THE IMPACT OF INFLATION TARGETING MONETARY POLICY ON MACROECONOMIC PERFORMANCE OF TURKEY DURING 2002-2022

Berdiyorov Bekzod Shoymardonovich
Turin Polytechnic University in Tashkent
ORCID: 0009-0008-6021-3549
bekzod.berdiyorov@polito.uz
Masharipov Sarvar Matkarimovich
JSC "KDB Bank Uzbekistan"
ORCID: 0009-0008-3828-0032
sarvar.masharipov@kdb.uz,

Abstract. *The main aim of the study is to investigate the impact of inflation targeting (IT) strategy in Turkey during 2002-2022, which was adopted in a three-year period of 2002-2004, on macroeconomic performance (actual inflation, exchange and interest rates) and economic growth of Turkey (in terms of the real GDP). The econometric and empirical investigation of this research focusing on the impact of inflation targeting on the selected macroeconomic variables were carried out by the linear squares method (LSM) regression taking the data of the period after implementation of the monetary policy. At this, the independent variable of inflation targeting was estimated against each chosen macroeconomic variable separately in four different models to catch its linear impact on the changes of these variables over the period after implementation of the strategy. The empirical outcomes demonstrated that inflation targeting monetary policy is strong enough to impact the macroeconomic performance of Turkey in terms of reducing inflation rates, boosting economy by pushing real GDP to grow, stabilize exchange rates and lower the nominal interest rates on deposits.*

Keywords: *inflation targeting (IT), macroeconomic performance, linear squares method.*

2002-2022-YILLARDA TURKIYADA INFLYATSION TARGETLASH SIYOSATINING MAKROIQTISODIY KO'RSATKICHLARGA TA'SIRI

Berdiyorov Bekzod Shoimardonovich
Toshkentdagi Turin Politexnika Universiteti
Masharipov Sarvar Matkarimovich
JSC "KDB Bank Uzbekistan"

Annotatsiya. *Tadqiqotning asosiy maqsadi Turkiyada 2002-2022-yillarda 2002-2022 yillarda uch yillik davrda qabul qilingan inflyatsiyani nishonlash (IT) strategiyasining makroiqtisodiy ko'rsatkichlarga (haqiqiy inflyatsiya, valyuta kursi va foizlar) ta'sirini o'rganishdan iborat. stavkalari) va Turkiyadagi iqtisodiy o'sish (real YaIM bo'yicha). Ushbu tadqiqotning ekonometrik va empirik tekshiruvi inflyatsiyani nishonlashning tanlangan makroiqtisodiy o'zgaruvchilarga ta'siriga qaratilgan bo'lib, pul-kredit siyosatidan keyingi davr uchun ma'lumotlardan foydalangan holda chiziqli kvadrat usuli (LSM) regressiyasi yordamida o'tkazildi.*

Bunday holda, inflyatsiyani maqsadlilashtirishning mustaqil o'zgaruvchisi har bir tanlangan makroiqtisodiy o'zgaruvchiga nisbatan, strategiya amalga oshirilgandan keyingi davr mobaynida ushbu o'zgaruvchilarning o'zgarishiga chiziqli ta'sirini aniqlash uchun to'rt xil modelda alohida baholandi. Empirik natijalar shuni ko'rsatdiki, pul-kredit siyosatini nishonga olgan inflyatsiya inflyatsiya darajasini pasaytirish, real YaIM o'sishini rag'batlantirish orqali iqtisodiyotni rag'batlantirish, valyuta kurslarini barqarorlashtirish va nominal depozit foiz stavkalarini pasaytirish nuqtai nazaridan Turkiyaning makroiqtisodiy ko'rsatkichlariga ta'sir ko'rsatish uchun etarlicha kuchli.

Kalit so'zlar: inflyatsiyani maqsadlilashtirish (IT), makroiqtisodiy ko'rsatkichlar, chiziqli kvadrat usuli.

ВЛИЯНИЕ ИНФЛЯЦИОННОГО ТАРГЕТИРОВАНИЯ ДЕНЕЖНО-КРЕДИТНОЙ ПОЛИТИКИ НА МАКРОЭКОНОМИЧЕСКИЕ ПОКАЗАТЕЛИ ТУРЦИИ В 2002-2022 ГГ.

