Araştırma Makalesi

THE EXCHANGE RATE PASS-THROUGH EFFECT IN TÜRKİYE: FOURIER SHIN COINTEGRATION APPROACH (2006-2023)

Mustafa NAİMOĞLU[*]

Abstract

In this research, the relationship between currency exchange rates and inflation in the context of Türkiye is investigated, covering the period 2006:Q1-2023:Q1. To achieve this objective, unit root tests on the variables are conducted using both Fourier KPSS and Standard KPSS methods. Additionally, Fourier SHIN and Standard SHIN cointegration tests are employed to determine the presence of a long-term connection between these variables. Furthermore, DOLS, FMOLS, and CCR estimators are utilized to estimate both long-term and short-term coefficients. The findings, which are obtained through all three estimation techniques, consistently indicate that increases in the exchange rate lead to higher inflation levels, whether in the long-term or the short-term. This result underscores the significant impact of exchange rates on inflation rates within the Türkiye economy. When Türkiye's economic structure is examined, it becomes evident that there is a substantial reliance on foreign exchange. This underscores the critical importance of maintaining exchange rate stability. Ultimately, the results emphasize the necessity of not only preserving exchange rate stability but also strengthening efforts to generate foreign exchange.

Keywords: *Exchange Rate Pass-Through, Inflation, Fourier Tests, Türkiye.*

TÜRKİYE'DE DÖVİZ KURU GEÇİŞ ETKİSİ: FOURIER SHIN EŞBÜTÜNLEŞME YAKLAŞIMI (2006-2023)

Öz

Bu araştırmada, 2006 yılının ilk çeyreğinden 2023 yılının ilk çeyreğine kadar olan dönemi kapsayan Türkiye özelinde döviz kurları ile enflasyon arasındaki ilişki araştırılmaktadır. Bu amaca ulaşmak için değişkenler üzerinde birim kök testleri gerçekleştirilmektedir. Hem Fourier KPSS hem de Standart KPSS yöntemleri. Ayrıca bu

[*]Assist. Prof. Bingöl University, Faculty of Economics and Administrative Scienes/ Department of Economics, ORCID: 0000-0001-9684-159X, e-mail: mustafanaimoglu@gmail.com

değişkenler arasında uzun dönemli bir bağlantının varlığını tespit etmek amacıyla Fourier SHIN ve Standard SHIN eşbütünleşme testleri kullanılmaktadır. Ayrıca hem uzun vadeli hem de kısa vadeli katsayıları tahmin etmek için DOLS, FMOLS ve CCR tahmincilerinden yararlanılmaktadır. Her üç tahmin tekniği kullanılarak elde edilen bulgular, döviz kurundaki artışların hem uzun hem de kısa vadede daha yüksek enflasyon seviyelerine yol açtığını tutarlı bir şekilde göstermektedir. Bu sonuç, Türkiye ekonomisinde döviz kurlarının enflasyon oranları üzerindeki önemli etkisini vurgulamaktadır. Türkiye'nin ekonomik yapısı incelendiğinde dövize büyük bir bağımlılığın olduğu görülmektedir. Bu durum döviz kuru istikrarının korunmasının kritik önemini vurgulamaktadır. Sonuç olarak, sonuçlar sadece döviz kuru istikrarının korunmasının değil, aynı zamanda döviz yaratma çabalarının da güçlendirilmesinin gerekliliğini vurgulamaktadır.

