degree of these relationships has been studied at regional scope. In the present study, it was investigated that whether 'currency substitution" (dollarization) is being affected by inflation rate, general price levels by

which affected most according to common belief, on either the long and short run or both. Again, existence of such correlations has been investigated through comparison of countries in the respective literature. There are studies conducted at macro-regional levels covering European Union, Central and Eastern Europe, Latin America, Far East and South America. However, there was no study concentrated on sub-country regions in investigation of the correlation between dollarization and inflation rate.

In our study, a data set covering Türkiye in 26 regions was analyzed to investigate the effect of inflation rate on dollarization. As a dollarization indicator, rate of bank deposits in foreign currencies to overall bank deposits was used. Since these data is reported by BRSA based on individual cities, they were agglomerated in 26 regions. Inflation rate data was captured from the EVDS of the CBRT. Our study data was from a period covering 2007:4-2021:4.

Long and short run conclusions were planned to be obtained at the end of the analysis. In this regard, various pre-tests were conducted to determine the analysis methods that need to be applied. The first one of these was cross-sectional dependency test; and cross-sectional dependency was determined for both variables. This was followed by the CIPS panel unit root test considering cross-sectional dependency, which indicated that both variables were stationary at level. Preliminary to the analysis, pre-test and post-test was conducted to homogeneity of slope coefficients. Our test results indicated that slope coefficients were not homogenous. Thus, a panel data analysis taking cross-sectional dependency and heterogeneous slope coefficients into consideration were preferred to determine long and short run relationships.

Based on the DCCE analysis results, lagged variable of dollarization was found significant and positively effective on the long run for all regions. This result suggested that dollarization was affected by its previous periods significantly and contained expectations. Inflation rate was found to be positively effective on dollarization in only three regions. No significant effect was determined with other regions. This finding was not conforming to long-run expectation about inflation-dollarization. However, according to the MG estimation result from the analysis of all panel data, 10% increase in inflation rate resulted in 2% increase in dollarization. Even though it was determined that inflation rate increased dollarization on the long run across the whole panel set, this was no supported for all regions with satisfactory evidence. To determine short run effect of inflation rate on dollarization, panel causality test developed by Emirmahmutoglu and Kose (2011) was employed. According to the obtained results, inflation rate was found as cause of dollarization across half of the 26 regions. There was no causality from inflation to dollarization for all panel set. According to causality test results, there was no strong evidence that inflation rate caused dollarization on the short run.

This study was conducted to investigate dollarization-inflation relationship for short and long run horizons in Türkiye on regional basis. Our findings above were to investigate whether inflation rate caused dollarization in Türkiye at regional scale. Whether obtained results were related with proximity of regions to each other could be examined in the future spatial econometric analysis. Our study is expected to shed light for the potential future studies investigating relationship between dollarization levels with proximity by adding other economic, social, or demographical indicators as well.

References

Ağaslan, E., & Gayaker, S. (2019). Türkiye'de Para İkamesinin Belirleyicileri Doğrusal Olmayan Bir Yaklaşım. *Ankara Hacı Bayram Veli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *21*(2), 362-387.

Akıncı, O., Özer, Y. B., & Usta, B. (2005). Dolarizasyon Endeksleri: Türkiyedeki Dolarizasyon Sürecine İlişkin Göstergeler. *Türkiye Cumhuriyet Merkez Bankası Çalışma Tebliği*, *05*/17.

Alesina, A., & Barro, R. J. (2001). Dollarization. *American Economic Review*, *91*(2), 381-385.

Alvarez-Plata, P., & García-Herrero, A. (2008). To dollarize or de-dollarize: Consequences for Monetary Policy. *BVA Working Paper*, 0921.

Arain, H., Han, L., & Meo, M. S. (2019). Nexus of FDI, population, energy production, and water resources in South Asia: a fresh insight from dynamic common correlated effects (DCCE). *Environmental Science and Pollution Research, 26*, 27128–27137. https://doi.org/10.1007/s11356-019-05903-7

Balaylar, N. A., & Duygulu, A. A. (2004). Türkiye'de Para İkamesi Olgusu ve Para Talebinin İstikrarı. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi, 19*(2), 33-55.

