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JEL Classification Numbers:	E31, E52, E58, O47.
Keywords:	inflation targeting, track records, dynamic target points and ranges, economic growth and inflation.
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Do Actions Speak Louder Than Words? Assessing the Effects of Inflation Targeting Track Records on Macroeconomic Performance*

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September 2022

Abstract

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Contents

1 Introduction

Inflation Targeting (IT) is a form of monetary policy framework. The choice of the monetary policy framework has always been a core pillar of central banking and monetary economics. It is common practice for central banks to attach their policy objectives to a nominal anchor, such as an exchange rate or a monetary aggregate target historically. First adopted by New Zealand as a pioneering monetary policy framework, inflation targeting sets the inflation rate[1] as the primary objective for monetary policy. Its main feature is that a central bank publicly announces an official inflation target point or target range. Inflation targeting has imposed a conceptual framework and an inherent constraint on central banks without removing all flexibility, combining some traditional advantages of rules and discretions.

Inflation targeting has gained popularity around the world over the past three decades. With the initial successes of adopting inflation targeting in a couple of advanced countries, many emerging market economies started to embrace the new monetary policy framework in the 2000s. By the end of 2019, inflation targeting has become a prevalent form of the monetary policy framework. The vitality of inflation targeting is manifested in time - once a country adopts inflation targeting, it tends to stay as the preferred monetary policy framework (Figure 1).[2]

Inflation targeting countries are often treated as one homogenous group. However, historical statistics show inflation targeting countries differ in their capacity and tendency to manage inflation. Some countries are able to anchor inflation within their announced bands[3] for the majority of the periods. In other cases, inflation has persistently located outside the central banks' announced bands.

[1]The inflation targets set by central banks vary by country. Typically, such targets refer to future inflation rates, ranging from one-year to medium-term horizons.

[2]Individual Euro Area countries are not inflation targeters. As members of a currency union, they are classified under the other monetary policy framework according to the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

[3]Not all inflation targeting countries have publicly announced their inflation point targets or target ranges. The focus of this paper is to study inflation targeters with explicit target bands.

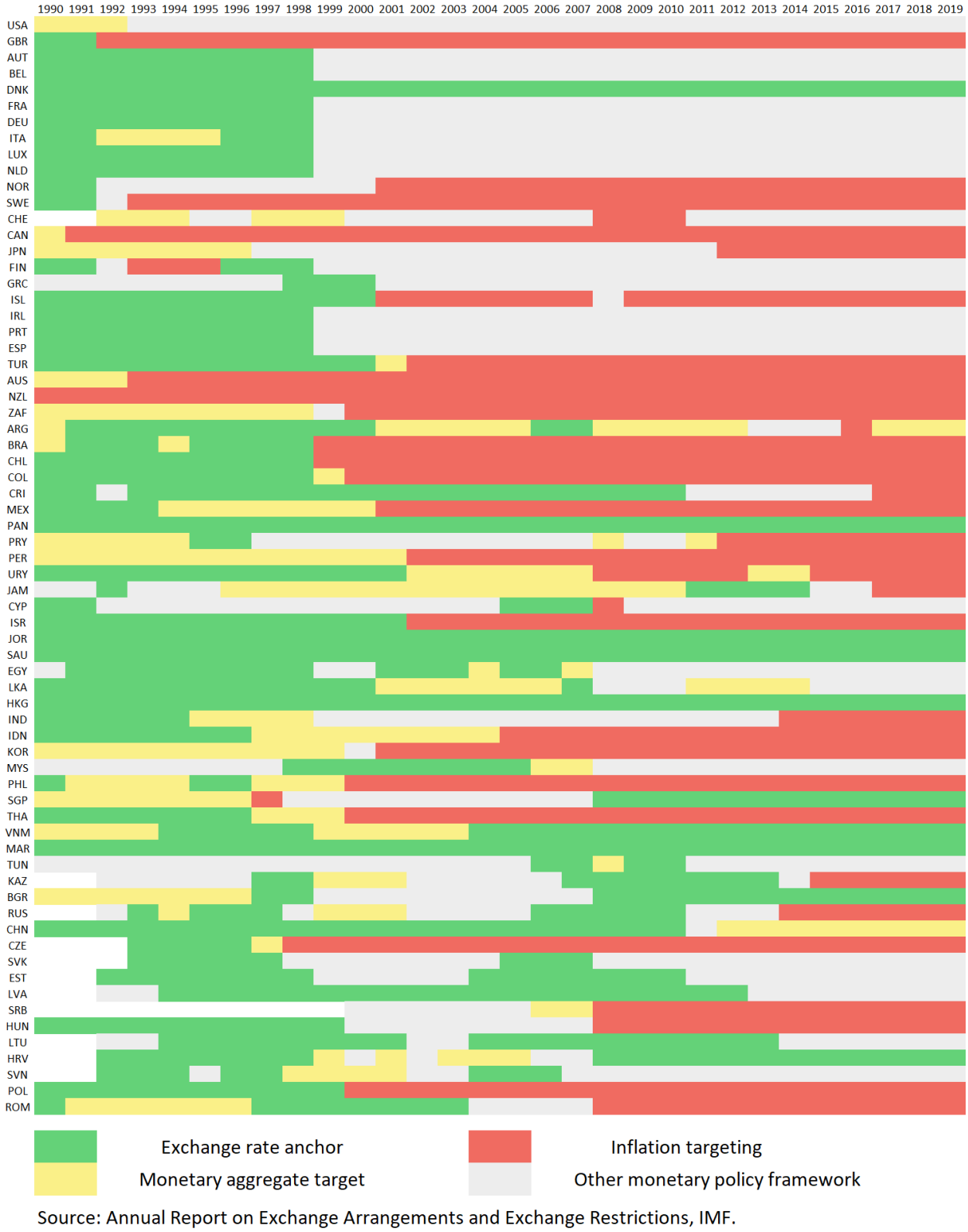


Figure 1: The Rising Popularity of Inflation Targeting as A Monetary Policy Framework

There is limited empirical documentation on the degree of dynamic consistency of inflation targeting. Past studies often treat inflation targets and bands as static parameters. While acknowledging inflation targeting as a rule-based strategy to address the dynamic inconsistency problem, the fact that inflation targeters occasionally move their point targets and adjust their target bands is conveniently ignored by most researchers.

Furthermore, little is known about whether inflation targeting countries' track records affects their macroeconomic performance. Earlier researchers found that the effectiveness of inflation targeting in enhancing inflation and output growth outcomes is disputable across countries. Regrettably, most empirical analysis regards the adoption of inflation targeting as an event, ignoring the dynamic and heterogeneous features of the monetary policy framework.

To fill the above-mentioned research gaps, this paper provides new evidence on inflation targeting countries' track records, the dynamic adjustments of target bands and examines the effects of inflation targeting track records on countries' macroeconomic performance. We contribute to the literature in three aspects. First, we construct three novel inflation targeting track record measures, covering the entire history of 32 major inflation targeting countries. These measures quantify the percent of the time that inflation stays within the band, the duration of the most recent spell that inflation remains in the band, and the maximum time span of consecutive quarters that inflation falls outside the target range during a given period. Our approach provides time-varying measures capturing the dynamic and country-specific characteristics of their monetary policy framework. The economic intuition behind these track records is to distinguish the de facto quality of inflation targeting across countries, reflecting both dynamics and heterogeneity. Second, we document the heterogeneity of inflation targeting countries' track records in managing inflation with respect to their stated objectives. Although often classified as one group, inflation targeting countries are very different in their track records of managing inflation. We find that most inflation targeters frequently adjust their target bands over time. Third, we empirically study the contemporaneous and future effects of inflation targeting track records on countries' real GDP

growth and CPI inflation. Results indicate that better inflation targeting track records do not lead to higher growth or lower inflation rates towards central banks' targets in the short term. However, the full benefits of solid IT track records remain to be investigated.

The rest of the paper is organized as follows. Section 2 reviews the literature on inflation targeting, emphasizing its implementation, dynamic nature, and macroeconomic effects. Section 3 presents the data and stylized facts, including three novel IT track record measures and new evidence on how central banks dynamically change IT target bands. Section 4 shows the empirical results of IT on economic growth and inflation. Section 5 performs several robustness checks. The last section discusses and concludes the paper.

2 Literature Review

Whether to adopt inflation targeting is a choice of monetary policy regimes. A nominal anchor, such as exchange rate, monetary aggregate, and inflation, lays the foundation for a central bank's monetary policy and its framework to influence macroeconomic variables. Bordo and Schwartz (1999) survey the historical experience of four broad monetary regimes: the classical gold standard, the interwar period, the postwar Bretton Woods system, and the recent managed float period. After the collapse of the Bretton Woods systems, many countries abandoned their exchange rate pegs and searched for new nominal anchors. Inflation targeting as opposed to monetary aggregate targeting began to gain traction. Early work by Svensson (1999, 2000) provides a theoretical foundation for inflation targeting, discusses inflation targeting in the context of monetary policy rules, and clarifies its essential characteristics.

There is rich literature on drivers of economic growth and the effects of adopting inflation targeting on growth. Classical economic growth literature highlights key drivers of economic growth, including institutions (Acemoglu et al., 2003), human capital (Barro et al., 2003),

and initial income level (Doppelhofer et al., 2004). To simultaneously address omitted variable bias and endogeneity issues, the cross-country growth empirics typically use dynamic panel regressions with a Generalized Method of Moments (GMM) estimator (Berg et al., 2018). Researchers are intrigued by the newfound inflation targeting regime and carry out extensive research on its economic effects. They try to shed light on whether inflation targeting is a determinant of economic growth in addition to the abovementioned factors. However, most researchers find little or mixed macroeconomic effects of inflation targeting. Ball and Sheridan (2004) examine the economic performance of seven OECD countries that adopted inflation targeting in the early 1990s and find that there is no evidence that inflation targeting improves performance once initial conditions are controlled for (i.e., regression to the mean). Ball (2010) compares the performance of economies with different monetary regimes and concludes that there is little evidence that inflation targeting affects performance in advanced countries while there are some benefits in emerging markets. In a recent study, Bhalla et al. (2022) confirm that there is not much difference on average between IT and non-IT countries in mean inflation, inflation volatility, or inflation anchoring. However, their evidence on the growth impacts of IT is mixed and offers some support for the concern that inflation gains at the expense of output.