Anahtar Kelimeler: *Döviz Kuru Geçişkenliği, Enflasyon, Fourier Testler, Türkiye.*

INTRODUCTION AND THEORETICAL FRAMEWORK

Exchange rates play a pivotal role in the economies of nations engaged in international interactions. Their significance in achieving sustainable macroeconomic objectives prompts frequent discussions due to their far-reaching effects on various economic variables. Both international trade and financial markets closely monitor exchange rate fluctuations. Excluding the Second World War, Türkiye generally experienced periods of moderate inflation from the republic until the 1970s. It is seen that inflation generally followed a high course from the mid-1970s until 2004. Thus, inflation has become one of the important macroeconomic problems in the Türkiye economy (Altıner & Sungur, 2021). During this period, devaluations were made to increase exports. Inflation, which was accelerated by the Oil Crisis in 1973, gained significant strength from the inevitable budget deficits of the public sector and the unstable political environment. The Türkiye economy experienced significant structural transformations during the 1980s, primarily driven by trade liberalization measures initiated in the early 1980s and subsequent financial deregulation, influenced by the forces of globalization (Oğul, 2022). As Türkiye responded to these shifts, the role of the exchange rate gained prominence, especially as the country transitioned from import-substitution policies to an export-driven growth strategy. Additionally, following two crises in Türkiye during the early 2000s, an implicit inflation targeting framework was introduced in 2002 (Arslan & Meçik, 2023).

In 2006, Türkiye formally embraced an explicit inflation targeting framework, which additionally broadened the CBRT's goals to include not just price steadiness but also financial stability (Allen & Wood, 2006, p.152). Another significant shift in this evolution was the move toward allowing the exchange rate to float freely, meaning that the central bank refrains from intervening in the exchange rate's determination by market forces. Intervention in foreign exchange markets occurs only during periods of extreme market turbulence (Felek & Ceylan, 2021). This stance holds particular importance in shaping the trajectory of inflation, especially in economies like Türkiye's, characterized by trade deficits, where

exchange rate movements significantly affect various macroeconomic indicators. In this context, the academic literature extensively focuses on the influence of the exchange rate(ER) on inflation(CPI), known as the Exchange Rate Pass-Through. This phenomenon can be classified as complete, partial, or nonexistent and relates to how fluctuations in the ER affect inflation.

In the scenario of a complete Exchange Rate Pass-Through, a rise in the ER aligns precisely with a parallel escalation in inflation. To illustrate, a 1% surge in the exchange rate (ER) results in an equivalent 1% rise in inflation. The Exchange Rate Pass-Through operates via two principal pathways: the immediate and the indirect consequences (Leiderman, 1993, p.124). The direct effect involves the rise in domestic prices of imported inputs that coincide with increases in the exchange rate. In contrast, the indirect effect revolves around changes in total demand. As the national currency depreciates, the demand for domestically produced substitutes for imported goods increases, while the demand for imports decreases. Simultaneously, the devaluation stimulates demand for export goods, contributing to price escalations (Çakır & Kaya, 2023).

In the Türkiye economy, inflation emerges as a crucial macroeconomic parameter. A persistent upward trajectory in inflation has been observed since the 1990s. However, when examining the past three decades, structural reforms implemented in the 2000s have yielded some degree of price stability. Instances of elevated inflation have arisen in various years due to domestic factors 1994, 2000, 2001 and global crises 2008. This investigation primarily focuses on the Exchange Rate Pass-Through, utilizing contemporary datasets from 2006 when the explicit inflation targeting regime was initiated. In traditional break tests, dummy variables are typically introduced into the model, which essentially consist of values of either 0 or 1. This setup illustrates a sharp switch between these two values, indicating suddenly and harshly structural shifts. Conversely, when employing Fourier methods that incorporate cosine and sine trigonometric functions, these structural shifts exhibit a more gradual and seamless progression. This suggests that Fourier functions align better with real-world life. Consequently, this study stands out by encompassing various time periods and employing a Fourier empirical approach, setting it apart from earlier research and offering a valuable addition to the existing body of literature.

The subsequent section of this research provides an overview of relevant literature on the Exchange Rate Pass-Through. Following that, the methodology and dataset are introduced, followed by the presentation of findings and outcomes.

