# The Situation of Inflation Hysteresis in Türkiye: Analysis with Traditional, Fourier and Fractional Frequency Fourier Tests

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## Türkiye'de Enflasyon Histerisinin Durumu: Geleneksel, Fourier ve Kesirli Frekans Fourier Testleri ile Analiz

### Abstract

This study investigates the impact of exchange rate shocks on pricing and whether the values normalise after the shock ends. Accordingly, the study tests the existence of inflation hysteresis. Goods and services sector inflation figures are used in the evaluation, and the data for the Turkish sample between February 2003 and December 2022 are analysed. The data are analysed by subjecting them to Traditional Fourier and Fractional Frequency Fourier tests. The methods used in the study minimise the margin of error as they include sine and cosine values as well as structural breaks in the analysis and are considered to be one of the most up-to-date analysis methods. According to the study's findings, the increase in inflation rates in Türkiye does not show a permanent feature after appropriate policy adjustments.

**Keywords** : Goods Inflation, Services Inflation, Hysteresis, Fourier.

**JEL Classification Codes** : E30, E31.

### Öz

Çalışmada, döviz kuru şoklarının fiyatlar üzerindeki etkisi ve şok sonrasında fiyatların şok öncesine göre sahip olduğu düzey incelenmektedir. Bu doğrultuda, çalışmada enflasyon histerisinin varlığı test edilmektedir. Ticari mal ve hizmet sektörlerindeki enflasyon oranları çalışma dahilinde değerlendirilmiş olup, Türkiye özelinde Şubat 2003-Aralık 2002 tarihleri arası dikkate alınarak analiz gerçekleştirilmiştir. Analiz, verilerin geleneksel Fourier ve Kesirli Frekanslı Fourier testine tabi tutulması ile gerçekleştirilmiştir. Çalışmada kullanılan yöntemler, serilerin sinüs ve kosinüs değerlerinin yanı sıra yapısal kırılmaları da analize dahil ederek hata payını en aza indirmekte ve literatürdeki en güncel analiz yöntemleri arasında kabul edilmektedir. Çalışma sonucunda, uygun politik düzenlemelere gidildiği taktirde Türkiye'de enflasyon oranlarındaki artışın kalıcı bir özellik göstermeyeceği çıktısına ulaşılmıştır.

**Anahtar Sözcükler** : Ticari Mal Enflasyonu, Hizmet Enflasyonu, Histeri, Fourier.

## 1. Introduction

Macroeconomic factors significantly impact a country's economy's quantitative and qualitative development. The interpretation of a country's economic performance results from evaluating factors such as unemployment, inflation, economic growth and economic development. When assessing a country's economy, following the upward and downward movements of the macroeconomic variables' indicators and providing output by commenting on the change is important. Factors such as growth, inflation, unemployment, income distribution, and poverty frequently examined in the literature and form the basis of more than one research can be observed as basic macroeconomic difficulties in countries' economies. These economic problems can become chronic in developing countries and, therefore, have a shaping effect on the political economy of countries. Inflation, one of the chronic problems, is one of the biggest obstacles to economic growth, which involves quantitative variables, and thus development, which involves qualitative variables.

The concept of hysteresis is frequently examined in the economic literature. It aims to investigate how the variable it examines changes in the event of a shock and whether the variable returns to its previous position when the shock's effect disappears.

The concept of hysteresis, which is the primary analysis concept of the study, was first used in the literature by (Tobin, 1995) to analyse the effect of the changes in unemployment rates on the economy. In his study, Tobin (1995) stated that the concepts of inflation and unemployment, which are among the macroeconomic problems, are among the critical issues for countries and that the importance of these concepts has not changed despite the changing political structure. In the study, although it is stated that the natural rate hypothesis is not valid, it is commented that unemployment rates remain constant even if the extraordinary situation that occurs is eliminated. This situation enables the study to be stated as the first to include the concept of hysteresis since it is the definition of the concept of hysteresis. The related study (Blanchard & Summers, 1986, 1988; Brunello, 1990) can also be mentioned among the studies analysing the concept. Although the concept of hysteresis entered the literature with unemployment studies, inflation has also been examined within the framework of this concept. The integrated examination of the concept of hysteresis with macroeconomic variables aims to test whether the macroeconomic problems, economic shocks, bottlenecks, etc., can return to their previous level if the conditions are eliminated. This study tests whether the increase in inflation, especially in developing countries, returns to its previous level with the economic recovery after the political arrangements will change the view of economic arrangements and will create an impetus to take measures if necessary.