Barro, R. J., & Gordon, D. B. (1983). Rules, Discretion, and Reputation in a Model of Monetary Policy. *Journal of Monetary Economics, 12*(1), 101-21. https://doi.org/10.1016/0304-3932(83)90051-X

BRSA. (2022). Banking Sector Data, Deposits of Domestic Residents According to Types, https://www.bddk.org.tr/bultenaylik (Date of access: 09.11.2022)

Chaudhry, I. S., Nazar, R., Ali, S., Meo, M. S., & Faheem, M. (2022). Impact of environmental quality, real exchange rate and institutional performance on tourism receipts in East-Asia and Pacific region. *Current Issues in Tourism, 25* (4), 611-631. https://doi.org/10.1080/13683500.2021.1894101

Chudik, A., & Pesearan, M. H. (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors, *Journal of econometrics. 188*(2), 393-420. https://doi.org/10.1016/j.jeconom.2015.03.007

Civcir, I. (2005). *Dollarization and its Long-run Determinants in Türkiye*. Neaime, S. and Colton, N.A. (Ed.) Money and Finance in the Middle East: Missed Oportunities or Future Prospects? (Research in Middle East Economics, Vol. 6), Emerald Group Publishing Limited, Bingley, 201-232. https://doi.org/10.1016/S1094-5334(05)06010-3

Corrales, M. J. S., & Imam, P. A. (2019). Financial Dollarization of Households and Firms: Does It Differ? *IMF Working Papers*, No. 2019/019.

De Nicolo, M. G., Ize, M. A., & Honohan, M. P. (2003). Dollarization of The Banking System: Good or Bad? *IMF Working Papers*, No. 2003/146.

Edwards, S., & Magendzo, I. I. (2006). Strict Dollarization and Economic Performance: An Empirical Investigation. *Journal of Money, Credit and Banking, 38*(1), 269–282.

Emirmahmutoglu, F., & Kose, N. (2011). Testing for Granger causality in heterogeneous mixed panels. *Economic Modelling 28* (3), 870–876. https://doi.org/10.1016/j.econmod.2010.10.018

Fischer, S. (2006). *Dollarization*. Keynote address at the 75th Anniversary Conference of the Central Bank of the Republic of Türkiye, Istanbul, December 13–15 2006, on Dollarization: Consequences and Policy Options.

Fisher, R.A. (1932). *Statistical Methods for Research Workers*. 4th edition, Oliver and Boyd, Edinburgh.

Galinda, A. J., & Leiderman, L. (2005). Living with Dollarization and the Route to Dedollarization. *Inter-American Development Bank Working Paper*, 526.

Guidotti, P. E., & Rodriguez, C. A. (1992). Dollarization in Latin America: Gresham's Law in Reverse? *IMF Staff Papers*, 39(3), 518–544. https://doi.org/10.2307/3867472

Honohan, P., & Shi, A. (2002). Deposit Dollarization and The Financial Sector in Emerging Economies. *SSRN* 634461. https://doi.org/10.1596/1813-9450-2748

Eğilmez, M. (2020). https://www.mahfiegilmez.com/2020/12/dolarizasyonda-son-durum.html (Date of access: 03.12.2022)

Karakaya, G., & Karoğlu, Y. (2020). Dolarizasyon Olgusu: 2008 Finansal Krizinden Sonra Türkiye'de Dolarizasyon İncelemesi. *Stratejik ve Sosyal Araştırmalar Dergisi, 4*(2), 353-364. https://doi.org/10.30692/sisad.701696.

Kaya, E., & Açdoyuran, B. (2017). Finansal Dolarizasyon Unsurları Olarak Kredi Dolarizasyonu ve Mevduat Dolarizasyonu ile Hisse Senedi Getirileri Arasındaki İlişki. *Dicle Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 7*(14), 325-344.

Keyder, N. (2002). *Para Teorisi-Politika-Uygulama*. Ankara: Seçkin Yayıncılık, 594.

Larrain B, F., & Tavares, J. (2003). Regional Currencies Versus Dollarization: Options for Asia and The Americas. *The Journal of Policy Reform, 6*(1), 35-49. https://doi.org/10.1080/13841280309602

Liddle, B., & Huntington, H. (2020). 'On the Road Again': A 118 country panel analysis of gasoline and diesel demand. *Transportation Research Part A, 142*, 151-167. https://doi.org/10.1016/j.tra.2020.10.015

Mansoor, A. T. (2018). Afganistan'da Dolarizasyon Sürecinde Döviz Kuru ve Enflasyon İlişkisi. Yüksek Lisans Tezi, Akdeniz Üniversitesi, Sosyal Bilimler Enstitüsü, İktisat Anabilim Dalı.