LITERATURE REVIEW

Numerous investigations within both theoretical and empirical literature have explored the factors influencing exchange rates and inflation (Gülden &

Akmyrat, 2019; Demirgil, 2019; Yenisu, 2019; Torun & Yılmaztürk, 2021; Akbabay, 2022; Berke, 2023; Kolcu, 2023). Within this domain, considerable attention has been directed toward testing the theoretical constructs of purchasing power parity, uncovered interest rate parity, and the international Fisher effect (Öztürk & Bayraktar, 2010; Ceylan & Ulucan, 2014; Çeviş & Ceylan, 2015; Küçükaksoy & Akalın, 2017; Güney & Tunalı, 2017; Mike, 2018; Cengiz, 2018; Yurttagüler & Kutlu Horvâth, 2019; Koçak & Özbek, 2020; Ulusoy et al., 2022). Simultaneously, variables such as foreign trade, energy consumption, current account deficit, interest rates, budget deficits, and oil prices have frequently been employed to elucidate determinants of exchange rates and inflation. However, it becomes evident that the focus on the Exchange Rate Pass-Through remains somewhat constrained, with a relatively narrower range of studies exploring this phenomenon.

Empirical inquiries into the Exchange Rate Pass-Through commonly lean towards the utilization of time series and panel data methodologies (Yetim & Yamak, 2019; Özata, 2019; Karahan & Gencür, 2019; Duman & Sağdıç, 2019; Yıldırım et al., 2019; Göktaş, 2019; Durgun, 2019; Kılcı, 2019; Kabundi & Mlachila, 2019; Karahan & Gencür, 2020; Alkan & Dağdır, 2020; Erdoğan, 2020; Yıldırım & Sarı, 2020; Demir & Yenipazarlı, 2020; Cheikh & Zaied, 2020; Yıldırım, 2021; Kuşkaya et al., 2021; Emek et al., 2021; Şeker, 2022; Özbek & Naimoğlu, 2022; Aytekin et al., 2022; Uysal et al., 2022; Şanlı, 2022; Camara et al., 2022; Oğul, 2022; Gereziher & Nuru, 2023; Özbek, 2023; Çakır & Kaya, 2023, Karabacak, 2023; Celkan, 2023; Geyik et al., 2022; Yanar & Berk, 2023). Within the literature, the panel Least Squares, panel Granger causality, panel first and second generation cointegration methods emerge as prominent choices for panel data analyses. Meanwhile, time series methodologies frequently involve the ARDL bounds test, Johansen cointegration, VAR analysis, Granger causality, and Toda-Yamamoto causality methods. It is discernible that the aforementioned methodologies lack provisions for structural breaks, whereas other approaches incorporate models capable of identifying sharp discontinuities. In this study, an empirical analysis employing Fourier methods is undertaken, a facet anticipated to offer a unique contribution to the existing literature in this domain.

In recent academic research, empirical techniques have been applied across diverse timeframes and regions or groups of countries to investigate the Exchange Rate Pass-Through. Valogo et al. (2023) conducted a study focusing on Ghana's economy, highlighting that the depreciation of the national currency in response to exchange rate increases leads to an increase in inflation expectations. Their investigation spanned the sample period from 2002:01 to 2018:12, employing the Threshold Autoregressive (TAR) method as the empirical approach. The empirical findings indicated that exchange rate depreciation exceeding 0.70% per month had an inflationary impact.

In the study conducted by Sheferaw & Sitotaw (2023), they explored the impact of the Exchange Rate Pass-Through on the Ethiopian economy. Their empirical approach involved employing Structural Vector Autoregression models (SVAR). Their investigation spanned from 1975 to 2020, and the outcomes of their research demonstrated that a single-unit elevation in the NER correlated with a 0.059 elevation in consumer prices. Furthermore, their study emphasized the transitory nature of the Exchange Rate Pass-Through.

