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Article

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Central Bank Review (CBR)

Provided in Cooperation with:

Central Bank of The Republic of Turkey, Ankara

Suggested Citation: Dubey, Amlendu Kumar; Mishra, Akanksha (2023) : Anticipation of central banks' adoption of inflation targeting and its effect on inflation, Central Bank Review (CBR), ISSN 1303-0701, Elsevier, Amsterdam, Vol. 23, Iss. 2, pp. 1-13, <https://doi.org/10.1016/j.cbrev.2023.100118>

This Version is available at:

<https://hdl.handle.net/10419/297960>

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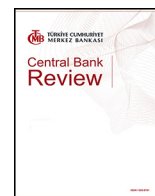
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Anticipation of central banks' adoption of inflation targeting and its effect on inflation[☆]

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ARTICLE INFO

Article history:

Received 2 March 2022

Received in revised form

14 May 2023

Accepted 7 June 2023

Available online 28 June 2023

JEL classification:

E52

E58

E31

C22

Keywords:

Inflation targeting

Anticipation effect

Central banks

ABSTRACT

We construct an empirical test of whether the anticipation of adoption of inflation targeting affects the inflation rate. We observe that most of the central banks adopt the regime after first achieving significant disinflation. With pre-inflation-targeting-disinflation, initial targets are met with success and the new regime gains credibility. Working with data for 114 emerging market, advanced and low-income economies, we identify the effect using forward-looking dynamic panel data models in a difference-in-difference framework. We find that inflation targeting is successful in locking-in already low inflation rather than reducing high inflation. The analysis has important implications for central banks looking forward to adoption of inflation targeting.

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1. Introduction

Does inflation targeting (IT) lead to low and stable inflation? The question has been extensively debated among researchers and policymakers, and there is conflicting theoretical and empirical evidence.

Theoretically, inflation targeting solves the problem of time inconsistency (Svensson, 1997; Bernanke et al., 1999; Mishkin, 1999) and leads to better anchoring of inflationary expectations. Gains may be even more pronounced in the case of emerging market economies since the initial credibility of emerging market central banks may be low. Another view – the conservative window dressing view of inflation targeting – argues that the framework on its own may contribute little to lower inflation; however,

the increased focus on inflation itself may subsequently lead to lower inflation (Romer, 2018).

On the empirical side, however, most of the papers in the literature find statistically insignificant effect from adoption of inflation targeting on inflation. Ball and Sheridan (2005), studying the impact of inflation targeting on 20 advanced economies, find no evidence that inflation targeting improves a country's economic performance. Similarly, Lin and Ye (2007) studying for 22 industrial economies find no significant beneficial effects of inflation targeting on targeting countries' inflation or inflation stability. Similar results are found by Levin et al. (2004), Mishkin and Schmidt-Hebbel (2007), Gonçalves and Carvalho (2009), Willard (2012) and Ardakani et al. (2018). For emerging market economies, Brito and Bystedt (2010), find significant output growth costs of inflation targeting policies and indicate that overall there is no evidence

[☆] Authors are extremely grateful to the editor and two referees for their extensive and detailed comments on the previous version of the paper. The comments have led to considerable improvement in the quality of the paper. Errors and shortcomings are authors' sole responsibility.

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Peer review under responsibility of the Central Bank of the Republic of Turkey.

that the inflation targeting framework has met its main goal of low and stable inflation in emerging market economies.

Existing empirical literature, however, does not discuss the role of reforms initiated before formal adoption of inflation targeting and their implications on inflation. Bernanke et al. (1999, p. 288) observe that inflation targeting central banks may attempt to lock-in early disinflationary gains before the formal adoption of inflation targeting. We find in this paper that most of the central banks have in fact chosen to adopt the new regime after first achieving significant disinflation. It has been recognized that policy makers may plan for the adoption of inflation targeting with structural reforms that help institutions become credible and help increase fiscal discipline which may result in pre-inflation-targeting disinflation. Moreover, central banks may try to achieve disinflation before formal adoption so that inflationary expectations are anchored better. When initial intermediate targets are met with success the new regime gains higher credibility. This pre-inflation-targeting disinflation may be called the *anticipation effect* of inflation targeting adoption.

Working with data for 114 economies, we aim to identify this effect using forward looking dynamic panel data models in difference-in-difference framework. Inclusion of expectation of future inflation targeting state in models lend themselves to a test for anticipation effect in the spirit of Granger (1969) (Angrist and Pischke, 2009; Malani and Reif, 2015). We exploit the fact that different countries adopted inflation targeting at different points in time, therefore identifying causation becomes a test of whether conditional on country and time effects, expectation of future inflation targeting adoption has causal effects on inflation (Angrist and Pischke, 2009).

We find evidence of negative and statistically significant anticipation effect on inflation for emerging and advanced economies while the average treatment effect is statistically insignificant in the whole sample that also includes low income countries. The results suggest that disinflationary gains are in fact locked-in early before the formal adoption of inflation targeting. Consequently, by the time inflation targeting is formally implemented, the adoption itself does not show any additional new statistically significant effect on inflation.

Our paper has important policy implications for central banks looking forward to adoption of inflation targeting. We discuss that pre-inflation targeting disinflation and initial credibility gains may be achieved via first adopting implicit inflation targeting or inflation targeting lite regime (Stone, 2003; Porter and Yao, 2005; Carare and Stone, 2006; Bhatt et al. 2017).

Rest of the paper is organized as follows. In section 2 we discuss the data used in this paper and conduct preliminary data analysis. In sections 3 and 4 we discuss the identification strategy and the results. In section 5 we discuss policy implications of the results and conclude the paper.

2. Data and preliminary analysis

The dataset for this study consists of annual data for 114 countries. We have divided these countries into three groups for our analysis. The first group consists of 66 emerging market economies, the second group consists of 28 advanced economies while the third group has 47 low-income countries (enumerated in Tables A1, A2 and A3 respectively). The low-income countries have been discussed separately because of poor performance of inflation targeting found in these economies (Morozumi et al., 2020), which is attributed to fiscal dominance and a lack of improvement in institutional

quality, such as the central bank's instrument independence (Morozumi et al., 2020). We test whether there is any anticipation effect of inflation targeting adoption for those 114 countries.

The group of emerging market economies has 28 inflation targeting countries and 38 non-inflation targeting countries for the period 1991 to 2018. The low-income group has 11 inflation targeting countries and 36 non-inflation targeting countries for the same period. The low-income countries are identified using the criteria discussed in Morozumi et al. (2020). The group of advanced economies has 10 inflation targeting countries and 18 non-inflation targeting countries for the period 1985 to 2012. We take the data from 1985 for this group as 4 advanced economies adopted inflation targeting in the early 90s (see Table A5). We use the data up to 2012 to avoid overfitting instrument variables, as an increase in number of time periods generates the problem of instrument proliferation.¹

To identify the appropriate countries for our control group, we follow the criteria suggested by Lin and Ye (2009). In the control group we select countries that have GDP per capita higher than the country with lowest GDP per capita included in the treatment group; and the population size larger than the country with lowest population size included in the treatment group. The identification of control group is important so that inflation performance can be compared to a similar group of countries. Data are drawn from International Financial Statistics of IMF and World Development Indicator database of World Bank.

To understand the role of inflation targeting and its impact on inflation, we first plot the annual inflation data in all the inflation targeting countries. Figs. 1–3 show the plots for emerging market, advanced and low-income country groups, respectively. The red vertical line denotes the year when the country adopted inflation targeting as a formal policy; red, yellow, and green horizontal lines show respectively the lower, upper and mid inflation target levels as adopted by the central bank (please refer to Tables A4, A5 and A6).

Figs. 1–3 confirm the observation of Bernanke et al. (1999, p. 288) that most of the inflation targeting countries may experience a decline in their respective inflation rates before formal adoption of inflation targeting suggesting a possible anticipation effect of inflation targeting adoption.