Бердиёров Бекзод Шоймардонович
Туринский политехнический университет в Ташкенте
Машарипов Сарвар Маткаримович
АО «КДБ Банк Узбекистан»

Аннотация. Основной целью исследования является изучение влияния стратегии инфляционного таргетирования (ИТ) в Турции в 2002-2022 гг., которая была принята в трехлетний период 2002-2004 гг., на макроэкономические показатели (фактическая инфляция, обменный курс и процентные ставки) и экономический рост Турции (с точки зрения реального ВВП). Эконометрическое и эмпирическое исследование этого исследования, сосредоточенного на влиянии таргетирования инфляции на выбранные макроэкономические переменные, было проведено с помощью регрессии методом линейных квадратов (LSM) с использованием данных за период после реализации денежно-кредитной политики. При этом независимая переменная таргетирования инфляции оценивалась по отношению к каждой выбранной макроэкономической переменной отдельно в четырех различных моделях, чтобы уловить ее линейное влияние на изменения этих переменных за период после реализации стратегии. Эмпирические результаты показали, что денежно-кредитная политика таргетирования инфляции достаточно сильна, чтобы повлиять на макроэкономические показатели Турции с точки зрения снижения темпов инфляции, стимулирования экономики путем стимулирования роста реального ВВП, стабилизации обменных курсов и снижения номинальных процентных ставок по депозитам.

Ключевые слова: таргетирование инфляции (IT), макроэкономические показатели, метод линейных квадратов.

Introduction.

Turkey has been experiencing significant rate of inflation since 2022, peaking at 85.4% in October 2022 and amounting to 75.5% as of the beginning of August 2024. Why the country is suffering from high inflation, when its government has been implementing Inflation Targeting (IT) policy since 2002. Has this policy ever been effective Turkey?

There have been strong debates among scholars on the true influence of IT on acquiring economic development as well as stability. Many experts argue that targeting inflation is beneficial only for the developed countries' economies while the strategy is assumed to give negative results when implemented by emerging nations. According to Mankiw (2008), the failure in enhancing economic situation through targeting inflation is related to the unsuccessful fulfillment of the requirements and conditions prior to policy implementation. As the author states, a country satisfying the 2 of the main prerequisites upon implementation of monetary policy of inflation targeting, namely, independence level of monetary policymaker

and non-existence of any exchange rate targeting or preference, is able to adopt inflation targeting as its monetary policy tool. It should be noted that Mishkin (2008) defines inflation targeting as "…an economic policy in which the Central Bank estimates and announces in public a targeted inflation rate, and then attempts to steer the actual inflation towards the targeted range through the use of interest rate changes and other monetary policy instruments."

During the last two decades, many countries such as Turkey, Sweden, Canada, Germany, Nigeria, Switzerland, New Zealand and Iran actively focused on targeting their levels of inflation to facilitate economic growth (Eroglu et. al, 2017). Moreover, targeting inflation has mattered Turkey in 2000s, when the country faced depression after failing to target the exchange rate. After the failure of Turkey on targeting exchange rates, the Central Bank (CBT) eventually implemented floating exchange rate. Following that government needed more successful monetary policy to stabilize the economic situation in the country. The successful practice in several countries made inflation targeting strategy a preferable choice for Turkey during the next years. As a result, the Turkish government implemented the inflation targeting monetary strategy "implicitly" starting from 2002 till 2004 as per the "Transition to a strong Economy" program and is fairly consistent with this method up to present.

So how the inflation-targeting method influenced the macroeconomic performance of Turkey? Since the monetary control possibly has a huge influence on economic indicators which play a key role for an economy's healthy progress, it is assumed that policymakers impact the economy by targeting inflation through interest rates and money supply (Mishkin, 2010). There have been opposite arguments as well as conflicts among economists, politicians, various labor organizations and professionals about the positive or negative influence of objecting inflation on development of economy of Turkey. The finance minister of Turkey, for instance, made arguments in 2005 about the position in maintaining their own policies in order to target high inflation rate that obviously play essential role in encouraging economic development as well as stabilizing market prices. Meanwhile, the experts from labor organizations in Turkey demonstrates opposite position that the effect of inflation targeting on monetary stability can be exaggerated if economic development as well as improvement is achieved primarily due to the implementation of this strategy (Eroğlu et al., 2017).

The main aim of the study is to investigate the impact of inflation targeting (IT) strategy, which was adopted in a three-year period of 2002-2004, on macroeconomic performance (actual inflation, exchange and interest rates) and economic growth of Turkey (in terms of real GDP).

Literature review.

The previous researches on the topic define the term of inflation targeting in various ways. Nonetheless, the most comply with the approach of Mishkin (2000) that the inflation targeting (IT) strategy is "*a monetary policy strategy in which a medium-term numerical target is set for inflation, the primary goal of monetary policy is to assure price stability and no other monetary target is pursued, and the transparency and accountability of the central bank is attained*".