There is also well-documented literature on determinants of inflation and the role of the inflation targeting regime in taming inflation. Cottarelli (1998) examine the nonmonetary determinants of inflation in addition to traditional monetary factors. Mishkin (2000) outlines the advantages and disadvantages of inflation targeting for emerging markets and argues that although IT is not a panacea, it can be highly useful in a number of countries. Mishkin and Schmidt-Hebbel (2007) suggest that inflation targeting helps countries achieve lower inflation in the long run, have smaller inflation responses to oil-price and exchange-rate shocks, and strengthen monetary policy independence and efficiency. Nevertheless, their results do not prove that inflation targeters have attained better monetary policy outcomes relative to their control group of non-inflation targeters. Vega and Winkelried (2005) estimate the

treatment effect of inflation targeting adoption using propensity score matching based on a yearly dataset of 109 countries and find out that IT has reduced the level and volatility of inflation in IT adopters. However, Lin and Ye (2007) evaluate the treatment effect of inflation targeting in seven industrial countries and show that inflation targeting has no significant effects on either inflation or inflation variability. Lin and Ye (2009) further investigate the effects of inflation targeting in thirteen developing countries and find significant but heterogeneous effects on lowering both inflation and inflation variability in these thirteen countries. De Mendonça and e Souza (2012) also use propensity score matching methodology on a sample of 180 countries for the period from 1990 to 2007. Their results suggest that the adoption of IT does not represent an advantageous strategy for advanced economies but reduces the inflation level and volatility of developing countries. Ardakani et al. (2018) re-evaluate the treatment effect of inflation targeting and point out that no significant difference in the inflation level and inflation volatility between targeters and non-targeters. Gonçalves and Salles (2008) analyze a subset of 36 emerging markets and discover that compared to non-targeters, developing countries adopting the IT regime had greater declines in inflation and growth volatility. Brito and Bystedt (2010) include a common time effect variation to control for the worldwide trends and apply the dynamic panel estimator to address simultaneity and omitted variable biases. They overturn the findings of the earlier research and conclude that there is no evidence that IT improves inflation and output growth in developing countries.

The transparency, credibility, and implementation aspects of inflation targeting have been widely studied. By explicitly announcing inflation targets or ranges and issuing regular communications, central banks aim to reduce economic and financial uncertainties and enhance their accountabilities to the government and the public through transparency. Meanwhile, central banks retain the flexibility to respond to short-term economic conditions within the constraints of the policy framework. Virtually all central banks are conducting flexible inflation targeting. While there is no consensus on how to design and implement inflation targeting, there are several important issues. First, what level of the inflation target is ap-

propriate. Setting an inflation target too low or too high can create risks[4]. Second, central banks need to decide their tolerance bands or target ranges. A narrower band is better at conveying the central bank's commitment to achieving the inflation target, but it comes at the cost of losing credibility as a more adverse shock could push inflation outside the target range. Third, although price stability is the primary mandate of inflation targeters, central banks usually have multiple policy objectives. Some inflation targeters may also keep an eye on the output gap, labor market, exchange rate, or other indicators. It may be reasonable for inflation targeting central banks to temporarily deviate from their inflation targets due to concerns about macroeconomic variables rather than inflation. These complexities may justify that the implementation of inflation targeting varies country by country. Svensson (2010) provides an overview of the characteristics of inflation targeting and discusses the developments of practical inflation targeting since its inception. Ehrmann (2021) studies different ways of implementing inflation targeting, such as adopting point targets, with or without tolerance bands, or by specifying target ranges. The author finds that these IT types affect the degree to which inflation expectations are anchored and targets with intervals tend to lead to better anchoring.

Several previous papers have emphasized the dynamic nature of conducting inflation targeting. Friedman (1990) surveys the conceptual developments in the literature on targets and instruments of monetary policy and examines the implications of controlling a monetary target. As inflation targeting starts to gain traction among central banks, it is commonly operationalized as a dynamic framework instead of a static one based on a strict monetary policy rule. Such dynamic nature of IT is evident from changes in IT targets and band sizes. Barro and Gordon (1983)'s theoretical work on discretionary monetary policy motivates the use of inflation targets as the interaction between a time consistency problem and a central

[4]Ambrocio et al. (2022) have just carried out a survey of more than 600 economists. Most respondents prefer their central banks to have an explicit inflation target. While roughly half of them want the central bank to keep its current target, two thirds of the rest prefer to raise the targe size by a median of one percentage point.

bank's private information. Walsh (1995) and Athey et al. (2005) demonstrate that a static inflation targeting mechanism can only resolve the resulting inflationary bias in either a fully static environment or when shocks are uncorrelated across time. Andrade et al. (2018) study how changes in the steady-state real interest rate affect the optimal inflation target and find that the relation is downward-sloping but its slope is not necessarily one-for-one. Most recently, Clayton and Schaab (2021) provide a theory of how a central bank should update its inflation target in the presence of persistent economic shocks and show both the level and flexibility of the target can change over time.

Our paper contributes to the literature by systematically documenting IT track records, enriching the debate on IT's macroeconomic implications by examining the effects of IT track records, and providing additional evidence on the heterogeneous and dynamic nature of inflation targeting.

3 Data and Stylized Facts

3.1 Data Description

We compile a panel dataset of 68 countries over the period 1990-2019 (Table 1). The dataset includes 32 advanced economies and 36 major emerging market and developing economies, based on the International Monetary Fund (IMF)'s World Economic Outlook (WEO) country classification. As of 2019, there are 32 inflation targeting countries, accounting for about 47 percent of all sample countries. According to the WEO data, our sample countries accounted for about 93 percent of the global nominal output in 2019.

We use various data sources for the variables included in this dataset. Country classification by monetary policy framework comes from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Inflation targeting countries' stated inflation targets and bands are based on public information from central banks' websites.

Zhang (2021) assembles these public records, and this paper further extends its data until 2019. Data on real GDP and Consumer Price Index (CPI), which we use to measure macroeconomic performance, are downloaded from the IMF's WEO and IFS databases, as well as Haver Analytics. Furthermore, the global primary commodity price index is retrieved from the IMF. The Nominal Effective Exchange Rate (NEER) is from the IMF's IFS database. Following the approach by Honig (2009), the institutional quality index is measured by the simple average of ratings on bureaucracy quality, corruption, law and order, published by the International Country Risk Guide (ICRG). The human capital index is from the Penn World Table 10.0 dataset. Finally, the terms of trade and population growth data are obtained from the IMF's WEO database. Table 2 summarizes variable names, data frequency, and data sources.

Table 3 summarizes the basic statistics for the main variables used in this paper[5]. Real GDP growth rates on average are 3.2 percent, and the standard deviation is 3.92 percent with a minimum of -20 percent and a maximum of 34.08 percent. CPI inflation is more volatile than real GDP growth with an average of 5.87 percent. The minimum value of -5.75 percent and the maximum of 161.52 percent suggest extreme price increases are more drastic than extreme price decreases. In contrast, the terms of trade growth variable has seen enormous values in both price rises (-55.9 percent minimum) and declines (94.61 percent maximum) with an average value of 0.52 percent. The annual growth rate of the primary commodity price index is similar to the movements in terms of trade. It has a mean of 4.41 percent with its lowest value being -29.83 percent and the highest value being 27.93 percent. Population and human capital grow 0.88 and 0.82 per annum for the sample countries. The annual change in Nominal Effective Exchange Rate (NEER) index on average is -1.73 percent, with huge appreciation (94.59 percent) and depreciation (-98.78 percent) episodes. Lastly, the composite institutional quality index constructed using the ICRG dataset has a 0.55 percent average annual change and a large standard deviation of 9.19 percent.

[5]Hyperinflation periods are dropped for regression analysis.

Table 1: Country List

Advanced Economies (32)	Emerging Markets and Developing Economies (36)
Australia	Argentina
Austria	**Brazil**
Belgium	Bulgaria
Canada	**Chile**
Cyprus	China
Czech Republic	**Colombia**
Denmark	Costa Rica
Estonia	Croatia
Finland	Egypt
France	Hungary
Germany	India
Greece	**Indonesia**
Hong Kong SAR	Jamaica
Iceland	Jordan
Ireland	Kazakhstan
Israel	Latvia
Italy	Lithuania
Japan	Malaysia
Luxembourg	**Mexico**
Netherlands	Morocco
New Zealand	Panama
Norway	Paraguay
Portugal	**Peru**
Singapore	**Philippines**
Slovak Republic	**Poland**
Slovenia	**Romania**
South Korea	Russia
Spain	Saudi Arabia
Sweden	**Serbia**
Switzerland	**South Africa**
United Kingdom	Sri Lanka
United States	**Thailand**
	Tunisia
	Turkey
	Uruguay
	Vietnam

Note: countries in red are inflation targeting countries as of 2019, and those in bold red are inflation targeting countries with more than ten years of track record measures.

Table 2: Variable Description

Variables	Data Frequency	Data Sources
Real GDP	Quarterly	WEO, IFS, Haver
Consumer Price Index	Quarterly	IFS, WEO
Monetary Policy Framework	Annual	IMF AREAER
IT Targets and Bands	Annual	Central Bank Websites
Primary Commodity Index	Quarterly	IMF
Nominal Effective Exchange Rate	Quarterly	IFS
Institutional Quality Index	Annual	ICRG
Human Capital Index	Annual	Penn World Table 10.0
Terms of Trade	Annual	WEO
Population Growth Rate	Annual	WEO

Table 3: Summary Statistics for Main Variables

Variable (Percent Change)	Observations	Mean	Std. Dev.	Min	Max
Real GDP Growth	1,739	3.20	3.92	-20	34.08
CPI Inflation	1,950	5.87	10.95	-5.75	161.52
Terms of Trade Change	1,956	0.52	6.58	-55.90	94.61
Population Growth	2,006	0.88	1.09	-6.51	6.49
Human Capital Change	2,030	0.82	0.63	-0.92	4.74
Primary Commodity Price Change	1,836	4.41	15.71	-29.83	27.93
NEER Change	1,999	-1.73	11.86	-98.78	94.59
Institutional Quality Change	1,957	0.55	9.19	-37.50	200.00

