Research Article / *Araştırma Makalesi*

NOT REGULAR INFLATION, BUT GREEDFLATION: CASE OF TÜRKİYE

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ABSTRACT

Inflation can occur in many different ways and for many different reasons. In addition to the traditional types of inflation caused by supply, demand, expectations and monetary policy, new types of inflation have recently been mentioned in the literature. The subject of this study is greedflation, which is defined as firms raising prices in pursuit of higher profits. Greedflation is a concept that refers to the situation in which firms, especially in a high-inflation environment, exploit the deterioration in consumers' price perceptions and raise prices well above cost increases, thereby increasing both their profitability and inflation. This study econometrically analyzes whether the concept of greedflation is valid in Türkiye. The study uses inflation, exchange rate, M1 money supply and operating surplus data for the period 2005Q4-2023Q4 and employs unit root with structural breaks and regression estimation methods with structural breaks. In addition, the causality relationship between the variables is tested using the Granger causality test. According to the findings, it is concluded that the high inflation experienced in Türkiye in recent years is largely due to greedflation. In addition, exchange rate and M1 money supply are also found to be influential on inflation.

Keywords: *Greedflation, Profit Inflation, Time Series, Structural Break Regression*

JEL Classification Codes: *E31, C32*

SIRADAN ENFLASYON DEĞİL, GREEDFLASYON: TÜRKİYE ÖRNEĞİ

ÖZET

Enflasyon pek çok farklı şekilde ve farklı sebeple ortaya çıkabilmektedir. Arz, talep, beklentiler ve para politikası gibi sebeplerden kaynaklanan geleneksel enflasyon çeşitlerine ilave olarak, son zamanlarda bahsedilen yeni enflasyon çeşitleri de literatürde yer almaktadır. Bu çalışmanın konusu firmaların yüksek kar hırsıyla fiyatları yükseltmesi olarak tanımlanan greedflation (greedflasyon, hırsflasyon)'dur. Greedflasyon, özellikle yüksek enflasyon ortamında şirketlerin tüketicilerin fiyat algılarındaki bozulmayı istismar ederek fiyatları maliyet artışlarının çok üzerinde artırmaları ve böylece hem karlılıklarını hem de enflasyonu artırmaları durumunu ifade eden bir kavramdır. Bu çalışma, Türkiye'de greedflasyon kavramının geçerli olup olmadığını ekonometrik olarak analiz etmektedir. Çalışmada 2005Q4-2023Q4 dönemine ait enflasyon, döviz kuru, M1 para arzı ve faaliyet artığı verileri kullanılarak yapısal kırılmalı

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birim kök ve yapısal kırılmalı regresyon tahmin yöntemleri kullanılmıştır. Ayrıca değişkenler arasındaki nedensellik ilişkisi Granger testi ile test edilmiştir. Elde edilen bulgulara göre, Türkiye'de son yıllarda yaşanan yüksek enflasyonun büyük ölçüde greedflasyondan kaynaklandığı sonucuna ulaşılmıştır. Ayrıca döviz kurunun ve M1 para arzının da enflasyon üzerindeki etkili olduğu görülmüştür.

***Anahtar Kelimeler:** Greedflasyon, Kar Enflasyonu, Zaman Serisi, Yapısal Kırılmalı Regresyon*

***JEL Sınıflandırması:** E31, C32*

1. Introduction

Inflation was declared "Public Enemy No. 1" by former U.S. President Gerald Ford in 1974 (Oner, 2022), a statement repeated by former Turkish President Süleyman Demirel in 1991[1]. That's why the primary objective of central banks around the world is to try to keep inflation under control through various policy instruments, mostly by inflation targeting. Once inflation is out of control, it requires great efforts to bring it back under control, to reduce it and to suppress it to its previous levels (Bianchi et al., 2020, 27). Moreover, these great efforts and the necessary struggle take years, and society usually pays the price (da Silva Filho, 2002, 26). The fiscal and monetary policies necessary to control rising inflation have direct consequences for the welfare of the population, especially wage earners. This is why the presidents of developed countries like the U.S. and developing countries like Türkiye agree that inflation is "Public Enemy No. 1".

High inflation, which can sometimes become a major problem for both developed and developing countries, can arise for many reasons. Price increases, which are mainly caused by an increase in aggregate demand or a shortage of aggregate supply, can be stopped before they become a major social problem by implementing the necessary monetary and fiscal policies in the right way and at the right time. As a matter of fact, in order to contain the demand-driven inflation that started in the post-COVID-19 pandemic period, the FED intervened quickly and correctly and raised interest rates. The interest rate, which was 0.5% in March 2022, was slowly raised to 5.5% within six quarters, while inflation, which was 9% at the beginning, fell to 3.2%[2]. Graph 1 presents the interest rate (orange line) and inflation (blue line) data for the period after 2020 in the U.S. In the graph, the left axis shows the interest rate and the right axis represents the inflation rate.

The interest rate instrument is one of the most important and effective weapons of central banks in the fight against inflation. However, for this weapon to be effective, it should be used at the right time and in the right way., It is widely accepted in the mainstream economics literature that interest rates should be used as the primary intervention tool when, regardless of the reason, inflation starts to rise (Fix, 2023, 1). Acting contrary to this widespread view may cause inflation to rise. As a matter of fact, in Türkiye, the interest rate instrument was not used at a time when it could have prevented inflation; on the contrary, it was reduced when it should have been increased, as suggested by the mainstream economics literature. Graph 2 presents

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1   https://www.youtube.com/watch?v=d2s3kitycnE (Access: 19.04.2024)

2   https://fortune.com/recommends/banking/fed-rate-change-history-forecast (Access: 19.04.2024)

interest rate (orange line) and inflation (blue line) data for the period after 2020 in Türkiye, with the left axis showing interest rates and the right axis showing inflation.

Graph 1: Interest Rate and Inflation in the US
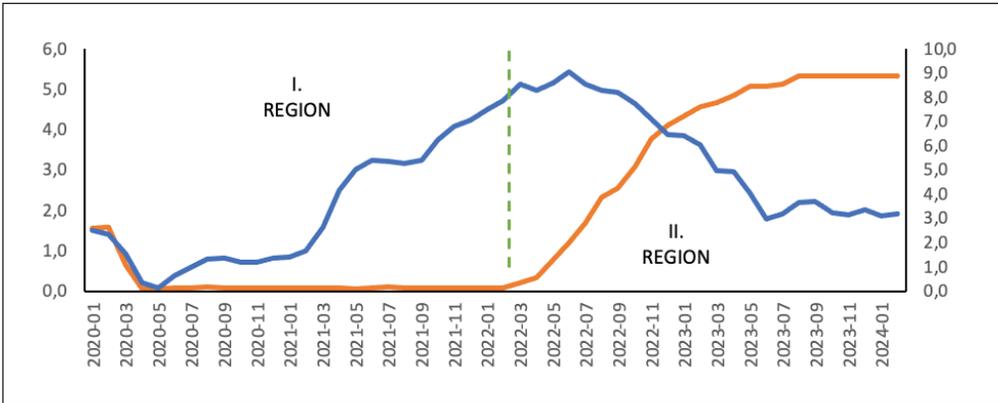
Note: The graph clearly shows the difference between Region I, where interest rates were kept constant by the Fed and inflation rose, and Region II, where interest rates were raised and inflation started to fall. **Source**: Inflation data are from OECD, interest rate data are from FRED.