In the next section we discuss the identification strategy to test for existence of such an effect.

3. Identification strategy

We begin with the following benchmark dynamic panel data model using a difference-in-difference framework:

$$\pi_{n,t} = \alpha_l \pi_{n,t-1} + \beta_T IT_{n,t} + \theta X_{n,t} + \gamma_n + \lambda_t + \varepsilon_{n,t}^1 \quad (1)$$

where $\pi_{n,t}$ is the inflation rate or inflation volatility. We include inflation volatility separately as a dependent variable to understand the implications on inflation stability. It is measured as a rolling standard deviation for three years inflation data. The subscript n and t denote country and year, respectively. Inflation targeting state variable $IT_{n,t}$ takes the value 1 if country n is an inflation targeting country in period t and 0 otherwise. Its coefficient β_T measures the average treatment effect of the adoption of inflation targeting. The lagged value $\pi_{n,t-1}$ captures persistence and mean-reverting dynamics. The vector $X_{n,t}$ accounts for control variables which include

¹ Section 3 discusses this issue in detail.

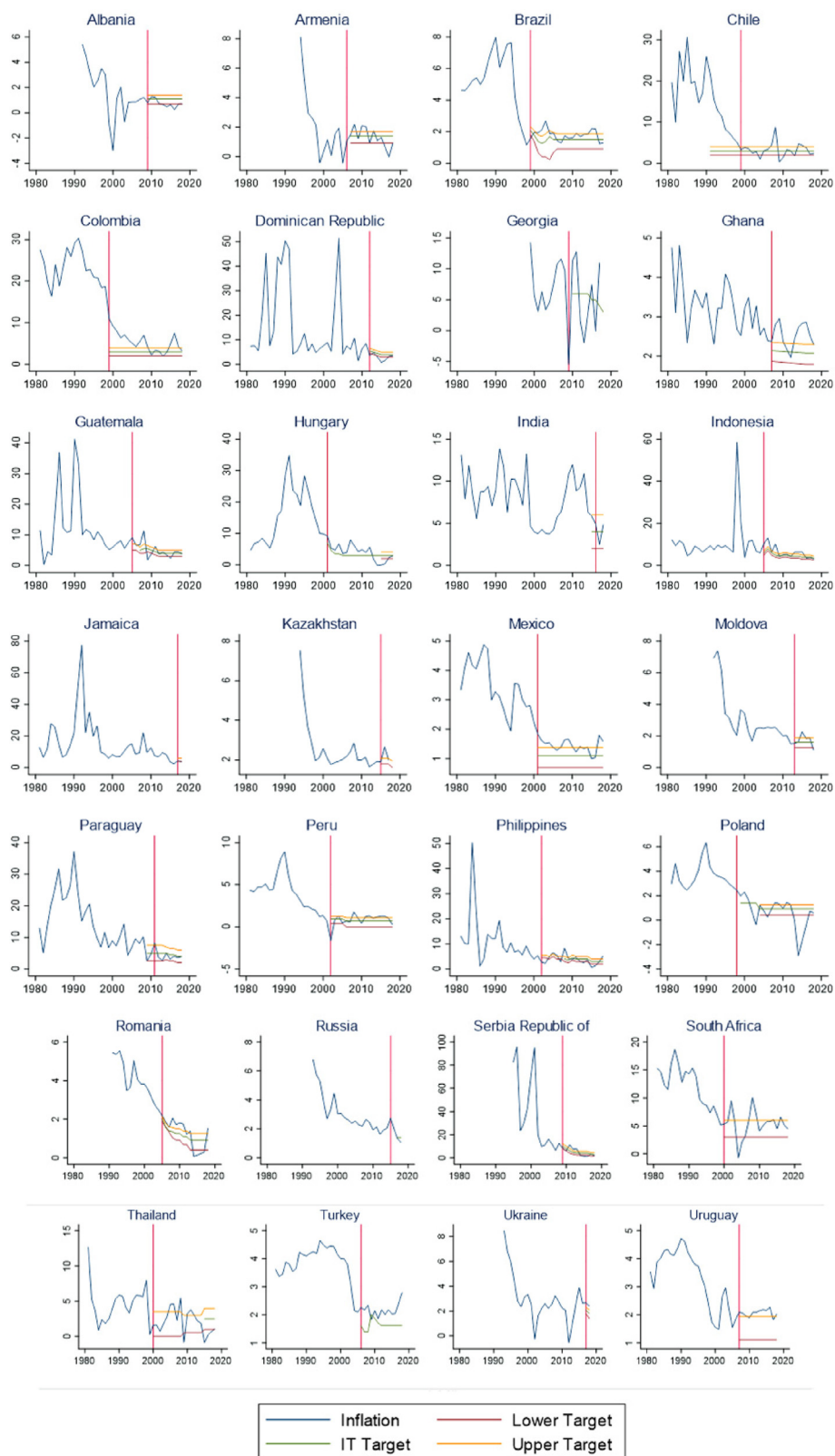


Fig. 1. Inflation in Inflation Targeting Emerging Market Economies. *Note:* We have taken the log values of inflation and inflation targets for economies that experienced an annual inflation rate of more than 100% during the period of analysis. These countries are Albania, Armenia, Brazil, Ghana, Kazakhstan, Mexico, Moldova, Peru, Poland, Romania, Russia, Turkey, Ukraine and Uruguay.