Anderl & Caporale (2023) investigated the Exchange Rate Pass-Through using a Smooth Transition Regression model to assess different inflation expectation patterns across a set of nations. This group included the United Kingdom, Canada, Australia, New Zealand, and Sweden, all of which have implemented the inflation targeting framework. They also tested the USA, Eurozone, and Switzerland, which did not adopt the inflation targeting regime, using data spanning from 1993:01 to 2021:08. Their empirical findings indicated that the Exchange Rate Pass-Through exhibited different outcomes between countries that adopted the inflation targeting regime and those that did not. They concluded that the Exchange Rate Pass-Through on CPI expectations is more pronounced in countries with inflation targeting.

Aisen & Manguinhane (2021) investigated the Exchange Rate Pass-Through within Mozambique's economy, focusing on the time span of 2001-2019 and employing the ARDL bound test as their empirical approach. Their analysis revealed that approximately half of the fluctuations in exchange rates translated into price adjustments within six months.

Similarly, Teferra (2020) delved into a comparable scenario across 14 nations in Eastern and Southern Africa, employing the Nonlinear Autoregressive Distributed Lag (NARDL) technique. His findings lent support to Taylor's hypothesis, revealing that the transmission of effects was more pronounced in countries adhering to a fixed exchange rate system and experiencing high inflation, in contrast to those with a flexible exchange rate regime and lower inflation levels. Furthermore, the potency of the effect increased following minor adjustments in exchange rates.

In a similar vein, Kassi et al. (2019) scrutinized Exchange Rate Pass-Through by analyzing CPI across 40 countries in Sub-Saharan Africa (SSA) through the NARDL framework spanning from 1990Q1 to 2017Q4. Their investigation unveiled an asymmetric, incomplete, and significant ERPT phenomenon across the entire SSA region. ERPT was more pronounced in nations embracing a fixed exchange rate system, such as the CFA franc zone, and characterized by lower inflation, as opposed to those opting for a flexible exchange rate regime with higher inflation levels. Furthermore, the impact of pass-through effects was magnified following minor adjustments in exchange rates.

Nasir et al. (2020) applied the NARDL technique to the Czech Republic, which had adopted the explicit inflation targeting regime, revealing an asymmetrical impact of the real ER on CPI expectations. On a broader scale, De Mendonça & Tiberto (2017) explored the impact of the Exchange Rate Pass-Through across 114 developing economies, employing the System GMM methodology for empirical analysis. Their findings suggested that the magnitude of the Exchange Rate Pass-Through decreased in economies characterized by strong central bank credibility. Similarly, López-Villavicencio & Mignon (2017), in their examination of the Exchange Rate Pass-Through within 14 developing nations through a similar empirical method, concluded that countries embracing the inflation targeting regime experienced reduced Exchange Rate Pass-Through.

Across these studies investigating the Exchange Rate Pass-Through, it is evident that the extent of this effect varies across contexts, influenced by factors such as the analysis period, specific countries under study, and the chosen empirical methodology. In addition, it has been understood from previous studies that the regimes used by the country's economies affect the results. In this context, the study will contribute to the relevant field by making empirical predictions from the period when the explicit inflation targeting regime was used in the Türkiye economy to the present day.

METHODOLOGY

Data and model

In this section, the variables under scrutiny are introduced, and the empirical framework employed in the study is outlined. The research incorporates widely acknowledged variables commonly found in the literature, namely the CPI and the nominal exchange rate (NER), with a specific focus on their relevance to the Türkiye economy. The data for these variables spans from the first quarter of 2006 to the first quarter of 2023, sourced from the IMF database. Chart 1 belongs to the variables used in the study in the period 2006:Q1-2023:Q1. Upon analyzing both charts, it becomes evident that there is a rising pattern. Nevertheless, the particularly pronounced recent surge in the upward direction is particularly noteworthy.