When the literature is examined, the studies in which the hysteresis effect is most frequently used have been observed in the field of unemployment, and it has been discussed how much a shock in the economy increases unemployment rates and how unemployment changes when the relevant shock situation disappears (Akcan, 2019; Önal, 2021; Telli-Üçler, 2022). The fact that unemployment rates are an important indicator of national growth and

development and that employment is the first factor to be affected by economic problems explains the more frequent examination of unemployment hysteresis.

In addition to unemployment, the effect of inflation, which provides information about the purchasing power of the country's currency and is an indicator of the competitiveness of the country under study in the international arena, is among the issues that should be examined within the framework of the concept of hysteresis. Inflation hysteresis, which is the subject of fewer studies in the literature compared to the concept of unemployment hysteresis, contributes to the economy in terms of evaluating the recoverability of inflation rates in the analysed country. Inflation is dynamic, and its impact factors can be different parameters. Policies that control inflation, which is determined by more than one parameter, may lead to wrong results if they are not chosen correctly.

To combat the adverse effects of inflation, the country's economies develop policies to ensure price stability and the appreciation of the national currency against foreign currencies. It aims to minimise or eliminate the emergence of economic crises and the problems encountered afterwards through the appreciation of the country's currency and a stable price mechanism. Most of the studies in the literature have investigated the hysteresis effect after crises and aimed to determine the extent to which post-shock stabilisation is achieved (Öztürk, 2021). Studies in the literature show that the cause of inflation in Türkiye is rising cost items. Azazi (2022) supported the conclusion in his research on the source of inflation in Türkiye. In another study, Selim and Güven (2014) revealed that inflation in Türkiye is cost-oriented and related to the exchange rate. In this regard, it is among the study results that changes in exchange rates can cause sudden changes in inflation. When examining exchange rate shocks, it can be stated that the hysteresis effect is lower, while the hysteresis effect lasts longer for the inflation variable. In this regard, it is deemed necessary to evaluate the resilient structure of inflation, focus on inflationary policies, and evaluate their results in different ways.

At this point, the aim of determining the hysteresis effect is to analyse the shock, crisis, etc., occurring in the relevant country to minimise the after-effects. The resilient nature of the hysteresis effect in inflation may lead to an increase in the negative factors that will occur in the country in the long run (Özcan, 2022; Roache, 2014).

In this respect, the study analyses the existence of inflation hysteresis by aiming to test whether the increase and decrease in inflation rates can return to their previous level when the factor causing the increase and decrease is removed. Türkiye was selected as the sample country for the analysis. The choice of Türkiye can be explained by the fact that the country is an inflationary and developing country, and therefore, inflation rates are affected by any shock, crisis, etc. The existence of inflation hysteresis is analysed in this study, and the year range is 2003-2022. While determining the existence of inflation hysteresis in the relevant year interval, new generation analysis methods are applied in addition to traditional unit root tests. Augmented Dickey-Fuller (ADF) unit root test and Fourier ADF unit root test, which is an improved version of the test and considers sine and cosine values, are

applied. The Fractional Frequency Fourier Augmented Dickey-Fuller Unit Root Test, which considers structural breaks, was also used in the study following the related tests.

The realisation is that the study aims to test the existence of hysteresis in Türkiye. If hysteresis is mentioned, it seeks to make policy recommendations that minimise the negative impact of inflation. In line with the outputs obtained, the study aims to make suggestions that will contribute to the regulations to be implemented in the field of political economy to control inflation and to positively affect variables such as economic growth, employment, unemployment, budget deficit, budget surplus, etc., which are among the macroeconomic indicators in the following processes. It is thought that this study will make a difference and contribute to the literature with its structure that minimises the margin of error of the applied methods and its timeliness, as well as other studies in the literature.