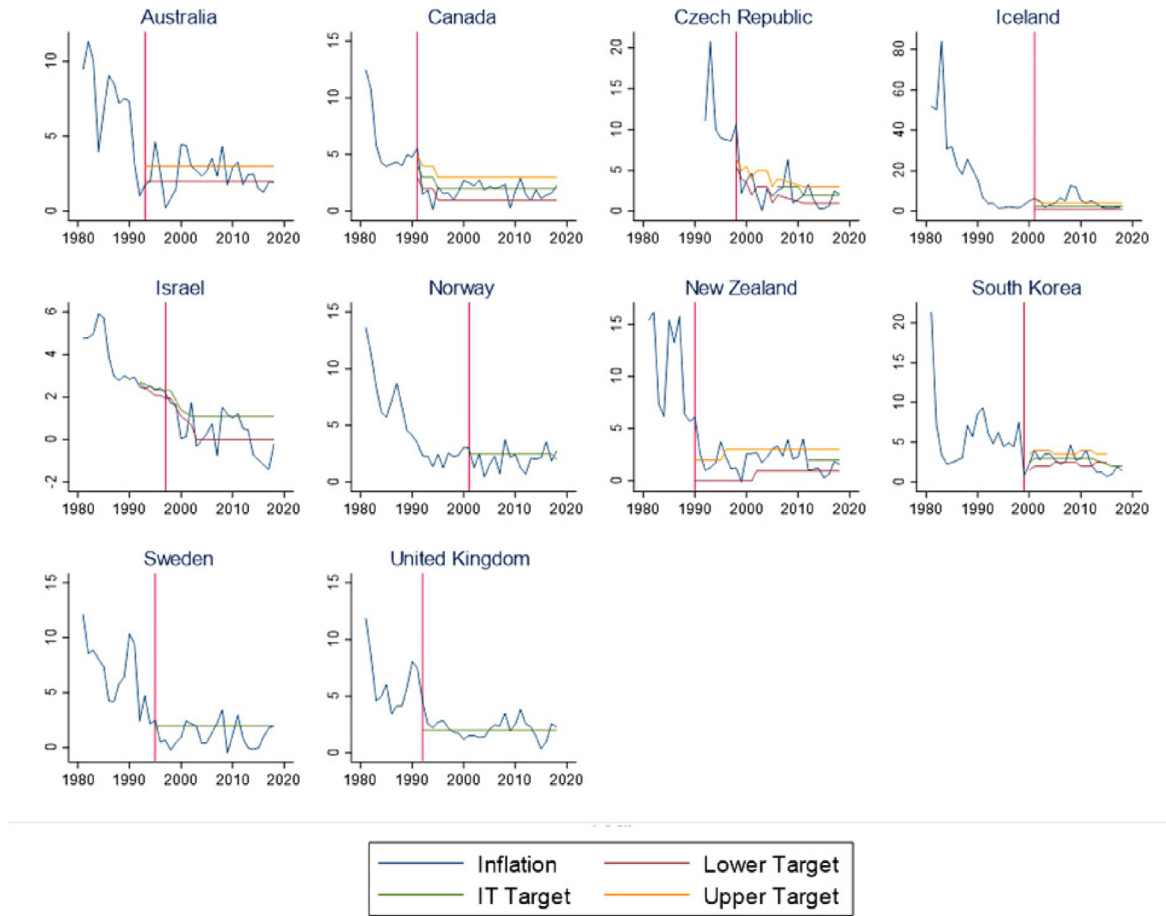


Fig. 2. Inflation in Inflation Targeting Advanced Economies. *Note:* We have taken the log values of inflation and inflation targets for Israel that experienced inflation rates exceeding 100% during the period of analysis.

output gap, high-inflation and low-inflation dummies² and other applicable endogenous regressors. γ_n allows for country specific fixed effects and λ_t allows for time specific fixed effect that captures common shocks to all countries. $\varepsilon_{n,t}^1$ is the disturbance term.

Identification strategies similar to model (1) have been extensively used in the literature (Brito and Bystedt, 2006, 2010; Batini and Laxton, 2007; Gonçalves and Salles, 2008; Ayres et al., 2014) to establish causation from inflation targeting adoption to inflation. However, the model does not include expectations of future inflation and their role on inflation dynamics. In Model (2), we augment model (1) by including $E_t[\pi_{n,t+1}]$, which captures forward looking component of the inflation dynamics conditional on the information available up to period t .

$$\pi_{n,t} = \alpha_l \cdot \pi_{n,t-1} + \beta_T \cdot IT_{n,t} + \alpha_f \cdot E_t[\pi_{n,t+1}] + \theta \cdot X_{n,t} + \gamma_n + \lambda_t + \varepsilon_{n,t}^2 \quad (2)$$

In model (3) we include $IT_{n,t-l}$ up to m lags which captures the post treatment effect of inflation targeting adoption to find out whether

the causal effect of inflation targeting adoption grows or fades over time.

$$\pi_{n,t} = \alpha_l \cdot \pi_{n,t-1} + \beta_T \cdot IT_{n,t} + \alpha_f \cdot E_t[\pi_{n,t+1}] + \sum_{l=1}^m \beta_l \cdot IT_{n,t-l} + \theta \cdot X_{n,t} + \gamma_n + \lambda_t + \varepsilon_{n,t}^3 \quad (3)$$

Our final specification is represented in Model (4) which includes our variable of interest $E_t[IT_{n,t+f}]$ up to q leads which captures the expectation of future inflation targeting state with respect to information available up to period t and captures the possible anticipation effect of inflation targeting adoption.

$$\pi_{n,t} = \alpha_l \cdot \pi_{n,t-1} + \beta_T \cdot IT_{n,t} + \alpha_f \cdot E_t[\pi_{n,t+1}] + \sum_{f=1}^q \delta_f \cdot E_t[IT_{n,t+f}] + \sum_{l=1}^m \beta_l \cdot IT_{n,t-l} + \theta \cdot X_{n,t} + \gamma_n + \lambda_t + \varepsilon_{n,t}^4 \quad (4)$$

Inclusion of $E_t[IT_{n,t+f}]$ in model (4) lends itself to a test for anticipation effect in the spirit of Granger (1969) (Angrist and

² High inflation is defined as inflation rate more than 50% whereas low inflation is defined as inflation less than 0.25%. We control for both high and low inflation in our models as some of the emerging market economies have seen very high inflation pre-adoption and some of the advanced economies have seen very low inflation post-adoption.

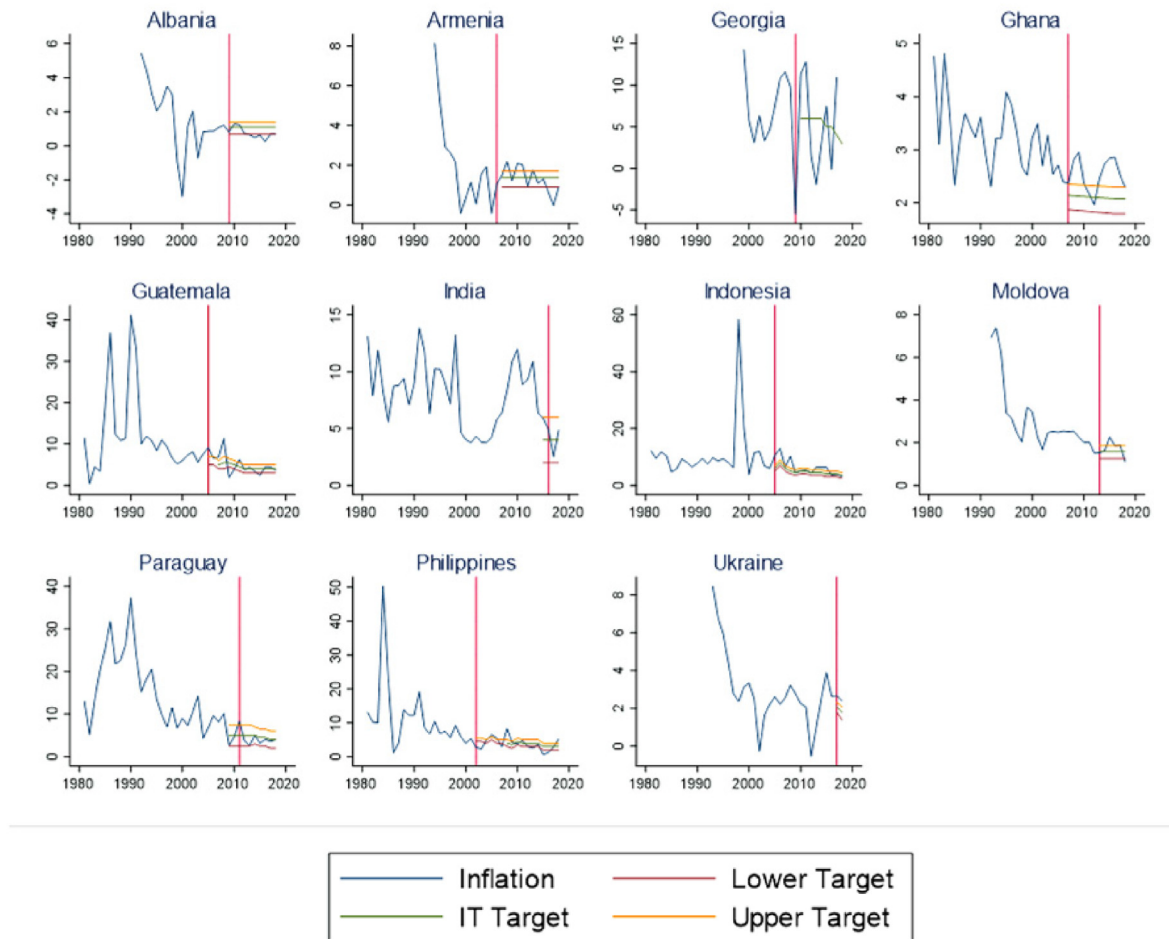


Fig. 3. Inflation in Inflation Targeting Low-income Countries. Note: We have taken the log values of inflation and inflation targets for economies that experienced an annual inflation rate of more than 100% during the period of analysis. These countries are Albania, Armenia, Ghana, Moldova and Ukraine.