Chart 1: CPI and NER charts

Consumer Price Index	Nominal Exchange Rate
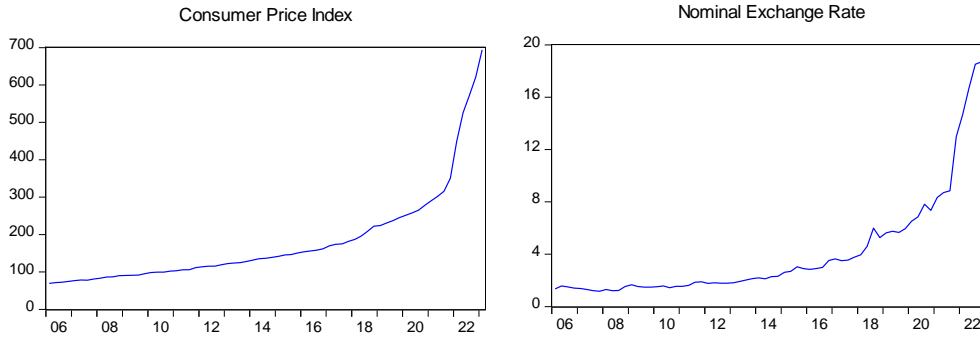
Subsequently, the study proceeds to assess the significance of their impact on the Türkiye economy through the initial model.

$$CPI_t = \beta_1 + \beta_2 NER_t + u_t \qquad (1)$$

In Model (1), CPI, standing for Consumer Price Index (All items, Index), NER, representing the Domestic Currency per U.S. Dollar at the End of the Period, and u_t, denoting the model's residual, are included. All variables in this context are transformed by taking their natural logarithms.

Table 1: Statistical Summaries of The Variables.

	Mean	Med.	Max.	Min.	Std. Dev.	Obs.
CPI	181.020	136.456	694.051	69.430	131.050	69
NER	4.280	2.281	19.163	1.171	4.444	69

Table 1 provides an overview of the descriptive statistics concerning the quarterly data for the Consumer Price Index (CPI) and exchange rates in Türkiye spanning from 2006:Q1 to 2023:Q1.

Upon examining the descriptive statistics for CPI, it is observed that the average CPI value stands at 181,020. The minimum CPI value of 69,430 and the maximum value of 694,051 highlight substantial fluctuations in inflation around the mean. The standard deviation, which measures the extent of these deviations from the mean, is notably high at 131,050.

In contrast, the average exchange rate is recorded at 4.280. Notably, the minimum and maximum values of the exchange rate exhibit considerable dispersion. As a result, it can be inferred that the exchange rate displays significant volatility around the mean. This is further affirmed by the substantial standard deviation of 4.444.

Analysis method of the study

In this section of the research, Fourier-based unit root tests and Fourier cointegration analyses will be conducted. Additionally, long-term and short-term cointegration coefficients will be estimated by incorporating Fourier functions.

Unit root test

According to Becker et al. (2006), the Fourier KPSS unit root test not only considers abrupt shocks but also takes into account gradual changes by assessing whether shocks will unexpectedly emerge or vanish. To achieve this, the following equation is employed.

$$y_t = X'_t\beta + Z'_t + r_t + \varepsilon_t$$

$$r_t = r_{t-1} + u_t$$

In this context, ε_t represents the error term free from a unit root, and u_t u is unrelated to variance but shares a similar distribution. $Z_t = \left[\sin\left(\frac{2\pi kt}{T}\right), \cos(\frac{2\pi kt}{T})\right]$ is a vector comprising trigonometric functions. In this equation, 't' trend, 'T' time dimension, and 'k' frequency value. The levels of test statistics needed for the analysis of stationarity are derived as follows for stationarity assessment.

$$y_t = a_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos(\frac{2\pi kt}{T}) + e_t$$

Trend stationarity models are executed in the following manner, leading to the acquisition of error terms and the subsequent testing of hypotheses in this fashion.

$$y_t = a_0 + \beta_t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos(\frac{2\pi kt}{T}) + e_t$$

The test statistic is calculated as follows.

$$\tau_\mu(k) = \frac{1}{T^2} \frac{\sum_{t=1}^{T} \check{S}_t(k)^2}{\check{\sigma}^2}$$