## 2. Literature Review

This section presents studies that analyse the effects of inflation hysteresis, unemployment and interest rates. Studies examining the hysteresis effect are included, and information on the scope of the relevant studies is provided. Since there are few studies on inflation hysteresis in the literature and the Fourier analysis, a new generation analysis method is inadequate, and this study is expected to contribute to the literature.

A literature review on inflation hysteresis reveals that Dibooglu & Kibritcioglu (2001) ranks first. The study is among the first to examine the field, and its results indicate that monetary shocks will cause permanent increases in inflation. Determining the existence of inflation hysteresis in the related study, in which Türkiye is selected as a sample, is also important in showing that policy arrangements in this direction are inadequate.

While studies on price stickiness and the permanence of inflation after the 2008 crisis in Türkiye focused on the permanence of inflation, Tunay (2009) examined consumer price inflation for Türkiye between 1994 and 2007 and evaluated the permanence of inflation. The study revealed a result opposite to Kibritcioglu's (2001) study, and an evaluation was made on the point that the policies implemented in the country in the relevant years yielded successful results.

The report by Roache (2014) can be described as another study providing output in the field. This report was created to compare the persistence of inflation in Brazil with the example of countries that use inflation expectations to target inflation. According to the report's findings, the persistence of inflation in Brazil increased until the beginning of 2013, primarily due to "upward" persistence, unlike many countries that implement inflation targeting. The analysis also shows that the 2013 rate hike cycle may have contributed to the persistence of the recent decline. Situations in which existing indicators are negatively affected after sudden shocks and crises and some variables cannot return to their previous state at the same pace even if market conditions improve have been discussed in terms of

different macroeconomic variables in the literature. Most studies have focused on unemployment hysteresis, closely related to inflation.

Tekin (2018) aimed to compare the natural unemployment rates and the hysteresis effect in the Turkish economy. Within the scope of the study, the author considered the period between 2005 and 2017 and carried out an examination specifically for Türkiye. The study contributed to the literature by proving the existence of unemployment hysteresis.

Öztürk (2021) revealed in his study that, taking into account structural breaks, a hysteresis effect was observed in consumer and price indices; prices showed hysterical characteristics and could not return to pre-shock levels. Although Türkiye was chosen as the sample in the study, the data obtained as of January 2003 was examined until July 2021.

Özcan (2022) aimed to explain inflation stickiness in Türkiye. In the study, traditional unit root tests and Fourier tests were performed using data from 01:2002 - 03:2022. The analysis results determined the periods in which inflation stickiness was experienced in Türkiye in the last ten years, and it was concluded that unit root tests that take into account a single structural change are not functional for Türkiye.

Çiçen (2021) aimed to analyse the unemployment hysteresis that emerged in unemployment rates during the 2008 Global Crisis regarding gender and age groups. In his study, he tried to explain the situation by applying the Fourier KPSS stationarity test, using monthly unemployment rate data between 2005 and 2014. He concluded that hysteresis effects have different binding effects in the context of gender and between age groups.

Çiçen (2020) discussed the Global Crisis period and investigated whether the crisis had a permanent effect on unemployment in Türkiye and concluded that the Global Crisis had a hysterical impact in Türkiye. Again, Çiçen (2021) aimed to examine the change in unemployment rates in Türkiye according to gender and marital status due to the 2008 global crisis, and in his study, the Fourier KPSS stationarity test was applied using monthly unemployment data for the period 2005-2014. According to the test, it has been observed that single men and married women experience unemployment hysteresis.

Azazi (2022) discussed hysteresis in Türkiye with the gender variable. In his study, the author tested the existence of the hysteresis effect by examining the data analysed from January 2005 until May 2022. The study concluded that men have more unemployment hysteresis than women.

Telli-Üçler et al. (2023) conducted a similar study, which obtained the opposite results of Azazi (2022). The difference between the two studies is that Telli-Üçler et al. (2023) analysed the gender hysteresis of young people. For this purpose, monthly data from 2014-2022 was used. According to the study results, it was determined that young women experience more unemployment hysteresis than young men.