Inflation targeting in economics defined as a target of maintenance of low inflation rates and thus used to get stabilize pricing policy. According to Gul et. al (2006), so as to practice the inflation targeting, the developing countries are recommended to hold approximately 15 percent of inflation rate, as in the example of Turkey. Yet, Sanli (2006) argues that majority of the countries that wish to implement inflation targeting begin the strategy with around 25 percent inflation rate. He states that between 2002 and 2004, Turkey managed to success low inflation rate. In 2002, the country's inflation - consumer price index - was 29.7 percent and was steadily decreased by implementing the monetary tool of inflation targeting. Inflation rate was reduced to 18.4 in 2003 and 9.3 percent in 2004 and finally to 7.7 percent in 2005 (ibid.).

From 2005, although the inflation rate experienced some increases, Turkey managed to maintain the stable inflation rates (Eroğlu et. al, 2017).

The impact of inflation targeting in macroeconomic indicators

Since it was obvious that inflation targeting strategy enables to improve the country's macroeconomic performance, it was regarded by some researches as one of the best monetary policy strategies in both developing and developed countries (Portugal, 2007). Currently, the empirical studies that have been done on the inflation targeting are not numerous enough as *it is fairly new strategy* for most countries to adopt. However, there are several studies which support that inflation targeting leads to better macroeconomic performances. According to Petursson (2014), for instance, the interest rates could be reduced and the currency stability was observed when this strategy had been adopted.

Empirical studies including Neuman and Hagen (2012), Hu (2013), Wu (2014) and IMF (2015) suggest that macroeconomic performance of the country can be positively affected if inflation targeting is practiced. However, Ehrmann and Cecchetti (2006) and Ball (2008) argue their findings did not show economic boost when inflation had been targeted. Yet, overall, the studies found that when countries adopted inflation targeting, the macro-performance was improved.

Controversially, the studies by many experts such as Debelle (2009) on the case of Australia, inflation practicing country, as well as several nations that did not apply IT method, Corbo and Herbel (2008) who studied Latin American countries, Dickman (2011) supporting the Debelle (2009)'s finding on Australia, Freedman (2011) researching Canada, Brash (2012) studying New Zeeland, Schmidt- Hebbel and Werner (2012) studied Brazil, Mexico and Chile, supported the idea that inflation rate can indeed be reduced by following inflation targeting strategy. What is more, the economic growth has been detected in these countries, yet the growth rates were rather low. It can therefore be concluded that inflation targeting was ultimately considered as a reliable strategy for the monetary policy makers who implemented it.

King (2009) examined inflation targeting effects on 12 industrialized countries and found that without the reduction of production it is possible to decrease the inflation rate. Nevertheless, Studies by Jones and Mishkin (2008) who did research on the case of Poland, Czech Republic and Hungary claim that it is a bit early to consider that inflation targeting always brings success to economies. Moreover, the authors suggested that in transition economies when the inflation is targeted, significant inflation variabilities over time can be witnessed. In the study of Fraga et. al (2008), the outcomes showed that IT monetary policy had been highly significant tool of stabilizing economy of emerging markets. However, another research by Karaca (2016) taking the example of more than hundred developing economies depicted, IT strategy lead to rather weak changes in actual inflation rates and did not hold influence on other macro-indicators.

Kara and Orak (2018) examined the average inflation rate expectations during 2002-2004 period of inflation targeting implementation in Turkish economy. According to the results, the inflation rates in these three years were in a decline and in line with the targeted corridors, despite the pre-adoption inflation rates had been quite high at average of 73%.

According to the study by Akyazi and Ekinchi (2018), IT strategy had been effective in Turkey and other developing countries who adopted it. The actual inflation rates and economic growth were positively influenced by inflation targeting. The scholars suggest that Turkish economy could acquire significant results on addressing high inflation rates and achieve higher GDP growth due to IT strategy, in comparison with pre-implementation periods.

Besides, Isik and Duman (2018) mentioned the exchange rate system of the Turkish financial market as one of the advantages and prerequisites of IT adoption. According to the scholars, the pre-implemented regime of floating exchange rates in Turkey assisted to lower the control of CBT (Central Bank of Turkey) on exchange rates, which in turn, increased the

impact of inflation targeting policy. At this, with the single monetary policy of inflation targeting, CBT increased its trustworthiness and the economy acquired lower inflation rates and growth.

Furthermore, it is suggested that even during the global financial recession of 2008, Turkish government could implement more robust policies to tackle and minimize financial and economic harm of crisis (Eruglu et. al, 2017). At this, the economic situation of Turkey on inflation targeting process was key to these policies.

Methodology.

The main aim of the paper is the analysis of the impact of the inflation targeting (IT) policy on economy of Turkey. In econometric terms, the research tests the consistence of our hypothesis that the above impact is positive enough to enhance overall macroeconomic performance of the country during the years of application. At this, the alternative hypothesis and the relative null hypothesis consist of the following:

H_0: The economic development of Turkey was not influenced considerably by the framework of the monetary policy of targeting inflation.