Where, it is expressed as $\check{S}_t(k) = \sum_{t=1}^{T} \check{e}_j$. If the data generation process does not exhibit nonlinear trends, the conventional KPSS unit root analysis is the recommended approach. Hence, Becker et al. (2006) suggested employing the F test to establish the fundamental hypothesis of the absence of a linear trend, as follows.

$$F_i(k) = \frac{(SSR_0 - SSR_1)/2}{SSR_1/(T - q)}$$

Where, SSR_0 and SSR_1 represent the sum of squared residuals, and 'q' represents the independent variable. The F test's significance also indicates the importance of the trigonometric function variables incorporated into the model. Consequently, based on the F test results, if the fundamental hypothesis cannot be rejected, KPSS will generate the test statistics, and an interpretation will follow.

In the study where the relationship between exchange rates and inflation in Türkiye was investigated, firstly unit root test was performed for the variables. The significance of the trigonometric variables will serve as the basis for selecting between the Fourier KPSS and the standard KPSS unit root test. This decision will be informed by the F test statistic. If the critical values are surpassed by the F test statistic, the Fourier KPSS unit root test will be opted for; conversely, if it falls below these values, the standard KPSS unit root test will be employed.

The outcomes of both the Fourier KPSS and KPSS unit root tests for the CPI and NER are presented in Table 2.

Table 2: Unit Root Test Results

Variable	F-Testi	FKPSS	Frequency	MİNSSR	Bandwith	KPSS
CPI	1.586	0.473	1	2.104	6	1.054
NER	1.304	0.455	1	3.274	6	1.019
ΔCPI	3.066	0.308	1	0.014	4	0.596*
ΔNER	1.600	0.131	1	0.089	0	0.624*

Note: The F test's critical values are as follows: 1% = 6.730, 5% = 4.929, and 10% = 4.133. For the Fourier KPSS test, the critical values are 1% = 0.2709, 5% = 0.1696, and 10% = 0.2709. As for the KPSS test, the critical values are 1% = 0.739, 5% = 0.463%, and 10% = 0.347.

Upon a thorough examination of Table 2, the outcomes of the standard KPSS (Kwiatkowski-Phillips-Schmidt-Shin) test are proceeded to be interpreted. This interpretation arises from the observation that the F test statistic falls below the critical values, indicating a lack of significance in the trigonometric functions. As per the results of the standard KPSS test, both the inflation and exchange rate series are identified to possess a unit root. This determination is based on the fact that their test statistics at the level values exceed the critical values.

Given this finding, a unit root test was conducted for both variables in the model, confirming the presence of unit roots in their level values. Consequently, the decision was made to take the difference of both variables. Notably, since significant results were not yielded by the F test for either variable, the interpretation of the standard KPSS test results was relied upon. According to these results, both variables demonstrated stationarity. Therefore, the integrated degree for both the CPI and the NER variable was established as I(1).

Cointegration test

In their developed cointegration test, Tsong et al. (2016) incorporated Fourier functions and conducted an analysis that revealed the existence of a cointegrating relationship in the primary hypothesis, setting it apart from other

cointegration tests. Tsong et al. (2016) conducted their analysis on the model as outlined below in their Fourier cointegration test.

$$y_t = d_t + x_t'\beta + \mu_t$$

In this context, where $\mu_t = y_t + u_{1t}$, $y_t = y_{t-1} + v_t$, and $x_t = x_{t-1} + u_{2t}$. both v_t and y_t have zero mean. However, it's important to note that y_t follows a random walk process, while both y_t and x_t exhibit stationarity when considering their first differences. If d_t is introduced as part of the fixed model, the following model is represented as follows:

$$d_t = \delta_0 + f_t$$

However, the following model is used for the fixed and trend model.

$$d_t = \delta_0 + \delta_1 t + f_t$$

In this case, the function f_t is defined as a Fourier function comprising trigonometric expressions in the following manner.

$$f_t = a_k + \sin\left(\frac{2\pi kt}{T}\right) + \beta_k \cos(\frac{2\pi kt}{T})$$

In this context, 'k' represents the frequency, 't' corresponds to the trend, and 'T' denotes the time dimension. If, through the F test, it is determined that the trigonometric functions here hold significance, the interpretation will be based on the Fourier SHIN test. Conversely, if the trigonometric functions are not deemed significant, the SHIN cointegration test will be employed for interpretation.