Pischke, 2009; Malani and Reif, 2015). Since the policy variable $IT_{n,t}$ changes at different times in different countries, identifying causation means a test whether conditional on country and time effects, expectation of future $IT_{n,t}$ has causal effect on $\pi_{n,t}$.

For further discussion we will refer to $\pi_{n,t}$ as average inflation in country n in time period t ; similar reasoning can be used for inflation volatility.

We assume that expectations are formed rationally and replace $E_t[\pi_{n,t+1}]$ and $E_t[IT_{n,t+f}]$ by $\pi_{n,t+1}$ and $IT_{n,t+f}$, respectively, with appropriate forecast errors. As we show further, this leads to endogeneity bias.

We assume forecast error in average inflation in country n is given by $v_{n,t+1} = \pi_{n,t+1} - E_t[\pi_{n,t+1}]$ and the forecast error in the adoption of inflation targeting in country n is given by $\rho_{n,t+f} = IT_{n,t+f} - E_t[IT_{n,t+f}]$.

This reduces equation (4) to the following:

$$\pi_{n,t} = \alpha_l \cdot \pi_{n,t-1} + \alpha_f \cdot \pi_{n,t+1} + \sum_{f=1}^q \delta_f \cdot IT_{n,t+f} + \sum_{l=0}^m \beta_l \cdot IT_{n,t-l} + \theta \cdot X_{n,t} + \gamma_n + \lambda_t + e_{n,t} \quad (4^*)$$

where $e_{n,t} = \pi_{n,t} - \alpha_l \cdot \pi_{n,t-1} - \alpha_f \cdot \pi_{n,t+1} - \sum_{f=1}^q \delta_f \cdot IT_{n,t+f} - \sum_{l=0}^m \beta_l \cdot IT_{n,t-l} - \theta \cdot X_{n,t} - \gamma_n - \lambda_t$

In equation (4*), $e_{n,t}$ is correlated with regressors $\pi_{n,t+1}$ and

$IT_{n,t+f}, f = 1, \dots, q$ via forecast errors $v_{n,t+1}$ and $\rho_{n,t+f}, f = 1, \dots, q$, leading to endogeneity bias. Another source of endogeneity is probable correlation of γ_n with the regressors.

We use a Difference-GMM estimation strategy (Arellano and Bond, 1991) to account for these endogeneity biases and the reverse causality of inflation rate on inflation targeting adoption as well as possible omitted variables that may cause both inflation targeting adoption and disinflation.

We assume the vector of regressors is given by $R_{n,t} = (\pi_{n,t-1}, \pi_{n,t+1}, IT_{n,t-l}, l = 1, \dots, m, IT_{n,t+f}, f = 1, \dots, q, X_{n,t})$. Then the following moment conditions on instruments $R_{n,t-s}$ can be used:

$$E[R_{n,t-s} \cdot \Delta e_{n,t}] = 0, \quad \forall s \geq 2, t = 3, \dots, T \quad (5)$$

Here, the regressors are internally instrumented by their suitable lags to handle endogeneity. The method is particularly suited for IT variables as they lack suitable instruments outside the immediate dataset (Brito and Bystedt, 2010; Mishkin and Schmidt-Hebbel, 2007). Because the number of years (T) is relatively large as compared to the number of countries (N), to avoid the problem of overfitting the instrumented variables, we use the strategy of summing up the data for two-year periods and shrinking T , compressing the information available in longer time series into a smaller number of time periods (Brito and Bystedt, 2010; Islam, 1995; Beck and Levine, 2004; Acemoglu et al., 2008). We apply

Table 1
Impact of inflation targeting on inflation in Emerging Market Economies.

Dependent Variable: Inflation	Two-Step System GMM					Two-Step Difference GMM				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Inflation (P+1)		0.07257 (0.453)	0.07024 (0.472)	−0.07319 (0.575)	−0.03982 (0.680)		0.12471 (0.691)	0.11694 (0.739)	−0.4197*** (0.010)	0.40868* (0.087)
Inflation (P-1)	0.13863** (0.023)	0.18429*** (0.001)	0.17746*** (0.002)	0.11889* (0.075)	0.12997*** (0.006)	0.05578 (0.702)	0.1663933 (0.140)	0.16766 (0.138)	0.0032555 (0.956)	−0.03728 (0.504)
Anticipation Effect (P-2)					0.35654 (0.413)					−1.8120* (0.060)
Anticipation Effect (P-1)				−2.8154* (0.072)	−1.2678** (0.017)				−2.7894** (0.033)	0.28327 (0.785)
Treatment Effect	−0.55205 (0.183)	−0.33646 (0.420)	−0.29469 (0.497)	1.8894 (0.153)	0.76779 (0.337)	−1.7216** (0.012)	−1.6753 (0.114)	−1.3198 (0.471)	−0.11152 (0.890)	−1.1967 (0.477)
Post-Treatment Effect (P+1)			−0.17503 (0.269)	−0.24201 (0.162)	−0.21391 (0.207)			−0.39841 (0.756)	−0.5019*** (0.007)	0.91821 (0.520)
Output Gap	1.67e-13 (0.517)	−4.51e-14 (0.920)	−1.31e-13 (0.806)	6.05e-14 (0.904)	−1.27e-13 (0.853)	1.70e-13 (0.636)	−1.91e-13 (0.743)	−2.21e-13 (0.692)	−1.33e-13 (0.839)	5.23e-13 (0.696)
High Inflation	1.7779*** (0.001)	1.6283*** (0.001)	1.6717*** (0.001)	1.8259*** (0.001)	1.9559*** (0.001)	3.0313** (0.030)	1.86736* (0.092)	1.8952* (0.090)	2.6589 (0.001)	2.7882*** (0.001)
Low Inflation	−3.4526*** (0.001)	−3.5249** (0.018)	−3.6536** (0.019)	−3.6929*** (0.001)	−4.5151*** (0.001)	−0.85119 (0.712)	−1.270234 (0.661)	−1.1978 (0.706)	−2.7118*** (0.001)	−6.3525* (0.092)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Omitted	Omitted	Omitted	Omitted	Omitted
Observations	754	681	681	681	627	688	615	615	610	561
AR (2)	0.744	0.144	0.178	0.268	0.112	0.985	0.300	0.287	0.590	0.506
Hansen Test	0.222	0.197	0.160	0.321	0.273	0.979	0.852	0.757	0.120	0.110
F/Wald Test	0.001	0.001	0.001	0.003	0.001	0.001	0.001	0.001	0.001	0.001
Time Period	14	14	14	14	14	14	14	14	14	14
Countries	66	66	66	66	66	66	66	66	66	66

To prevent the results from being biased by a small number of emerging economies with very high inflation, we use the natural logarithm of inflation. p-value in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Windmeijer's (2005) finite sample correction to avoid downward biased standard errors, as documented in Arellano and Bond (1991) and Blundell and Bond (1998).

Also, since the lagged values of IT variables have little information about their future changes, whereas their last changes convey reasonable information about their present values, another set of instruments $\Delta R_{n,t-s}$ may be used to increase efficiency (Brito and Bystedt, 2010), leading to the following moment conditions.

$$E[\Delta R_{n,t-s} \cdot e_{n,t}] = 0, \quad \forall s \geq 1, t = 3, \dots, T \quad (6)$$

Moment conditions (5) and (6) lead to a System-GMM (Arellano and Bover, 1995) estimation.

In the empirical analysis we confirm the assumptions that (1) the error terms are not serially correlated, which means that $\Delta e_{n,t}$ is not second-order serially correlated, and that (2) the instruments are valid instruments. For this we present the Hansen (1982) test of over-identifying restrictions, which tests the overall validity of the instruments by evaluating the sample counterpart of the moment conditions (5) and (6).