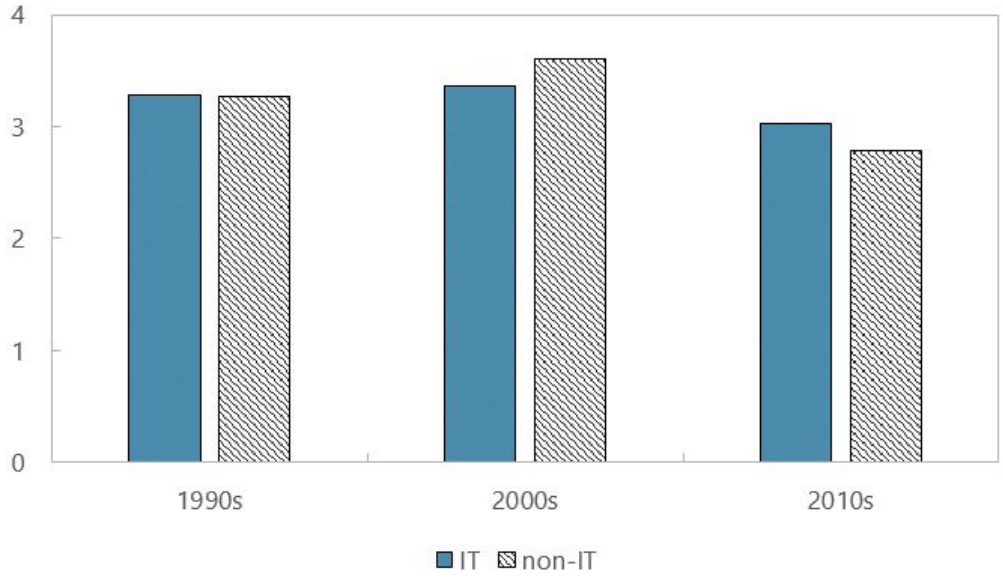


Figure 2: Average Real GDP Growth by Monetary Policy Framework

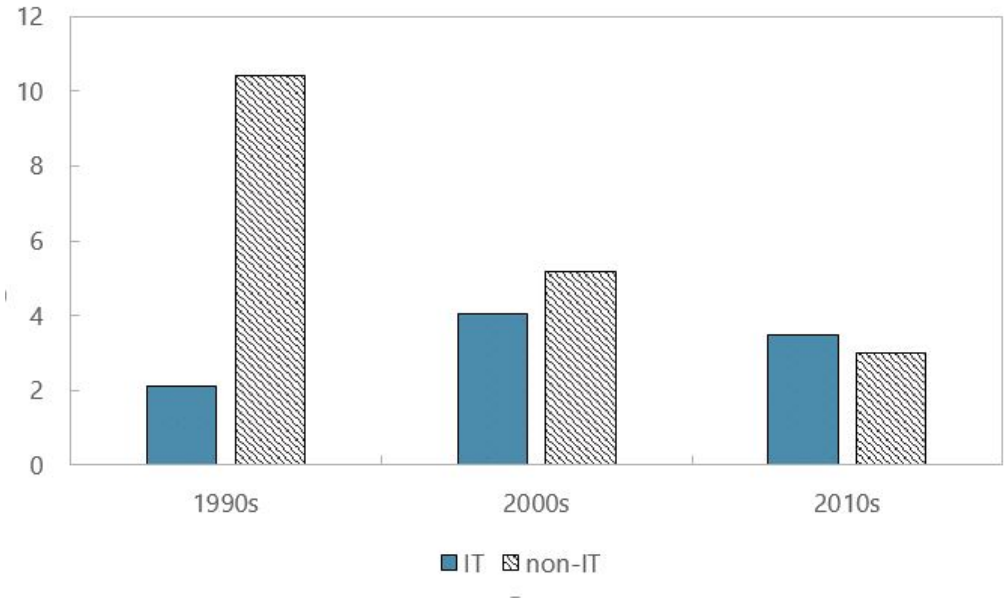


Figure 3: Average Inflation by Monetary Policy Framework

3.2 Stylized Facts

With the data above, we unfold some stylized facts about macroeconomic performance between inflation targeting countries and other countries. First, we calculate the average real GDP growth rates and average CPI inflation rates by country group in the last three decades. Figure 2 shows average real GDP growth by monetary policy framework. Average GDP growth rates during the 1990s are roughly the same between IT and non-IT countries. IT countries' average growth slightly underperforms during the 2000s but modestly overperforms during the 2010s. Figure 3 plots the average CPI inflation with the split between IT and non-IT countries. Early IT adopters, which are a few developed countries, had significantly lower inflation in the 1990s. However, as more countries joined the IT club, the inflation differential between IT and non-IT countries narrowed in the 2000s and reversed in the 2010s. Results from these two figures suggest that IT countries, on average, do not have better macroeconomic outcomes on an unconditional basis. We will conduct an econometric analysis in the next section.

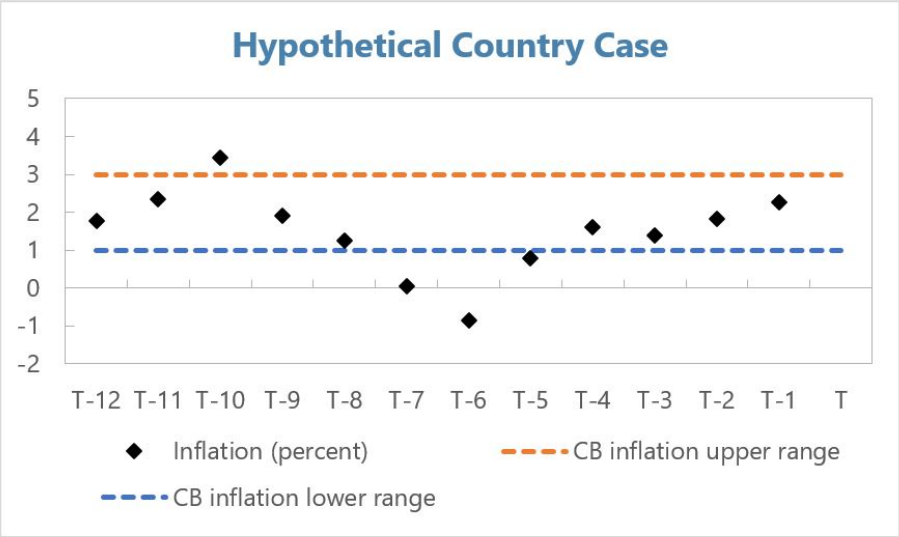
3.3 Inflation Targeting Track Record Measures

To systematically evaluate how inflation targeters manage inflation with respect to their stated policy objectives, we construct three novel inflation targeting track record measures. These measures review central banks' tendency to manage inflation and assign rule-based scores to how inflation is situated with respect to the official inflation target bands.[6] If history is any guide, we expect economic agents to respond to the track records of how well inflation is managed. The first measure is in the spirit of Zhang (2021). This average in-band probability measure ("A measure") computes the percent of actual inflation stays within the central bank's announced band in the last N years for a given country. The second measure follows the exchange rate regime work by Klein and Shambaugh (2015). This recent in-band duration measure ("R measure") calculates the duration of the most recent spell that actual inflation stays within the central bank's announced band in the last N years. The third measure adopts the approach by Fratzscher et al. (2020). It is a maximum out-of-band duration measure ("M measure") that evaluates the maximum time span of consecutive quarters the actual inflation falls outside the target corridor in the last N years. To ensure the above measures are not sensitive to the length of time horizon, we build the track record measures over the horizon of 1 year, 3 years, or 5 years (N = 1, 3, or 5).[7] Finally, the measures are normalized so that the values are bounded between 0 and 1.

The above track record measures can be illustrated using a hypothetical country case. As shown in Figure 4, an inflation targeting central bank sets an upper bound of 3 percent and a lower bound of 1 percent. Actual inflation, marked in black dots, may not always stay within the central bank's announced band. According to the definition of the A measure,

[6]For those inflation targeters who do not have formal inflation target ranges, we intentionally avoid adding inflation target bands to preserve central banks' own assessment metrics. Therefore, the track record measures are not available for these countries.

[7]When comparing these track record measures across countries, it is important to use the same actual dates. It is not just the proportion of time in compliance that matters: the actual dates matter as it was much easier to meet an inflation target during the Great Moderation than in other times. Our examination of track record measures distinguishes the time dimension (as shown in Figure 5) and the regression analysis includes time-fixed effects.



Three IT track record measures based on a 3-year horizon	
A measure = 8 / 12=0.667	Average in-band probability measure
R measure = 4 / 12=0.333	Recent in-band duration measure
M measure = 3 / 12 =0.25	Maximum out-of-band duration measure

Figure 4: Illustration of IT Track Record Measures Using a Hypothetical Country Case

there are 8 periods of actual inflation that stay within the 1-3 percent band over 12 quarters (3 years). Thus, the value of the A measure is $8/12 = 0.667$. Most recently, inflation has remained in the band for 4 consecutive quarters, thus the R measure is equal to $4/12 = 0.333$. Lastly, inflation has fallen out of the band for two episodes, and the maximum duration of such miss is 3 periods. Under this situation, the M measure records a tally of $3/12 = 0.25$.

The summary statistics and correlations among IT track record measures are presented in Tables 4 and 5. The average in-band probability measures are larger than the recent in-band duration measures because the former takes into account all episodes that actual inflation stays within the band while the latter only considers the last episode that actual inflation remains within the band. Notably, the direction of the maximum out-of-band duration measure is the opposite of the first two measures because it examines the largest extent that actual inflation is outside the band. Results in the correlation matrix correspond to economic intuition: the A and R measures are positively correlated, while the M measure

Table 4: Summary Statistics for IT Track Record Measures

Variable	Obs	Mean	Std.Dev.	Min	Max
IT track record measure A, 1-year	406	0.491	0.384	0	1
IT track record measure A, 3-year	352	0.479	0.279	0	1
IT track record measure A, 5-year	301	0.471	0.225	0	1
IT track record measure R, 1-year	406	0.363	0.427	0	1
IT track record measure R, 3-year	352	0.197	0.298	0	1
IT track record measure R, 5-year	301	0.127	0.213	0	1
IT track record measure M, 1-year	406	0.484	0.383	0	1
IT track record measure M, 3-year	352	0.392	0.257	0	1
IT track record measure M, 5-year	301	0.330	0.187	0	1

Table 5: Correlations Among IT Track Record Measures

	Measure A, 3-year	Measure R, 3-year	Measure M, 3-year
IT measure A, 3-year	1		
IT measure R, 3-year	0.67	1	
IT measure M, 3-year	-0.89	-0.52	1

has negative correlations with the first two measures. As the time horizon expands from 1 to 5 years, all three measures decline in value.