After applying first-order differencing to the series, our objective is to explore the potential relationship between CPI and the NER. To achieve this, both the Fourier SHIN and SHIN cointegration tests were conducted, and their outcomes are detailed in Table 3. In these tests, the initial assessment hinges on the statistical values derived from the F test, which evaluates the significance of sinus and cosinus. If the critical values are exceeded by the F test statistic, the interpretation of the Fourier SHIN results will be proceeded with; conversely, if it does not, the SHIN values will be relied upon for the interpretation process.

Table 3: Cointegration Test Results

F-Testi	Fourier SHIN	Frekans	MİN SSR	Fourier Bandwidth	Standart SHIN	Standart Bandwidth
77.688***	0.041	1	0.013	1	0.258	5

Note: The critical-values for the Fourier F test: 1% = 5.774, 5% = 4.066, and 10% = 3.352. For the Fourier SHIN test, the critical values are 1% = 0.095, 5% = 0.124, and 10% = 0.198. As for the SHIN test, the critical values are 1% = 0.553, 5% = 0.314, and 10% = 0.231.

Upon scrutinizing the table, the interpretation of the Fourier SHIN results will be undertaken due to the significant outcome of the F test. As per the test results, the primary hypothesis cannot be dismissed at a 1% level, indicating the existence of a relationship.

Estimation of cointegration coefficients

The confirmation of cointegration results signifies the presence of an established relationship among the variables, necessitating the computation of long-term coefficients. In pursuit of this objective, the estimation of these long-term coefficients will be proceeded with using a combination of econometric techniques. Specifically, the Fully Modified-Ordinary-Least-Squares (FMOLS) technique, initially proposed by Phillips & Hansen (1990), will be employed. This method is chosen to address potential issues related to endogeneity in our analysis.

Furthermore, to address concerns related to interdependencies and autocorrelation among explanatory variables and residuals, the Dynamic-Ordinary-Least-Squares (DOLS) method, developed by Stock & Watson (1993), will be incorporated.

Conversely, the Canonical-Cointegrating-Regressions (CCR) estimator, introduced by Park (1992), will also be considered. This estimator effectively addresses the challenges of endogeneity that may arise from long-term correlations in our model.

In summary, given the presence of a cointegration relationship within the model, a combination of FMOLS, DOLS, and CCR methods has been employed to estimate both long-term and short-term coefficients. The detailed outcomes of these estimations are presented in Table 4.

Table 4: Long-Short Term Coefficient Estimation Results

CPI	FMOLS		DOLS		CCR	
	Long run	Short run	Long run	Short run	Long run	Short run
NER	0.802***		0.797***		0.806***	
SIN	0.049***		0.042***		0.050***	
COS	-0.037***		-0.038***		-0.037***	
C	1.801***		1.808***		1.799***	
ECT		-0.250***		-0.249***		-0.187*
ΔNER		0.204***		0.164**		0.362***
SIN		-0.004		-0.004		-0.002
COS		0.009***		0.008**		0.008**
C		0.011***		0.012***		0.009***

Note: *(10%), **(5%) and ***(1%) are levels of significance.

After conducting a thorough analysis of Table 4, it becomes evident that estimations are accessible for both enduring and immediate coefficients regarding the influence of the NER on CPI. Remarkably, there is a notable level of consistency, both in terms of the numerical values and the directional signs of these coefficients. This consistency is observed across various methodologies, specifically FMOLS, DOLS, and CCR, which were employed to investigate this effect.