H_1: The economic development of Turkey was influenced considerably by the framework of the monetary policy of targeting inflation.

In other words, the research aims to define, analyze and explain the influence of IT on macro-performance and development in Turkey. In this regard, quantitative estimation is implemented.

The method of research, which is based on analyzing empirical results and figures in broad comparison, will show the influence of IT strategy realization on actual rates of inflation, exchange, interest rates as well as changes real GDP over the periods. In this regard, data containing 17 years was gathered from the websites of leading databases of the world, such as the World Development Indicators.

Model and Dataset.

Within this study, apart from the proxy for the inflation targeting, 4 common indicators of macroeconomic performance, namely, deposit interest, inflation, exchange rates and real GDP of Turkey, were utilized. The estimation of results on these variables were carried out with the help of Least Squares Method (LSM) taking the data of the period after implementation of the monetary policy.

According to Ball (2003) and Fraga et. al (2003), this approach was previously utilized in the analyses of performances. In previous studies, descriptive explanatory estimations were utilized to investigate the effect of inflation targeting, however, in this research, least squares method is being utilized. For example, scholars such as Mishkin and Jones (2003), Hu (2003), Fraga et al. (2008), Akyazi and Ekinci (2018) and Isik and Duman (2018) utilized more descriptive estimating method with scatter plots, standard deviations, means and etc. The LSM method has its pros if compared to other alternatives. The main advantage is that least squares estimation is defined as the Best Linear Unbiased Estimation (BLUE), which easily describes points.

Table 1.

Data description:

Abb	Variable	Definition	Exp. sign
TIR	Target Inflation	Targeted inflation rates by Central Bank of Turkey, in %	N/A
AIR	Inflation rate	Annual inflation rates in terms of change in CPI, in %	-
EXCH	Exchange rate	Change in purchasing power of Lira against USD, in %	-
INT	Interest rate	The deposit interest rate of one year maturity, in %	-
GDP	Real GDP	Real Gross domestic product of Turkey in USD, in log	+

The main conclusion can be derived from previous studies that the adoption of this strategy results in a decrease in inflation rates and their volatility, which means that the projected correlation between TIR and AIR is negative. Besides, most inflation targeted countries experienced economic growths in different pace, thus, the targeted inflation rates are positively related with real GDP. Another attribute of the inflation targeting, as was stated by the scholars, when implemented, this strategy helps to stabilize exchange rates and decrease interest rates. This leads us to an assumption that interest and exchange rates are negatively correlated to IT.

To carry out our investigation, the data from World Development Indicators database was acquired. The study takes the period of 21 years (2002-2022) after the implementation. The data contains the following macroeconomic indicators of Turkey.

So, was the implemented monetary policy by the Turkish government in 2002-2004 successful? If so, how the strategy changed the variables that are being regressed. To expose the impact in details, following model was established:

Model: The below equation was established to examine the relationship between inflation targeting strategy and the actual outcomes in given indicators of Turkey. At this, the model is subjected to be separately used for each chosen macroeconomic indicator.

$$Y_t = \beta_0 + \beta_1 * TIR_t + \beta_2 * t_t + u_t \qquad (1)$$

At this, each of the chosen indicator is defined by Y_t to individually check for their relation to targeted inflation rates, which are defined as TIR_t. Here, time variable is also included as t_t while the constant value is set as β_0 by default. u_t is for residuals and β_1 and β_2 are coefficients of TIR_t and time trend, respectively. In this sense, β_1 represents the impact of targeted inflation rates on each variable that, in turn, makes it the research's main coefficient.

Empirical results.
Before carrying out econometric regressions over the variables of the model, several tests on the consistency and validity of the gathered data should be implemented.

Unit Root Tests: When dealing with time-series data, the inputs should be first checked for stationarity before implementing any regressions, as stated by Tari (2005). Data that is not stationary can provide incorrect or deceptive results to researchers, apart from causing some problems in estimations. As the scholar claims, the non-stationarity of the two variables in LSM can cause the derived R-squared to be abnormally high. In this sense, the researchers can get confused when setting conclusion on the correlation and significance of the models, referring to incorrect R-squared. Regarding to Enders (2005), such situation is called spurious estimation which is the result of similar direction of time-series trends.

Stationarity of the variables is *"... a stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed"* as stated by Gujarati (2003).

As per the above definition, there are following assumptions for Y_t:

$$\text{Mean} \quad : E(Y_t) = \mu \qquad (2)$$

$$\text{Variance} \quad : Var(Y_t) = \gamma_0 = E(Y_t - \mu)^2 \qquad (3)$$

$$\text{Covariance} \quad : Cov(Y_t, Y_{t+k}) = \gamma_k = E[(Y_t - \mu)(Y_{t+k} - \mu)] \qquad (4)$$

Y_t with the above features is called weak stochastic but still stationary - sufficient for use.

