ISSN: 2146-1740
https://dergipark.org.tr/tr/pub/ayd,
Doi: 10.54688/ayd.1475425

Araştırma Makalesi/Research Article

CAN EXCHANGE RATE CONTROL IN TURKİYE HELP THE CENTRAL BANK? EVALUATIONS WITHIN THE FRAMEWORK OF THE TAYLOR RULE

Yavuz ÖZEK [1] **Halil Oğuzhan ERGÜR**

Article Info

Received:
29/04/2024

Accepted:
11/06/2024

Abstract

This paper tests the validity of the Augmented Taylor rule in the Turkish economy for the period between February 2011 and February 2024 with the structural vector autoregression model. It is found that the central bank did not use the policy rate against deviations from inflation in the relevant period. On the other hand, the policy rate moves within expectations against deviations in the output gap and the real exchange rate. According to the structural impulse-response functions, the output gap and the inflation gap respond positively to a one-unit shock to the policy rate, while the real exchange rate reacts negatively. According to the results of structural variance decomposition, the most influential variable on changes in the policy rate is the real exchange rate deficit. In conclusion, the policy rate in the Turkish economy takes into account the output gap and the real exchange rate gap. However, it ignores the inflation gap.

Keywords: Augmented Taylor Rule, Structural VAR Model, Exchange Rate

JEL Clasifications: E31, E42, F31

[1]**Corresponding Author:** Assoc. Prof., Fırat University, ORCID: 0000-0003-4517-4875 yozek@firat.edu.tr
[2] Dr. Intependent Researcher, ORCID: 0000-0001-9475-7036 halilоguzhanergur@hotmail.com

Cite: Özek, Y. & Ergür, H. O. (2024). Can exchange rate control in Türkiye help the entral bank? Evaluations within the framework of the Taylor Rule. *Akademik Yaklaşımlar Dergisi*, *15*(2), 1016-1027.

1. Introduction

The neo-classical economic theory's approach that monetary policy (hereafter MP) will have no effect on macro parameters with the assumption that the markets will be cleared continuously is tried to be explained by Monetarist economics by moving monetary instruments on the path appropriate to the target. With the crises in the world economy and the integration of the markets, the public sector has attached more meaning to monetary policy. In the process of mitigating the effects of economic crises, central banks tend to implement a basket of rule-based policies. Thanks to the rule-based policies of central banks, economic agents take more action against the danger of asymmetric information. As a result of this situation, empirical economic theory also gives more space to studies on rule-based policy implementations.

According to Swensson (1998), the Taylor Rule (hereafter TR) involves adjusting the monetary policy rate in response to deviations in gross domestic product (heraafter GDP) and the inflation rate (hereafter π). The central bank of a country with an absolute reserve currency cannot be expected to add the exchange rate (hereafter, ER) to the TR. However, in developing countries, the ER has an important place in MP due to the expectations of economic actors, the import-oriented production structure and the fact that they are commodity exporters. In the Turkish economy, the fact that households keep their foreign currency savings under cushion due to currency substitution, the effect of the exchange rate on the general level of prices due to the high ER pass-through effect, the fact that exporters are constantly disturbed by the ER level in every period, and the sensitivity of the economy, which is a net commodity importer, to ER movements cause the central bank to keep the nominal ER in the forefront. Given the importance of the ER in MP, the main objective of this study is to evaluate the Augmented TR for the Turkish economy. On the other hand, there are debates in the empirical literature on which interest rate (herafter IR) component should be taken for the IR, which is the dependent variable. In this study, unlike other studies, we use the weighted average funding cost that the Central Bank of the Republic of Turkiye has been implementing since February 2011. Finally, studies generally use lagged autoregressive models. In this study, the structural vector autoregression model, which can both estimate parameters and obtain impulse-response functions and variance decomposition results, is preferred.

After this section, the theoretical background and literature review on the TR will be presented. Subsequently, the autoregressive model results of Blabchard and Quah (1988) are presented. The last section provides policy recommendations.