4. Results

First, we discuss the estimation results for the emerging market economies. As discussed in the data section, we have 66 emerging market economies in this group with 29 inflation targeting and 37 non-inflation targeting countries.

Table 1 reports the results when inflation is the dependent variable. The first five columns present the estimates from the two-step system-GMM (Arellano and Bover, 1995), and the last five columns contain the estimates from the two-step difference-GMM (Arellano and Bond, 1991) estimation, for overall 10 models with different specifications as presented in equations (1)–(4). The models have been named Model (I) to Model (X) for discussion.

In the regression results, Inflation (P+1) and Inflation (P-1)

represent the forward looking and persistence components in the inflation dynamics, respectively. Anticipation Effect (P-2) and Anticipation Effect (P-1) capture the anticipation effect 2 periods (4 years) and 1 period (2 years) prior to the adoption of inflation targeting, respectively.³ Treatment Effect captures the average treatment effect of inflation targeting adoption. Post-Treatment Effect (P+1) captures the effect of inflation targeting after 1 period (2 years) of the adoption of inflation targeting. Output Gap, High Inflation and Low Inflation are control variables. We control for country and time specific fixed effects in all our models.

In model (I), consistent with the literature, we find that the Treatment Effect is statistically insignificant whereas Inflation (P-1) is positive and statistically significant, capturing persistence and mean-reverting inflation dynamics. In model (VI) where we use D-GMM estimation, the Treatment Effect variable turns negative and statistically significant, whereas Inflation (P-1) variable is statistically insignificant. Here the results may be affected by the fact that past values of the inflation targeting state may be weak instruments for its present changes.

In models (II) and (III) we sequentially include forward looking behaviour of inflation dynamics (Inflation (P+1)) and the post-treatment effect of inflation targeting adoption (Post-Treatment Effect (P+1)). Treatment Effect and Post-Treatment Effect (P+1) variables are statistically insignificant. Similarly, in the difference-GMM case in model (VIII), the Treatment Effect and the Post-Treatment Effect (P+1) variables are statistically insignificant.

In models (IV) and (IX) we include Anticipation Effect (P-1). In both models, the variable comes out to be negative and statistically significant. The Treatment Effect variable continues to be

³ As discussed in the methodology section, to avoid the problem of overfitting the instrumented variables, we have summed up the data for two-year period, compressing the information available in longer time series into smaller number of time periods. Therefore, the period of analysis is now biennial which we denote as P.

Table 2
Impact of inflation targeting on inflation volatility in Emerging Market Economies.

Dependent Variable: Inflation Volatility	Two-Step System GMM					Two-Step Difference GMM				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Inflation Volatility (P+1)		0.9138*** (0.001)	0.8775*** (0.001)	0.4195** (0.014)	0.25269 (0.758)		1.0613*** (0.001)	1.0512*** (0.001)	1.1558*** (0.001)	0.3024*** (0.001)
Inflation Volatility (P-1)	0.25678*** (0.001)	0.2770*** (0.001)	0.3019*** (0.001)	0.4659*** (0.001)	0.03068 (0.878)	0.4686*** (0.007)	0.2841*** (0.001)	0.2845*** (0.001)	0.2416*** (0.001)	0.4363*** (0.001)
Anticipation Effect (P-2)					-2.27303* (0.058)					-2.5589** (0.016)
Anticipation Effect (P-1)				-0.00187 (0.999)	-9.3639 (0.191)				-2.8095** (0.013)	1.14083 (0.193)
Treatment Effect	-0.11105 (0.665)	0.16312 (0.678)	0.76496 (0.179)	0.77358 (0.520)	7.2338 (0.292)	-1.0022 (0.325)	0.65734 (0.139)	0.96766 (0.121)	5.2542*** (0.001)	-0.3136 (0.627)
Post-Treatment Effect (P+1)			0.05227 (0.958)	-0.01426 (0.975)	-2.13934 (0.742)			-0.38169 (0.706)	-2.0491* (0.073)	-0.31548 (0.118)
Output Gap	-6.73e-12*** (0.001)	-3.97e-12* (0.080)	-4.16e-12* (0.075)	-1.54e-12 (0.499)	-5.23e-12 (0.372)	-1.04e-11* (0.070)	-3.30e-12 (0.182)	-3.71e-12 (0.151)	-3.01e-12 (0.395)	-2.44e-12 (0.366)
High Inflation	6.9726*** (0.001)	1.4374 (0.198)	1.5445 (0.145)	0.96902 (0.298)	4.54404 (0.206)	2.6811 (0.106)	1.02618 (0.390)	1.1593 (0.363)	0.57035 (0.812)	0.28793 (0.417)
Low Inflation	-0.11219 (0.905)	0.04195 (0.949)	-0.1852 (0.788)	-0.44696 (0.235)	3.8629 (0.184)	-0.68805 (0.436)	-0.21499 (0.721)	-0.03758 (0.955)	-0.48006 (0.556)	0.2372 (0.438)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Omitted	Omitted	Omitted	Omitted	Omitted
Observations	753	697	697	697	635	688	632	632	632	569
AR (2)	0.752	0.411	0.500	0.637	0.938	0.120	0.563	0.488	0.341	0.699
Hansen Test	0.936	0.982	0.995	0.992	0.922	0.275	0.334	0.270	0.162	0.113
F/Wald Test	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Time Period	14	14	14	14	14	14	14	14	14	14
Countries	66	66	66	66	66	66	66	66	66	66

To prevent the results from being biased by a small number of countries with very high inflation volatility, we use the natural logarithm of inflation volatility. Volatility is calculated from the standard deviation in the 3 years rolling windows data. p-value in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

statistically insignificant. We further experiment with including Anticipation Effect (P-2) in models (V) and (X), and, in both cases, the results of models (IV) and (X), in terms of the anticipation effect, continue to hold. In Model (X), Anticipation Effect (P-2) is negative and statistically significant.

Table 2 presents the results when the dependent variable is inflation volatility. Models (V) and (X) show negative and statistically significant Anticipation Effect (P-2), which shows that inflation volatility in emerging market economies falls four years prior to the adoption of inflation targeting. The Treatment Effect variable in this case also is statistically insignificant in all the model specifications, except in model (IX) where it is positive and statistically significant.

Overall, there is consensus in the results that, for emerging market economies, there is insignificant treatment effect of inflation targeting adoption on inflation, whereas there is negative and statistically significant anticipation effect of inflation targeting adoption. Both these results suggest that, in emerging market economies, the disinflationary gains are locked-in early by the central banks before formal adoption of inflation targeting. Formal adoption of policy, however, does not show any significant reduction in the inflation rate. In other words, inflation targeting adoption is successful in locking-in already low inflation rates, rather than reducing high inflation.

Now we discuss the results for advanced economies presented in Tables 3 and 4. First, we discuss the results in Table 3 where the dependent variable is inflation. The Treatment Effect variable is consistently insignificant in all the model specifications in Table 3.

Models (IV) and (IX) report negative and statistically significant Anticipation Effect (P-1), however, the variable turns insignificant in Models (IX) and (X) in the presence of negative and statistically significant Anticipation Effect (P-2). Overall, all the model specifications suggest a negative and statistically significant anticipation effect.

In the case of inflation volatility, as reported in Table (4), the Treatment Effect variable is positive and statistically significant in Models (I), (IV), (IX) and (X). Further, Models (IV), (V), (IX) and (X) consistently report negative and statistically significant Anticipation Effect (P-1). In model (V), Anticipation Effect (P-2) is positive and significant.

Overall, in the case of advanced economies' inflation, we find broad agreement with the results discussed in the case of emerging market economies where we found insignificant treatment effect but negative and statistically significant anticipation effect of inflation targeting adoption. In the case of inflation volatility, we find some evidence of positive and statistically significant average treatment effect, however, the 2-year prior anticipation effect is consistently negative and statistically significant.