Figure 5 shows the 3-year backward-looking average in-band probability track record measures by countries' income groups. The simple averages of each income group are used to plot the line chart. As only a few developed countries adopted IT in the early 1990s and a limited number of developing countries adopted IT in the early 2000s, the group averages are less representative in those years and sometimes look volatile. Nevertheless, the two income groups' track record measures demonstrate a high degree of synchronization since the late 2000s, with relatively low track records around 2010 and high track records around 2019. Furthermore, advanced economies on average have better track records than those of emerging markets and developing economies. Lastly, while the difference between the two income groups is not large, there is substantial heterogeneity within each group's member countries.

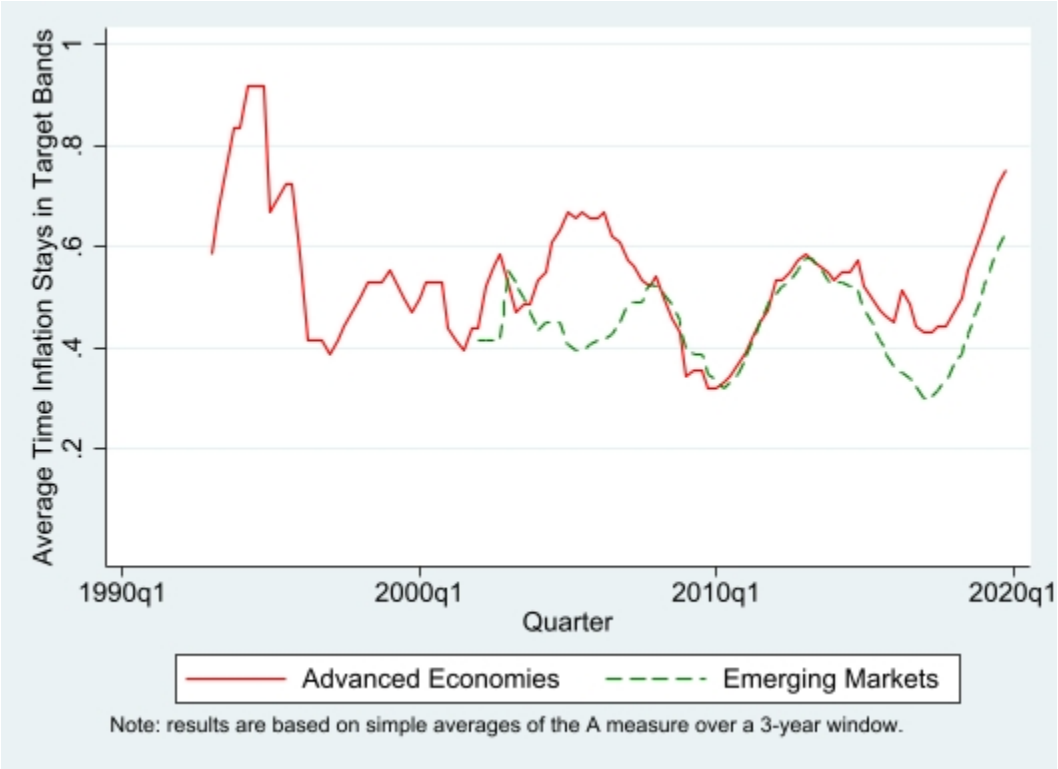


Figure 5: IT Track Record Measures by Income Group

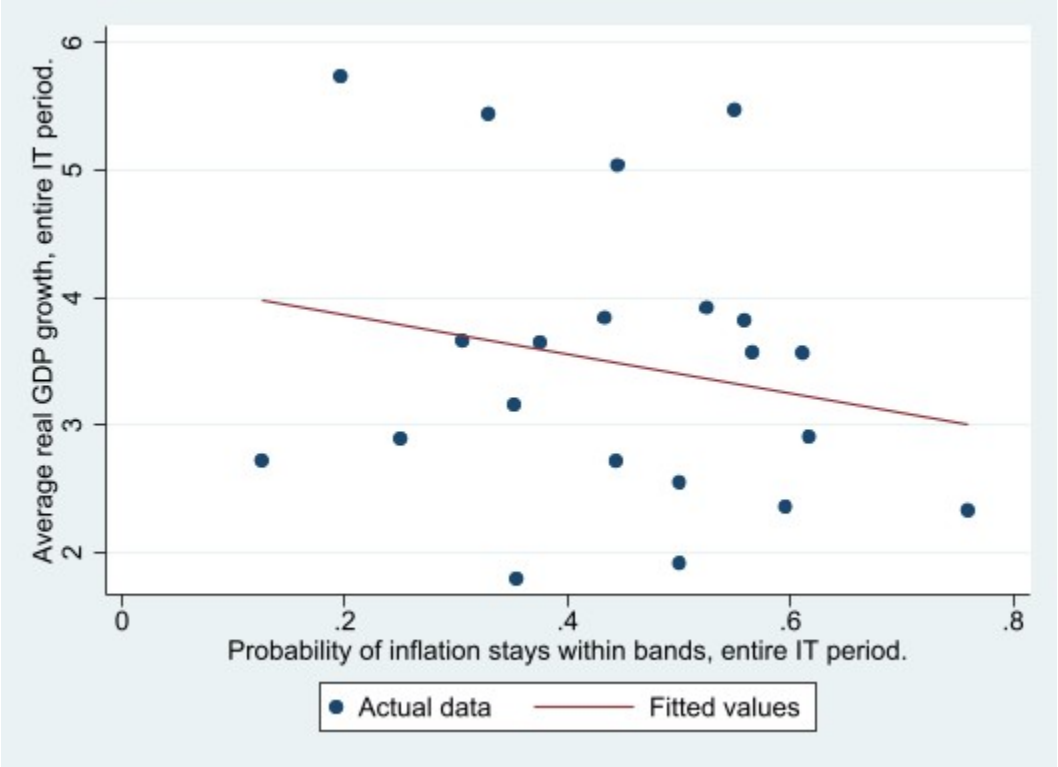


Figure 6: Average Real GDP Growth and IT Track Record

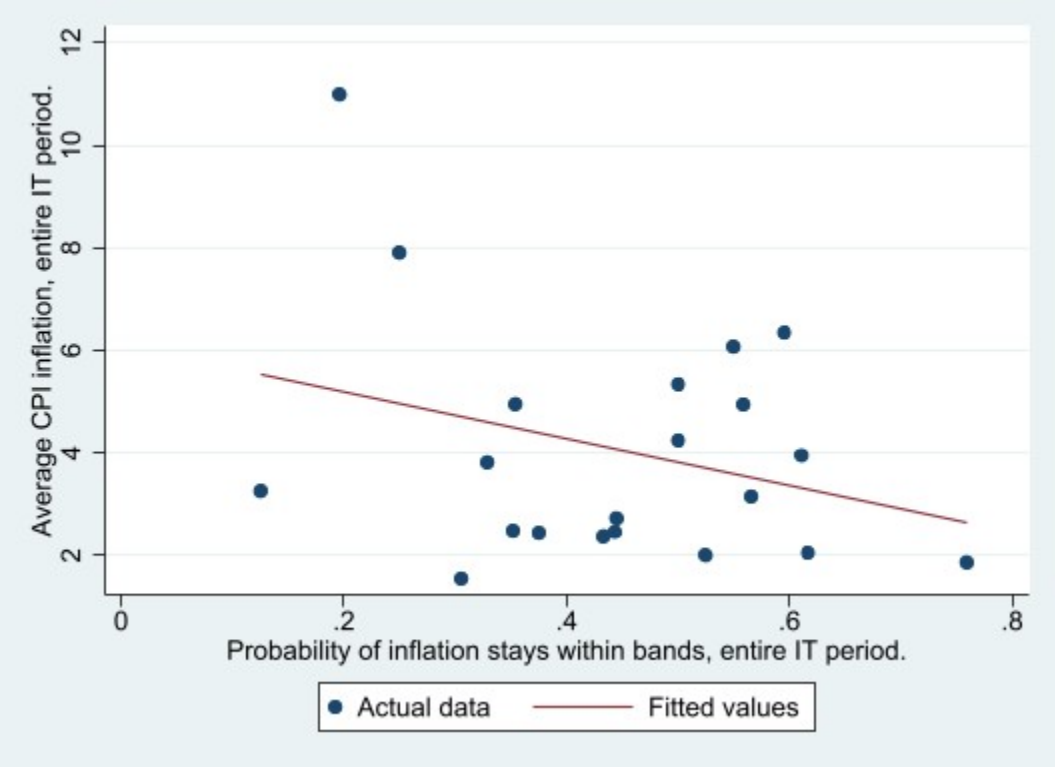


Figure 7: Average CPI Inflation and IT Track Record

Next, we examine the relationship between IT track record measures and macroeconomic performance using scatter plots. Figure 6 plots the probability of inflation staying within bands during the entire IT period against average real GDP growth during the same periods. While there are enough variations among variables on both axes, there is no clear correlation between the two variables. Figure 7 illustrates the probability of inflation staying within bands during the entire IT period against average CPI inflation during the same periods. Similarly, we cannot find a straightforward relationship between these two unconditional variables.

3.4 Dynamic Inflation Target Bands

It is common practice for inflation targeting countries to change their inflation targets and bands, and this issue of dynamic inconsistency has not been emphasized in the previous

Table 6: Inflation Targeters' Band Sizes

IT Range Size (Percentage Point)	Frequency	Percent
1	56	13.49
1.4	1	0.24
2	228	54.94
2.5	6	1.45
3	60	14.46
3.5	11	2.65
4	46	11.08
5	7	1.69
Total	415	100

literature. Past research papers often assume that inflation targets and bands are static, ignoring the fact that inflation targeters are heterogeneous in dynamically updating their targets and bands. As documented in Zhang (2021), central banks often change their inflation targets and bands, and such changes do not exclusively occur during the initial IT adoption stages.