Özen-Atabey (2024) analysed the unemployment hysteresis with more comprehensive econometric methods. According to the results of the analyses, it can be concluded that young people in some tests and men in some tests do not have unemployment hysteresis. In the econometric methods applied in the study, it was found that women have unemployment hysteresis.

Akcan (2018); Akkuş & Topuz (2019); Özen-Atabey (2023); Özen-Atabey & Karakuş (2023); Baştav (2019); Daştan (2024); Ergül (2024) and Karataş, (2024). Many studies have investigated unemployment hysteresis. However, the literature has also investigated whether variables such as money substitution and interest rate have a hysteresis effect. However, the number of these studies is quite limited.

Another interesting variable is the hysteresis effect, which has been investigated in Türkiye. Şengül (2021) focused on the interest rate hysteresis in Türkiye in his study and, referring to the period after 2016, concluded that the monetary policies implemented by the central bank caused negativities in the market, causing the hysteresis effect. As can be seen, the panic effect has emerged as one of the most critical factors to be considered in crisis economies. The rules established during and after the crisis are practices aimed at eliminating the problem of hysteresis. In this example, the use of current econometric modelling to examine the hysterical effects, especially inflation, in Türkiye, where the study will focus, makes the study important. The study is also expected to help policy solutions to the ongoing inflation crisis.

The money substitution variable is another economic variable in which the hysteresis effect is analysed. Bayat & Taş (2021) found that money substitution hysteresis was experienced using monthly data for Türkiye between 2011 and 2020.

The reviewed literature shows that the concept of hysteresis is generally investigated in relation to unemployment. Therefore, our study, which investigates inflation hysteresis, is expected to contribute to the literature.

### 3. Data and Methodology

In the third part of the study, the tests and test formulations to be applied to determine whether inflation hysteresis, which is the main subject of the study, exists in Türkiye at the relevant year interval are stated. The study analyses the data between February 2003 and December 2022 in Türkiye. The data analysed are inflation data, expressed as goods and services inflation. The choice of Türkiye in the study can be explained by the country being developing and inflationary. In this direction, it is thought that making appropriate policy recommendations in the light of the data obtained from the study will contribute to the national economy. The series to be analysed are shown in Chart 1 and Chart 2.

**Chart: 1**
**Development of Goods Inflation**
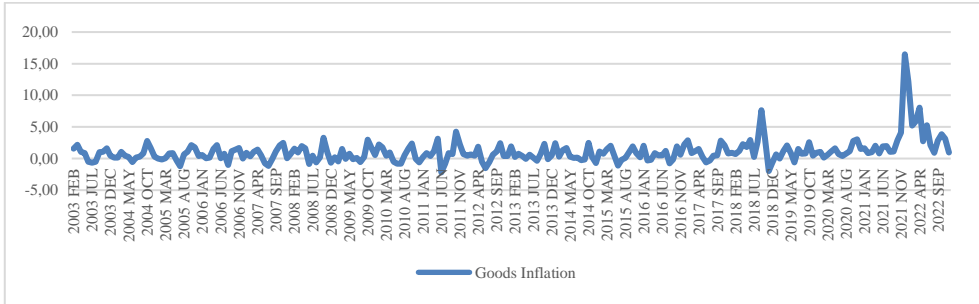
The graph above shows that Türkiye has commodity inflation that has fluctuated throughout history and stabilised. Commodity inflation data, collected monthly since 2003 after the crisis, followed an unusually dynamic and unstable course until the end of 2022. However, it is observed that there were severe and adverse breaks in the first and fourth quarters of 2018. With the measures taken in the economic arena, efforts have been made to improve the increasing instability by the end of 2022. An analysis of the graph reveals that inflation increased at a higher rate in September compared to the last 15 years. In addition to the fact that the related increase is felt in all items of the economy, the inadequacy of the political arrangements implemented explains this situation. (Eğilmez, 2018a). The dysfunctionality of the monetary policy was realised with the inflation observed in that month, and inflation rates were subsequently reduced, as seen in the graph. When the period between 2003 and 2022 is analysed, it is seen that the highest increase was met with an inflation rate of 16.48 in December 2021. It can be said that incomplete political arrangements and fluctuations in exchange rates accompany this situation.