Many methods of identifying stationarity of variables exist but the most famous way is the Unit Root test. The main assumption in this test is that the variables of time-series should have no unit root in order to be considered as stationary, otherwise, the variables are subjected to

the non-stationarity problem. In this research, I used the common unit root test called Augmented Dickey-Fuller (ADF) test. The general equation of this test is as following:

$$\Delta Y_t = \mu + \beta t + \delta Y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta Y_{t-i} + \varepsilon_t \tag{5}$$

At this, the variable's first difference testable for stochastic stationarity is defined by ΔYt, where t is the time trend. Besides, the term of delay difference is presented by ΔYt-1, which is used in the regression to escape the problem of autocorrelation in residuals. According to Karaca (2005), the equation must not have any kinds of autocorrelation problem in order for ADF test to give correct results. Moreover, k is the number of lags taken for variables, which is identified by the SIC (Schwarz Information Criterion) or AIC (Akaike Information Criterion). The stochastic residuals are given as εt.

Table 2.

Augmented Dickey-Fuller unit root test outcomes:

Variable	ADF	Lag	T,S
Targeted inflation rates (TIR)	-3.267 (-3.750*)	1	T+S
Actual inflation rates (AIR)	-4.068*	0	T+S
Exchange rates (EXCH)	-4.111*	1	T+S
Interest rates (INT)	-5.927*	0	T+S
Real GDP (ln_GDP)	-3.776*	1	S

*the variable is stationary at 1% level of significance

The ADF test examines whether the Y_{t-1} parameter of δ is zero. If so, the variables are assumed to be non-stationary due to existence of unit root. Otherwise, the variables are stationary without any unit root. This case is defined as δ ≠ 0, δ < 0.

Upon the application of the ADF test in this research, it is better to clarify the structure of equation first. 9 lags are set to be the maximum length of lags applied in this test as per the SIC (Schwarz Information Criterion).

The above table demonstrates that only targeted inflation rates (TIR) variable contains unit root and is non-stationary. However, after first difference of TIR, unit root was avoided and stationarity was acquired.

Analysis of results.

According to Serper (2000), there are many assumptions that serve as a base for linear estimation. One of them is the normal distribution of residuals, which means the zero mean of residuals. The others imply the absence of autocorrelation and heteroskedasticity problems within the error terms.

The normal distribution of variables or residuals can be defined as the variables' visual appearance in symmetric hill-shaped curve. The zero mean is defined as the situation when the sum of the all the residuals of the variable is zero (ibid.).

If the issue of residuals' non-normal distribution exists, the problems can still be solved by the assumption of Central Limit Theorem (CLT), as stated by Cil (2004). The theorem defines that the normal distribution of residuals can be achieved if the size of sample (number of observations) is increased.

It is also not desired for the variables to have the problems of heteroscedasticity and autocorrelation. These problems can be found, if exists, by several tests. According to Alkan and Nargelecekenler (2008), the above-stated problems can be addressed by the Newey-West Heteroskedasticity and Autocorrelation (HAC) test.

After utilization of linear regressions, the below results on the effect of IT (inflation targeting) strategy on the chosen indicators, namely, actual inflation, interest, exchange rates

and real GDP of Turkey were acquired. For the purpose of eliminating the potential problems of autocorrelation and heteroscedasticity, log forms of variables were generated and applied within regression estimations, as was suggested by Tari (2005).

Table 3.

Results of separate linear regressions:

VARIABLES	MODEL 1 Log (Inf. rate)	MODEL 2 Log (Real GDP)	MODEL 3 Log (Exch. rate)	MODEL 4 Log (Int. rate)
D1 Inf. target.	-0.0711464	0.0423214	-0.041058	-0.0364417
	(-3.40)***	(4.16)***	(-3.69)***	(-2.64)***
Time trend	0.0464888	0.0306795	0.0981597	-0.0147916
	(2.48)***	(3.36)***	(9.85)***	(-1.20)
Constant	1.656114	27.05234	-0.3664161	3.012189
	(7.66)***	(257.23)***	(-3.19)***	(21.14)***
Observations	16	16	16	16
R-squared	0.4733	0.8609	0.8938	0.6237
Adjusted R-sq.	0.3923	0.8395	0.8775	0.5659
F-test	0.0155	0.0000	0.0000	0.0017

*t statistics values in parentheses: *** p<0.01, ** p<0.05, * p<0.1*

Model #1 (Actual Inflation rates)

As per the Model 1 regression outcomes (*table 3*), the coefficient of differenced targeted inflation (tirD1) variable was -0.0711464, which is negative as was projected. The variable is significant at 1%. It means that the inflation targeting strategy decreases the inflation rates.