The inflation band size announced by the central bank is critical to our IT track record measures. Under an extreme case, a particularly wide band (e.g., 10 percentage points between upper and lower bounds) will surely make inflation fall into the band almost all the time for an ordinary country. Given the importance of IT band sizes in determining our track record measures, we study historical data on IT band sizes in detail.[8]

We find that central banks have used a lot of discretions in setting the band sizes, which are wide-ranging across IT countries. On the one hand, the band size could change at any time in a given country (Figure 8). While some countries seem to follow a learning-by-doing approach by changing their band sizes in the early years of IT adoption, other countries tend to change the band sizes in later years. It is not uncommon for countries to change their band

[8]We do not take into account the mid-point of the inflation target band. Presumably, if the target is set much too low or high, the success at achieving it will be poor. However, relying on the mid-point to measure successes would involve the authors' judgement, as it is not straightforward to define a cutoff point for successes or failures based on the deviation from the inflation target. On the other hand, it is mechanical to declare whether inflation is within the target band using central banks' own evaluation criteria.

Figure 8: Inflation Targeters' Band Sizes (Percentage Points)

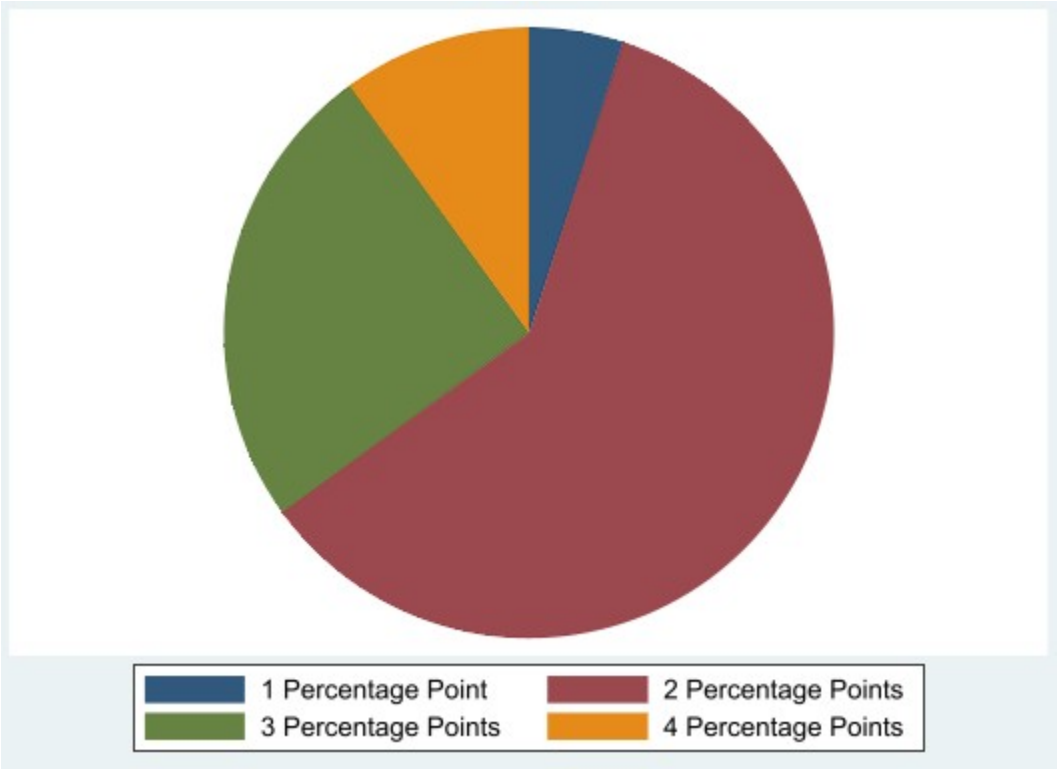


Figure 9: Distribution of IT Target Band Sizes, 2019

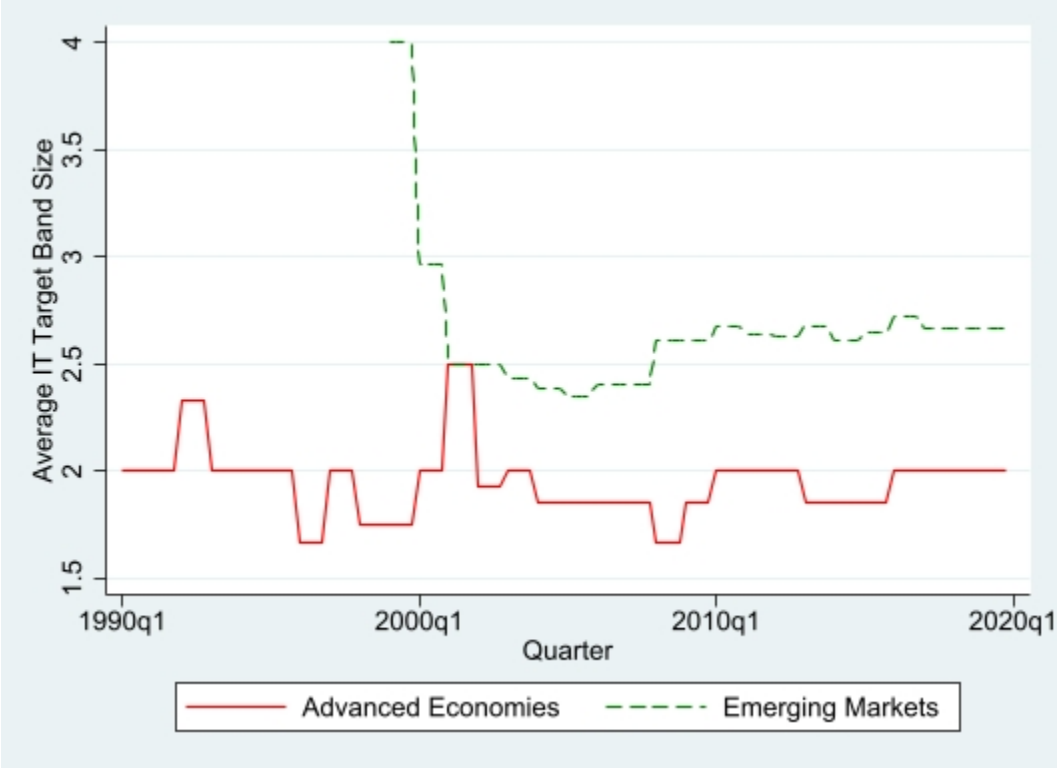


Figure 10: Average IT Target Band Sizes by Income Group

sizes multiple times. On the other hand, IT band sizes differ across countries significantly. As Table 6 shows, inflation targeters' historical band sizes range from 1 percentage point to 5 percentage points. As of 2019, the majority of the inflation targeters have embraced the 2-percentage-points band size (Figure 9). The distribution of band sizes also contains 3 percentage points, followed by 4 percentage points and 1 percentage point. The above facts suggest that central banks choose very different evaluation criteria for themselves: some are strict in setting a small band size, while the wide bands reflect loose standards by other central banks. When comparing average band sizes by income group, advanced economies have a smaller or equal band size than that of emerging markets and developing economies (Figure 10). Advanced economies' average band size is stable and moves around 2 percentage points. Emerging markets and developing economies had an average band size of 4 percentage points in 1999, driven by a limited number of IT adopters. As more emerging markets and developing economies joined the IT club, their average band size fell below 2.5 percentage points before the Great Financial Crisis but rose above 2.5 percentage points after that. It is not surprising for emerging markets and developing economies to have a larger IT band size on average, given that some countries, mainly developing ones, may have adopted IT without fulfilling the appropriate structural prerequisites. Presumably, it is an acknowledgement that deficiencies in meeting the structural preconditions require a wider IT band size to accommodate greater and more frequent inflation overshooting episodes.

4 Empirical Results

4.1 Results for All Countries

We begin our econometric analysis by investigating whether adopting the inflation targeting monetary policy framework affects macroeconomic performance. We follow the previous literature by treating IT adoption as a dummy variable and running regressions on the

panel dataset of all 68 countries over the period of 1990-2019. Given the well-documented persistence in economic growth and inflation, we estimate the following dynamic panel model:

$$y_{it} = \eta y_{i,t-1} + \beta IT_{it} + \boldsymbol{\lambda X} + \alpha_i + \theta_t + \varepsilon_{it} \tag{1}$$

y_{it} is the annual change in real GDP or CPI of the country i in year t. η is the estimated coefficient on the lagged dependent variable. IT_{it} is an inflation targeting dummy variable [9]. $IT = 1$ if a country adopts the inflation targeting framework, and $IT = 0$ if a country adopts other forms of monetary policy frameworks. $\boldsymbol{X}$ is a vector of standard control variables. For real GDP growth regressions, $\boldsymbol{X}$ includes annual growth rates in terms of trade, population, human capital index, and institutional quality. For CPI inflation regressions, $\boldsymbol{X}$ includes annual growth rates of commodity prices, nominal effective exchange rate, and institutional quality. α_i and θ_t are country and time fixed-effects. We apply the Generalized Method of Moments (GMM) to estimate the dynamic panel model. The lagged dependent variable is the GMM instrument and time dummy variables are IV instruments.

Table 7 reports the dynamic panel data estimations for all sample countries. As expected, the lagged dependent variables are positive and statistically significant, suggesting that economic growth and inflation exhibit certain degrees of inertia. Terms of trade and population growth can lift economic growth. Commodity price increases raise inflation, while nominal effective exchange rate appreciation and better institutional quality reduce inflation. However, the estimated coefficients of IT dummy variables in all regressions are statistically insignificant. Consistent with the existing literature, our results indicate that IT adoption is not a panacea to promote economic growth and control inflation. While countries often adopt IT because inflation is initially high and it may take several years for inflation

[9]The classification of countries' monetary policy frameworks is based on information from the IMF's AREAER database. Nevertheless, the Euro Area economies are classified under other monetary policy frameworks but the Eurozone as a whole conducts inflation targeting. Several non-IT countries' monetary policy strategies are also influenced by the practices of inflation targeting. The similarities among IT and non-IT countries may explain the insignificant results found in this section.

to subside, the effects of IT adoption are statistically insignificant once time fixed-effects are controlled for. Nevertheless, the estimated point estimates and standard errors on the IT dummy variables are large, which could result from simply classifying countries based on their IT adoption. Unfortunately, the devil is in the details, and such a black-or-white classification cannot fully capture how monetary policy is conducted in the real world. In fact, many IT countries do not have complete exchange rate flexibility and some of them are quasi exchange rate targeters. This motivates us to use continuous and dynamic measures to profile inflation targeters.

4.2 Results for Inflation Targeting Countries

Next, we focus on inflation targeting countries and utilize our newly constructed track record measures in the regression analysis. Although there are 32 inflation targeting countries in 2019, some central banks have not announced their inflation target bands, while others have only adopted IT for a short amount of time. We select 21 inflation targeters, which have at least 10 years of IT experience with explicitly stated IT target bands by the central banks[10]. In other words, these 21 inflation targeters have at least 10 years' track records that can be numerically assessed using central banks' own evaluation criteria.