2. Theoretical Background and Literature Review

The monetary authority may pursue a non-rule-based policy as a result of political pressures to prioritize economic growth. The main objective of the rule-based policy is to bring the economy closer to potential gross domestic product and achieve full employment targets (Mehrotra & Sánchez-Fung, 2011). However, in this process, the signal lag brought about by the achievement of the policy objective takes the economy to a higher level at the peak of the cyclical fluctuation. In this case, economic agents can be expected to engage in irrational behavior when exposed to exogenous shocks (Tabal & Menna, 2020). According to Lear (2000), the time inconsistency of non-rules-based policies across periods may increase the dose of criticism of central bank monetary policy credibility. The main premise of those who propose a rule-based policy is to provide the central bank with target and instrument independence, thus freeing it from government pressure (Galimberti & Moura, 2013).

Taylor (1993) analyzes the response of potential and actual output-inflation to the MP interest rate. Taylor (1993) presents the function;

$$i=f(\pi_{gap}, y_{gap}) \quad (1)$$

i short-term IR, π_{gap} is the difference between target π and actual π, y_{gap} is the difference between full employment output and actual output. According to Orphanides (2007), the TR can be expressed as follows;i

$$-i^{*}= \beta_1 (\pi-\pi^{*})+ \beta_2 (y-y^{*}) \quad (2)$$

In this expression, π s actual inflation, π^{*} is target inflation, y is real GDP and y^{*} is potential GDP. In this model without a constant term, β_1 shows the effect of the π gap on short-term IR and β_2 shows the effect of the output gap on short-term IR. As national economies open up, they become more affected by the economic policies of the reserve currency. Greiber and Herz (2000) introduce a new determinant on the right-hand side of the equation by adding the exchange rate to the TR.

$$i-i^{*}= \beta_1 (\pi-\pi^{*})+ \beta_2 (y-y^{*})+ \beta_3 (e-e^{*}) \quad (3)$$

e is the actual real ER and e^{*} is the equilibrium real ER. Clarida et al. (1998) examine the validity of the TR in the USA, France, Germany, the UK, Japan and Italy with quarterly data for the period 1979-1990 using the panel estimation method. As a result of the study, they argue that the TR is valid in all countries in the panel. Österholm (2003) examines the validity of the TR in the Austrian economy in the 1992-2002 period, in the Swedish economy in the 1990-

2001 period and in the American economy in the 1960-1994 period and concludes that the rule is valid. Teles and Zaidan (2010) analyze the 2001-2007 period in developing countries within the framework of nonlinear time series methods. According to nonlinear time series models, the rule is valid in these countries. Verona et al. (2017) analyze the US economy for the period 1953-2011 and argue that the Federal Reserve Bank sets interest rates within the framework of market conditions. Zortuk (2006) argues that it is valid in the Turkish economy in the 2001-2006 period with a lagged autoregressive model. Yapraklı (2011) reaches the same conclusion for the period 2001-2009, Lebe and Bayat (2011) for the period 1986-2010, Alkın et al. (2019) for the period 2004-2016, Altınöz (2019) for the period 2004-2016, Şeker and Eroğlu (2022) for the period 2006-2021, again with a lagged model. Coşar and Köse (2019) include financial stability in the Augmented TR. They conclude that the central bank pays attention to financial stability when setting the policy rate for the 2002-2017 period. There are some studies that examine the validity of the TR across periods. Bulut and Tokatlıoğlu (2022), in their study examining the TR in the Turkish economy for the period January 2003-October 2021, argue that the TR was valid until the 2003-2008 period and that the stability of the Taylor equation deteriorated after the 2008 global economic crisis. However, there are some studies suggesting that the TR is not valid in the Turkish economy. Taş and Özbek (2021) conclude that the TR is not valid for the 2002-2020 period with the vector autoregression model and Toker (2020) concludes that the TR is not valid for the 2002-2019 and 2011-2019 periods with parameter estimation methods.

3. Empirical Results

This study tests the validity of the TR including the exchange rate in the Turkish economy between February 2011 and February 2024 when the weighted average cost of funding was introduced. In the model, the weighted average cost of funding (INT), the real ER based on the consumer price index (2003=100, REER), the industrial production index (2015=100, IPI), and the π derived from the consumer price index (2003=100) are used as proxy variables for the central bank PR. The natural logarithm of the real ER and industrial production index variables are taken. In the empirical literature, the Hodrick-Prescott (HP) Filter is generally used to obtain potential concepts. In order to obtain the potential output gap, the difference between the potential GDP obtained by the HP filter and the actual GDP is used. Similarly, HP filter is applied to the real ER variable and subtracted from the actual real ER. Again, in the empirical literature, the actual π is subtracted from the central bank's π target for the π gap. However, since the central bank is relatively optimistic in its π target, the π gap is obtained by subtracting

the actual π difference with the help of the HP filter. In the empirical analysis, the Phillips and Perron (1988) unit root test and Blanchard and Quah (1988) structural vector autoregression model results are presented first.