Time trend (t) had a positive coefficient of 0.0464888 and statistically significant at the level of 1% while the adjusted R-squared equaled 0.3923 that suggests more than 39% of the fluctuations in the actual inflation rates can be explained by this model and the other 61% is related to non-included factors and indicators. Moreover, F-test shows us that the model itself is at 1% level of significance. The above values demonstrate that the monetary policy under this research is effective to decrease inflation rates, yet not highly effective.

Model #2 (Real GDP)

The Model 2 regression outcomes show that the coefficient of differenced targeted inflation (tirD1) variable was 0.0423214, which is positive as was projected in advance. The variable is significant at 1%. It means that the inflation targeting strategy boosts the economy and leads to a growing real GDP of Turkey.

Time trend (t) had a positive coefficient of 0.0306795 and statistically significant at the level of 1% while the adjusted R-squared equaled 0.8395 that suggests almost 84% of the changes in real output of Turkey can be represented by this model and the remaining 16% is related to non-included factors and indicators. Moreover, F-test shows us that the model itself is at 1% level of significance. The above values demonstrate that the inflation targeting monetary policy is strongly effective to increase real output of Turkey.

Model #3 (Exchange rates)

As per the Model 3 regression outcomes, the coefficient of differenced targeted inflation (tirD1) variable was -0.041058, which is negative as was projected. The variable is significant at 1%. It means that the inflation targeting strategy decreases the exchange rates. Time trend (t) had a positive coefficient of 0.0464888 and statistically significant at the level of 1% while the adjusted R-squared equaled 0.8775 that suggests about 88% of the fluctuations in the exchange rates can be explained by this model and the other 12% is related to non-included factors and indicators. Moreover, F-test shows us that the model itself is at 1% level of significance. The above values demonstrate that the monetary policy under this research is effective to decrease inflation rates and highly correlated.

Model #4 (Interest rates)

The Model 4 regression outcomes show that the coefficient of differenced targeted inflation (tirD1) variable was -0.0364417, which is negative as was expected beforehand. The variable is significant at 1%. It means that the inflation targeting strategy will lead to a decrease in the deposit rates.

Time trend (t) had a positive coefficient of -0.0147916 and statistically significant at the level of 1% while the adjusted R-squared equaled 0.5659 that suggests almost 57% of the changes in real output of Turkey can be represented by this model and the remaining 43% is related to other factors. Moreover, F-test shows us that the model itself is at 1% level of significance. The above outcomes suggest that the inflation targeting strategy has fairly strong effect in the nominal interest rates on deposits.

Table 4.

Results of de-trended variables' linear regressions:

VARIABLES	MODEL 1 Log (Inf. rate)	MODEL 2 Log (Real GDP)	MODEL 3 Log (Exch. rate)	MODEL 4 Log (Int. rate)
D1 Inf. target.	-0.0711464	0.0423214	-0.041058	-0.0364417
	(-3.40)***	(4.16)***	(-3.69)***	(-2.64)***
Constant	-.0590127	.0292828	-.01955	-.0331447
	(-0.85)	(0.86)	(-0.56)	(-0.74)
Observations	16	16	16	16
R-squared	0.4235	0.5216	0.4924	0.3178
Adjusted R-sq.	0.3823	0.4875	0.4561	0.2690
F-test	0.0063	0.0016	0.0024	0.0230

*t statistics values in parentheses: *** p<0.01, ** p<0.05, * p<0.1*

However, by including the time trend (t) into the regressions, inflated high R-squares were obtained. In order to get the reasonable outcomes, the variables were de-trended and input to the regressions again. The results, including the t-statistics, coefficients and p-values were the same as the regressions with the time trend, while only R-squared values were less and reasonable (*table 4*).

Comparison the periods of pre and post adoption

The above econometric analysis gave us the results on how much the inflation targeting impacted the macroeconomic performance of Turkey after adoption. However, comparing the results of pre and post adoption period figures shows us the real enhancement in the economy of the country. Below, the findings of Eruglu et. al (2017) on the statistics of chosen macroeconomic variables are given separately for pre and post years of strategy implementation. The author used gathered data of 1990-2002 for the pre-inflation targeting period and for post-adoption of 2002-2007, in order to avoid the global crisis effects on the country's economic situation.

Figure 5.