Now we discuss the results for low-income countries as presented in Tables 5 and 6. We find Treatment Effect variable is statistically insignificant in all the models, except in Model (I) in Table 5 where it is, in fact, positive and significant. Furthermore, we do not discover any statistically significant anticipation effect of inflation targeting adoption for the low-income group. The results support the findings in Morozumi et al. (2020) where the authors found that inflation targeting adoption has not been successful in

Table 3
Impact of inflation targeting on inflation in Advanced Economies.

Dependent Variable: Inflation	Two-Step System GMM					Two-Step Difference GMM				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Inflation (P+1)		0.46285*	0.81667*	−0.55814	0.6048***		0.6189***	0.6161***	0.43541***	0.56398
		(0.065)	(0.075)	(0.350)	(0.010)		(0.001)	(0.001)	(0.003)	(0.188)
Inflation (P-1)	0.1220	0.03483	0.02999	0.03004**	0.0129	0.07359*	0.0291	0.02657	0.02245	0.38637**
	(0.125)	(0.219)	(0.273)	(0.024)	(0.603)	(0.091)	(0.282)	(0.296)	(0.214)	(0.027)
Anticipation Effect (P-2)					−3.5704**					−1.9692**
					(0.034)					(0.020)
Anticipation Effect (P-1)				−5.8748**	1.2978				−4.2285**	0.62967
				(0.021)	(0.320)				(0.011)	(0.569)
Treatment Effect	−0.9141	−1.9505	0.07968	−0.6092	−0.7112	1.1500	−2.3242	−0.66859	−0.48473	0.29925
	(0.834)	(0.190)	(0.970)	(0.875)	(0.598)	(0.775)	(0.147)	(0.559)	(0.694)	(0.903)
Post-Treatment Effect (P+1)			−2.6205	5.9352	−2.4254**			−1.2937	−1.0694	−1.4734***
			(0.178)	(0.458)	(0.030)			(0.278)	(0.372)	(0.005)
Output Gap	6.19e-13	−1.18e-12	2.78e-12	3.25e-12	1.12e-12	2.01e-12	1.76e-12	1.85e-12	1.34e-12	−3.88e-13
	(0.455)	(0.845)	(0.515)	(0.451)	(0.518)	(0.296)	(0.189)	(0.124)	(0.107)	(0.918)
Low Inflation	−4.8611*	−12.6709	−10.1457*	−17.8998*	−4.11419*	−3.4402***	−3.4248***	−3.3448***	−3.4025***	−1.9905**
	(0.065)	(0.120)	(0.097)	(0.095)	(0.056)	(0.003)	(0.002)	(0.004)	(0.004)	(0.030)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Omitted	Omitted	Omitted	Omitted	Omitted
Observations	372	343	343	343	314	343	314	314	314	285
AR (2)	0.779	0.514	0.216	0.997	0.940	0.859	0.902	0.783	0.862	0.290
Hansen Test	0.925	0.866	0.873	0.940	0.999	0.319	0.156	0.349	0.519	0.816
F/Wald Test	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Time Period	14	14	14	14	14	14	14	14	14	14
Countries	29	29	29	29	29	29	29	29	29	29

p-value in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Table 4
Impact of inflation targeting on inflation volatility in Advanced Economies.

Dependent Variable: Inflation Volatility	Two-Step System GMM					Two-Step Difference GMM				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Inflation Volatility (P+1)		0.34935	0.4660**	−0.2900	−0.27851		0.4975***	0.4967***	0.5684***	0.1941
		(0.613)	(0.043)	(0.473)	(0.310)		(0.001)	(0.001)	(0.001)	(0.258)
Inflation Volatility (P-1)	0.4602***	0.45699***	0.18138	0.32868	0.4747***	−0.00061	−0.1095	−0.02785	0.1302	0.21097
	(0.001)	(0.001)	(0.524)	(0.632)	(0.001)	(0.998)	(0.657)	(0.937)	(0.704)	(0.242)
Anticipation Effect (P-2)					5.4421***					0.07704
					(0.013)					(0.947)
Anticipation Effect (P-1)				−1.2281***	−2.2449**				−1.3017***	−1.0875**
				(0.001)	(0.019)				(0.001)	(0.019)
Treatment Effect	0.99843*	1.15719	0.7819	1.65403**	0.25505	−0.02767	0.2862	0.55086	1.2827***	1.1861***
	(0.096)	(0.255)	(0.364)	(0.046)	(0.723)	(0.947)	(0.258)	(0.270)	(0.001)	(0.001)
Post-Treatment Effect (P+1)			−0.1784248	−0.9674	0.00226			−0.3069	−0.37164	−0.31120
			(0.692)	(0.222)	(0.998)			(0.501)	(0.295)	(0.426)
Output Gap	3.18e-13	1.31e-13	2.75e-13	−3.31e-13	−8.70e-14	−1.97e-13	8.20e-13	4.23e-13	4.31e-13	−3.73e-13
	(0.807)	(0.950)	(0.825)	(0.791)	(0.942)	(0.817)	(0.530)	(0.778)	(0.692)	(0.918)
Low Inflation	0.23095	−0.05371	1.28295*	−0.3163	−0.76201	1.4838*	1.7319**	2.0049**	1.5321	−0.46906
	(0.722)	(0.980)	(0.081)	(0.875)	(0.490)	(0.078)	(0.034)	(0.023)	(0.116)	(0.515)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Omitted	Omitted	Omitted	Omitted	Omitted
Observations	370	341	341	341	312	341	312	312	312	283
AR (2)	0.557	0.861	0.746	0.537	0.308	0.557	0.623	0.722	0.999	0.838
Hansen Test	0.977	0.997	0.996	0.409	0.371	0.551	0.243	0.107	0.253	0.116
F/Wald Test	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Time Period	14	14	14	14	14	14	14	14	14	14
Countries	29	29	29	29	29	29	29	29	29	29

Volatility is calculated from the standard deviation in the 3 years rolling windows data. p-value in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

low-income countries in reducing inflation due to a lack of institutional reforms before the adoption of inflation targeting.

5. Conclusion and policy implications

Our results for advanced and emerging market economies are consistent with a picture of the adoption of inflation targeting, where the formal adoption of inflation targeting is preceded by

Table 5
Impact of inflation targeting on inflation in Low Income Countries.