Table 1:
PP (1988) Unit Root Results

	Variables	Test Statistics		Test Statistics
Level	**IPIGAP**	1.709 (0.99)	*First Differecences*	-6.644 (0.00)***
	INFGAP	4.593 (0.99)		-4.753 (0.00)***
	INT	-0.336 (0.91)		-7.729 (0.00)***
	REER	-0.790 (0.81)		-9.171 (0.00)***
	IPIGAP	-0.625 (0.97)		-6.725 (0.00)***
	INFGAP	0.591 (0.99)		-4.854 (0.00)***
	INT	-1.501 (0.82)		-7.911 (0.00)***
	REER	-2.777 (0.20)		-9.114 (0.00)***

p<0.01 ****, () indicates probability values.

Table 1 presents the Phillips and Perron (1988) linear time series unit root test results. All variables in the model are clearly affected by economic shocks at their level values. When their first differences are taken, it is seen that these shocks are eliminated. The reason for the unit root problem in the industrial production index is the macroeconomic crises that emerged in both national and international markets during the empirical analysis period. The unit root in the PR, on the other hand, provides evidence that the IR hysteria effect may have occurred. This is because actual IRs are above the natural IR and natural IRs are expected to rise in the long run. The unit root in the π deficit reveals one of the most structural macroeconomic problems of the Turkish economy. The rigidity of π on the downside means that price expectations cannot be broken. The underlying cause of the unit root in the real ER deficit is the deterioration in π expectations. In the vector autoregression model where the errors are entered at stationary levels, the appropriate lag length is determined as four. TR including the exchange rate;

$$INT_t=\beta_0+ \beta_1 IPIGAP_t+ \beta_2 CPIGAP_t +\beta_3 REER_t+\varepsilon_t \quad (4)$$

In this simple regression, β_1 is the effect of the output gap obtained through the industrial production index on the weighted average cost of funding, β_2 is the effect of the inflation gap obtained through the consumer price index on the weighted average cost of funding and β_3 is the effect of the real ER on the weighted average cost of funding. In import-oriented economies, depreciation of the national currency creates cost inflation. Central banks tend not to raise interest rates against the cost inflation caused by exogenous shocks. Therefore, the parameter β_3 s negative (Fendel et al., 2011).

Table 2:

Long Run SVAR Parameters

	INT	IPIGAP	INFGAP	REER
INT	C(1)	0	0	0
IPIGAP	C(2)	C(5)	0	0
INFGAP	C(3)	C(6)	C(8)	0
REEER	C(4)	C(7)	C(9)	C(10)

Coefficient C(2) represents the effect of parameter β_1 and output gap on the weighted average cost of funding in the above model, coefficient C(3) represents the effect of parameter β_2 and π gap on the weighted average cost of funding, and C(4) represents the effect of parameter β_3 and real ER on the weighted average cost of funding. The coefficients are estimated using the Blanchard and Quah (1988) long-run structural vector autoregression (SVAR) model.