**Graph 2: Interest and Inflation in Türkiye**
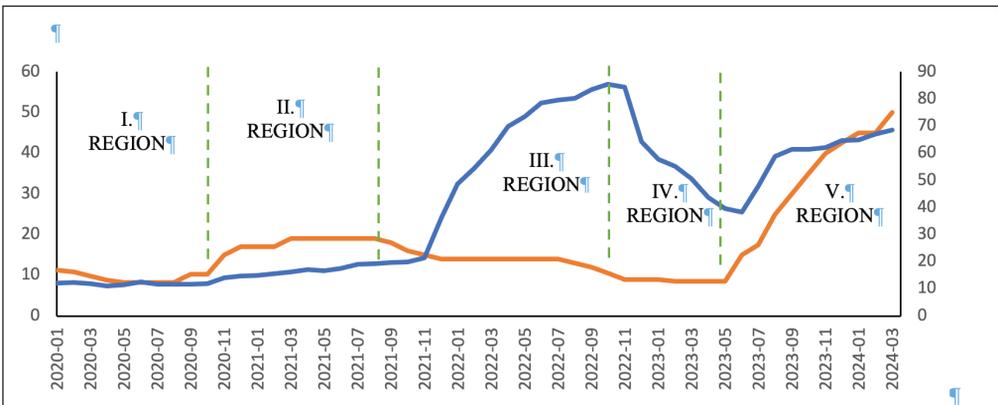
Note: The graph clearly shows that the CBRT's interest rate cuts and the excessive rise in inflation in Region III, the decline in inflation due to the base effect in Region IV, and the late interest rate hikes that failed to have the desired effect on inflation in Region V. **Source**: All data are from the CBRT.

Inflation may have various causes and consequences. Accurately identifying these causes and consequences is of primary importance in mapping the course of the fight against inflation. For example, in periods of inflation caused by a demand boom, tightening policies to reduce demand would be appropriate, while in periods of inflation caused by a supply shortage, policies to increase supply would be appropriate to control inflation. Expectation-driven infla-

tion, on the other hand, can be defeated with an environment of confidence that will reverse expectations. Inflation has not only economic but also social and moral consequences. One of the most important social effects of inflation is its destabilizing effect on social peace. The fight for income sharing between social segments will become inevitable. Because of diminishing income due to high inflation, family relations become tense, and solidarity decreases. Unemployment becomes widespread. In addition to these, it causes negativities such as swindle, marginality, distancing from work ethics and rebellion against taxes (Meral, 2005, 314).

Especially in cases where inflation rises too high and governments and central banks are late in taking measures, inflation may get out of control and bring other problems with it. One of these problems is the distortion of consumers' perception of prices. High inflation can blur the consumer's knowledge and perception of prices, leading them to make wrong decisions in their consumption behaviors (Shamir, 1985, 383). This distortion of consumers' price perception is exploited by producers and leads to different types of inflation, namely shrinkflation, skimpflation and greedflation. Shrinkflation refers to the case that firms do not change the price of final products, but rather increase the price per unit by reducing the volume or quantity of goods they sell at the same price (Bennett, 2022, 2). Shrinkflation is often used by companies as a marketing tactic because it is not easily recognizable to consumers that the volume or quantity of products have been decreasing. Therefore, when inflation occurs for any reason (three main reasons can be listed: cost-push, competition and consumer behavior)[3], firms can easily prefer shrinkflation. Skimpflation, on the other hand, means that companies reduce the quality of the goods or services they sell, again without increasing prices (Evangelidis, 2024, 3). Especially in services sector, skimpflation is seen more frequently. Considering the huge share of services sector in total consumer price index (the share in US is 57% and in Germany 50.3%), the impact of skimpflation is in a place that should not be neglected. In both cases, consumers remain below their previous welfare levels, and although they pay the same price, they can access either fewer or poorer quality goods. In order to understand shrinkflation and skimpflation, Figure 1 can be seen.

Figure 1: Visualization of Shrinkflation and Skimpflation
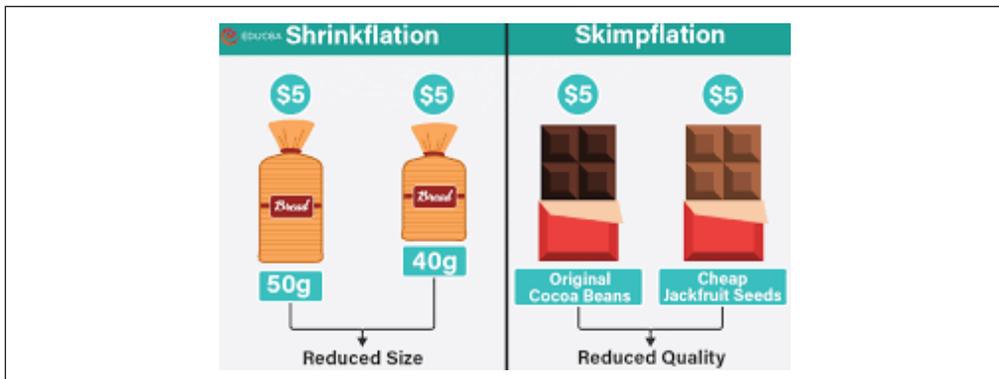
Source: Uçar, F. (2020). Mahfi Eğilmez: Türkiye Skimpflasyon ve Shrinkflasyon Dönemine Girdi, Bu Ne Demek? https://coin-turk.com/mahfi-egilmez-turkiye-skimpflasyon-ve-shrinkflasyon-donemine-girdi-bu-ne-demek

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3 For more information, see Yergin et al. (2024)

Shrinkflation and Skimpflation leads to a welfare transfer from consumers to producers, but the factor that distorts the distribution of income more during periods of high inflation is the so-called greedflation, which refers to the situation in which firms raise prices in a disproportionate and greedy manner due to consumers' distorted price perception.

Greedflation is a type of inflation that is variously referred to as profit inflation, greed inflation, cost-push inflation or profit-led inflation. Greedflation is when companies increase their profits above the rate of inflation by raising prices much higher than cost increases, and these higher prices lead to higher and longer-lasting inflation. Greedflation is a more dangerous form of inflation than shrinkflation and skimpflation because it results in higher and more persistent inflation. Firms, in their greed for more profits by exploiting consumers' distorted price perception and blurred price information, increase prices above the current inflation rate, thus creating a profit-inflation spiral (Dekimpe & van Heerde; 2023: 332).

Greedflation may also occur because of oligopolistic structure with the inherent characteristics of limited competition, barriers to entry, price rigidity and strategic behavior of the market members allowing them to obtain and maintain high profits. This is the notion of greedflation that given an initial rise in inflation the low competition in an industry/ sector of the economy leads its firms to create excessive profits (Agiomirgianakis et al, 2024: 428).

As a result of the intertemporal consumption preference shift that occurs in consumers during periods of high inflation, the amount to be allocated as savings will also be directed to spending (Bagus et al, 2014: 514). This means that consumers will bring forward future consumption in order to hedge against price increases, which also means an increase in demand in the current period. Thus, not only firms but also consumers will cause a form of greedflation by trying to spend in current time instead of future due to their greed to reach more goods with low prices.