Dependent Variable: Inflation	Two-Step System GMM					Two-Step Difference GMM				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Inflation (P+1)		−0.16684 (0.500)	−0.01299 (0.979)	−0.5022*** (0.001)	0.05972 (0.861)		−0.32916** (0.040)	−0.3597*** (0.008)	−1.2436 (0.207)	−0.26799* (0.098)
Inflation (P-1)	−0.32027 (0.212)	0.14412 (0.439)	0.34067** (0.037)	−0.17978 (0.426)	−0.14606 (0.472)	0.3066*** (0.004)	0.00347 (0.965)	−0.00413 (0.957)	−0.12419 (0.544)	0.03786 (0.617)
Anticipation Effect (P-2)					2.52899 (0.302)					1.78754 (0.121)
Anticipation Effect (P-1)				−2.24928 (0.518)	−1.76049 (0.610)				−10.15503 (0.335)	−1.11264 (0.382)
Treatment Effect	4.06684*** (0.014)	0.32306 (0.719)	0.81863 (0.603)	1.96396 (0.635)	1.44674 (0.630)	0.61694 (0.518)	1.15373 (0.300)	1.94556 (0.204)	2.79854 (0.631)	0.82505 (0.531)
Post-Treatment Effect (P+1)			0.24526 (0.934)	−0.12975 (0.814)	0.33199 (0.803)			0.24194 (0.335)	5.31164 (0.670)	0.07986 (0.742)
Output Gap	−1.63e-11** (0.030)	−4.21e-12 (0.195)	7.09e-13 (0.916)	−7.87e-12 (0.537)	−6.86e-12 (0.593)	−3.10e-13 (0.923)	−6.53e-12** (0.031)	−7.07e-12** (0.027)	−2.00e-12 (0.951)	−4.02e-12 (0.326)
High Inflation	0.23978 (0.658)	2.67552 (0.001)	−0.68941 (0.770)	1.52061*** (0.002)	1.37490 (0.515)	−0.46633 (0.832)	1.51233*** (0.001)	1.4792*** (0.001)	4.90059*** (0.011)	1.4612*** (0.001)
Low Inflation	−1.15584** (0.018)	−1.16393** (0.026)	−1.25052 (0.469)	−0.64214 (0.167)	−2.57604 (0.183)	−0.25555 (0.855)	−1.4722*** (0.001)	−1.4887*** (0.001)	−0.44601 (0.760)	−1.6094*** (0.001)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummy	Yes	Yes	Yes	Yes	Yes	Omitted	Omitted	Omitted	Omitted	Omitted
Observations	523	468	468	468	427	476	422	422	417	381
AR (2)	0.510	0.595	0.230	0.525	0.911	0.109	0.813	0.730	0.665	0.523
Hansen Test	0.455	0.991	0.982	0.947	0.988	0.559	0.322	0.116	0.873	0.221
F/Wald Test	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Time Period	14	14	14	14	14	14	14	14	14	14
Countries	47	46	46	46	46	46	45	45	45	44

To prevent the results from being biased by a small number of emerging economies with very high or very low inflation, we use the natural logarithm of inflation. p-value in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Table 6
Impact of inflation targeting on inflation volatility in Low Income Countries.

Dependent Variable: Inflation Volatility	Two-Step System GMM					Two-Step Difference GMM				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Inflation Volatility (P+1)		0.12556 (0.388)	0.15748 (0.329)	0.36355 (0.108)	0.19194 (0.316)		0.10002 (0.755)	0.14736 (0.623)	0.26068 (0.440)	1.11852*** (0.001)
Inflation Volatility (P-1)	0.15307** (0.035)	0.24503*** (0.001)	0.25302*** (0.001)	0.45753*** (0.001)	0.49033*** (0.002)	0.42326 (0.001)	0.4336 (0.001)	0.41643 (0.001)	0.43388 (0.001)	0.12566 (0.419)
Anticipation Effect (P-2)					−0.06814 (0.944)					−0.08949 (0.980)
Anticipation Effect (P-1)				−0.16408 (0.875)	−0.95857 (0.457)				−1.95493 (0.475)	−1.96069 (0.676)
Treatment Effect	1.73777 (0.515)	0.67123 (0.541)	0.94635 (0.456)	1.22587 (0.505)	0.57545 (0.763)	0.50684 (0.717)	0.93358 (0.676)	0.86836 (0.679)	3.5044 (0.394)	2.4743 (0.570)
Post-Treatment Effect (P+1)			0.17833 (0.482)	−1.27105 (0.392)	−0.89955 (0.472)			−0.32054 (0.782)	−2.0914 (0.141)	−5.2992 (0.371)
Output Gap	−6.92e-12 (0.161)	−4.39e-12 (0.605)	−4.61e-12 (0.610)	−3.74e-12 (0.455)	1.76e-12 (0.811)	−1.25e-12 (0.401)	−1.19e-12 (0.631)	−1.39e-12 (0.571)	−4.54e-12 (0.388)	−5.35e-12 (0.634)
High Inflation	0.22455 (0.766)	0.18568 (0.670)	0.19800 (0.658)	5.32321 (0.342)	4.62486 (0.615)	2.0262 (0.359)	2.2724 (0.362)	2.39063 (0.354)	1.5093 (0.490)	4.258 (0.142)
Low Inflation	−0.00608 (0.986)	0.35516 (0.323)	0.36817 (0.304)	−0.14393 (0.853)	−0.26736 (0.811)	0.49711 (0.632)	0.62179 (0.642)	0.75984 (0.555)	0.51802 (0.607)	2.94491* (0.095)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummy	Yes	Yes	Yes	Yes	Yes	Omitted	Omitted	Omitted	Omitted	Omitted
Observations	510	463	463	463	416	463	416	416	416	370
AR (2)	0.121	0.445	0.543	0.168	0.487	0.884	0.983	0.873	0.295	0.339
Hansen Test	0.214	0.418	0.412	0.985	0.986	0.305	0.334	0.313	0.575	0.798
F/Wald Test	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Time Period	14	14	14	14	14	14	14	14	14	14
Countries	47	47	47	47	46	47	46	46	46	46

To prevent the results from being biased by a small number of countries with very high or very low inflation volatility, we use the natural logarithm of inflation volatility. Volatility is calculated from the standard deviation in the 3-year moving average data. p-value in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

comprehensive structural reforms, in which institutions become independent and credible, tight fiscal discipline is ensured and the expectations are anchored, and only after a successful disinflationary process, explicit inflation targeting is announced. In this paper, we call such a pre-inflation-targeting disinflation, “the *anticipation effect* of inflation targeting adoption”.

We find evidence of negative and statistically significant anticipation effect, apart from statistically insignificant treatment effect. Collectively these results suggest that, in inflation targeting advanced and emerging market economies, disinflationary gains have been locked-in early, well in advance of formal adoption. Consequently, adoption itself does not show any statistically significant reduction in the inflation rate. In low-income countries, however, we find that inflation targeting adoption is not preceded by any statistically significant disinflation and the subsequent performance of inflation targeting remains poor.

Our paper has important policy implications for the central banks looking forward to adoption of inflation targeting. Our results suggest that, for a successful inflation targeting regime, its adoption should be preceded by institutional reforms and significant disinflationary process. These implications are consistent with past international experiences such as failed inflation targeting

regime (2016–2018) in Argentina, where inflation targeting was adopted without any pre-inflation-targeting disinflation and a later negative credibility shock led to the failure of the regime (Cachanosky and Mazza, 2021).

Pre-inflation-targeting disinflation may be achieved via first adopting implicit inflation targeting or a regime of inflation targeting lite (Stone, 2003; Porter and Yao, 2005; Carare and Stone, 2006; Bhatt et al. 2017). In such a regime, the central bank announces a broad inflation objective, but, owing to its relative low credibility (which may be because of weak institutional framework), it is not in a position to maintain inflation as the foremost policy objective (Stone, 2003, p. 8). Inflation targeting lite has been found in the literature to be successful in locking-in and avoiding a bounce-back effect on inflation (Angeriz and Arestis, 2007). In Appendix (Table A7) we provide a list of countries which currently follow an inflation targeting lite approach and may be able to move towards the formal adoption of a well-defined inflation targeting

Appendix A

Table A1
Countries in the Dataset of Emerging Market Economies Group

Treatment Group		Control Group	
1. Albania	2. Armenia	1. Algeria	2. Angola
3. Brazil	4. Chile	3. Argentina	4. Azerbaijan
5. Colombia	6. Dominican Republic	5. Belarus	6. Bolivia
7. Georgia	8. Ghana	7. Bosnia and Herzegovina	8. Bulgaria
9. Guatemala	10. Hungary	9. China	10. Congo, Rep.
11. India	12. Indonesia	11. Costa Rica	12. Croatia
13. Jamaica	14. Kazakhstan	13. Ecuador	14. Egypt, Arab Rep.
15. Mexico	16. Moldova	15. El Salvador	16. Honduras
17. Paraguay	18. Peru	17. Iran, Islamic Rep.	18. Iraq
19. Philippines	20. Poland	19. Jordan	20. Kuwait
21. Romania	22. Russian Federation	21. Lao PDR	22. Lebanon
23. Serbia	24. South Africa	23. Libya	24. Malaysia
25. Thailand	26. Turkey	25. Mongolia	26. Morocco
27. Ukraine	28. Uruguay	27. Myanmar	28. Nicaragua
		29. Nigeria	30. Oman
		31. Pakistan	32. Panama
		33. Saudi Arabia	34. Sri Lanka
		35. Sudan	36. Tunisia
		37. United Arab Emirates	38. Vietnam

We have included Argentina in our control group as data for Argentina was not available post 2014.