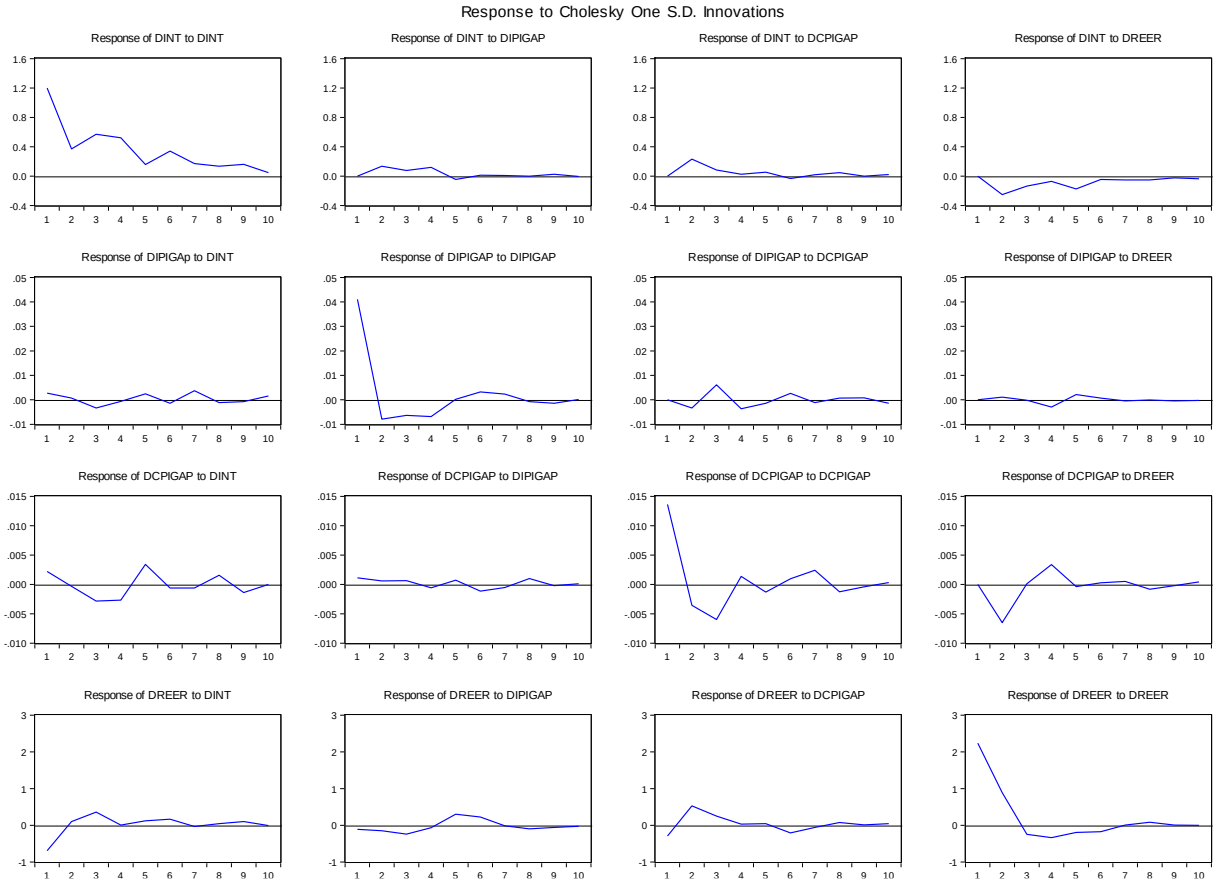
Table 3:
Long Run SVAR Parameters for the Augmented Taylor Rule

	INT	IPIGAP	INFGAP	REER
INT	C(1) 4.062 (0.00)***	0	0	0
IPIGAP	C(2) -0.485 (0.00)***	C(5) 1.795 (0.00)***	0	0
INFGAP	C(3) 0.0005 (0.29)	C(6) -0.001 (0.018)**	C(8) 0.006 (0.00)***	0
REER	C(4) -0.364 (0.03)**	C(7) 0.096 (0.56)	C(9) -0.775 (0.00)***	C(10) 1.938 (0.00)***

p<0.05 **, p<0.01 ****

In the model where the weighted average cost of funding is the dependent variable, the effects of output gap and real ER on the weighted average cost of funding are statistically significant at the 1% and 5% levels, respectively. Accordingly, if the output gap increases by 1%, the weighted average cost of funding decreases by 0.48%. Moreover, if the real ER increases by 1%, the weighted average cost of funding decreases by 0.36%. In the model, the effect of the π gap on the weighted average cost of funding is statistically insignificant. According to the Augmented TR, the coefficient C(2) indicating the effect of the output gap on the PR and the coefficient C(3) indicating the effect of the π gap on the PR should have positive values. The coefficient C(4), which shows the effect of the real ER on the PR, is expected to be zero (Sheel, 2014). A negative coefficient on the effect of the real ER deficit on the PR indicates that the national currency depreciates. In response to this situation, which increases imports, the central bank should lower the PR. Short-term capital movements will exit the country in a falling IR environment. Increasing nominal ER will increase exports and decrease imports in

the short run with the J curve effect. On the other hand, the increase in the PR in the face of an increase in the output gap is explained by the central banks' desire to control the π gap (Goyal & Tripathi, 2014).