In the following sections of the study, first the theoretical framework is discussed, then a summary of the existing literature is presented and then the econometric analysis process is explained. In the theoretical framework section, the relationship between the variables analyzed in the econometric analysis section, the theoretical expectations and the justifications of these expectations are revealed as well as theoretical discussion about greedflation is given. The study is important in that it deals with one of the most important topics of recent times such as greedflation. Moreover, it will make an important contribution to the literature as it examines and analyzes in depth a topic that, although important, does not have much literature on it.

2. Theoretical Framework

Two variables are taken as the main determinants of inflation in this study: exchange rate and M1 money supply. The effects of these two variables on inflation have been tested many times in the literature from many different perspectives and the relationship between these variables has become theoretically clear. In addition to the exchange rate and M1 money supply, the theoretical explanations and expectations regarding the operating surplus variable, which is the main focus of the study, are also explained in detail.

The goods consumed within the country are either domestically produced or imported from abroad. In terms of consumption goods used in the calculation of inflation (Consumer Price Index, CPI), it does not matter whether the origin of the goods is domestic or foreign.

Therefore, increases in the prices of domestic or imported goods have a direct impact on the CPI. While the prices of imported goods are directly related to the exchange rate, the prices of domestically produced goods are indirectly related to the exchange rate due to the supply chain or inputs such as oil that are globally priced in foreign currency. Therefore, increases in the exchange rate have a significant impact on the price of final goods for consumption.

The effect of exchange rates on prices is generally referred to as exchange rate pass-through (Kaya & Soybilgen, 2019: 56). The effect of exchange rate pass-through on consumer prices can be through many different channels. These channels can affect inflation directly, such as energy and goods prices, or indirectly, such as import prices, wage formation or profit markups (Ha et al., 2020: 3).

Mathematical formulations can be used to determine how and in what direction the effects will occur (Kara & Nelson, 2003: 588-589):

$$P_t = s_D \, P_t^D + s_M \, P_t^M \tag{1}$$

The relationship between CPI and the prices of domestic and imported goods can be shown with above-stated expression. Here, P_t; is CPI at quarter t, P_t^D; is the price index of consumer goods produced and sold in the domestic market and P_t^M is the price index of imported consumer goods. s_D and s_M shows the shares of domestic and imported goods, respectively and $s_D = 1 - s_M$. Adjusting quarterly equation of the CPI to be annual:

$$\pi_t = (1 \text{-} s_M) \, \pi_t^D + s_M \, \pi_t^M \tag{2}$$

Here, π_t^D can be interpreted in two different ways: $4\Delta\log P_t^D$ or $((P_t^D)/(P_{t\text{-}1}^D))^{4}\text{-}1$. Here, we can see how the concept of exchange rate pass-through is reflected in prices by considering the Law of One Price, which suggests that the price of a good will be the same in all countries if a common currency is used throughout the world (Miljkovic, 1999: 126). According to this law, changes in the exchange rate and world prices will be reflected in the country's import prices and domestic market prices of goods in the case of perfect exchange rate pass-through as follows:

$$P_t^M = P_t^W S_t = P_t^D \tag{3}$$

Here, P_t^M is world prices and S_t is nominal exchange rate. The reason why the prices of imported and domestic goods are equal in Equation 3 is that the arbitrage arising from the Law of One Price will equalize the prices of both imported and domestic goods. When the expression in Equation 3 is combined with the expression in Equation 2 with appropriate transformations:

$$\pi_t = (1 \text{-} s_M) \, \pi_t^D + s_M \, \pi_t^M = (1 \text{-} s_M)(\pi_t^W + \Delta s_t) + s_M \, (\pi_t^M + \Delta s_t) = \pi_t^M + \Delta s_t \tag{4}$$

Here, Δs_t is the quarterly nominal exchange rate converted to annual. Equation 4 implies that the increase in CPI is equal to the sum of world inflation and the nominal exchange rate. In other words, under the assumption of zero world inflation, increases in the nominal exchange rate directly increase the CPI, while decreases in the nominal exchange rate directly decrease the CPI.

In terms of money supply, the first theory to be mentioned is the Quantity Theory developed by Fisher & Brown (1911). According to this theory, the quantity of money and the general level of prices are directly proportional and this expression is shown by the following equation:

$$M * V = P * T \tag{5}$$

In the equation, M is the money supply, V is the velocity of money circulation, P is the general level of prices, T is the total number of transactions, and under the assumption that V and T remain unchanged, there is a linear relationship between the money supply and the general level of prices (Evans & Thorpe, 2013: 465). In other words, when money supply increases, the general level of prices increases and when money supply decreases, the general level of prices decreases.

Another approach that analyzes the money supply and the general level of prices is the Cash-Balance Approach proposed by Pigou (1951), which argues that money can be used as an asset (wealth) in addition to spending, instead of the Quantity Theory which is built on the assumption that money can only be spent. According to this approach, there are concepts such as future uncertainty and the cost of holding money that affect the use of money as an asset. This approach is shown as (Su et al., 2016: 706):

$$M^d \equiv M^s \equiv M = k(r^*) \, Py^f \tag{6}$$

Here, $M^d \equiv M^s$ indicates that the demand for money is equal to the supply of money, k; proportionality, r^*; equilibrium interest rate, P; is price level and y^f; is output at full employment. According to this statement, there is a direct proportionality between the money supply and the general level of prices. This direct proportion is not one-to-one as in the Quantity Theory, but proportional. According to the Cash Balance Approach, when the money supply increases, the general level of prices rises by a certain fraction of the rate of increase in the money supply and when the money supply falls, the general level of prices falls by a certain fraction of the rate of decrease in the money supply.

Another approach, which is a continuation of these two approaches, is the Friedman (1956, 1970) approach. According to these approaches, the value of k in Pigou (1951), which is claimed to represent a constant rate, should not be a constant variable but a function of all other variables that are ignored in holding money as an asset. With this idea, the following model was constructed (Su et al., 2016: 707):

$$\frac{M}{P} = f\left(Y, \omega, r_m, r_b, r_e, \frac{1}{p}\frac{dp}{dt},\right. \tag{7}$$

Here, ω is non-human wealth as a proportion of total wealth, r_m is expected nominal rate of return on money, r_b is expected nominal bond yield, r_e is expected nominal return on equities, $\frac{1}{p}\frac{dp}{dt}$; is the expected change in prices and u; represents other factors related to holding money other than these. In the long run, ω, $\frac{1}{p}\frac{dp}{dt}$ and u are stable, r_m, r_b and r_e is mainly affected by the interest rate i. Friedman (1970), after long empirical research, finalized Equation 7 as follows:

$$\frac{M}{P} = aY^b i^c \tag{8}$$

Taking the logarithm and derivative of this expression:

$$MG = PG + bYG = ciG \tag{9}$$

In this expression, G is the growth rate, MG is the rate of growth in the money supply, PG is the rate of growth in prices, i.e. inflation, YG is the growth rate of aggregate output and iG is the rate at which interest rates rise. According to this equation, inflation is always a monetary phenomenon and it is unlikely to arise if money supply growth is not greater than output growth. In other words, for an increase in the money supply to cause inflation, the increase must be greater than output growth.