In the context of the FMOLS outcomes, it is discernible that the ER exerts a favorable impact on inflation over the specified timeframe. Expressing this influence

in coefficient terms, a 1% augmentation in the exchange rate corresponds to an almost 0.8% inflation increment. Furthermore, the coefficient associated with the Error Correction Term (ECT) in the FMOLS analysis falls within the range of -1 to 0. The statistical significance of this coefficient strengthens the assertion of a persistent relationship between the variables. Significantly, these results signify that the exchange rate affects inflation positively, not only in the near term but also over an extended duration.

Conversely, when scrutinizing the findings derived from the DOLS and CCR methodologies, they consistently reveal that an elevation in the exchange rate results in an upswing in inflation. In quantitative terms, a 1% rise in the exchange rate is associated with an approximately 0.80% to 0.81% inflation surge over the long haul. Additionally, the Error Correction Term (ECT) coefficients for both DOLS and CCR analyses fall within the range of -0.249 to -0.187, which further solidifies the evidence of a cointegration relationship. It is worth highlighting that these findings underscore the NER's favorable influence on CPI, not only in the extended term but also in the immediate term.

CONCLUSION AND RECOMMENDATIONS

The trajectory of exchange rates in open economies holds immense significance due to its far-reaching impact on various economic and societal variables. One prominent aspect of this influence is the interaction between the exchange rate and inflation, commonly known as the "Exchange Rate Pass-Through." This research investigates the dynamics of ER and CPI, using data spanning from the first quarter of 2006 to the first quarter of 2023. Initially, stationarity is assessed using both Fourier KPSS and standard KPSS Fourier tests, revealing that the variables exhibit an integrated order of I(1).

Subsequently, Fourier SHIN and standard SHIN tests are employed to determine whether the variables evolve together over the specified period, leading to the identification of a cointegration relationship. Further analysis involves the application of DOLS, FMOLS, and CCR tests to estimate long-term and short-term coefficients. The empirical results underscore the significant Exchange Rate Pass-Through, with all three estimators concurring that a 1% increase in the ER corresponds to a substantial inflationary increase ranging from +0.80% to +0.81%.

Furthermore, the statistically significant Error Correction Term(ECT) coefficients, falling within the range of -0.186 to -0.251 across all three estimators, confirm the existence of a relationship (long-term). This outcome highlights the substantial impact of ER fluctuations on the inflation rate within the Türkiye economy. Given Türkiye's production structure, which heavily relies on foreign currency, the importance of maintaining a stable exchange rate becomes evident. These findings emphasize the necessity of not only ensuring exchange rate stability but also expanding foreign exchange earning activities.

Given the findings, there are significant recommendations for Türkiye policymakers concerning the economy. Firstly, the Central Bank of Türkiye and other relevant institutions should enhance their analytical and mathematical capabilities to improve their ability to predict future exchange rate movements. This improved forecasting can enable policymakers to better prepare for fluctuations in exchange rates. The Central Bank should also consider intervening when necessary to mitigate and control exchange rate fluctuations, which can be an effective means of regulating the relationship between exchange rates and inflation. Moreover, it is advisable to offer training to both exporting and importing companies on strategies for guarding against exchange rate fluctuations. This can assist businesses in managing exchange rate risks and minimizing price hikes. To maintain macroeconomic stability and ensure balanced inflation, it is essential to effectively implement economic policies and uphold fiscal discipline. Lastly, the development of social assistance and support policies for low-income individuals and groups can help mitigate the adverse impacts of exchange rate increases on inflation, thereby alleviating the economic challenges caused by inflation. Finally, it is of great importance to restore confidence in the targets in the fight against inflation in order to prevent the inflation, exchange rate and expectation spiral from getting stronger.

Future studies will extend this analysis to assess the Exchange Rate Pass-Through in a panel dataset encompassing countries with similar economic structures to Türkiye, contributing to the existing body of literature in this field.

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