Neanidis, K. C. (2010). Financial Dollarization and European Union Membership. *International Finance, 13*(2), 257-282. https://doi.org/10.1111/j.1468-2362.2010.01266.x

Neanidis, K. C., & Savva, C. S. (2013). Institutions and Financial Dollarization: Indirect Effects Based on A Policy Experiment. *Economics Letters, 121*(3), 405-410. https://doi.org/10.1016/j.econlet.2013.09.027

Neanidis, K. C., & Savva, C. S. (2018). Regional Spillovers in Financial Dollarization. *Centre for Growth and Business Cycle Research Discussion Paper Series*, University of Manchester, (238).

Özdemir, V., & Yavuz, H. (2021). Yeni Uluslararası İktisadi Düzende Dolarsızlaşma Eğilimleri. *Başkent Üniversitesi Ticari Bilimler Fakültesi Dergisi, 5*(1), 64-76.

Özkul, G. (2021). Türkiye'de Finansal Dolarizasyonun Enflasyon Ve İstihdam İle Olan Etkileşimi. *İşletme Ekonomi ve Yönetim Araştırmaları Dergisi, 4*(1), 59-79. https://doi.org/10.33416/baybem.843339.

Pesaran, M. H. (2006). Estimation and Inference in Large Heterogeneous Panels with Multifactor Error Structure. *Econometrica, 74* (4), 967-1012. https://doi.org/10.1111/j.1468-0262.2006.00692.x

Pesaran, M. H., & Smith, R. (1995). Estimating long-run relationships from dynamic heterogeneous panels. *Journal of Econometrics, 68* (1), 79-113. https://doi.org/10.1016/0304-4076(94)01644-F

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association, 94*(446), 621-634. https://doi.org/10.2307/2670182

Peseran, M. H. (2007). A Simple Panel Unit Root Test in The Presence of Cross- Section Dependence. *Journal of Applied Econometrics, 22*(2), 265-312. https://doi.org/10.1002/jae.951

Peseran, M. H., & Yamagata, T. (2008). Testing Slope Homogeneity in Large Panels. *Journal of Econometrics, 142*(1), 50-93. https://doi.org/10.1016/j.jeconom.2007.05.010

Ramirez-Rojas, C. L. (1985). Currency Substitution in Argentina, Mexico, and Uruguay. *Staff Papers, 32*(4), 629-667.

Rennhack, R., & Nozaki, M. (2006). *Financial Dollarization in Latin America*. Palgrave Macmillan, London. https://doi.org/10.1057/9780230380257_4

Rose, A. K. (2000). One Money, One Market: Estimating the Effect of Common Currency on Trade. Econo*mic Policy: A European Forum*, 30, 7-33.

Saraç, T. B. (2010). Enflasyon ve Para İkamesi İlişkisi: Türkiye Ekonomisi için Ekonometrik Bir Analiz (1994:01-2009:12). *Ekonomi Bilimleri Dergisi, 2*(1), 147-152.

Sarı, İ. (2007). Makroekonomik Değişkenlerin Dolarizasyon Sürecine Etkisi: Ampirik Bir Yaklaşım. Uzman Yeterlilik Tezi, TCMB Piyasalar Genel Müdürlüğü, Ankara.

Serdengeçti, S. (2005). Dolarizasyon/Ters Dolarizasyon. Eskişehir.

Serel, A., & Darıcı, B. (2006). Para İkamesini Etkileyen Faktörler: Türkiye Uygulaması. *Kocaeli Üniversitesi Sosyal Bilimler Dergisi*, (11), 150-167.

Sever, E. (2012). Türkiye'de Dolarizasyon Süreci ve Döviz Kuru Belirsizliği İlişkisi. *Sosyoekonomi, 17*(17), 203-222.