We replace the IT dummy variable with our continuous IT track record measures in the regression analysis. Our novel track record measures are time-varying for each inflation targeter, thus nicely demonstrating the heterogeneity of how well inflation is managed within inflation targeting countries. We investigate whether better IT track records can improve countries' macroeconomic performance in terms of growth and inflation by modifying the benchmark dynamic panel model as follows:

[10]The subsample only includes periods when inflation targeters have explicit tolerance bands and excludes the periods when countries only have inflation point targets. For instance, the Czech National Bank is currently targeting a 2 percent inflation point, and only before 2006 there was a target band.

Table 7: Dynamic Panel Estimations for All Countries

	(1) RGDP Growth	(2) RGDP Growth	(3) RGDP Growth	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation
L.RGDP Growth	0.168***	0.185***	0.142**			
	(0.059)	(0.062)	(0.064)			
L.CPI Inflation				0.592***	0.586***	0.445***
				(0.072)	(0.084)	(0.124)
L.IT Dummy	-1.988	-2.532	-2.412	-4.950	-4.813	-4.951
	(1.229)	(1.662)	(1.484)	(3.936)	(3.508)	(4.039)
Terms of Trade Change		0.345***	0.243***			
		(0.127)	(0.093)			
Population Growth Rate		1.227*	1.322*			
		(0.737)	(0.770)			
Human Capital Change			0.522			
			(1.331)			
Institution Quality Change			0.083			-0.813***
			(0.058)			(0.308)
Commodity Price Change					0.036***	0.060**
					(0.011)	(0.025)
NEER Change						-0.684***
						(0.250)
Constant	1.148	-0.242	-0.190	2.164***	3.840***	4.511***
	(0.897)	(1.416)	(1.799)	(0.806)	(1.232)	(1.729)
No. of observations	1666	1647	1629	1873	1773	1752
No. of countries	68	68	68	68	68	68
No. of instruments	85	85	85	85	81	81
Arellano-Bond AR1 test (p-value)	0.000	0.000	0.000	0.044	0.046	0.001
Arellano-Bond AR2 test (p-value)	0.845	0.520	0.449	0.194	0.165	0.377
Hansen test of overid. restrictions (p-value)	0.871	0.901	0.978	0.351	0.336	0.576

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

$$y_{it} = \eta y_{i,t-1} + \beta ITTR_{it} + \boldsymbol{\lambda X} + \alpha_i + \theta_t + \varepsilon_{it} \tag{2}$$

y_{it} is the annual change in real GDP or CPI of the country i in year t [11]. η is the estimated coefficient on the lagged dependent variable. $ITTR_{it}$ is one of our inflation targeting track record measures of country i in year t. $\mathbf{X}$ is the same set of control variables. α_i and θ_t are country and time fixed-effects. The modified dynamic panel model is estimated using the GMM.

Table 8 reports the results of dynamic panel estimations for inflation targeting countries using IT track record measures. This average in-band probability track record measure is based on the history of one year, three years, five years, or the entire IT period.[12] Results suggest that IT track records do not affect contemporaneous economic growth or inflation, as the estimated coefficients are statistically insignificant for track record measures across all horizons.

Furthermore, we explore the effects of IT track records on future macroeconomic performance. The dynamic panel estimations above investigate the contemporaneous effects of IT track records on macroeconomic performance. In the following analysis, we estimate the impacts of IT track records on economic growth and inflation in future periods following Jordà (2005)'s local projection method. The specification of local projections are as follows:

$$y_{i,t+h} = \beta^h ITTR_{it} + \boldsymbol{\lambda^h X} + \alpha_i^h + \theta_t^h + \varepsilon_{i,t}^h \tag{3}$$

$y_{i,t+h}$ is the annual change in real GDP or CPI of the country i in year $t+h$ (h periods ahead). $ITTR_{it}$ is one of our inflation targeting track record measures of the country i in

[11] We do not intend to suggest that it is always better to have lower inflation, as low inflation or deflation is also harmful to the economy. There is an alternative regression to examine the inflation deviation from the target in the robustness check section.

[12] The track record over the entire IT period is a static measure. Track record R and M measures are also used. Results are included in the robustness check section.

Table 8: Dynamic Panel Estimations for Inflation Targeting Countries

	(1) RGDP Growth	(2) RGDP Growth	(3) RGDP Growth	(4) RGDP Growth	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
L.RGDP Growth	0.238*	0.156*	0.171	0.220*				
	(0.122)	(0.089)	(0.147)	(0.118)				
L.CPI Inflation					0.391***	0.459***	0.412***	0.410***
					(0.083)	(0.099)	(0.116)	(0.042)
L.IT Measure A, 1-year	1.210				0.027			
	(1.819)				(1.269)			
L.IT Measure A, 3-year		0.849				1.252		
		(1.301)				(1.608)		
L.IT Measure A, 5-year			-1.188				-0.505	
			(4.175)				(1.696)	
Within Band Time Measure				4.972				-2.814
				(8.658)				(5.559)
Terms of Trade Change	0.231	0.162	0.242**	0.301*				
	(0.144)	(0.118)	(0.117)	(0.160)				
Population Growth	1.331	1.935*	-0.392	0.940				
	(1.793)	(1.103)	(1.128)	(1.220)				
Commodity Price Change					0.041***	0.049***	0.037***	0.040**
					(0.013)	(0.010)	(0.012)	(0.019)
NEER Change					-0.108**	-0.142***	-0.111**	-0.078
					(0.048)	(0.048)	(0.055)	(0.059)
Institution Quality Change					-0.034	-0.065	-0.108	-0.144**
					(0.057)	(0.064)	(0.097)	(0.063)
Global Financial Crisis Dummy	-2.447***	-3.132***	-1.681	-2.204**	2.183***	1.669*	1.967**	2.938***
	-0.924	(0.807)	(1.147)	(1.010)	(0.812)	(0.889)	(0.836)	(0.969)
Constant	0.567	0.498	3.549**	-0.755	1.644***	0.868	1.740**	2.975
	(1.578)	(1.441)	(1.775)	(3.862)	(0.570)	(0.757)	(0.862)	(2.753)
No. of observations	352	315	275	403	354	316	275	404
No. of countries	21	21	21	21	21	21	21	21
No. of instruments	81	75	69	85	79	75	69	81
Arellano-Bond AR1 test (p-value)	0.009	0.014	0.017	0.007	0.002	0.000	0.002	0.002
Arellano-Bond AR2 test (p-value)	0.949	0.601	0.451	0.312	0.279	0.519	0.166	0.316
Hansen test of overid. restrictions (p-value)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

year t. Therefore, β^h is the h-period ahead macroeconomic performance response to inflation targeting track record at time t. $\boldsymbol{X}$ is a vector of control variables used before. α_i and θ_t are country and time fixed-effects.

Figures 11 and 12 illustrate local projection results on real GDP growth and CPI inflation with 95% confidence intervals. The response of economic growth or inflation to an increase in the IT track record measure does not statistically differ from zero as the area of confidence intervals never falls outside the horizontal line y=0 in the next 5 years.[13] Therefore, we find that better track records of inflation targeting do not enhance economic growth or decrease inflation. The findings are robust regardless of the track record measures (A, R, or M) or the impact horizon assessed (contemporaneous or future periods). Nevertheless, the short-term impacts of IT track records on real GDP growth are possibly negative at a lower significance level. As expected, IT prioritizes inflation over growth, therefore economic growth could be lower when IT objectives are met.

Given that differences in inflation targeters' band sizes vary significantly across countries, we test whether the insignificant effects of IT track records on macroeconomic performance are due to band sizes. As previously noted, a wide IT band size could make it easier for actual inflation to remain in a central bank's inflation range while a narrow IT band size makes the inflation management task more challenging. To create a level playing field for all inflation targeting countries, we adjust the track record measures by band sizes. We re-run the dynamic panel regressions by incorporating the adjusted track record measures:

$$y_{it} = \eta y_{i,t-1} + \beta ITTR_{it}^{adjusted} + \boldsymbol{\lambda X} + \alpha_i + \theta_t + \varepsilon_{it} \tag{4}$$

y_{it} is the annual change in real GDP or CPI of the country i in year t. η is the estimated coefficient on the lagged dependent variable. $ITTR_{it}^{adjusted}$ is an adjusted measure that equals

[13] There are very few exceptions when the impact on real GDP growth is not zero for certain years ahead when using the 1-year or 5-year A measure.