The basic comparison of variables during pre and post-adoption periods of IT:

№	Variables	Pre-adoption of 1990-2002		Post-adoption of 2002-2007	
		Mean	Std.dev.	Mean	Std.dev.
1	Actual inflation	73.7%	17.9%	17.7%	15.3%
2	Rate of GDP growth	3.6%	5.5%	6.8%	1.7%
3	Deposit interest rates	65.1%	28.8%	28.7%	11.4%
4	Exchange rate change	4.7%	6.1%	-0.1%	3.6%

As the preliminary comparison of the inflation, exchange, interest rates and GDP growth rate figures during pre and post implementation, Eruglu et. al (2017) uses the values such as mean and standard deviation to show the impact of inflation targeting on the above stated macroeconomic variables. At this, the mean values associate the arithmetic mean of the above indicators while the standard deviations show their volatility over the periods of time.

According to the table above, after adoption of inflation targeting strategy, inflation rates in Turkey on average decreased to 17.7% from 73.7% while the decline in nominal deposit interest rates constituted about 36% from 65% to 28.7%. The influence of inflation targeting on growth rate was also significant. The growth rates on average went up from 3.6% in pre-adoption years to 6.8% in post-adoption years. Moreover, the exchange rates' mean value of annual change during 1990-2002 was 4.7%, which decreased to average of -0.1% during 2002-2007.

The changes in the standard deviations of the indicators demonstrates the decline in their volatility after implementation of inflation targeting. For example, the volatility of inflation rates went down to 15,3% from 17,9% and the volatility of GDP growth declined from 5,5% to 1,7% after the usage of the strategy. So, the above results refer to the idea that IT monetary policy is proven to be strong enough to impact the macro-performance of Turkey in terms of reducing inflation rates, boosting economy by pushing real GDP to grow, stabilize exchange rates (even decrease to a negative value) and lower the nominal interest rates on deposits.

Indeed, the comparison of the results during pre and post IT implementation shows clear picture on the extend of the strategy's impact on Turkey's economy during the given years. According to Sanli (2006), between 2002 and 2004, Turkey managed to success low inflation rate. In 2002, the country's inflation - consumer price index - was 29.7 percent and was steadily decreased by implementing the monetary tool of inflation targeting. Inflation rate was reduced to 18.4 in 2003 and 9.3 percent in 2004 and finally to 7.7 percent in 2005 (ibid.). From 2005, although the inflation rate experienced some increases, Turkey managed to maintain the stable inflation rates (Eroglu et. al, 2017).

Conclusion.

There have been numerous researches on the effects of inflation targeting monetary policy on the economic growth and macroeconomic performance of many countries recently. The main conclusion can be derived from these studies that the adoption of this strategy leads to a decrease in inflation rates and their volatility. Besides, most inflation targeted countries experienced economic growths in different pace. Another attribute of the IT was that when implemented, this policy helps to stabilize exchange rates and decrease interest rates.

Since it was obvious that inflation targeting strategy enables to improve the country's macroeconomic performance, it was regarded by some researches as one of the best monetary policy strategies in both developing and developed countries (Portugal, 2007). Currently, the empirical studies that have been done on the inflation targeting are not numerous enough as *it is fairly new strategy* for most countries to adopt. However, there are several studies which support that inflation targeting leads to better macroeconomic performances. According to Petursson (2014), for instance, the interest rates could be reduced and the currency stability was observed when this strategy had been adopted.

My research examined the impact of inflation targeting strategy, adopted in 2002-2004, on macroeconomic performance (actual inflation, exchange and interest rates) and economic growth of Turkey (in terms of the Real Gross Domestic Product) during 17 years from 2002 to 2018. The econometric and empirical investigation of this research focusing on the impact of inflation targeting on the selected macroeconomic variables were carried out by the linear squares method (LSM) regression. At this, the independent variable of IT was estimated against each chosen macro-variable separately in four different models to catch its linear impact on the changes of these variables over the period after implementation of the policy.

So how the inflation-targeting method influenced the macroeconomic performance of Turkey? Was the inflation targeting monetary policy adopted in early 2000s by Turkey successful to address the economic depression? The empirical outcomes of this research show that the strategy was strongly efficient in the performance of the chosen macroeconomic variables. Although the coefficients of targeted inflation rate variable (TIR) and time trend (t) were rather low, the regressions results gave us the expected coefficient signs of correlation. Besides, both the above regressors were statistically significant at 1% level of significance.

Moreover, the all the four models of regressions were statistically significant, as per the respective F-test values, with adjusted R-squares of ranging from 0,3923 to 0,8775.