Graphic 1:

SVAR Impulse-Response Functions

Graphic 1 shows the impulse-response functions obtained from the structural vector autoregression model. A one-unit shock to the weighted average cost of funding responds positively and over ten periods. However, the output gap, the π deficit and the real ER do not respond statistically significantly to a shock to the weighted average cost of funding. The response of the weighted average cost of funding to a shock to the output gap is positive and significant for one period. The positive response of the output gap itself to a shock to the output gap remains very low. Again, the π gap and the real ER do not respond to a shock to the output gap. The response of the weighted average cost of funding to a shock to the π deficit is positive and lasts for two periods. The response of the output gap to a shock to the π deficit is positive and lasts for four periods. Finally, the response of the real ER to a shock to the π deficit is statistically insignificant. The response of the weighted average cost of funding to a shock to the real ER is negative and significant for two periods. The response of the output gap to a

shock to the real ER is negative and significant for five periods, while the response of the π deficit is negative and significant for one period. The response of the own response to a shock to the real ER is positive and significant for four periods.

Table 4:
SVAR Variance Decompositons

DINT Variance Decompositons						DCPIGAP Variance Decompositons					
Period	S.E.	DINT	DIPI	DCPI	DREER	Period	S.E.	DINT	DIPI	DCPI	DREER
1	1.20	100.00	0.00	0.00	0.00	1	0.01	2.54	0.63	96.83	0.00
2	1.31	92.04	1.04	3.15	3.77	2	0.02	2.02	0.62	80.24	17.12
3	1.43	91.88	1.14	2.93	4.05	3	0.02	4.52	0.66	80.31	14.51
4	1.53	92.05	1.59	2.59	3.76	4	0.02	6.53	0.72	75.56	17.18
5	1.55	90.77	1.65	2.65	4.93	5	0.02	9.81	0.85	72.85	16.49
6	1.59	91.07	1.57	2.57	4.79	6	0.02	9.84	1.26	72.53	16.37
7	1.60	91.06	1.56	2.55	4.84	7	0.02	9.76	1.31	72.81	16.12
8	1.61	90.95	1.54	2.60	4.90	8	0.02	10.30	1.58	72.07	16.05
9	1.62	91.00	1.55	2.58	4.87	9	0.02	10.81	1.58	71.65	15.96
10	1.62	90.95	1.55	2.59	4.91	10	0.02	10.80	1.58	71.62	15.99
DIPIGAP Variance Decompositons						DREER Variance Decompositons					
Period	S.E.	DINT	DIPI	DCPI	DREER	Period	S.E.	DINT	DIPI	DCPI	DREER
1	0.04	0.43	99.57	0.00	0.00	1	2.36	8.69	0.22	1.55	89.55
2	0.04	0.44	98.84	0.66	0.07	2	2.58	7.41	0.54	5.44	86.62
3	0.04	1.03	96.24	2.66	0.07	3	2.64	8.90	1.34	6.08	83.69
4	0.04	1.02	95.19	3.26	0.53	4	2.66	8.75	1.38	5.99	83.89
5	0.04	1.32	94.58	3.34	0.76	5	2.69	8.76	2.59	5.89	82.76
6	0.04	1.41	94.14	3.67	0.78	6	2.72	8.94	3.21	6.36	81.49
7	0.04	2.07	93.45	3.70	0.78	7	2.72	8.94	3.21	6.42	81.43
8	0.04	2.13	93.36	3.72	0.78	8	2.72	8.94	3.33	6.46	81.26
9	0.04	2.16	93.30	3.75	0.79	9	2.73	9.06	3.37	6.45	81.12
10	0.04	2.27	93.09	3.85	0.79	10	2.73	9.06	3.38	6.47	81.09