The variable analyzed in terms of measuring greedflation, which is the subject of the study, is the operating surplus, that is obtained by subtracting payments to employees and taxes on production from net value added and adding subsidies. It represents the share of capital in value added. The relationship between this variable and CPI needs to be explained theoretically. For this purpose, it is first necessary to model the country's gross value added using the income approach. For non-financial corporations, this model is presented in the following equations Hornstein, 2023: 2-3):

Gross Value Added (GVA):

$$GVA = T^{net} + W + GOS \tag{10}$$

Gross Operating Surplus (GOS):

$$GOS = NOS + D \tag{11}$$

Net Value Added (NVA):

$$NVA = GVA - D \tag{12}$$

$$NVA = T^{net} + W + NOS \tag{13}$$

Net Operating Surplus (NOS):

$$NOS = I^{net} + Tra + Befora\ Tax\ Profit \tag{14}$$

Profits with IVA and CCAdj:

$$P^{gross} = T^{inc} + P \tag{15}$$

Here, T^{net}; taxes on production and imports less subsidies, W; Compensation of employees, i.e paid wage, D; Consumption of fixed capital, i.e., depreciation, I^{net}; Net interest and miscellaneous payments, Tra; business net current transfer payment, T^{inc}; Taxes on corporate income, IVA; inventory valuation adjustment and CCAdj; capital consumption adjustment. Rewriting the GVA equation:

$$Y = T + W + \Pi \tag{16}$$

Where Y represents GVA, T represents Taxes and Π represents GOS. All values in the equation are included in nominal terms.

Let y denote the quantity index of GVA which is based on the goods produced by the non-financial corporate business sector net of the intermediate goods purchased, that is, real GVA, and the price index is p=Y/y or

$$p = \frac{T}{y} + \frac{W}{y} + \frac{\Pi}{y} = \tau + w + \pi \tag{17}$$

where lower case letters denote the unit cost components of the GVA price index. The change in the price index as an income-share-weighted average of the changes in the unit cost components can be written as:

$$\frac{\Delta p}{p} = \frac{\Delta \tau}{p} \frac{\tau}{\tau} + \frac{\Delta w}{p} \frac{w}{w} + \frac{\Delta \pi}{p} \frac{\pi}{\pi} \tag{19}$$

$$\frac{\Delta p}{p} = \frac{\Delta \tau}{\tau} \frac{\tau}{p} + \frac{\Delta w}{w} \frac{w}{p} + \frac{\Delta \pi}{\pi} \frac{\pi}{p} \tag{20}$$

$$\hat{p} = \frac{\tau}{p} \hat{\tau} + \frac{w}{p} \hat{w} + \frac{\pi}{p} \hat{\pi} \tag{21}$$

$$\hat{p} = \frac{T}{Y} \hat{\tau} + \frac{W}{Y} \hat{w} + \frac{\Pi}{Y} \hat{\pi} \tag{22}$$

Where $\hat{x} = \Delta x / x$ implies the rate of change for any given variable x. This system of equations ultimately implies that changes in the price index $(\hat{p})$ are directly proportional to changes in taxes $(\hat{\tau})$, wages $(\hat{w})$ and corporate profits $(\hat{\pi})$. That is, under ceteris paribus assumption, the higher the increase in corporate profits, the higher will be the increase in the CPI when taxes and wages remain unchanged. The same statement can be made for taxes and wages.

3. Literature Review

Although it is an important topic especially in recent years, there is not a wide discussion on it in contemporary literature. Available literature is presented in this section, yet it is all limited to few studies.

Duvan (2024) analyzed whether the concept of greedflation is valid in Türkiye with the GDP deflator decomposition method for the Covid-19 pandemic period. According to the findings of the study, it is found that the highest contribution to the inflation realized in Türkiye during the pandemic period stemmed from the increase in unit profit. It is also stated in the study that the highest contribution to domestic inflation came from the manufacturing industry, transportation and commercial sectors.

Leduc et al. (2024), using industry-level data, find that profitability increased significantly between early 2021 and mid-2022 in a few key sectors such as motor vehicles and petroleum products, but there was no significant change in overall profitability. Therefore, they argue that the concept of greedflation does not apply to the US, the country they analyze.

Nikiforos et al. (2024) find that a major part of the increases in inflation can be attributed to many firms raising their price to maintain their profit margins, and by that, breaking the cyclical nature of a company's growth. This gives another perspective to "greedflation" where firms are not trying to raise their prices to accumulate more profits necessarily.

Schneider (2024) investigated what contributes to consumer price inflation by decomposition method for the value-added deflator for Austria. The period covered by the study was 2019Q1-2023Q1. After the analysis, the paper concluded that most significant contributors to inflation in 2022 was both energy and non-energy imports. Also, it was found that profits of the firms contributed to inflation in the second half of 2022.

Obiora (2023) analyzed the effects of corporate profitability on inflation in Nigeria using firm data for the period 2000-2023. Using panel data analysis methods, the study finds a strong and positive relationship between corporate profitability and inflation. The study also found that the profitability of firms operating in the agricultural sector has an impact on food inflation in Nigeria.

Krompas (2023) investigated the claims that inflation has increased in Greece due to high corporate profitability, presenting various data on supply and demand and concluded that corporate profitability is consistent with historical data, markups have generally remained stable, and therefore, there is no evidence of greedflation in Greece. In the study, it is also stated that the increase in prices is not due to the profitability of companies, but to the increase in costs.

Vinod (2022) tests the claim that corporate profitability and inflation are highly correlated, but the direction and strength of this relationship are uncertain. The study concludes that corporate profitability has led to inflation only in the last 10 quarters, but not in the previous 300 quarters. Therefore, it is stated that the greedflation phenomenon has existed in the US in recent years.

Dayı (2020) analyzed with the help of independent sample t-test whether some firms increased their sales prices in parallel with the rise in costs because of the sudden increase

in exchange rates in the July-September period of 2018 or higher than that. For this purpose, the study analyzed the balance sheet data of 10 firms traded in Borsa Istanbul and found that supermarkets updated their prices to gain more profit by taking advantage of the cost increase, thus causing inflation.

4. Econometric Analysis

In this section of the study, the econometric analysis process is carried out. For this purpose, firstly, it is shown how the analyzed period was selected and how the data set and the model were constructed in accordance with the selected period. Afterwards, the results obtained from the model established by unit root, causality and regression analysis in accordance with the time series analysis processes are explained.

4.1. Variables and Period

In the study, Consumer Price Index (CPI) as dependent variable and nominal TL-USD exchange rate, M1 money supply and net operating surplus as independent variable are used. Operating surplus is obtained by subtracting payments to employees and taxes on production from net value added and adding subsidies. It represents the share of capital in value added. The operating surplus variable is included in the analysis to represent the profits of the companies operating in the country. In the greedflation analysis, we investigate whether and how operating surplus triggers inflation and the causality between them. The period under consideration is chosen as 2005Q4 to 2023Q4, when the most comprehensive data are available. While there is no older data on the money supply variable, more recent data on the net operating surplus variable have not yet been published.