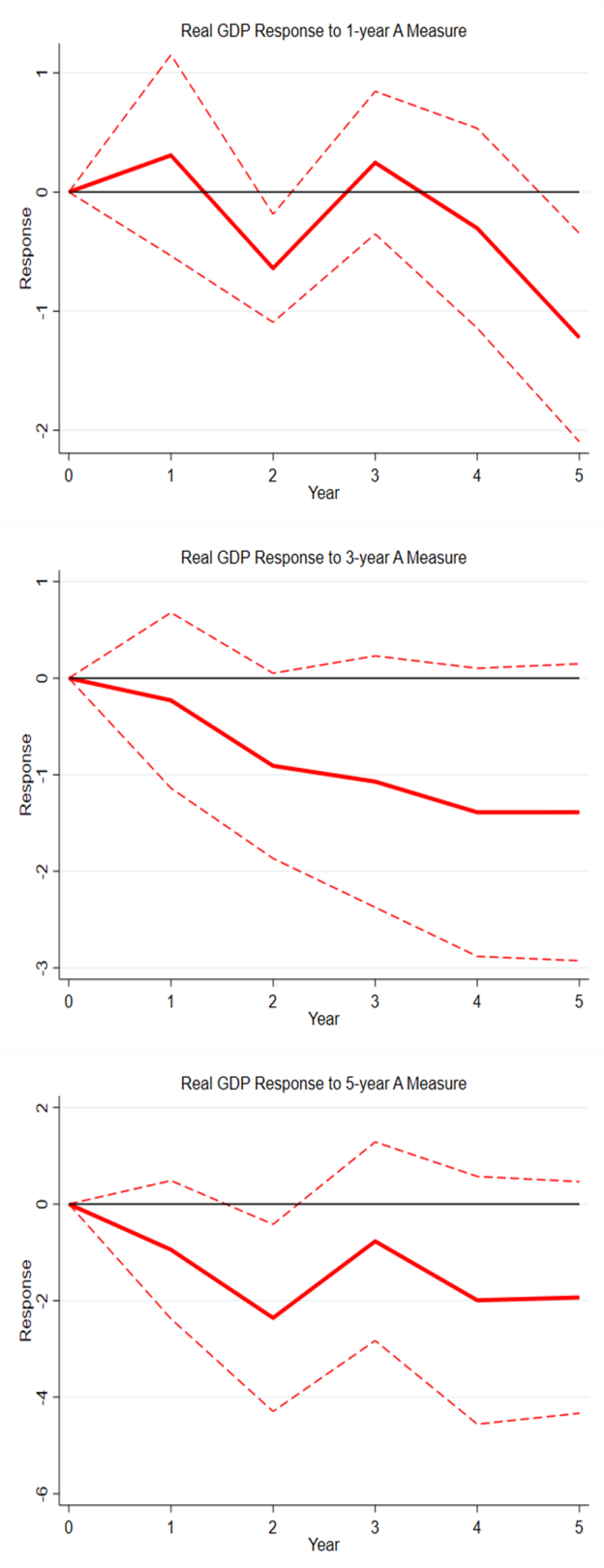


Figure 11: Local Projection Analysis of Real GDP Growth

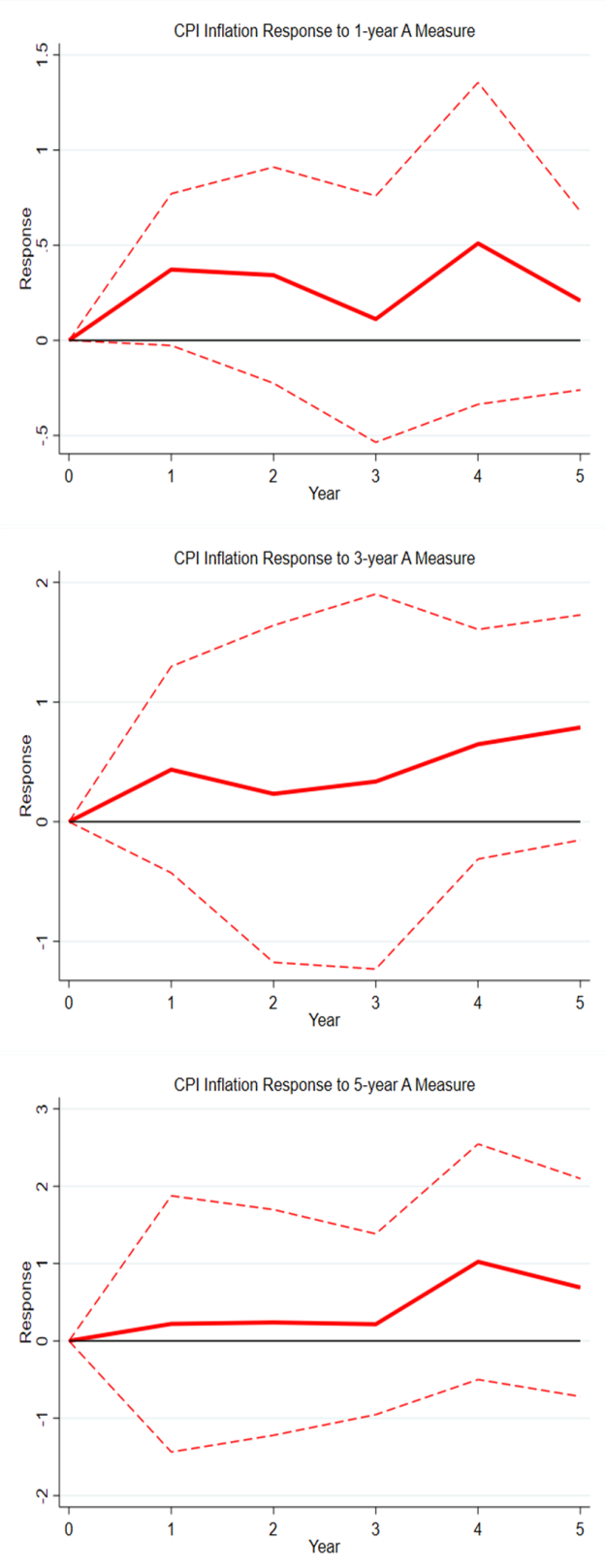


Figure 12: Local Projection Analysis of CPI Inflation

Table 9: Dynamic Panel Estimations for Inflation Targeting Countries, Continued.

	(1) RGDP Growth	(2) RGDP Growth	(3) RGDP Growth	(4) RGDP Growth	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
L.RGDP Growth	0.173	0.140	0.183	0.237*				
	(0.112)	(0.093)	(0.146)	(0.138)				
L.CPI Inflation					0.387***	0.457***	0.405***	0.331***
					(0.084)	(0.076)	(0.119)	(0.102)
L.IT Measure A, 1-year Adjusted	2.980				0.040			
	(2.706)				(2.086)			
L.IT Measure A, 3-year Adjusted		3.731				2.510		
		(2.442)				(3.428)		
L.IT Measure A, 5-year Adjusted			0.705				-1.013	
			(5.400)				(2.625)	
With Band Time Adjusted Measure				0.920				-5.690
				(12.033)				(14.820)
Terms of Trade Change	0.233**	0.128	0.238	0.233*				
	(0.109)	(0.093)	(0.146)	(0.123)				
Population Growth	1.033	1.650	-0.614	0.556				
	(1.741)	(1.201)	(1.121)	(1.730)				
Commodity Price Change					0.041***	0.052***	0.038***	0.044**
					(0.013)	(0.013)	(0.012)	(0.019)
NEER Change					-0.110**	-0.148***	-0.111**	-0.115*
					(0.048)	(0.046)	(0.053)	(0.063)
Institution Quality Change					-0.026	-0.085	-0.111	-0.108
					(0.070)	(0.093)	(0.096)	(0.113)
Global Financial Crisis Dummy	-2.544***	-3.236***	-1.874	-2.595***	2.230***	1.705**	2.064**	2.778***
	(0.814)	(0.919)	(1.233)	(0.953)	(0.714)	(0.770)	(0.831)	(0.904)
Constant	1.037	0.353	3.014*	1.676	1.663***	0.799	1.780**	3.191
	(1.199)	(1.184)	(1.622)	(3.308)	(0.483)	(0.875)	(0.770)	(3.488)
No. of observations	352	315	275	383	354	316	275	385
No. of countries	21	21	21	21	21	21	21	21
No. of instruments	81	75	69	85	79	75	69	81
Arellano-Bond AR1 test (p-value)	0.010	0.014	0.018	0.011	0.002	0.000	0.002	0.002
Arellano-Bond AR2 test (p-value)	0.912	0.589	0.367	0.548	0.360	0.581	0.161	0.116
Hansen test of overid. restrictions (p-value)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

one of previous inflation targeting track record measures divided by the corresponding IT band size for the country i in year t. $\boldsymbol{X}$ is the same set of control variables. The dynamic panel model is estimated using the GMM with α_i and θ_t as country and time fixed-effects.

We do not find empirical evidence to conclude that IT band size is the reason behind the insignificant effects of IT track records on short-term macroeconomic outcomes. Table 9 represents the regression results using the band-size-adjusted IT track record measures. Similar to previous results, the estimated coefficients for all the adjusted track record measures are not statistically significant. Therefore, we cannot assert that the heterogeneity of IT band sizes explains the failure of IT track records to influence short-term macroeconomic performance.

5 Robustness Checks

To ensure that our results are robust, we perform several checks. First, we replace the IT track record A measures with the alternative R and M measures described in Section 3.3. Tables 10 and 11 report the results. Consistent with our baseline results using the track record A measures, the estimated coefficients of IT track records are still statistically insignificant when alternative measures are used over the 1-year, 3-year, and 5-year backward-looking windows. The evidence confirms that better IT track records do not lead to more favorable growth and inflation rates in the short term. This conclusion is not sensitive to the construction of track record measures or the choice of evaluation horizon.

Furthermore, we use the inflation deviation from the target as the dependent variable to consider the undesirable effects of disinflation. While high inflation is generally regarded as harmful, low inflation or deflation is also damaging to the economy. For instance, deflation episodes can increase the real values of debt burden, cause firms to produce less and consumers to spend later. They can also make central banks' policy rates more likely to hit the

Table 10: Robustness Check: Using R Measure of IT Track Record

	(1) RGDP Growth	(2) RGDP Growth	(3) RGDP Growth	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation
L.RGDP Growth	0.216*	0.150	0.193			
	(0.128)	(0.104)	(0.146)			
L.CPI Inflation				0.388***	0.420***	0.451***
				(0.080)	(0.088)	(0.098)
L.IT Measure R, 1-year	1.215			0.236		
	(1.420)			(1.722)		
L.IT Measure R, 3-year		-0.204			3.192	
		(1.487)			(2.558)	
L.IT Measure R, 5-year			-2.654			-0.996
			(3.097)			(1.433)
Terms of Trade Change	0.228*	0.129*	0.276*			
	(0.123)	(0.073)	(0.155)			
Population Growth	1.174	1.865	0.466			
	(1.357)	(1.473)	(2.414)			
Commodity Price Change				0.041***	0.047***	0.039***
				(0.013)	(0.008)	(0.012)
NEER Change				-0.107**	-0.119**	-0.125**
				(0.046)	(0.049)	(0.050)
Institution Quality Change				-0.026	-0.023	-0.116
				(0.066)	(0.064)	(0.093)
Global Financial Crisis Dummy	-2.265**	-3.129***	-2.008**	2.273***	2.137**	1.800*
	(0.931)	(0.862)	(0.895)	(0.746)	(0.954)	(0.958)
Constant	0.961	1.040	2.331	1.590**	0.982*	1.459***
	(1.591)	(1.165)	(2.088)	(0.759)	(0.520)	(0.384)
No. of observations	352	315	275	354	316	275
No. of countries	21	21	21	21	21	21
No. of instruments	81	75	69	79	75	69
Arellano-Bond AR1 test (p-value)	0.011	0.015	0.017	0.002	0.000	0.001
Arellano-Bond AR2 test (p-value)	0.958	0.561	0.470	0.290	0.156	0.272
Hansen test of overid. restrictions (p-value)	1.000	1.000	1.000	1.000	1.000	1.000