In the first period, all of the changes in the weighted average cost of funding are self-induced. In the second period, 1% of the changes in the weighted average cost of funding were due to the output gap, 3% to the π gap and 3.7% to the real ER. In the last period, 90% of the changes in the weighted average cost of funding are self-induced, 1.5% are caused by the output gap, 2.6% by the π gap and 4.9% by the real ER. In the first period, almost all changes in the output gap are self-inflicted. A similar result emerges in the second period. At the end of the 10th period, 93% of the changes in the output gap are self-induced, 2.2% by the weighted average cost of funding, 3.8% by the π gap and 0.8% by the real ER. The π gap variable is most affected by the weighted average cost of funding in the first period. In the second period, the effect of the real ER on the π gap emerges surprisingly. In the last period, 71.61% of the changes

in the π gap are caused by the self, 10.8% by the weighted average cost of funding, 1.5% by the output gap and 16% by the real ER. In the first period, 89.5% of the changes in the real ER are affected by itself, 8.6% by the weighted average cost of funding, 1.5% by the π gap and a very small amount by the output gap. In the second period, 86.6% of the change in the real ER is self-induced, 5.4% is caused by the π gap and 7.4% by the weighted average cost of funding. In the last period, 81% of the changes in the real ER are caused by the real ER, 9% by the weighted average cost of funding, 6.4% by the π gap and 3.4% by the output gap.

4. Results and Policy Implications

Although the main objective of central banks is to achieve price stability, this does not mean that they ignore other macroeconomic variables. In open economies, the exchange rate creates cost inflation through imports. Moreover, unfavorable expectations of economic agents for the future lead to currency substitution. In an economy with currency substitution, the effectiveness of the central bank's monetary policy decreases. Demand inflation emerges with the exchange rate pass-through effect.

In the structural vector autoregression model, the coefficient for the real ER is negative. This has two implications for the economy. First, it causes asset prices to rise by creating demand inflation. Although the wealth of economic agents increases in national currency, it actually depreciates in foreign currency. This first effect is considered negative. Secondly, it affects the competitiveness of national firms in international markets in the Turkish economy, which has an import-based production structure. The fact that firms do not hold enough foreign currency against their foreign currency denominated loans leads to firm bankruptcies. This second effect is considered to be negative for the Turkish economy. Other independent variables in the model do not respond to shocks to the policy rate. Accordingly, the policy rate should not be given more importance than it actually should. This is because it indicates that the link between deposit rates and loan rates and the PR is broken. According to the variance decomposition results for the weighted average cost of funding, the weighted average cost of funding is affected most by the real ER and least by the output gap. Changes in the output gap are most affected by the π gap and least by the real ER. The fact that the real ER has the largest effect on the π gap indicates that the ER should be the first indicator that the central bank should control in order to ensure price stability. Thus, it can ensure price stability by limiting the ER pass-through effect. Limiting the ER pass-through effect will also facilitate the prevention of currency substitution in the economy. The most influential variable on changes in the real ER is the weighted average funding cost. Thus, IR are an effective tool to implement a manageable

ER policy. An optimal IR above the π rate will provide short-term capital flows to the economy. However, the negative effects of these hot money flows on the Turkish economy, whose production structure is based on imports, should not be ignored. Cheap imports may cause a deficit in the balance of payments and may cause a sudden stop while trying to utilize foreign savings.

In emerging economies, in addition to price stability, financial stability is also included in the policy bundle. In future studies, the concept of financial stability can be included in the Augmented Taylor rule. On the other hand, in parallel with the developments in econometric theory, nonlinear time series modeling can be used. In this way, the parameters of the output gap, π gap and real ER gap in contraction and expansion phases can be estimated. Finally, rolling window regressions can be used to find the relevant parameters for each period.

Peer-review: Externally peer-reviewed.

Contribution Rate Statement: Corresponding author %60 Other author %40

Conflicts of Interest: There is no potential conflict of interest in the study

REFERENCES

Alkın, H., Işık, S., & Çağlar, A. E. (2019). Türkiye'de Taylor kuralının asimetrik nedensellik testi. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (35), 211-225.

Altunöz, U. (2019). Faiz haddinin ekonominin gelir ve enflasyon seviyesine uyum sağlayabilirliği: türkiye ekonomisi için Taylor kuralı analizi, *Mehmet Akir Ersoy Üniversitesi İİBF Dergisi,* C:6, S:1, Nisan

Blanchard, O., J. & Quah, D. (1988). The dynamic effects of aggregate demandand supply disturbances. *American Economic Review*, 79, 655-73

Bulut, E., & Tokatlıoğlu, İ. (2022). Türkiye ekonomisi için genişletilmiş Taylor kuralı analizi: ARDL sınır testi. *Fiscaoeconomia*, *6*(3), 976-1002.