**Chart: 2**
**Development of Services Inflation**
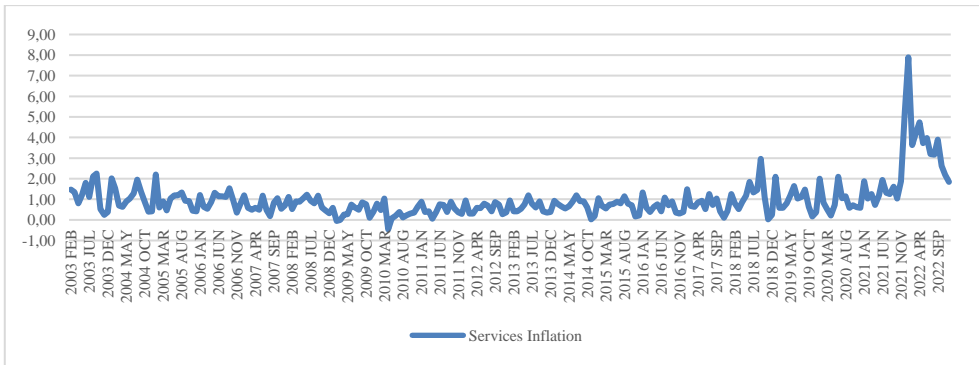
An analysis of the services inflation graph reveals that services inflation in Türkiye has fluctuated within a specific range since 2003 throughout the period analysed. Although 2018 slightly increased, the inflation rate tested its highest level with 5,27 in December 2021 and 7,89 in January 2022.

In addition to the data on commodity inflation and services inflation shown in Charts 1 and 2, Table 1 explains how these variables are named in the study, how their abbreviations will be expressed, what period they will be discussed, and from which database they were obtained.

**Table: 1**
**Variables Subjected to Analysis**

| Variable(s) | Abbreviation | Period | Source |
|---|---|---|---|
| Service Inflation | SRV | February 2003-December 2022 | TURKSTAT |
| Goods Inflation | GDS | February 2003-December 2022 | TURKSTAT |

Table 1 shows the variables utilised in the study. While SRV reflects service inflation, GDS represents goods inflation. The study's data were gathered from TURKSTAT data, and both variables span the monthly periods between February 2003 and December 2022.

**Table: 2**
**Descriptive Statistics**

| | SRV | GDS |
|---|---|---|
| Mean | 0,976318 | 1,08318 |
| Median | 0,77 | 0,79 |
| Maximum | 7,89 | 16,48 |
| Minimum | -0,46 | -2,2 |
| Std. Dev | 0,913438 | 1,840692 |
| Skewness | 3,392996 | 3,927472 |
| Kurtosis | 20,02803 | 28,66722 |
| Sum | 233,34 | 258,88 |
| Sum Sq. Dev | 198,5798 | 806,3786 |
| Observations | 239 | 239 |

Table 2 presents the statistical values defining the variables. It is seen that a total of 239 data were analysed for both variables. Descriptive statistics also show the highest and lowest values of the SRV and GDS series. As observed in Charts 1 and 2, the highest rate for services inflation is 7,89, and for goods inflation, it is 16,48.

When the studies examining the inflation hysteresis are discussed, it is seen that in addition to the Augmented Dickey-Fuller unit root test (Dickey & Fuller, 1979, 1981), Phillips-Perron (Phillips & Perron, 1988) and Zivot-Andrews (Zivot & Andrews, 1992) tests are among the applications. In the study (Öztürk, 2021), which is among these studies, the variables defining the consumer price index were subjected to analysis. The test applied is the conventional unit root test.

The existence of a relationship between the variables analysed by the unit root test is determined. Unit root tests are used to analyse the stationarity of series. Determining the stationarity of the series forms the basis for other tests and is considered necessary. Dickey-

Fuller Unit Root Test, which was first described in the literature in 1979, was applied to determine that the series are stationary, that is, they do not contain unit roots, and is the most common unit root test in the literature (Taş et al., 2017).

This study contributes to the literature by applying the Fourier ADF test, the integrated version of the traditional unit root test, and the Augmented Dickey-Fuller unit root test with the new generation Fourier analysis method. Besides the Fourier ADF test, the study also applies the Fractional Frequency Fourier ADF, an improved version of the Fourier ADF. Critical values in these tests are assessed against data from (Bozoklu et al., 2020).

The Fourier ADF test, which will be applied to test the relationship between the variables in the study, has been used in the literature with the study of Enders-Lee (2012). The method minimises the error margin by adding sinus and cosine values to the traditional ADF test formulation. Although Fourier function unit root analysis cannot predict structural breaks early, it allows for more effective analysis than traditional methods. At this point, the aim is to increase the reliability of the study's outputs with Fourier analysis among the new generation analysis methods. (Enders & Lee, 2012; İltaş & Demirgüneş, 2020; Tatar, 2021).

Following the reduction of the margin of error with the Fourier ADF test, the related formulation was developed, and the method's reliability was increased with the "Fractional Frequency Fourier Augmented Dickey-Fuller Unit Root Test". This test contributes by taking structural breaks into account.

The formula to be applied in the study is shown in Table 3.

**Table: 3**
**Equations to be Applied in the Study**

| Method | Equation |
|---|---|
| ADF | $\gamma_t = \alpha + p\gamma_{t-1} + e_t$ |
| Fourier ADF | $\Delta yt = c_0 + c_1\sin\left(\dfrac{2\pi kt}{T}\right) + c_2\cos\left(\dfrac{2\pi kt}{T}\right) + c_3 y_{t-1} + \sum\limits_{i=1}^{p} a_i \Delta y_{t-i} + e_t$ |
| Fractional Frequency Fourier ADF | $y_t^* = \alpha_0 1_t^* + \beta_0 t_t^* + \lambda_1\sin_{1,t}^* + \lambda_2\cos_{1,t}^* + u_t, \ t = 1,2,3,\dots,T$ |

The above formulae can be expressed as the standard formula of the ADF analysis method, the Fourier ADF method developed by adding sine and cosine values, and finally, the Fractional Frequency Fourier ADF method, which considers structural breaks.

**4. Findings**

The study aims to seek an answer to the question of whether the existence of inflation hysteresis is valid in Türkiye in the relevant year interval by analysing the variables of goods inflation and services inflation. As a result of the analysis, it is concluded that if inflation rates do not return to their previous level after an extraordinary situation such as a shock, there is an inflation hysteresis. There is a natural rate hypothesis if they return to their prior level.

The analysis results are expressed in Tables 4, 5, and 6. The relevant outputs in Table 4 are traditional unit root test outputs, those in Table 5 are Fourier-augmented Dickey-Fuller outputs, and those in Table 6 are Fractional. Thus, the analysis results can be expressed as Frequency Fourier-augmented Dickey-Fuller Unit Root Test outputs.

**Table: 4**
**Augmented Dickey-Fuller Unit Root Test Results**

| Variables | GDS | SRV |
|---|---|---|
| Trend and Constant Term Model | | |
| 1% Critical Value | -3,99918 | -3,99708 |
| %5 Critical Value | -3,42983 | -3,42882 |
| %10 Critical Value | -3,13845 | -3,13785 |
| Test Statistics Value | -2,42498 | -8,76111 |
| Prob. | 0,3656 | 0,000 |

Table 4 analyses inflation hysteresis in the goods and services sector according to the traditional Augmented Dickey-Fuller unit root test. According to the study results, while there is no inflation hysteresis in the service, it is seen that there is inflation hysteresis in the goods. The relevant evaluation is carried out according to the probability values calculated as a result of the analysis. When interpreting the unit root test result, $H_0$ indicates a unit root in the series, which is non-stationary, while the $H_1$ hypothesis suggests that the series does not contain a unit root and is stationary. When evaluated in this direction, the probability value of the goods inflation variable is greater than the constraint value of 0.3656. The probability value of the services inflation series is smaller than the constraint value. This confirms the existence of goods inflation.

**Table: 5**
**Fourier Augmented Dickey-Fuller Unit Root Test Results**

| Variables | GDS | SRV |
|---|---|---|
| Trend and Constant Term Model | | |
| 1% Critical Value | 4,35 | -4,35 |
| %5 Critical Value | -3,76 | -3,76 |
| %10 Critical Value | -3,46 | -3,46 |
| Test Statistics Value | -5,2077*** | -3,9678** |

Fourier analysis results were obtained by including sinus and cosine values in the equation and testing the variables in the analysis performed with the ADF test. The evaluation is done by analysing the relationship between test statistic and critical values. Thus, if the test statistic value is more significant than the necessary values, it is concluded that the series does not contain a unit root and is stationary. While the values show that the series is stationary at all critical values for goods inflation, the corresponding result for services inflation is stationary at 5% and 10%. Fourier ADF test results show that, unlike the traditional test, there is no inflation hysteresis in the goods and services sectors.

**Table: 6**
**Fractional Frequency Fourier Augmented Dickey-Fuller Unit Root Test Results**

| Variables | GDS | SRV |
|---|---|---|
| Trend and Constant Term Model | | |
| k | 0,1 | 0,1 |
| Min. KKT | 515,6791 | 85,93882 |
| F Test Statistics | 6,766004 | 11,04002 |
| Appropriate Delay | 6 | 14 |
| %1 Critical Value | -4,76837 | -4,76837 |
| %5 Critical Value | -4,21683 | -4,21683 |
| %10 Critical Value | -3,93332 | -3,93332 |
| Test Statistics Value | -5,67058*** | -4,87993*** |

Table 6 shows the Fractional Frequency Fourier ADF unit root test results, a more advanced version of the Fourier ADF test. When the results are evaluated by comparing the test statistic value and the significance level values of 1,5 and 10 %, the statistic values are more significant than the significance levels. The observed results indicate that the series are stationary and do not contain unit roots. The results of this test are parallel to the results of the Fourier ADF test. According to the analysis results, there is no inflation hysteresis in the goods or service sectors.

The study simultaneously used traditional and Fourier tests, which are improved versions of traditional tests. The reason for this is that while the traditional tests do not consider the sine and cosine values, the Fourier test can eliminate the margin of error of the traditional test with new generation methods. In addition to the Fourier ADF test, applying the Fractional Frequency Fourier ADF test, which considers structural breaks, increases the reliability of the findings obtained in the study. In the conclusion section of the study, the findings obtained will be interpreted, and policy recommendations will be made.

**5. Conclusion**

Turkish economy is a developing country that struggles with two main macroeconomic problems. These problems are unemployment and inflation. Unemployment and inflation show the ability of the citizens of that country to earn income and provide information about purchasing power. In countries with high unemployment rates, employment problems are observed, and current unemployment is an obstacle for people to meet their needs. The decline in labour force participation negatively affects the labour input in production processes and creates a handicap for economic growth. The importance of economic growth in terms of increasing the competitiveness of countries has led to the concepts of unemployment and inflation being among the issues studied both academically and politically. Inflation is analysed in terms of its effect on the purchasing power of the country's citizens. The increase in inflation rates causes depreciation of the country's currency, increases income inequality, increases import costs and negatively affects investments.

When academic studies are analysed, it is seen that there is more than one study examining macroeconomic variables. In addition to the studies examining the importance of inflation and unemployment variables, which are among the macroeconomic variables, some

studies examine the impact of these changes on the economy by following the increases and decreases in the relevant variables. At this point, the concept of hysteresis is assessed by monitoring the change of the variable subjected to analysis in the sampled country over a certain period. The evaluation determines the change in the rate of variables, such as unemployment, inflation, etc., observed in the country under scrutiny following an extraordinary situation and the ability of this change to return to its previous level when the state of emergency is lifted. At this point, two concepts appear in the literature. These concepts are categorised as "natural rate hypothesis" and "hysteresis". While the natural rate hypothesis states that the rates of macroeconomic variables that change following a shock, etc., in the relevant economy return to their previous levels in the natural order if the current situation disappears, the concept of hysteresis argues that the rates do not return to their previous levels and cause permanent damage to the economy. The importance of both situations for the economy cannot be denied, and political planning should be done by determining which concept Türkiye is close to and considering the possibility of any situation in this direction under the concept of prudence in the economy. In economies where there is no inflation hysteresis, or the hysteresis effect is low, it can be concluded that the monetary policies implemented are successful, whereas in the opposite case, it should be stated that it is necessary to review the policy arrangements.

Based on the stated necessity, among the studies on unemployment and inflation in the literature, studies analysing unemployment hysteresis are more common, while studies on inflation hysteresis are relatively less common. In this respect, it can be stated that there is a deficiency in the literature. In this regard, this study evaluates the inflation of goods and services in Türkiye between February 2003 and December 2022 and investigates whether there is inflation hysteresis in the country between the relevant years. Based on this purpose, the Augmented Dickey-Fuller unit root test, which is the traditional unit root test, and the Fourier Augmented Dickey-Fuller unit root test, which increases the reliability of the output by taking into account the sine and cosine values of the same test, were used in the study. As a result of the study, it was determined that there was no inflation hysteresis for either the goods sector or the service sector.

The literature provides a comprehensive output when the study is evaluated in terms of the actuality of the methods applied and the range of years examined. The study's contribution to the literature is also evident in the fact that the result obtained differs from other studies. There are studies in the literature that conclude that inflation hysteresis exists between 1980-2002 (Dibooglu & Kibritcioglu, 2004), January 2003-July 2021 (Öztürk, 2021), January 1998-December 2000 (Metin-Özcan et al., 2004). This study examines Türkiye and reveals no hysteresis effect between February 2003 and December 2022. Even when the data on the variables analysed in the study are analysed, it is observed that the rising inflation values in both goods and services series return to their previous levels in the following years. This situation can be explained by the functionality of the monetary policies implemented after the increase. When the inflation values calculated for commercial goods are analysed, it is observed that the increase, which reached 7.62 in September 2018, declined in October and recovered to a level lower than its previous level in November under

the natural rate hypothesis. The highest rate for the related inflation item tested was 16.48 in December 2021, dropped to 12.22 in January 2022, and regained its previous level in February. This is attributed to the success of the monetary policy implemented following the increase in inflation. When the research was carried out, among the reasons for the September inflation jump observed in 2018, showed that the exchange rates for the dollar and the euro, which were 4.61 and 5.37 for the dollar and the euro, respectively in July, rose to 6.63 and 7.71 in September, and the subsequent recovery in exchange rates can be attributed to the exchange rates falling back to the old level. Among the factors other than exchange rate changes, the decline in oil prices, tax cuts and changes in domestic demand (Eğilmez, 2018b) should be mentioned among the reasons. Similar factors are observed when the December 2021 inflation increase and the decline in the following months are analysed. When the data on the services inflation variable are analysed, it is determined that there were decreases in inflation in the same period, and the reasons are evaluated in the same way as in goods inflation.

In this respect, it can be stated that there is no inflation hysteresis in Türkiye in the analysed year interval, and the reasons for the absence of hysteresis are exchange rates, oil prices and tax rates, respectively. Accordingly, determining appropriate monetary policies to control the inflation increases observed following an extraordinary situation such as a shock and returning it to its previous level in a short time, and strengthening the forecasts on exchange rates by accurately observing the political economy conjuncture will lead to a healthy response to a possible inflationary change. Examples of measures that can be taken in this direction include tax cuts for citizens by reducing taxes on essential consumption goods and for producers by reducing taxes on production, stabilising exchange rates by intervening in increases and decrease with appropriate monetary policies, minimising the impact of fluctuations in oil prices by turning to alternative energy sources, or making appropriate arrangements to reduce inflation by regulating fuel prices. The study is thought to guide future studies with both the outputs obtained and policy recommendations.

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