4.2. Model and Dataset

In this study, the model given in the equation below is analyzed for the existence of the greedflation phenomenon in Türkiye.

$$LnCPI = \beta_0 + \beta_1\, EXR + \beta_2\, LnM1 + \beta_3\, LnOprtSurp + \varepsilon \qquad (23)$$

LnCPI is the natural logarithm of CPI, EXR is the nominal exchange rate, LnM1 is the natural logarithm of M1 money supply and LnOprtSurp is a measure of the surplus accruing from processes of production before deducting any explicit or implicit interest charges, rent or other property incomes payable on the financial assets, land or other natural resources required to carry on the production (International Monetary Fund, 2009: 132). Among the variables in the equation, CPI, nominal exchange rate and M1 money supply data are obtained from the Central Bank of the Republic of Türkiye (CBRT), while operating surplus data are obtained from TurkStat. Before the analysis, the series are seasonally adjusted. This process was performed with the Census X-12 method. It is observed with the help of graphs that there is no seasonal effect in other variables except operating surplus. All analyses were conducted using E-views 12 and Python.

4.3. Structural Break and Unit Root Analysis

In the process of econometric analysis, the series should not contain unit roots, that is, they should be stationary. Otherwise, the results obtained will be biased and the problem of spurious regression may be encountered (Yerdelen Tatoglu, 2020: 4). For this reason, as the first element of the analysis, the stationarity of the series should be tested, that is, unit root analysis should be performed. The presence or absence of a unit root in the analyzed series affects the rest of the analysis. If there is a unit root in the series, the analysis is continued with cointegration tests in order to avoid the problem of spurious regression, while if the series are stationary, direct regression can be started. Therefore, unit root tests are of great importance.

The fact that the period considered in the analysis process of the study covers a long period of approximately 20 years has created the need to choose the methods to be used in the analysis with structural breaks. For this reason, methods that take structural breaks into account in the unit root test applied to the series were selected. Structural breaks were found both with Python and E-views. In the structural break analysis with Python, the data set is divided into two periods for each date in the 2nd and n-1st order, the variance difference in the period before and after each date is calculated and the date with the highest difference is taken as the structural break date. That is, the data set is divided into two separate periods as 1-2 and 3-n, 1-3 and 4-n, ..., 1-49 and 50-n, ... and finally 1-(n-2) and (n-1)-n and the variance differences are calculated. The structural break dates and graphs calculated with Python using this method are presented below.

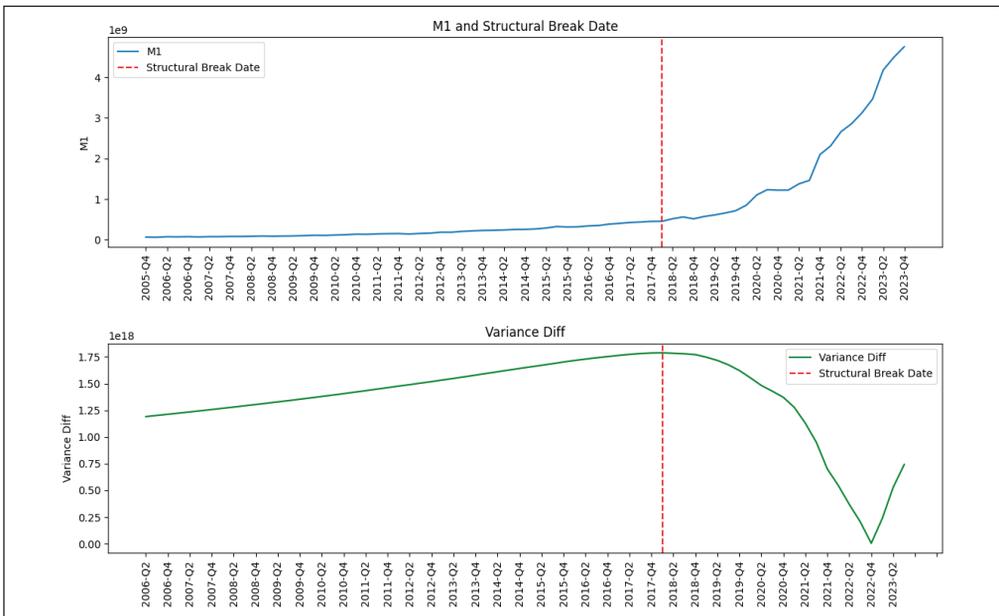**Graph 3: Structural Break Date of CPI Generated with Python**
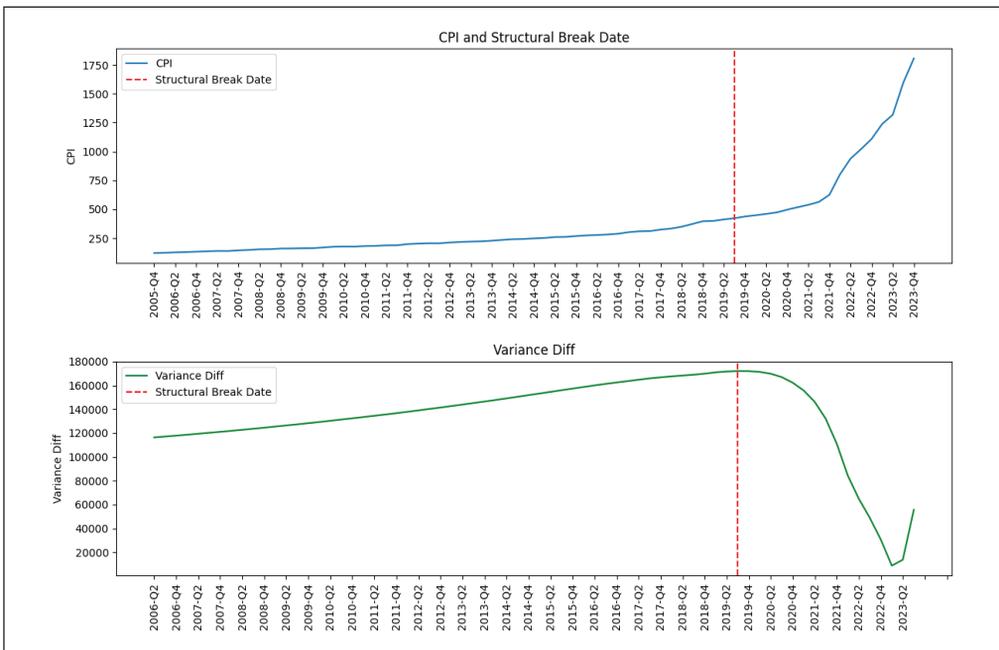
Note: The Structural Break Date is 2019Q3.