Seyidoğlu, H. (2001). *Ekonomi ve işletmecilik terimleri*. Güzem Can Yayınları

Smawy, P. A. V. B. (1970). Efficient inference in a random coefficient regression model. *Econometrica, 38*(2), 311-323. https://doi.org/10.2307/1913012

Terzi, H., & Kurt, S. (2007). Türkiye'de Dolarizasyon Sürecinde Döviz Kuru ve Enflasyon İlişkisi. *Ekonomik Yaklasim, 18*(64), 1-22. http://dx.doi.org/10.5455/ey.10635

Toda, H. Y., & Yamamoto, T. (1995). Statistical Inference in Vector Autoregressions with Possibly Integrated Processes. *Journal of Econometrics, 66* (1-2), 225–250. https://doi.org/10.1016/0304-4076(94)01616-8

Turkay, M. (2017). Heterogeneity across emerging market central bank reaction functions. *Central Bank Review, 17*(3), 111-116. https://doi.org/10.1016/j.cbrev.2017.06.002

Vieira, F. A., Holland, M., & Resende, M. F. (2012). Financial Dollarization and Systemic Risks: New Empirical Evidence. *Journal of International Money and Finance, 31*(6), 1695-1714. https://doi.org/10.1016/j.jimonfin.2012.03.007

Vos, I. D., & Everaert, G. (2019). Bias-Corrected Common Correlated Effects Pooled Estimation in Dynamic Panels. *Journal of Business; Economic Statistics, 39*(1), 294-306. https://doi.org/10.1080/07350015.2019.1654879

Yalçıner, K., & Mutlu, A. A. (2018). Küresel Kriz Sonrası Gelişmekte Olan Ülkelerde Dolarizasyon Süreci. *Third Sector Social Economic Review, 53*(2), 450-462. https://doi.org/10.15659/3.sektor-sosyal-ekonomi.18.06.949.

Yeyati, E. L. (2021). Financial Dollarization and De-Dollarization in The New Milennium. *Documento De Trabajo*, 2021/02.

Yılmaz, M., & Uysal, D. (2019). Türkiye'de Dolarizasyon Ve Enflasyon İlişkisi. *İktisadi İdari ve Siyasal Araştırmalar Dergisi, 4*(10), 286-306. https://doi.org/10.25204/iktisad.543482.

Yinusa, D. O. (2008). Between Dollarization and Exchange Rate Volatility: Nigeria's Portfolio Diversification Option. *Journal of Policy Modeling, 30*(5), 811-826. https://doi.org/10.1016/j.jpolmod.2007.09.007

Zeybek, H. (2014). Dolarizasyon ve Finansman Maliyeti. *İşletme ve İktisat Çalışmaları Dergisi, 2*(2), 44-61.

Zeybek, H. (2018). Effects of Dollarization on The Cost of Financing: A Comparative Analysis on The Turkish Economy. International Congress on Business and Marketing, İstanbul, (29.11.2018-01.12.2018).

Appendices

Panel Code	Region Code	Region	Panel Code	Region Code	Region
1	TRA1	Erzurum, Erzincan, Bayburt	14	TR41	Bursa, Eskişehir, Bilecik
2	TRA2	Ağrı, Kars, Iğdır, Ardahan	15	TR42	Kocaeli, Sakarya, Düzce, Bolu, Yalova
3	TRB1	Malatya, Elazığ, Bingöl, Tunceli	16	TR51	Ankara
4	TRB2	Van, Muş, Bitlis, Hakkari	17	TR52	Konya, Karaman
5	TRC1	Gaziantep, Adıyaman, Kilis	18	TR61	Antalya, Isparta, Burdur
6	TRC2	Şanlıurfa, Diyarbakır	19	TR62	Adana, Mersin
7	TRC3	Mardin, Batman, Şırnak, Siirt	20	TR63	Hatay, Kahramanmaraş, Osmaniye
8	TR10	İstanbul	21	TR71	Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir
9	TR21	Tekirdağ, Edirne, Kırklareli	22	TR72	Kayseri, Sivas, Yozgat
10	TR22	Balıkesir, Çanakkale	23	TR81	Zonguldak, Karabük, Bartın
11	TR31	İzmir	24	TR82	Kastamonu, Çankırı, Sinop
12	TR32	Aydın, Denizli, Muğla	25	TR83	Samsun, Tokat, Çorum, Amasya
13	TR33	Manisa, Afyonkarahisar, Kütahya, Uşak	26	TR90	Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane