- RESEARCH ARTICLE -

INTEREST RATE AND INFLATION: IS THERE A FISHER OR NEO-FISHER EFFECT? EVIDENCE FROM TURKEY

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Abstract

In this study, we empirically analyze the relationship between the interest rate and inflation within the content of the Fisher and Neo-Fisher effect for Turkey. Considering the recent elevated discussion of inflation and interest rate, our paper re-examines this relationship using an extended sample covering recent dates to address these discussions. We employ a time-varying robust causality approach, accounting for structural breaks, helping us to analyze the degree of relation between Turkey's inflation rate and interest rate over the monthly period 2012-2021 of our research. Our main results point out a bidirectional causal relationship in the existence of the Fisher and Neo-Fisher effect in terms of the variables in the corresponding period in Turkey. However, after 2018 the Neo-Fisher effect has become more significant in Turkey.

Keywords: Interest rate, Inflation, Time-varying granger causality, Turkey.

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TÜRKİYE'DE FAİZ ORANI VE ENFLASYON ARASINDAKİ NEDENSELLİK İLİŞKİSİNDE FISHER VEYA NEO-FISHER ETKİSİ'NİN VARLIĞI[2]

Öz

Bu çalışmada, Türkiye için Fisher ve Neo-Fisher etkisi kapsamında faiz oranı ve enflasyon arasındaki ilişki ampirik olarak analiz edilmiştir. Enflasyon ve faiz oranlarıyla ilgili son zamanlarda yükselen tartışma göz önünde bulundurulduğunda, makalemizde bu tartışmaları ele almak için yakın tarihleri kapsayan genişletilmiş bir örneklem kullanılmış, bu ilişki yeniden incelenmiştir. Araştırmada 2012-2021 dönemi aylık periyodlar için, Türkiye'nin enflasyon oranı ile faiz oranı arasındaki ilişkinin derecesini analiz etmemize yardımcı olan, yapısal kırılmaları hesaba katan, zamana göre değişen güçlü bir nedensellik yaklaşımı kullanılmıştır. Temel sonuçlarımız, Türkiye'de ilgili dönemdeki değişkenler açısından Fisher ve Neo-Fisher etkisinin varlığında çift yönlü bir nedensellik ilişkisine işaret etmektedir. Ancak 2018 yılından sonra Türkiye'de Neo-Fisher etkisi daha belirgin hale gelmiştir.

Anahtar Kelimeler: Faiz oranı, Enflasyon, Zamanla değişen granger nedenselliği, Türkiye

JEL Kodları: C32 E31 E43

"Bu çalışma Araştırma ve Yayın Etiğine Uygun olarak hazırlanmıştır".

1. INTRODUCTION

The causality relationship between inflation and interest rates has been one of the most important issues attracting the attention of economists. According to macroeconomic literature, some argue that high inflation causes an increase in the interest rate, and some support the idea that an increase in interest rates raises the inflation rate. The theoretical foundations of the relationship between interest rate and inflation back to Fisher (1930), and when studies analyzing the relationship between these variables are scanned, it is seen that there are many applied studies in which the effectiveness of the Fisher effect is tested by using various methods and approaches. The Fisher hypothesis suggests that nominal interest rates and expected inflation rates have a positive relationship, as well as causality from inflation rates to interest rates.

Fisher's hypothesis has been applied to many countries during particular periods, and the results point out differs from country to country. Fama (1975), Gupta (1991), Pelaez (1995), Choi (2002), Phillips and Sun (2004) for US economy; Atkins and Coe (2002) for Canada and USA economies; Phylaktis and Blake (1993) for Mexico, Argentina and Brazil economies; Woodward (1992), Granville and Mallick (2004) for British economy; Weidmann (1997) for German economy; Olekalns (1996) for

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[2] Genişletilmiş Türkçe Özet çalışmanın sonunda yer almaktadır.

Australian economy; Junttila (2001) for Finnish economy; Bajo-Rubio et al. (2005) for the Spanish economy, Zainal et al. (2014) for Malaysian economy; Ayub et al. (2014) for Pakistani economy; Hachicha and Tsong (2014) for selected developing countries; Mansson et al. (2017) for Nordic countries have confirmed the positive relationship between interest rates and inflation. Conversely, some studies have verified that the relationship is not present in all cases and periods. Summers (1983), Barsky (1987), Mishkin (1992) for USA economy; Obstfeld and Cumby (1980) for six developed countries; Ghosh and Dutt (1995) for Canada; Silvapulle and Inder (1993) for Australia; Linden (1995) for Finland; Ghazali and Shamshubariah (2003) for G7 countries; Ito (2009) for Japan, Chen (2015) for China economy have been unable to verify the causality relationship between interest rates and inflation.

Central banks have adopted an expansionary monetary policy to prevent an economic recession and have used low interest rate policy to eliminate the negative effects of the financial crisis practiced in 2008. Nevertheless, very low (zero-bound) interest rate policy led inflation to fall below the targeted levels instead of increasing inflation. On the contrary to theoretical foundations, low interest rates coexist together with low inflation. The positive relationship between the nominal interest rate and inflation, referred to as the Fisher effect, has been re-examined in terms of causality. The opposite causality relationship seen in this Fisher theory refers to the Neo-Fisher effect. Neo-Fisher effect, which is based on the work of Bullard (2015), Cochrane (2016), Williamson (2016), argues that an increase in the nominal rate of interest, which is assumed to be permanent will cause a rise in inflation in both the short and long run. Uribe (2017) obtained that a gradual and persistent ascent in the nominal interest rate leads a swift correction of inflation to a perennially higher level in which he examined US and Japanese data over the period 1995 to 2016. Schmitt-Grohe and Uribe (2017) showed that increasing the nominal interest rate in the long view would increase inflation expectations in which they studied for the economy of US, Eurozone from the period of 2005-2015 and for the economy of Japan from the period of 1990-2000. Ioana (2017) studied the positive relationship between inflation and interest rates for inflation targeting nations from Eastern and Central Europe by using VAR analysis for the period of 2005 to 2015. The study results showed a significant positive relation between inflation and interest rates close to the Neo-Fisher effect, meaning that negative shocks to interest rates give rise to lower inflation. A recent paper by Lukmanova and Rabitsch (2018) studied the Neo-Fisher effect over the period 1947:Q2-2019:Q1 by using VAR analysis. Their results indicated that the nominal interest rates and inflation had a positive correlation.

The existing literature working on Fisher hypothesis in Turkey, Aksoy and Kutan (2003); Turgutlu (2004); Kadılar and Şimşek (2006); Gül and Açıkalın, (2008); İncekara et al. (2012) Köse et al. (2012); Mercan (2013); Omay et al. (2016); Küçükaksoy and Akalın (2017) obtained findings supporting the Fisher hypothesis, Çakmak et al. (2002); Yılancı (2009); Bayat, (2011) obtained that interest rates are unaffected by inflation. In addition, studies in which the Neo-Fisher effect is tested for the Turkish economy, Tayyar (2019) for the period 2002:1-2014:5 by using Toda-Yamamoto causality analysis and Sümer (2020) for the period 2010:5-2019:12 by

using EG, CCR, DOLS, FMOLS cointegration tests. Both studies obtained that the Neo-Fisher effect is valid in the Turkish economy in terms of the periods discussed.

Our study contributes to growing literature in many directions. Firstly, considering the recent elevated discussion of inflation and interest rate, this paper re-examines this relation using an extended sample covering the recent dates to address these discussions. Since 2010 Central Bank of the Republic of Turkey (CBRT) has created a new policy component aiming at financial stability as well as price stability in monetary policy implementations. Changes in monetary policy practices in Turkey in this period and still there is no general consensus in the linkage between inflation and interest rates, made it necessary to re-examine this in the scope of Fisher or Neo-Fisher effect. Secondly, one important key point that makes this study different from other existing literature is using a time-varying approach in our econometric analysis. Latterly submitted multivariate time-varying causality framework of Wang and Rossi (2019). This robust granger causality test considers structural breaks, helping us to analyze the degree of relation between Turkey's inflation rate and CBRT weighted average cost of funding rate over the monthly period of our research 2012:M1 to 2021:M6.

The remainder of this paper is organized as follows: the nature of data and the methodology are described in part 2; followed by the empirical results in section 3, section 4 is the discussion part and the final section is conclusion.

2. METHODOLOGY

The data consist of weighted average cost of funding rate (WACF) acquired from the Central Bank of the Republic of Turkey's (CBRT) Electronic Data Delivery System (EVDS) and monthly inflation rates for Turkey. The sample period runs from 2012:M1 to 2021:M6 on a monthly basis. Monthly changes in the consumer price index (CPI) take the place of inflation rates acquired from the Turkish Statistical Institute.

Table 1: Sample Variables and Data Sources

Variable	Definition	Source
WACF	CBRT Weighted Average Cost of	CBRT EVDS Database
CPI	Changes in the Consumer Price Index on a Monthly Basis	Turkish Statistical Institute
M2	Time Deposits plus M1 Monetary	CBRT EVDS Database
CREDIT	Total Bank Credit	CBRT EVDS Database
USDTRY	US Dollar Turkish Lira Exchange Rate	CBRT EVDS Database

Table 2 presents the summary statistics of our variables. All variables are stationary after transformation.

Table 2: Descriptive Statistics

	WACF	**CPI**	**CREDIT**	**M2**	**USDTRY**
Mean	11.02	10.52	0.21	0.12	0.16
Median	8.86	9.24	0.20	0.11	0.15
Maximum	25.50	25.24	0.37	0.27	0.61
Minimum	4.52	3.99	-0.06	0.04	-0.11
Std. Dev.	5.32	4.17	0.08	0.05	0.12
Skewness	1.28	1.32	-0.15	0.72	0.67
Kurtosis	3.66	4.56	3.28	3.30	4.29
Jarque-Bera	36.48	49.41	0.90	11.46	18.30
Probability	0.00	0.00	0.64	0.00	0.00
ADF Test	-3.53**	-3.15*	-2.75*	-5.96***	-7.59***
Observations	126	126	126	126	126

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Since ADF test suggests that series are nonstationary, we transform all variables into stationary form before implementing VAR model. In particular, we transform M2, CREDIT variables using log-difference. It is fairly common to use logarithmically transformed variables in regression models to deal with situations when there is a non-linear connection between the independent and dependent variables. Because of this, using the logarithm of one or more variables instead of the un-logged form makes the effective relationship non-linear, while still maintaining the linear model. Logarithmic transformations, on the other hand, provide a straightforward way to turn a highly-skewed variable into one that is more or less normal in distribution. We take YoY growth rate of CPI variable and USDTRY variable and level difference of WACF variable.

To investigate the degree of relation between Turkey's inflation rate and CBRT weighted average cost of funding rate, we employ the time-varying parameter robust Granger-causality method (TVP-GC) put forward by Wang and Rossi (2019). The TVP-GC approach provides us major robust results in the presence of instabilities compared to those from the standard Granger causality test. Besides, the time intervals when the Granger causality is present or absent in the data can be identified using this method. In this way, we aim to generate more robust estimations for the causality between CPI and WACF than the estimations relying on a constant criterion Granger causality approach. Table 2 presents the summary statistics of our variables.

A VAR model together with time-varying criterions may be represented by the following:

$$y_t = \Phi_{1,t} y_{t-1} + \Phi_{2,t} y_{t-2} + \cdots + \Phi_{p,t} y_{t-p} + \epsilon_t \tag{1}$$

where $y_t = [CPI_t, WACF_t, M2_t, BankCredit_t, USDTRY_t]'$ represents a 5×1 vector and functions of time-varying coefficient matrices are denoted by $\Phi_{j,t}, j = 1, \dots, p$. Idiosyncratic shocks, assumed to be serially correlated and heteroscedastic is

represented by ϵ_t. We apply the TVP-GC test using the STATA's gcrobustvar command written by Wang and Rossi (2019).

Subsequently, the null hypothesis states that the lags of WACF (CPI) do not granger cause CPI (WACF). We test this hypothesis where a relevant subset of $\text{vec}(\Phi_{1,t}, \Phi_{2,t}, ..., \Phi_{p,t})$ is represented by θ_t:

$$H_0 : \theta_t = 0, \quad \forall t = 1,2 ... T \tag{2}$$

Following Rossi (2005), we get four alternative test statistics for test H_0 in equation (2); ExpW (Exponential Wald), MeanW (Mean Wald), Nyblom (Nybolm) and SupLR (Quandt Likelihood Ratio) to forecast the causal causalities. The interested reader is referred to Rossi (2005) for technical details of the computation of mentioned test statistics. The Schwarz Information Criterion (SIC) is used to choose lag. With one lag, the VAR model is forecasted. If test results overlap the critical points, we can statistically determine that there is a major causality between the linked variables. Given that potential breakpoints are generally trimmed to discard the origin and the last of the sample period, the standard trimming parameter is chosen as 0.10, which is consistent with the existing literature regarding structural breaks.

3. RESULTS

The Rossi-Wang causality test is applied, and the findings are presented in Table 3. Concerning the causality from average cost of funding rate (WACF) to consumer price index (CPI), we discover that all test statistics Exponential Wald, Mean Wald, Nyblom and Quandt Likelihood Ratio are statistically significant in Turkey at the 1% level. All four tests reject the null of no granger causality from WCF to CPI in Turkey at the greatest degree of strength achievable. The corresponding critical values of the asymptotic distributions under the null are tabulated in Rossi's (2005) table B1, which are obtained by simulating the asymptotic distributions with Monte Carlo replications.

Table 2: Causality Test Statistics

	ExpW	**MeanW**	**Nyblom**	**SupLR**
WACF ➔ CPI	271.4	134.6	618.9	552.0
p-value	0.0	0.0	0.0	0.0
CPI ➔ WACF	147.7262	151.5041	44146.78	304.6627
p-value	0.0	0.0	0.0	0.0

In Turkey, however, we also discover that Exponential Wald, Mean Wald, Nyblom and Quandt Likelihood Ratio are statistically significant at the 1% level in terms of causality from CPI to WACF. All four tests also reject the null of no granger causality from WCF to CPI in Turkey at the greatest degree of strength achievable.

Therefore, the results obtained from the analysis show that WACF and CPI in Turkey have a bidirectional causal relationship which is also robust across different test statistics such as ExpW, MeanW, Nyblom, and SupLR. In order to examine the time-varying relation we put the time series of exponential Wald test statistics over time in figures 1. and 2. This provides more information when the Granger causality occurs and break downs.

Figure 1 shows that the Granger causality relationship between WACF and CPI seems over the entire sample period. However, as can be seen from Figure 1, the relationship has strengthened after 2018. CBRT hiked its benchmark one-week repo interest rate by 625 basis points from 17.75% to 24% in September 2018 and in November 2020 they increased its benchmark one-week repo interest rate by 475 basis points from 10.25% to 15%. After these two periods, the Granger causality relationship between WACF and CPI became more significant.

Figure 1: Time-varying causality WACF to CPI
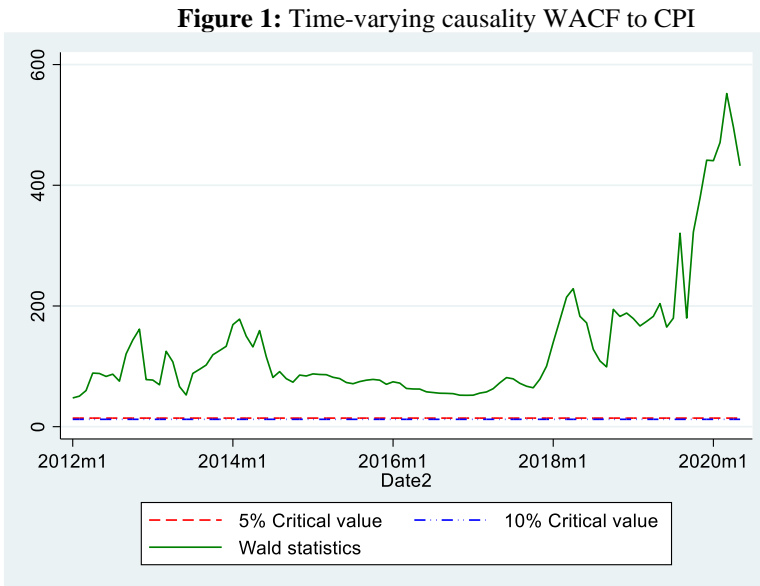
On the other hand, Figure 2 shows that the Granger causality relationship between CPI and WACF seems over the entire sample period. As shown in Figure 2, the relationship has weakened after 2016. Put differently, in comparison to the Fisher effect the Neo-Fisher effect has become more significant in Turkey, especially after 2018 compared to the Fisher effect.

Figure 2: Time-varying causality CPI to WACF
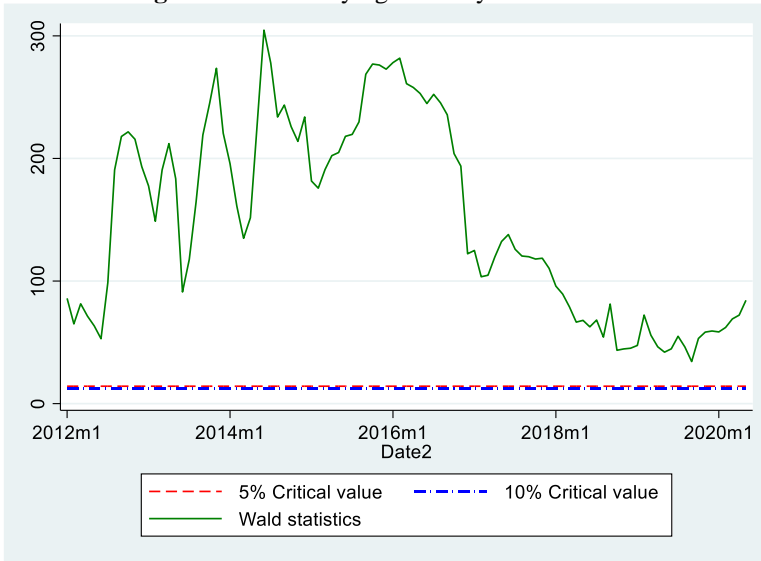
We have shown VAR model results in Table 4. Column (1) of Table 4 suggests that the lag of WACF has a significant and positive coefficient (0.00139), indicating the Neo-Fischer effect. Furthermore, the coefficient of USDTRY (0.0297) is also significant and positive, capturing the effect of pass through from exchange rate to CPI. In line with the expectations, the coefficient of CREDIT is positive and significant, suggesting that when more credit is provided to consumers and businesses, consumers spend more money on good and services leading to an acceleration in economic growth. Subsequently, this results in a sustained rise in overall inflation.

Table 4: VAR Model Results

VARIABLES	(1) CPI	(2) WACF	(3) USDTRY	(4) M2	(5) CREDIT
L.CPI	0.762***	10.37*	-0.536*	0.00513	-0.0283
	(0.0674)	(5.479)	(0.290)	(0.0789)	(0.129)
L.WACF	0.00139***	0.904***	0.00379*	-0.000313	-0.000797
	(0.000513)	(0.0417)	(0.00221)	(0.000601)	(0.000979)
L.USDTRY	0.0297**	2.118*	0.917***	-0.00232	-0.0300
	(0.0149)	(1.210)	(0.0640)	(0.0174)	(0.0284)
L.M2	-0.000980	-1.893	0.0862	0.983***	0.202***
	(0.0256)	(2.078)	(0.110)	(0.0299)	(0.0488)
L.CREDIT	0.0456***	4.739***	0.0975	-0.0692***	0.878***
	(0.0174)	(1.418)	(0.0750)	(0.0204)	(0.0333)
CONSTANT	0.235***	-11.38**	0.535*	0.0140	0.0439

	(0.0692)	(5.622)	(0.297)	(0.0810)	(0.132)
OBSERVATIONS	125	125	125	125	125

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Column (2) of Table 4 indicates that the coefficient of CPI is positive and significant, confirming the Fisher effect, which proposes that monetary policy moves the nominal interest rates and inflation together parallel to one another. Similarly, the lag of USDTRY is positive and significant. The reason might be that central banks increase the rates due to the depreciation of local currency to limit potential exchange rate - inflation pass through.

4. DISCUSSION

Our research adds to the growing literature in many ways. In light of the recent focus on inflation and interest rates, this research re-examines this relationship using a larger sample that spans recent dates to address these discussions. Changes in Turkey's monetary policy methods, as well as the fact that there is still no widespread agreement on the link between inflation and interest rates, necessitated a re-examination of the Fisher or Neo-Fisher effect. The use of a time-varying approach in our econometric analysis is one crucial feature that distinguishes our work from other previous studies.

Our outcomes are consistent with the other Neo-Fisher related papers such as Schmitt-Grohe and Uribe (2017), Cochrane (2016) and Uribe (2017), argues that inflation and nominal interest rates are both positively affected by a permanent monetary policy shock, not just in the long run but also in the near term. In September 2018, CBRT increased its benchmark one-week repo interest rate by 625 basis points from 17.75% to 24%. The Neo-Fisher effect, in which a monetary policy shock that boosts the nominal interest rate in the long run induces an increase in inflation already in the near term, appears to exist just in closed economy empirical models, but also in models with a foreign bloc, in line with our observation, Schmitt-Grohe and Uribe (2021) mentioned in their recent article. Similarly, in November 2020, CBRT increased its benchmark one-week repo interest rate by 475 basis points from 10.25% to 15%. Likewise, the Granger causality relationship between WACF and CPI has become more significant after this phase.

Fisher (1930) hypothesis proposed that nominal interest rates and expected inflation rates had a positive relationship, as well as causality works from inflation rates to interest rates. For the relevant terms, the Fisher effect is effective in Turkey. The results obtained from the study about the Fisher effect in Turkey show that CPI and WACF are related. We can say that the Neo-Fisher effect has become more significant in Turkey, especially after 2018 compared to the Fisher effect.

CONCLUSION

In the long term, the Fisher hypothesis argues that expected or trend inflation causes nominal interest rates, whereas the Neo-Fisher hypothesis claims that nominal interest rates cause trend inflation. According to the results of our analysis, bidirectional causality between WACF and CPI variables was determined. This observation shows the existence of Fisher and Neo-Fisher effect in terms of the variables in the corresponding period in Turkey. However, our results are in line with the recent ongoing discussions about the possible existence of the Neo-Fisher effect, especially after 2018 compared to the Fisher effect, Neo-Fisher effect has become more significant in Turkey.

Interest rates are a powerful tool in the monetary policies to be implemented by central banks against inflation, making the direction and degree of the causality relationship between WACF and CPI extremely important in terms of results. The monetary policies to be implemented should be addressed in this context and economic decisions should be taken considering that both variables affect each other. Even though there is a bidirectional interaction, it is understood from the findings that particularly after 2018, while interest rates create a more significant effect on inflation, inflation does not have the same effect on interest rates. Therefore, other economic variables should also be taken into account when making decisions related to interest rate policies. As the only tool in the fight against inflation by central banks interest rates may not be the only option, they can diversify their instruments with other alternatives.

Although the Neo-Fisher effect depends on an unorthodox monetary policy configuration, Cochrane (2016) has also mentioned that there are some requirements for using interest rates to control inflation. First, it is necessary to establish coordination between monetary and fiscal policies. Second, exchange rates volatility should be stabilized, and lastly, the credibility of the central banks should be high.

TÜRKİYE'DE FAİZ ORANI VE ENFLASYON ARASINDAKİ NEDENSELLİK İLİŞKİSİNDE FISHER VEYA NEO-FISHER ETKİSİ'NİN VARLIĞI

1. GİRİŞ

Enflasyon ve faiz oranları arasındaki nedensellik ilişkisi iktisatçıların ilgisini çeken en önemli konulardan birisi olmuştur. Makroekonomik literatüre göre, kimileri yüksek enflasyonun faiz oranlarında artışa neden olduğunu savunurken, kimileri de faiz oranlarındaki artışın enflasyon oranını yükselttiği fikrini desteklemektedir.

Merkez bankaları, ekonomik durgunluğu önlemek için genişletici para politikası benimsemişler ve 2008 yılında yaşanan finansal krizin olumsuz etkilerini ortadan kaldırmak için düşük faiz politikası uygulamışlardır. Çok düşük faiz politikası,

enflasyonu artırmak yerine enflasyonun hedeflenen seviyelerin altına düşmesine neden olmuştur. Teorik temellerin aksine, düşük faiz oranlarının düşük enflasyonla birlikte var olduğu gözlenmiştir. Fisher etkisi olarak adlandırılan nominal faiz oranı ile enflasyon arasındaki pozitif ilişki nedensellik açısından yeniden incelenmiştir. Ortaya çıkan Neo-Fisher etkisi, kalıcı olduğu varsayılan nominal faiz oranındaki bir artışın hem kısa hem de uzun vadede enflasyonda artışa neden olacağını savunmaktadır.

Çalışmamız literatürün birçok yönden gelişmesine katkıda bulunmaktadır. İlk olarak, son zamanlarda yükselen enflasyon ve faiz oranı tartışması dikkate alınarak yakın tarihleri kapsayan genişletilmiş bir örneklem grubu ile bu ilişki yeniden incelenmektedir. Türkiye'de para politikası uygulamalarında yaşanan değişiklikler ve halen enflasyon ile faiz oranları arasındaki bağlantı konusunda genel bir fikir birliğinin olmaması, Fisher veya Neo-Fisher etkisi kapsamında yeniden incelemeyi gerekli kılmıştır. İkinci olarak, bu çalışmayı mevcut diğer literatürden farklı kılan önemli bir nokta ekonometrik analizimizde zamanla değişen bir yaklaşım kullanmaktır. Bu güçlü granger nedensellik testi, yapısal kırılmaları göz önünde bulundurarak, araştırmamızın 2012-2021 döneminde Türkiye'nin enflasyon oranı ile TCMB ağırlıklı ortalama fonlama faizi arasındaki ilişkinin derecesini analiz etmemize yardımcı olmaktadır.

2. YÖNTEM

Veriler, Türkiye Cumhuriyet Merkez Bankası Elektronik Veri Dağıtım Sistemi'nden alınan ağırlıklı ortalama fonlama maliyeti ve Türkiye aylık enflasyon oranlarından oluşmaktadır. Örnek dönem, aylık olarak 2012 Ocak ayından 2021 yılı Haziran ayına kadardır. Türkiye İstatistik Kurumu'ndan alınan enflasyon oranları verisi, tüketici fiyat endeksindeki aylık değişimler olarak yer almaktadır.

Türkiye'nin enflasyon oranı ile TCMB ağırlıklı ortalama fonlama maliyeti arasındaki ilişkinin derecesini araştırmak için Wang ve Rossi (2019) tarafından ortaya konan zamanla değişen parametreli Granger-nedensellik yöntemi (TVP-GC) kullanılmıştır. Verilerde Granger nedenselliğinin var olduğu veya olmadığı zaman aralıkları da bu yöntem kullanılarak belirlenebilmektedir. Enflasyon ve faiz oranı arasındaki nedensellik için, sabit bir Granger nedensellik yaklaşımına dayanan tahminlerden daha sağlam tahminler üretmek hedeflenmiştir.

Rossi'yi (2005) takip ederek nedensellikleri tahmin edebilmek içi dört alternatif test istatistiği "ExpW (Exponential Wald), MeanW (Mean Wald), Nyblom (Nybolm) and SupLR (Quandt Likelihood Ratio)" kullanılmıştır.

3. BULGULAR

Rossi-Wang nedensellik testi uygulanmış ve bulgular paylaşılmıştır. Ağırlıklı ortalama fonlama maliyeti oranından (AOFM) tüketici fiyat endeksine (TÜFE) nedensellik ile ilgili olarak tüm test istatistiklerinin "Exponential Wald, Mean Wald,

Nyblom and Quandt Likelihood Ratio" %1 düzeyinde istatistiksel olarak anlamlı bulunmuştur. Dört testin tamamı, Türkiye'de AOFM'den TÜFE'ye elde edilebilecek granger nedensellik testinin sıfır hipotezini en yüksek anlamlılık düzeyinde reddetmiştir.

Diğer taraftan TÜFE'den AOFM'ye nedensellik tüm test istatistiklerinde %1 düzeyinde istatistiksel olarak anlamlı olduğu gözlemlenmiştir. Dört testin tamamı, Türkiye'de TÜFE'den AOFM'ye elde edilebilecek granger nedensellik testinin sıfır hipotezini en yüksek anlamlılık düzeyinde reddetmiştir. Analizden elde edilen sonuçlar Türkiye'deki AOFM ve TÜFE'nin farklı test istatistiklerinde de güçlü olan çift yönlü bir nedensellik ilişkisine sahip olduğunu göstermektedir.

AOFM ve TÜFE arasındaki Granger nedensellik ilişkisi tüm örneklem dönemi boyunca gözlemlenmiş, ilişki 2018'den sonra güçlenmiştir. TCMB, gösterge bir hafta vadeli repo faiz oranını Eylül 2018'de ve Kasım 2020'de artırmıştır. Bu iki dönemden sonra, AOFM ve TÜFE arasındaki Granger nedensellik ilişkisi daha da güçlenmiştir. Öte yandan TÜFE ve AOFM arasındaki ilişkinin 2016'dan sonra zayıfladığı, Fisher etkisine kıyasla Türkiye'de Neo-Fisher etkisinin özellikle 2018'den sonra daha fazla gözlemlendiği görülmüştür.

4. TARTIŞMA

Türkiye'nin para politikası yöntemlerindeki değişiklikler ve enflasyon ile faiz oranları arasındaki ilişki konusunda halen yaygın bir mutabakatın olmaması, enflasyon ve faiz oranı arasındaki ilişkinin Fisher veya Neo-Fisher etkisi bağlamında yeniden incelenmesini gerekli kılmıştır. Ekonometrik analizde zamanla değişen bir yaklaşımın kullanılması, çalışmayı önceki çalışmalardan ayıran önemli bir özellik olarak ortaya çıkmaktadır.