Clarida, R., J. Gali & M. Gerdler (1998), Monetary policy rules in practice: some ınternational evidence. *European Economic Rewiev*, 42, 1033-1067.

Coşar, K., & Köse, N., (2019). Zamanla değişen parametreli genişletilmiş Taylor kuralı: Türkiye için finansal istikrarın rolü. *İstanbul Gelişim Üniversitesi Sosyal Bilimler Dergisi*, *6*(1), 1-17.

Eroğlu, İ., & Şeker, H. (2022). Kurala Dayalı-İhtiyari politika tartışmaları çerçevesinde Taylor kuralı: TCMB özelinde bir uygulama. *Öneri Dergisi*, *17*(58), 589-612.

Fendel, R., Frenkel, M., & Rülke, J. C. (2011). "Ex-ante" Taylor rules and expectation forming in emerging markets. *Journal of Comparative Economics*, *39*(2), 230-244.

Galimberti, J. K., & Moura, M. L. (2013). Taylor rules and exchange rate predictability in emerging economies. *Journal of International Money and Finance*, *32*, 1008-1031.

Goyal, A., & Tripathi, S. (2014). Stability and transitions in emerging market policy rules. *Indian Economic Review*, 153-171.

Greiber, C., ve Herz, B. (2000). Taylor rules in open economies. *Working Paper Bayreuth University*

Lear W.V. (2000), A rewiev of the rules wersus discretion debate in monetary policy. *Eastern Economic Journal*, Vol:26, No:1

Lebe, F., & Bayat, T. (2011). Taylor kuralı: Türkiye için bir vektör otoregresif model analizi. Ege Akademik Bakış, 11(Özel), 95-112.

Mehrotra, A., & Sánchez-Fung, J. R. (2011). Assessing McCallum and Taylor rules in a cross-section of emerging market economies. *Journal of International Financial Markets, Institutions and Money*, *21*(2), 207-228.

Österholm, P. (2003). *The Taylor rule: a spurious regression?* (No. 2003: 20). Working Paper.

Sheel, A. (2014). A monetary policy rule for emerging market economies: the ımpossible trinity and the Taylor rule. *Economic and Political Weekly*, 39-42.

Svensson, L.E.O. (1998). Open-economy ınflation targeting. *NBER Working Paper*, No:6545.

Taş, S., & Özbek, S. (2021). Enflasyon hedeflemesi stratejisinde genişletilmiş Taylor kuralı'nın geçerliliği: Türkiye üzerine ampirik bulgular. *Journal Of Economics And Research*, *2*(1), 13-25.

Taylor J. B. (1993). Discretion versus policy rules ın practice. *Carnegie-Rochester Conference Series On Public Policy*, 39, 195-214.

Teles V.K. & Zaidan M. (2010). Taylor principle and inflation stability in emerging market countries. *Journal of Development Economics*, 91, 180-183.

Tobal, M., & Menna, L. (2020). Monetary policy and financial stability in emerging market economies. *Latin American Journal of Central Banking*, *1*(1-4), 100017.

Toker, K. (2020). Türkiye'de enflasyon hedeflemesi ve Taylor kuralının geçerliliği, Yüksek Lisans Tezi, Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü, Denizli.

Verona F. (2017). Financial shocks, financal stability, and optimal Taylor rules. *Journal of Macroeconomics*, 54, 187-207.

Yapraklı S. (2011). Türkiye'de açık ekonomi para politikası kuralının geçerliliği: sınır testi yaklaşımı. *İş, Güç, Endüstri İlişkileri ve İnsan Kaynakları Dergisi*, 13/01, 127-142.

Zortuk M. (2007). Koşulluluk aracı olma bağlamında kısa vadeli faiz oranlarının hedeflenen enflasyondan sapmada kullanımı: bounds test yaklaşımı (Türkiye örneği). *İstanbul Üniversitesi İktisat Fakültesi Ekonometri ve İstatistik Dergisi,* 6, 41-68.