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

Table 11: Robustness Check: Using M Measure of IT Track Record

	(1) RGDP Growth	(2) RGDP Growth	(3) RGDP Growth	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation
L.RGDP Growth	0.236*	0.192	0.140			
	(0.125)	(0.119)	(0.185)			
L.CPI Inflation				0.388***	0.408***	0.357***
				(0.082)	(0.092)	(0.103)
L.IT Measure M, 1-year	-0.904			0.036		
	(1.923)			(0.926)		
L.IT Measure M, 3-year		-0.443			0.998	
		(1.126)			(1.319)	
L.IT Measure M, 5-year			-2.390			2.932
			(2.775)			(2.715)
Terms of Trade Change	0.216	0.105	0.251*			
	(0.142)	(0.095)	(0.130)			
Population Growth	1.551	1.931	1.017			
	(1.824)	(1.395)	(1.884)			
Commodity Price Change				0.041***	0.034**	0.028**
				(0.014)	(0.017)	(0.011)
NEER Change				-0.109**	-0.102	-0.096**
				(0.048)	(0.063)	(0.040)
Institution Quality Change				-0.023	-0.049	-0.109
				(0.069)	(0.079)	(0.073)
Global Financial Crisis Dummy	-2.453***	-3.206***	-2.245*	2.215***	1.941**	2.225***
	(0.936)	(0.924)	(1.264)	(0.715)	(0.808)	(0.765)
Constant	1.410	0.991	2.650*	1.649**	1.231**	0.734
	(2.408)	(1.310)	(1.518)	(0.664)	(0.615)	(0.796)
No. of observations	352	315	275	354	316	275
No. of countries	21	21	21	21	21	21
No. of instruments	81	75	69	79	75	69
Arellano-Bond AR1 test (p-value)	0.009	0.021	0.026	0.002	0.000	0.001
Arellano-Bond AR2 test (p-value)	0.931	0.502	0.655	0.347	0.196	0.097
Hansen test of overid. restrictions (p-value)	1.000	1.000	1.000	1.000	1.000	1.000

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

Table 12: Robustness Check: Using Inflation Deviation from Target as the Dependent Variable

	(1) CPI Inflation Deviation	(2) CPI Inflation Deviation	(3) CPI Inflation Deviation	(4) CPI Inflation Deviation
L.CPI Inflation Deviation	0.217	0.217	0.108	0.109
	(0.138)	(0.161)	(0.137)	(0.112)
L.IT Measure A, 3-year	-0.223		0.389	
	(1.693)		(0.857)	
L.IT Measure A, 3-year Adjusted		0.628		0.909
		(6.586)		(2.093)
Commodity Price Change	0.0704***	0.0385	0.0319***	0.0317**
	(0.0269)	(0.0270)	(0.0112)	(0.0141)
NEER Change	-0.109*	-0.200**	-0.0324	-0.0166
	(0.0604)	(0.0778)	(0.0533)	(0.0501)
Institution Quality Change	-0.227*	-0.107	-0.0570	-0.0537
	(0.120)	(0.106)	(0.0864)	(0.0711)
Global Financial Crisis Dummy	3.937***	1.817*	3.689**	3.917***
	(1.345)	(0.928)	(1.634)	(1.275)
Constant	0.782	0.719	-0.895**	-0.948*
	(1.014)	(1.425)	(0.450)	(0.498)
No. of observations	111	111	94	94
No. of countries	15	15	16	16
No. of instruments	56	56	53	53
Arellano-Bond AR1 test (p-value)	0.0704	0.0401	0.0804	0.0766
Arellano-Bond AR2 test (p-value)	0.265	0.919	0.905	0.935
Hansen test of overid. restrictions (p-value)	1.000	1.000	1.000	1.000

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

Table 13: Robustness Check: Using Inflation Deviation from the World Average as the Dependent Variable

	(1) CPI Demeaned Inflation	(2) CPI Demeaned Inflation	(3) CPI Demeaned Inflation	(4) CPI Demeaned Inflation
L.CPI Demeaned Inflation	0.583***	0.522***	0.586***	0.543***
	(0.164)	(0.090)	(0.131)	(0.101)
L.IT Measure A, 3-year	2.312			
	(3.229)			
L.IT Measure A, 5-year		1.919		
		(3.697)		
L.IT Measure A, 3-year Adjusted			2.822	
			(7.622)	
L.IT Measure A, 5-year Adjusted				4.199
				(6.710)
Commodity Price Index	0.023**	0.021**	0.039	0.023**
	(0.010)	(0.009)	(0.025)	(0.010)
NEER Change	-0.095	-0.083	-0.059	-0.086
	(0.060)	(0.062)	(0.065)	(0.056)
Institution Quality Change	-0.180	-0.141	-0.162	-0.137
	(0.149)	(0.124)	(0.162)	(0.124)
Global Financial Crisis Dummy	-0.018	-0.210	0.845	-0.260
	(0.878)	(0.741)	(1.364)	(0.656)
Constant	-1.272	-1.266	-0.986	-1.354
	(1.343)	(1.762)	(1.655)	(1.591)
No. of observations	316	275	316	275
No. of countries	21	21	21	21
No. of instruments	75	69	75	69
Arellano-Bond AR1 test (p-value)	0.002	0.002	0.002	0.001
Arellano-Bond AR2 test (p-value)	0.320	0.366	0.076	0.375
Hansen test of overid. restrictions (p-value)	1.000	1.000	1.000	1.000

Standard errors in parentheses
* p<0.10 ** p<0.05 *** p<0.01

Zero Lower Bound, which constraints monetary policy. Therefore, we compute the difference between actual inflation and the central banks' announced inflation targets. We divide the sample according to whether inflation is above or below the target. An effective inflation targeting regime should lower inflation when it is above target and raise inflation when it is below target. Results in Table 12 show that IT track record measures are not statistically significant in affecting the deviation from the inflation target, although the limited number of observations suggests the need to interpret the results with caution.

The final check is to try inflation deviation from the world average in each year as the dependent variable. There is a possibility that, based on the international comparison, inflation targeters with better track records could enjoy finer inflation outcomes. However, the results in Table 13 exclude such a possibility. Once the world average inflation is subtracted from a country's actual inflation, IT track records do not affect the country's inflation differential vis-à-vis the world average.

6 Conclusion

This paper shows the heterogeneity of inflation targeting countries. While inflation targeting countries are often classified as one analytical group, the extent of these countries' track records in managing inflation within announced bands is distinct. There exist uneven gaps between inflation targeting countries' commitments to price stability and their actions to actually do so. One reason to account for such gaps could be that certain countries, especially developing countries, have not fully attained the preconditions for successfully adopting IT. Structural factors including shallow financial markets and fiscal dominance are not conducive to IT. Another possible cause of this phenomenon is insufficient exchange rate flexibility for inflation targeters. Calvo and Reinhart (2002) present an epidemic case of fear of floating and conclude that official labels often do not provide an adequate representation of actual country practice. Recent work such as Ilzetzki et al. (2019) also show that the de-jure label of IT

needs to be qualified with additional considerations and IT countries are far less distinctive as a group than advertised. They find IT countries let their policy rates stabilize the exchange rates to various degrees and their case studies suggest that exchange rate movements among inflation targeters that they classify as having a fixed exchange arrangement are strikingly similar to the non-IT control group.

This paper also illustrates the dynamic nature of conducting inflation targeting. Inflation targets and bands are not set in stone, and most central banks conduct dynamic inflation targeting by frequently updating the upper and lower bounds of their inflation bands. The choice of IT band sizes can be dynamic, which reflects policy guidance on future inflation developments and policy preferences on how a central bank's job in managing inflation should be assessed. On the other hand, dynamically updating the IT bands complicates the evaluation of IT countries' track records and could distort the linkage between track records and macroeconomic performance. Furthermore, policymakers can calibrate the IT band size according to the structure of the economy and how well the preconditions of IT adoption have been met. Nevertheless, the inflation targeting framework is not very good at handling commodity price shocks, which are found significant for inflation outcomes in this study. The latest spikes in energy and food prices could pose serious challenges for inflation targeters, as elevated inflation over the official target band undermines the credibility of a central bank and hiking policy rates at home may not dissipate global commodity price increases.

Results in this paper suggest that better IT track records do not translate into more favorable economic growth and inflation rates in the short term. Consistent with earlier research, our results confirm that adopting the IT framework does not improve countries' macroeconomic performance in terms of growth and inflation. We contribute to the literature by examining the effects of track records among IT adopters and find that better IT track records do not lead to superior growth and inflation rates in the short term. Our findings are robust when the heterogeneity of IT band sizes is considered.

The findings in this paper raise questions on why inflation targeting does not bring better inflation and growth outcomes in the short term and the motivation for countries to pursue inflation targeting. For those countries who do not strictly follow IT, there are concerns about the potential negative effects on economic output because strict practice implies a freely floating exchange rate and loss of international competitiveness if they tighten monetary policy as needed to meet their IT objectives. Nevertheless, the growing popularity of IT adoption indicates that central banks see its merit, probably because of the advantages to facilitate communication with the general public and the financial markets as the stated IT objectives are transparent and simple to understand.

Results in this paper do not necessarily mean good IT track records are ineffective. Rather, there could be other advantages for IT adopters to have strong track records. We only focus on real GDP growth and CPI inflation rates, a particular angle of economics. Other angles, including growth and inflation volatilities, inflation expectations, financial markets, and central bank credibility and accountability, are also important and yet to be examined. One exception is Zhang (2021), which shows that stock markets react to inflation strongly when inflation targeting central banks have proven track records in managing inflation. Lastly, while the short-run benefits of good IT track records on growth and inflation rates are elusive, the long-run effects of solid track records are unknown.

This paper opens a wide research agenda. One could investigate how central banks dynamically choose the IT point targets and target band sizes. What are the reasons behind the changing IT objectives? Are they due to shifts in the natural real rates or difficulties in achieving the targets for prolonged periods? How well do central banks utilize their research and communication capabilities when switching their objectives? One could also assess the long-term macroeconomic impacts of IT track records. A relatively short history of implementing the inflation targeting framework for many countries poses data limitations. However, as time passes, future researchers will be able to examine the long-term effects of IT track records using a low-frequency sample. In addition, the implications of IT track

records on inflation expectation, macroeconomic volatility, and financial markets have not been explored. We leave the above questions to future research.

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