The results are in close to the conclusions made by Kara and Orak (2018) that examined the average inflation rate expectations during 2002-2004 period of inflation targeting implementation in Turkish economy. According to the scholars, the inflation rates in these three years were in a decline and in line with the targeted corridors, despite the pre-adoption inflation rates had been quite high at average of 73%. Besides, the study by Akyazi and Ekinchi (2018) also suggested that IT strategy had been effective in Turkey and other developing countries who adopted it. The actual inflation rates and GDP growth were positively influenced by inflation targeting. The Turkish economy acquired significant results on addressing high inflation rates and achieve higher GDP growth due to IT strategy, in comparison with pre-implementation periods (ibid.).

Besides, Isik and Duman (2018) mentioned the exchange rate system of the Turkish financial market as one of the advantages and prerequisites of IT adoption. According to the scholars, the pre-implemented regime of floating exchange rates in Turkey assisted to lower the control of CBT (Central Bank of Turkey) on exchange rates, which in turn, increased the impact of inflation targeting policy. At this, with the single monetary policy of inflation targeting, Central Bank of the country increased its trustworthiness and the economy acquired lower inflation rates and higher growth. Furthermore, it is suggested that even during the global financial recession of 2008, Turkish government could implement more robust policies to tackle and minimize financial and economic harm of crisis (Eruglu et. al, 2017). At this, the economic situation of Turkey on inflation targeting process was key to these policies.

In this sense, it can be concluded that inflation targeting monetary policy is proved to be strong enough to impact the macroeconomic performance of Turkey in terms of reducing inflation rates, boosting economy by pushing real GDP to grow, stabilize exchange rates and lower the nominal interest rates on deposits. The empirical results may show even stronger correlation if the research is carried out again in the future with more variables employed and more years are considered.

Reference:

Aklan, N. A., & Nargelecekenler, M. (2008). *Para Politikası Faiz Kararları ve Uzun Donem Faiz İlişkisi: Turkiye Orneği [Policy rates decisions and its relation with long term ınterest rates: Evidence from Turkey]. Marmara Unıversıty Journal of Economıc and Admınıstratıve Scıences, 25, 141–163.*

Akyazı, H. (2008). *Enflasyon Hedeflemesi, Ulke Deneyimleri ve Turkiye'de Uygulanabilirliği [Inflation targeting, country experiences and applicability in Turkey] (1st ed.). Ankara-Turkey: Seckin Press.*

Akyazı, H., & Ekinci, A. (2008). *Enflasyon Hedeflemesi Stratejisinin Performansı: Gelişmekte Olan Ulkeler ve Turkiye Karşılaştırması [The performance of ınflation targeting: A comparison between Turkey and developing countries]. Marmara Unıversıty Journal of Economıc and Admınıstratıve Scıences, 24, 21–39.*

Ball, L., & Sheridan, N. (2003). *Does ınflation targeting matter? (IMF Working Paper No: 03/129).*

Berdiyorov, B. S. (2024). The Impact of Corruption on Foreign Direct Investment Inflows: Empirical Evidence from 64 Developing Countries. Actuarial Finance and Accounting Journal. Volume-4, Issue #5, pp 116-125.

Bernanke, B. S., & Mishkin, F. S. (1997). Inflation targeting: A new framework for monetary policy? (NBER Working Paper No. 5893).

Eroğlu, İ. (2017). Acık Enflasyon Hedeflemesi Stratejisi ve Turkiye Deneyimi [Open inflation targeting strategy and Turkey experience]. Karamanoğlu Mehmetbey Unıversıty Journal of Economıc and Admınıstratıve Scıences, 9, 1–28.

Eroğlu, N., & Eroğlu, İ. (2017). Kuresel Kriz ve Bir Para Politikası Stratejisi Olarak Enflasyon Hedeflemesi'nin Rolu [The global crisis and the role of inflationtargeting as a monetary policy strategy]. Journal of finance political and economic reviews, 47, 61–70.

Fraga, A., Goldfajn, I., & Minella, A. (2013). Inflation targeting in emerging market economies (Working Paper Series of Banco Central Do Brasil No. 76). 1–50.

Hu, Y. (2013). Empirical investigations of inflation targeting (Institute For International Economics Working Paper No: 03/6).

Işık, S., & Duman, K. (2018). Enflasyon Hedeflemesi ve Dalgalı Doviz Kuru: Bazı Ulke Deneyimleri [Inflatıon targetıng and floatıng exchange rate: Experıences of some countrıes]. Mediterranean Unıversıty Journal of Economıc and Admınıstratıve Scıences, 15, 50–86.

Jones, J., & Mishkin, F. S. (2013). Inflation targeting in transition countries: Experience and prospects (NBER Working Paper Series Working Paper No. 9667).

Karaca, O. (2016). Enflasyon Hedeflemesi Gelişmekte Olan Ulkelerde Calışır Mı? [Will ınflation targeting work in emerging countries?]. (The Turkish Economic Association Discussion Paper No. 2006/12).