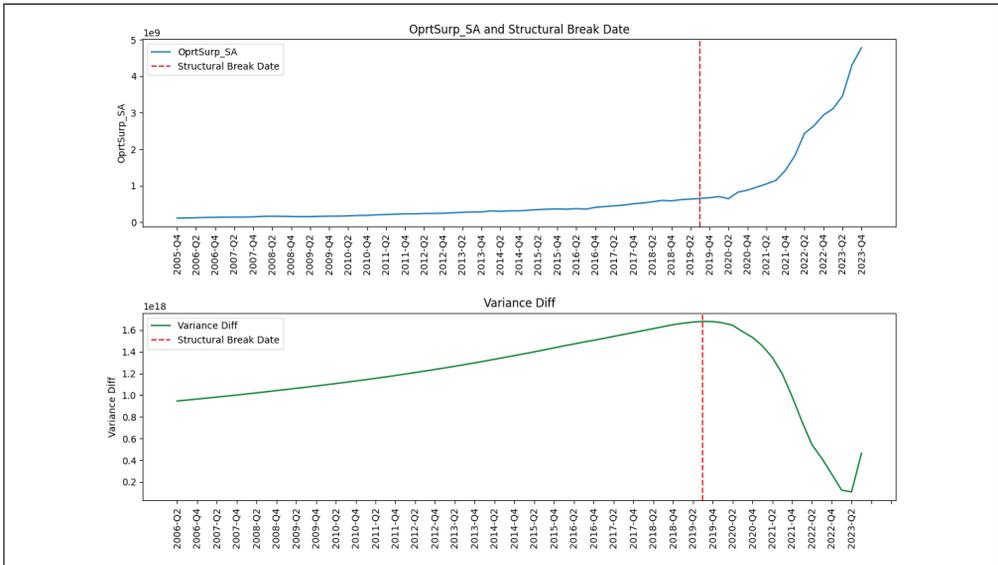**Graph 4: Structural Break Date of the Exchange Rate Generated with Python**
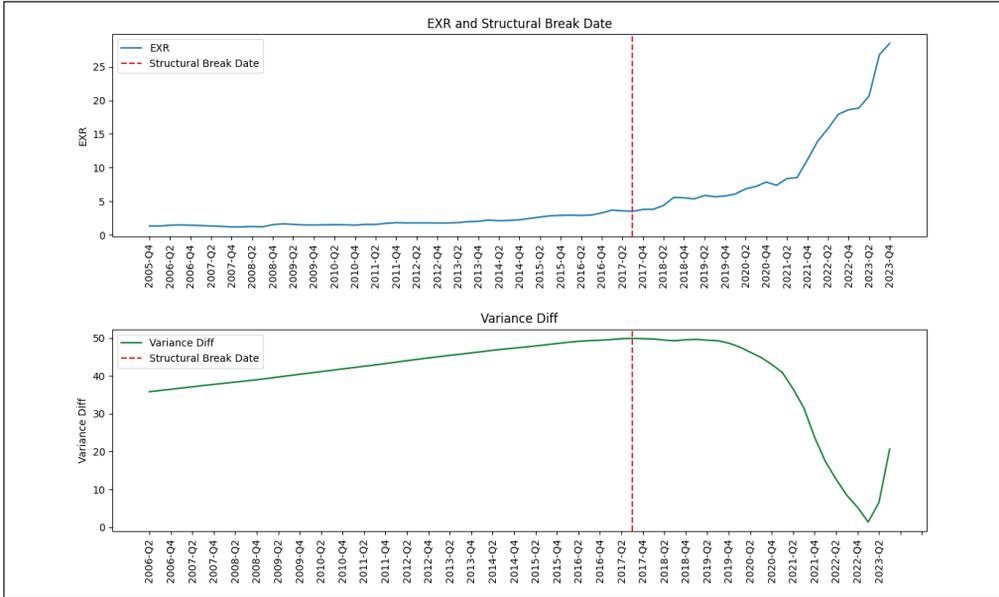
Note: The Structural Break Date is 2017Q3.

Graph 5: Structural Break Date of Money Supply Generated with Python

Note: The Structural Break Date is 2018Q1.

Graph 6: Structural Break Date of the Net Operating Surplus Generated with Python

Note: The Structural Break Date is 2019Q3.

In each pair of graphs, the top graph shows the graph of the original values of the variables. According to the results obtained from the graphs, breaks in all series occurred between 2017Q3 and 2019Q3. As can be clearly seen in the graphs, there are both trend and constant values in the series both before and after the structural break. For this reason, in the unit root analysis, methods and models that test for the presence of a break in both the trend and the constant value in the series were used.

In the analysis process, the stationarity of the series is first tested with the Vogelsang & Perron (1998) (VP) unit root method with structural break. This test performs with the assumption of the presence of at most one structural break. In the VP test, unit root analysis with structural break is performed over two different models: additive outlier model and innovational outlier model. Among these models, the additive outlier model operates with the assumption that the break occurs suddenly and independently of the dynamics of the series, while the innovational outlier model is appropriate when the break occurs slowly and over time (Vogelsang & Perron, 1998: 1075-1076). Since the breaks in the series tested in this study are sudden, as can be seen on the graph, unit root analysis with structural breaks is performed with the additive outlier model. This test consists of two steps. In the first step, the models given below are estimated by OLS and the series are detrended:

$$Model\ 1: y_t = \mu + \beta t + \theta DU_t + \tilde{y}_t^1 \tag{24}$$

$$Model\ 2: y_t = \mu + \beta t + \theta DU_t + \gamma DT_t + \tilde{y}_t^2 \tag{25}$$

$$Model\ 3: y_t = \mu + \beta t + \gamma DT_t + \tilde{y}_t^3 \tag{26}$$

Here, $DU_t = 1$ $(t>T_b)$ and $DT_t = 1(t > T_b)(t - T_b)$. In the second step, the unit root hypothesis is tested using the t-test for $\alpha=1$ in the following regression:

$$\tilde{y}_t^j = \sum_{i=0}^{k} \omega_i \, D(T_b)_{t-i} + \alpha \tilde{y}_{t-1}^j + \sum_{i=1}^{k} c_i \, \Delta \tilde{y}_{t-i}^j + u_t \tag{27}$$

$$\tilde{y}_t^3 = \alpha \tilde{y}_{t-1}^3 + \sum_{i=1}^{k} c_i \, \Delta \tilde{y}_{t-i}^3 + u_t \tag{28}$$

$$y_t = \delta Z_t + e_t \qquad e_t = \beta e_{t-1} + \varepsilon_t \tag{29}$$

Here, $D(T_b)_t = 1(t = T_b + 1)$. The inclusion of the $k+1$ dummy variables $D(T_b)_{t-1}$ ($i=0,\ldots,k$) in (Y) is necessary to ensure that the limiting distributions of the t-statistics on α are invariant to the correlation structure of the errors. The one-time dummies are not needed in Model 3 as the t-statistic on α is asymptotically invariant to the correlation structure of the data with the appropriate choice of k. The t-statistics for testing $\alpha = 1$ using regressions (27) and (28) are denoted by $t_{\hat{\alpha}}(j, AO, T_b, k)$ where j denotes the model (j = 1, 2,3), T_b is the break date used, and k is the lag length of the autoregression. The null hypothesis of this test is that the series are non-stationary under structural break, while the alternative hypothesis is that the series are stationary under structural break. The results of the VP test applied to the series and the break dates are presented in Table 1.

Table 1: VP (1998) Test Results

	Test Stat.	Break Date	Critical Values		
			1%	5%	10%
LnCPI	-7.31*	2019Q3			
EXR	-8.98*	2018Q2	-4.90	-4.363	-4.08
LnM1	-4.364**	2019Q2			
LnOprtSurp	-4.74*	2018Q4			

Note: * and ** denote 1% and 5% significance levels, respectively.

According to the results in Table 1, all series are stationary under the structural break assumption. The break dates are determined for the periods between 2018Q2 and 2019Q3.