Sonuçlarımız, Schmitt-Grohe ve Uribe (2017), Cochrane (2016) ve Uribe (2017) gibi Neo-Fisher ile ilgili diğer makalelerle tutarlılık arz etmektedir. İlgili makalelerde hem enflasyonun hem de nominal faiz oranlarının sadece uzun vadede değil aynı zamanda yakın vadede kalıcı bir para politikası şokundan olumlu etkilendiği savunulmaktadır. Eylül 2018'de ve Kasım 2020'de TCMB bir hafta vadeli repo faiz oranında artış yapmıştır. AOFM ve TÜFE arasındaki Granger nedensellik ilişkisi de bu aşamadan sonra daha güçlü hale gelmiştir.

Fisher (1930) hipotezi, nominal faiz oranları ile beklenen enflasyon oranlarının pozitif bir ilişkiye sahip olduğunu öne sürdüğü gibi, nedenselliğin enflasyon oranlarından faiz oranlarına doğru var olduğunu iddia etmektedir. İlgili dönemler için Fisher etkisi Türkiye'de gözlemlenmiştir. Türkiye'de Fisher etkisi ile ilgili elde edilen sonuçlar, TÜFE ve AOFM arasında nedensellik ilişkisinin var olduğunu göstermektedir. İncelenen dönemde Türkiye'de Neo-Fisher etkisi özellikle 2018 yılından sonra Fisher etkisine göre daha belirgin halde gözlemlenmiştir.

SONUÇ

Uzun vadede Fisher hipotezi beklenen enflasyonunun nominal faiz oranlarına neden olduğunu savunurken, Neo-Fisher hipotezi, nominal faiz oranlarının trend enflasyonuna neden olduğunu iddia etmektedir. Analizimizin sonuçlarına göre AOFM ve TÜFE değişkenleri arasında çift yönlü nedensellik ilişkisi mevcuttur. Bu gözlem Türkiye'de ilgili dönemde değişkenler açısından Fisher ve Neo-Fisher etkisinin varlığını göstermektedir. Ancak 2018 yılından sonra Fisher etkisine kıyasla Neo-Fisher etkisinin varlığı daha fazladır.

Faiz oranlarının merkez bankalarının enflasyona karşı uygulayacakları para politikalarında güçlü bir araç olması, AOFM ile TÜFE arasındaki nedensellik ilişkisinin yön ve derece sonuçları açısından önemli kılmaktadır. Uygulanacak para politikaları bu bağlamda ele alınmalı ve ekonomik kararlar her iki değişkenin birbirini etkilediği dikkate alınarak alınmalıdır. Çift yönlü bir etkileşim olmasına rağmen özellikle 2018 sonrasında faiz oranlarının enflasyon üzerinde daha belirgin bir etki yarattığı, enflasyonun faiz oranları üzerinde aynı etkiyi göstermediği bulgulardan anlaşılmaktadır. Bu nedenle faiz politikalarına ilişkin kararlar alınırken diğer ekonomik değişkenler de dikkate alınmalıdır. Merkez bankaları enflasyonla mücadele ederken faiz oranları tek seçenekleri olamayıp, araçlarını başka alternatiflerle çeşitlendirme imkânlarına sahiplerdir.

Neo-Fisher etkisi alışılmışın dışında bir para politikası konfigürasyonuna bağlı olsa da, Cochrane (2016) enflasyonu kontrol etmek için faiz oranlarının kullanılması için bazı gereklilikler olduğundan da bahsetmiştir. Öncelikle para ve maliye politikaları arasında koordinasyonun sağlanması gerekmektedir. İkinci olarak döviz kurlarındaki oynaklık istikrara kavuşturulmalı ve son olarak merkez bankalarının kredibilitesi yükseltilmelidir.

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KATKI ORANI / *CONTRIBUTION RATE*	AÇIKLAMA / *EXPLANATION*	KATKIDA BULUNANLAR / *CONTRIBUTORS*
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Veri Toplama ve İşleme / *Data Collecting and Processing*	Verileri toplamak, düzenlemek ve raporlamak / *Collecting, organizing and reporting data*	M. Enes OLGUN
Tartışma ve Yorum / *Discussion and Interpretation*	Bulguların değerlendirilmesinde ve sonuçlandırılmasında sorumluluk almak / *Taking responsibility in evaluating and finalizing the findings*	M. Enes OLGUN
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