Table A2
Countries in the Dataset of Advanced Economies Group

Treatment Group		Control Group	
1. Australia	2. Canada	1. Austria	2. Belgium
3. Czech Republic	4. Iceland	3. Cyprus	4. Denmark
5. Israel	6. South Korea	5. Finland	6. France
7. New Zealand	8. Norway	7. Germany	8. Hong Kong SAR, China
9. Sweden	10. United Kingdom	9. Ireland	10. Italy
		11. Japan	12. Luxembourg
		13. Macao SAR, China	14. Malta
		15. Netherlands	16. Singapore
		17. Spain	18. United States

Table A3
Countries in the Dataset of Low-income Countries Group

Treatment Group		Control Group	
1. Albania	2. Armenia	1. Afghanistan	2. Azerbaijan
3. Georgia	4. Ghana	3. Bangladesh	4. Benin
5. Guatemala	6. India	5. Bolivia	6. Bosnia and Herzegovina
7. Indonesia	8. Moldova	7. Burkina Faso	8. Cambodia
9. Paraguay	10. Philippines	9. Cameroon	10. Cote d'Ivoire
11. Ukraine		11. El Salvador	12. Ethiopia
		13. Haiti	14. Honduras
		15. Kenya	16. Lao PDR
		17. Madagascar	18. Mali
		19. Mongolia	20. Morocco
		21. Mozambique	22. Myanmar
		23. Nepal	24. Nicaragua
		25. Nigeria	26. Pakistan
		27. Papua New Guinea	28. Senegal
		29. Sri Lanka	30. Sudan
		31. Tanzania	32. Tunisia
		33. Uganda	34. Vietnam
		35. Zambia	36. Zimbabwe

We have taken low-income countries from [Morozumi et al. \(2020\)](#).

Table A4
Inflation Targeting Emerging Market Economies with Adoption Years

S.N.	Country	Adoption Year	Inflation Target (in %) As on May 2019
1	Albania	2009	3
2	Argentina	2016–2018	5 by 2019
3	Armenia	2006	4
4	Brazil	1999	4.25 ± 1.5
5	Chile	1999	3 ± 1
6	Colombia	1999	3 ± 1
7	Dominican Republic	2012	4 ± 1
8	Georgia	2009	3
9	Ghana	2007	8 ± 2
10	Guatemala	2005	3–5 (2017)
11	Hungary	2001	3 ± 1
12	India	2016	4 ± 2
13	Indonesia	2005	3.5 ± 1
14	Jamaica	2017	4–6
15	Kazakhstan	2015	4–6
16	Mexico	2001	3
17	Moldova	2013	5 ± 1.5
18	Paraguay	2011	4
19	Peru	2002	1–3
20	Philippines	2002	3 ± 1
21	Poland	1998	2.5 ± 1
22	Romania	2005	2.5 ± 1
23	Russia	2015	4 by 2017
24	Serbia Republic of	2009	3 ± 1.5
25	South Africa	2000	3–6
26	Thailand	2000	2.5 ± 1.5
27	Turkey	2006	5 ± 2
28	Ukraine	2017	5 ± 1
29	Uruguay	2007	3–7

Note: Adoption dates are as per information available in the respective country's central bank's website or IMF.

Table A5
Inflation Targeting Advanced Economies with Adoption Years

S.N.	Country	Adoption Year	Inflation Target (in %) As on May 2019
1	Australia	1993	2–3
2	Canada	1991	1–3
3	Czech Republic	1998	1–3
4	Iceland	2001	2.5 ± 1.5
5	Israel	1997	1–3
6	Korea, Republic of	1999	2
7	New Zealand	1990	1–3
8	Norway	2001	2
9	Sweden	1995	2
10	United Kingdom	1992	2

Note: Adoption dates are as per information available in the respective country's central bank's website or IMF.

Table A6
Inflation Targeting Low-income Economies with Adoption Years

S.N.	Country	Adoption Year	Inflation Target (in %) As on May 2019
1	Albania	2009	3
2	Armenia	2006	4
3	Georgia	2009	3
4	Ghana	2007	8 ± 2
5	Guatemala	2005	3–5 (2017)
6	India	2016	4 ± 2
7	Indonesia	2005	3.5 ± 1
8	Moldova	2013	5 ± 1.5
9	Paraguay	2011	4
10	Philippines	2002	3 ± 1
11	Ukraine	2017	5 ± 1

Note: Adoption dates are as per information available in the respective country's central bank's website or IMF.

Table A7
Inflation Targeting Lite Countries

S.N.	Country	Target	Source
1	Algeria	3%	IMF
2	Austria	Below but close to 2%	European Central Bank
3	Belarus	5% by 2020	The National Bank of The Republic of Belarus
4	Belgium	Below but close to 2%	European Central Bank
5	Benin	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
6	Botswana	3–6%	Bank of Botswana
7	Burkina Faso	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
8	Costa Rica	3% ± 1%	Central Bank of Costa Rica
9	Cote d'Ivoire	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
10	Cyprus	Below but close to 2%	European Central Bank
11	Egypt	13% ± 3%	Central Bank of Egypt
12	Estonia, Republic of	Below but close to 2%	European Central Bank
13	Fiji	Around 3%	Reserve Bank of Fiji
14	Finland	Below but close to 2%	European Central Bank
15	France	Below but close to 2%	European Central Bank
16	Gambia		
17	Germany	Below but close to 2%	European Central Bank
18	Greece	Below but close to 2%	European Central Bank
19	Guinea-Bissau	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
20	Ireland	Below but close to 2%	European Central Bank
21	Italy	Below but close to 2%	European Central Bank
22	Kenya	Target provided by national treasury	Central Bank of Kenya
23	Kyrgyz Republic	5–7%	National Bank of the Kyrgyz Republic
24	Lao P.D.R.	3% ± 1%	IMF
25	Latvia, Republic of	Below but close to 2%	European Central Bank
26	Lithuania, Republic of	Below but close to 2%	European Central Bank
27	Luxembourg	Below but close to 2%	European Central Bank
28	Malawi	5%	Reserve Bank of Malawi
29	Mali	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
30	Malta	Below but close to 2%	European Central Bank
31	Mongolia	6% in Medium run	The Bank of Mongolia
32	Nepal	Within 6.5%	Nepal Rastra Bank
33	Netherlands	Below but close to 2%	European Central Bank
34	Niger	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
35	Pakistan		State Bank of Pakistan
36	Portugal	Below but close to 2%	European Central Bank
37	Senegal	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
38	Singapore	1–2%	Monetary Authority of Singapore
39	Slovak Republic	Below but close to 2%	European Central Bank
40	Slovenia, Republic of	Below but close to 2%	European Central Bank
41	Spain	Below but close to 2%	European Central Bank
42	Sri Lanka		Central Bank of Sri Lanka
43	Switzerland	>2%	Swiss National Bank
44	Tajikistan, Republic of	7% ± 2%	National Bank of the Republic of Tajikistan
45	Tanzania	5%	Bank of Tanzania
46	Togo	Price Stability 2% ± 1%	Central bank of West African States (BCEAO)
47	Uganda	5%	Bank of Uganda
48	USA	2%	Federal Reserve
49	Vanuatu	0–4%	Reserve Bank of Vanuatu
50	Vietnam	4%	IMF
51	Zambia	6–8%	Bank of Zambia

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cbrev.2023.100118>.

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