The stationarity of the variables in the study was also checked with the Lee & Strazicich (2003) (LS) test. The LS test allows for two breaks in the series. Lee & Strazicich (2003) stated that when there are two structural breaks in the series, considering the presence of only one structural break, as in the Zivot-Andrews (1992) test, would lead to a loss of power in the unit root test and developed the LS test, which allows two structural breaks in the series and deter-

mines the structural break dates endogenously (Gocer & Aslan, 2020: 172). This unit root test, which allows the presence of endogenously determined structural breaks, is the LM unit root test based on two models according to the breaks in the constant (Model A) and trend (Model C) (Lee & Strazicich, 2004: 1-2). This test performs the analysis through the following data generation process equation (Yilanci, 2009: 330).

$$y_t = \delta Z_t + e_t \qquad\qquad e_t = \beta e_{(t-1)} + \varepsilon_t \tag{29}$$

Here, Z_t is the vector containing exogenous variables, $\varepsilon_t \sim iid\ N(0,\ \sigma^2)$. Model A, which is the "crash model" of Perron (1989), allows for two shifts in level and is described by $Z_t = [1, t, D_{1t}, D_{2t}]'$, where $D_{jt} = 1$ for $t \geq T_{Bj} + 1$, $j = 1, 2$ and 0 otherwise. T_{Bj} denotes the time of break. Model C, which is again defined by Perron (1998), includes two changes in level and trend and is described by $Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]'$ where $DT_{jt} = t - T_{Bj}$ for $t \geq T_{Bj}$, $j = 1, 2$ and 0 otherwise (Lee & Strazicich, 2003: 1082-1083). The LS test generates the LM test statistic with the help of the following regression.

$$\Delta y_t = \delta' \Delta Z_t + \phi \tilde{S}_{t-1} + u_t \tag{30}$$

In this expression, $\tilde{S}_t = y_t - \tilde{\psi}_x - Z_t\tilde{\delta}$ and $t = 2, \dots, T$. $\tilde{\delta}$ are coefficients in the regression of Δy_t on ΔZ_t; $\tilde{\psi}_x$ is given by $y_1 - Z_1\tilde{\delta}$ while y_1 and Z_1 denote the first observations of y_t and Z_t, respectively. The null hypothesis of the LS test is that there is a unit root under structural breaks, while the alternative hypothesis is that there is no unit root under structural breaks. In this study, the LS test was applied to the series both under one break and under two breaks and the results are presented in Table 2.

Table 2: LS (2003) Test Results

| | One Break LS Test | | | | | Two Breaks LS Test | | | |
| | Test Stat | Break Date | Critical Values | | | Test Stat | Break Dates | Critical Values | | |
			1%	5%	10%			1%	5%	10%
LnCPI	-7.53*	2018Q2	-4.89	-4.32	-4.04	-9.54*	2015Q1 2019Q2	-6.97	-6.28	-5.99
EXR	-11.37*	2017Q4	-4.89	-4.33	-4.05	-11.04*	2015Q2 2020Q2	-6.93	-6.17	-5.82
LnM1	-4.44**	2018Q2	-4.89	-4.32	-4.04	-7.21*	2008Q4 2019Q2	-6.69	-6.15	-5.79
LnOprtSurp	-6.08*	2018Q3	-4.88	-4.32	-4.03	-7.75*	2008Q3 2018Q4	-6.69	-6.15	-5.79

Note: * and ** denote 1% and 5% significance levels, respectively.

According to the LS test results in Table 2, all series are stationary under structural break(s). The break dates under single break vary between 2017Q4 and 2018Q3. The reason why most of the breaks occurred in 2018 explained after the above Table 1. In the analysis for two structural breaks, the first break date is 2008 for the money supply and operating surplus series, which is assumed to be because of 2008 global crisis, while the first break date is 2015 for the CPI and exchange rate series, which may be because of the factors such as the central bank's interest rate cut, the downgrade of Türkiye's credit rating and the FED's increase in interest rates in 2015. The second break dates cover the period between 2018Q4 and 2020Q2 in all series. Considering both single and two breaks, all series are stationary in both cases.

In the light of the findings obtained from the unit root analysis, all series are stationary under structural break(s). Therefore, since there will be no spurious regression problem in the analysis with stationary series, we proceed directly to regression analysis. Although regression analysis reveals the direction and strength of the interaction between variables, it is an econometric necessity that the variables are in causality relationship with each other (Karaca, 2003, 249-250). Therefore, causality test was also conducted before the regression analysis.

4.4. Causality Test

It is econometrically important to determine whether the interaction between the series is actually a causal relationship. In other words, if one variable has an effect on another variable and knowing the past values of one of these two variables facilitates the estimation of the values of the other variable, it can be said that there is a causal relationship between these two variables. In other words, if the past values of a variable such as Y_t can be utilized in predicting the present or future values of a variable such as X_t and the information contained in Y_t is not available in another variable, then Y_t is the cause of X_t (Granger, 1969: 430). This expression is shown mathematically in bidirectional way below:

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t \tag{31}$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t \tag{32}$$

From these expressions, Equation (31) means that for some $bj \neq 0$, Y is the cause of X, while Equation (32) shows the opposite, i.e. for some $c_j \neq 0$, X is the cause of Y. The null hypothesis of the test is that X is not the cause of Y, while the alternative hypothesis is that X is the cause of Y. What is important here is the assumption that both X and Y variables are stationary (Granger, 1969: 431). Since the variables included in the analysis are stationary, the level values of the series are used in Granger test. The results of the Granger causality test applied to the series in the study are given in Table 3.

Table 3: Granger Causality Test

Direction of Causality	Test Stat.	Prob.	Decision
LnCPI => EXR	26.32*	0.00	Granger causality from CPI to the exchange rate
EXR => LnCPI	25.89*	0.00	Granger causality from the exchange rate to CPI
LnCPI => LnM1	5.61	0.46	No Granger causality from CPI to M1
LnM1 => LnCPI	25.01*	0.00	Granger causality from M1 to CPI
LnCPI => LnOprtSurp	4.30	0.63	No Granger causality from CPI to operating surplus
LnOprtSurp => LnCPI	11.09***	0.08	Granger causality from operating surplus to CPI

Note: * and *** denote 1% and 10% significance levels, respectively. In the Granger causality test, the optimum lag length is found to be 6.

According to the results obtained from the Granger causality test, while there is a bi-directional causality relationship between CPI and exchange rate, unidirectional causality is found from money supply and operating surplus variables to CPI. This causality relationship between operating surplus and CPI is very important in terms of confirming the hypothesis of the study, i.e. the claim that firms' greed for profits leads to inflation. One way causality from operating surplus to CPI is a proof of the hypothesis of the study. That is, in Türkiye, inflation is driven by firm's seek for more profit.

4.5. Regression Analysis

Regression analysis is performed to reveal the direction and strength of the effects of the independent variables on dependent variable. At this stage, the model established at the beginning is estimated and the direction and strength of the effects of the independent variables on the dependent variable are determined with the coefficients obtained.

In this study, the method developed by Bai & Perron (2003), which allows k structural breaks, is used for regression analysis. This method tests the alternative hypothesis that there are k structural breaks against the null hypothesis that there are no structural breaks. In the testing process, the process is carried out with the F test in the matrix form given below:

$$F_T(\lambda_1, \ldots, \lambda_k; q) = \frac{1}{T}\left(\frac{T-(k+1)q-p}{kq}\right)\hat{\delta}' R'^{(R\hat{V}(\hat{\delta})R')^{-1}} R\hat{\delta} \tag{33}$$

Here, $(T_1, \ldots, T_k)$ is a partition such that $T_i = [T\lambda_1]$ $(i=1,\ldots,k)$ and let R be the conventional matrix such that $(R\delta)' = (\delta'_1 - \delta'_2, \ldots, \delta'_k - \delta'_{k+1})$. The variance covariance matrix obtained by this method is robust in terms of serial correlation and heteroscedasticity (Bai & Perron, 2003: 12). In this study, regression estimation was performed with the Bai & Perron (2003) procedure and the results are presented in Table 4.

Table 4: Regression Estimation Results

	Coeff.	Prob.	Period
EXR	-0.101332	0.1223	
LnM1	0.096254	0.3840	2005Q4
LnOprtSurp	0.510263*	0.0000	-
C	-6.239784*	0.0000	2008Q3
EXR	0.031525*	0.0001	
LnM1	0.180344*	0.0001	2008Q4
LnOprtSurp	0.281869*	0.0000	-
C	-3.574299*	0.0000	2018Q3
EXR	0.003914	0.7413	
LnM1	0.130357*	0.0004	2018Q4
LnOprtSurp	0.284351*	0.0000	-
C	-2.393599***	0.0531	2021Q4
EXR	0.013322**	0.0107	
LnM1	0.306974**	0.0120	2022Q1
LnOprtSurp	0.401729*	0.0038	-
C	-8.693940*	0.0000	2023Q4

Note: *, ** and *** denote 1%, 5% and 10% significance levels, respectively.

According to the results in Table 4, there were three structural breaks in the period under consideration and thus four sub-periods were formed. The break dates are 2008Q4, 2018Q4 and 2022Q1. When each period is analyzed separately, it is possible to see the effects of exchange rate, money supply and operating surplus variables on CPI separately. In the first period, 2005Q4-2008Q3, money supply had no significant effect on CPI, but exchange rate and operating surplus had a negative and positive significant effect, respectively. While 1% rise in EXR decreased CPI by 0.01%, a 1% increase in operating surplus variable increased the CPI by 0.51%. In the second period, 2008Q4-2018Q3, exchange rate, money supply and operating surplus had a statistically significant effect on CPI. For these variables, operating surplus had the largest effect on CPI. In this period, a 1% increase in this variable increased CPI by 0.28%. In the third period, 2018Q4-2021Q4, the exchange rate had no significant effect on CPI, but other variables had statistically significant effects. Again, in this period, the variable that increased CPI the most was operating surplus. A 1% increase in this variable increased CPI by 0.28% as in the previous period. Finally, when the 2022Q1-2023Q4 period is analyzed, it is seen that all variables had significant effects. It is noteworthy that both money supply and operating surplus had a larger effect on CPI compared to the previous two periods. While money supply increased the CPI by 0.18% and 0.13% in the previous two periods, it had a 0.30% effect on the CPI in the last period. Likewise, the operating surplus increased the CPI by 0.28% in the previous two periods, whereas in the most recent period it affected the CPI by 0.40%. According to these

results, it is possible to say that after 2022, the period in which inflation started to climb rapidly in Türkiye, the main reason for this climb was not only the increase in money supply but also the fact that the operating surplus increased significantly compared to the previous periods.

4.6. Diagnostic Tests

In order to check whether the results obtained by regression is robust and reliable, many diagnostic tests can be performed. In this study, Breusch-Pagan-Godfrey (BPG) and White tests for heteroscedasticity, Breusch-Godfrey (BG) LM test for serial correlation and Jarque-Bera (JB) test for normality is conducted and the results is presented in Table 5.

Table 5: Results of Diagnostic Tests

	Test Stat.	Prob.
BPG	0.89	0.57
White	1.16	0.31
BG	0.55	0.46
JB	0.66	0.71

According to BPG and White tests, the null hypothesis of homoscedasticity is accepted, that is, there is no heteroscedasticity problem in the model. according to BG test, the null hypothesis of no serial correlation at up to 1 lag is accepted, while JB test shows that the residuals are normally distributed.

5. Conclusion and Recommendations

This study investigates whether the high inflation in Türkiye in recent years has been caused by corporate greed for profits along with many other reasons, which is called greedflation. For this purpose, the econometric analysis, which is the main focus of the study, is presented to test the model for greedflation. After the stationarity test, it is concluded that the series are stationary under structural breaks. The fact that the series are stationary at level values eliminates the need for a cointegration test in this study. Before proceeding to the regression analysis, causality was investigated and the causality relationship between the series was revealed. Subsequently, the regression estimation with structural breaks is used to determine how and to what extent the dependent variable CPI is affected by the independent variables exchange rate, M1 money supply and operating surplus. Accordingly, it is concluded that the primary cause of the recent inflation in Türkiye is money supply and operating surplus, in other words, the concept of greedflation is valid in Türkiye.

When talking about greedflation, three questions need to be addressed: are companies really raising prices more than their costs rise? If so, is this increase high enough to trigger inflation? Finally, is this happening because large companies have market power that they did not have decades ago? A discussion of greedflation centered around these three questions would be useful for understanding and solving the problem. Indeed, one potential solution is a temporary "excess profits tax" specific to the greedflation period, or a temporary ban on making profits

above certain rates. At this point, it is clear that public power must be used to effectively combat greedflation as a form of inflation. More clearly, government or governmental institutions has to strictly monitor the profit rates of each firms, even the smallest grocery stores, in order to find out whether they increase their prices in accordance with the rise in their costs or more than that. If the rise in the prices are more than the rise in the costs or the profitability of the firms are more than their own historical rates, government should impose taxes or other kinds of punishment for that firms. By this way, greedflation can be stopped or its degree can be lowered. Other than government, no one can solve the problem of high inflation and greedflation since no other type of collective power as big as government exists in any society. In Türkiye, after years of high inflation caused by greed of the firms, government finally started to watch all private enterprises to check whether they pay their taxes as much as they had to. By this way, the amount they earn and the rate of their profit will be determined and the greedflation will be slowed since higher tax rates will be applied and the unfair increases in prices will be revealed.

There are many obstacles to companies raising prices in ordinary times. These include: (i) the boycott power of the public, (ii) the income effect that may result from widespread price increases, (iii) the substitution effect, especially for "price elastic" products, (iv) public control over price increases or quality reductions, and (v) the cost of updating prices. When excessive profitability is added to the already existing cost-driven inflation during periods of hyperinflation, the society's perception of prices deteriorates and the power to boycott weakens. Due to the distorted price perception, every price level offered by companies is somehow accepted by consumers, thus eliminating income and substitution effects. Since the cost of updating prices is contained in the prices themselves, this is not a prohibitive factor. Therefore, the only effective weapon in the fight against inflation and greedflation is the public authority. The most important stage in the fight against greedflation is to ensure that greedflation does not begin. If this is not possible and greedflation starts, it will be possible to eliminate it through state policies such as higher taxes for higher profit rates or reasonable price ceilings for each and every product sold in the country. In this way, inflation and greedflation can be eliminated. To repeatedly state, only government can solve the problem of inflation and greedflation.

For future studies, it is recommended that the profitability of the firms and the measure of greed be calculated and analyzed by using firm-level profit data. That is to say the balance sheet of firms listed on the stock exchanges of the relevant countries may be analyzed in terms of their nominal profits and some profit ratios in order to determine whether they earned excess profits during certain periods.

Contribution Statement of Researchers
The author confirms sole responsibility for the following: conception and design of the research, data collection, analysis and interpretation of results, and preparation of the manuscript.

Conflict of Interest
The author declares no conflict of interest.

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