Effectiveness of Inflation Targeting in Emerging and Developing Asia: Panel Evidence

Abstract

This paper examines the effectiveness of Inflation Targeting (IT) regime using dynamic panel data of 12 Emerging and Developing Asia (EDA) countries covering from the period between 2001 and 2021. Controlling for common time and country fixed effects, the study employs the robust approach of panel OLS and System Generalised Method of Moments (SGMM) to measure its effectiveness of IT on inflation, output growth and their variabilities. The study concludes that adoption of IT policy has a positive significant relationship with disinflation in the EDAs. However, it has no significant effect on real output growth and the fluctuations in inflation and output growth of these countries, indicating that cost of disinflation is not significant in the EDAs.

JEL classifications: E31, E52, E58

Keywords: inflation targeting, inflation, output growth, monetary policy, Emerging & Developing Asia

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> *"Having looked at monetary policy from both sides now, I can testify that central banking in practice is as much art as science. Nonetheless, while practising this dark art, I have always found the science quite useful."*[1]
>
> *-Alan S. Blinder*

1. Introduction and Motivation

For decades, economies have grappled with the elusive goal of price stability in the face of inflation. Inflation, the persistent rise in the general price level, can have a disruptive effect on the economy by eroding purchasing power and distorting investment decisions. High inflation is frequently linked to financial crises and slower growth (IMF 2001; Mishkin 2008). Moreover, declining investor confidence, diminished saving incentives, and deteriorated banking and public sector balance sheets are all associated with rising prices. Furthermore, because impoverished households are less likely to have access to interest-bearing accounts, are more dependent on wage income, and are less likely to own substantial amounts of real or financial assets other than cash, they may suffer disproportionately from high inflation. For these reasons, improved economic and development results, financial stability, and the decrease of poverty have all been linked to low and stable inflation (Ha et al., 2019).

However, it is also true that extremely low inflation, such that which has been experienced over the last ten years in many advanced economies, can potentially be problematic. Given the lower constraint on nominal interest rates, it might be challenging for central banks to reduce real short-term interest rates by enough to stimulate demand. Additionally, it might tip into deflation, which is a persistent decrease in prices that might worsen recessionary pressures. (Blanchard et al., 2010; Arteta et al., 2018)

The regressive nature of inflation, with its disproportionate impact on the poor and vulnerable due to their higher expenditure share on essential goods like food and shelter, underlines the critical importance of maintaining a stable and moderate inflation rate. This objective aligns with broader development goals, as it fosters income stability, incentivizes savings, and promotes economic growth conducive to poverty reduction (Lanzafame & Qureshi, 2023). To achieve the macroeconomic goal of reduced inflation, central banks have

[1] Blinder, 1999

increasingly adopted Inflation Targeting (IT), a monetary policy framework that prioritizes maintaining inflation at a predetermined, low level or within a target range.

This policy gained popularity in the early 1990s with New Zealand being the first IT-adopting nation.[2] Gradually, other advanced countries such as Canada, the United Kingdom, Australia, and Sweden adopted the monetary policy around the same time. Not much later, in May 2000, the Bank of Thailand became one of the pioneering Asian countries to adopt this widely discussed policy (Ayales, 2002). Even though East Asian and South-East Asian nations such as Korea, the Philippines, Thailand, and Indonesia had adopted IT policies by the early 2000s in the wake of the Asian crisis, India took another decade to emerge as the first South Asian country to choose price stability as the principal monetary policy objective in May 2016, following a sharp decline in output growth and persistently high inflation in the wake of the global financial crisis. (Adrian et al., 2018). Despite the widespread adoption of IT, its effectiveness remains a contentious issue, particularly in the Emerging and Developing Asian (EDA)[3] economies, prompting robust empirical investigations.

1.1 Inflation Targeting (IT) Framework

The world has witnessed the catastrophic effects of uncontrolled inflation throughout the 20th century, from the hyperinflationary spirals of war-torn Germany to the stagflation of the 1970s. These incidents highlighted the need for a monetary policy framework that explicitly prioritized price stability. Inflation targeting emerged as a potent response, offering several key advantages such as transparency and accountability, focus on domestic concerns, and flexibility; while the shortcomings may result as output volatility, low growth, and accountability at high inflation (Mishkin, 2000).

The central feature of an IT framework is that the inflation target is the primary objective of monetary policy. IT distinguishes itself from other monetary policy frameworks by having the central bank explicitly announce on the prioritization of a pre-defined, low (typically one-digit), medium-term inflation target or a range. This contrasts with simply announcing an inflation forecast, as IT commits the central bank to actively pursue the target through its policy decisions. Therefore, two important components of inflation targeting are the public

[2] See Table I in Appendices.
[3] According to the IMF classification, "Emerging and Developing Asia" refers to Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao P.D.R., Malaysia, Maldives, Marshall Islands, Micronesia, Fed. States of, Mongolia, Myanmar, Nauru, Nepal, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Vietnam.

proclamation of a medium-term inflation target and increased transparency to ensure maximum accountability for policy actions. Furthermore, inflation targeting allows the central bank to concentrate on domestic issues and frames policy debates on long-term inflation, decreasing political pressures to inflate in the short run (Mishkin, 2000). By anchoring inflation expectations and fostering predictable price movements, IT aims to create a stable economic environment conducive to sustainable growth (Debelle, 2001).

However, Mishkin (2000) warns that there are several consequences of IT adoption, particularly for the emerging market economies. Long gaps between policy acts and their inflationary consequences might undermine policy accountability. While IT can expose the risks of fiscal inefficiency, it does not ensure improved fiscal performance. Furthermore, emerging market nations that use inflation targeting frequently have unpredictable exchange rates and underdeveloped banking systems, which can jeopardize the inflation target.

It is important to note that IT frameworks are not solely focused on inflation. In practice, inflation targeting is never "strict," but always "flexible," in the sense that all inflation-targeting central banks or monetary authorities put some weight on stabilizing the real economy, for instance, implicitly or explicitly stabilizing a measure of resource utilization such as the output gap; that is, the gap between actual and potential output. Thus, the central bank's "target variables" include not only inflation but also other variables such as the output gap (Svensson, 2010). Debelle (2001) states that most countries employing IT have adopted flexible regimes that integrate considerations of employment and output growth into policy decisions. The fact that IT framework incorporates aspects of both "rules" and "discretion" in monetary policy is a major advantage. A precise numerical target for inflation in the medium-term horizon (2–3 years) and a short-term response to economic shocks are the two unique components of this "constrained discretion" approach. The IT framework’s focus on the medium-term targets empowers policymakers to flexibly navigate economic fluctuations over the short term by addressing other macroeconomic goals such as output smoothing, liberating them from the fixation on period-by-period basis (Jahan, 2020). Therefore, central banks always take output into account when determining the appropriate policy course (Debelle, 2001).

1.2 Motivation

Amid a series of shocks of pandemic and war, the Asian countries are facing the challenge of calibrating policies to mitigate inflation and combat fiscal pressures. With soaring global food and energy prices, local inflation in South Asia has spread beyond energy-related

products to a wide range of food and non-food, non-energy-related products. (Xie & Zhu, 2022).

Inflation in developing countries is generally higher and more volatile than in developed countries due to macroeconomic policies, monetary frameworks and demographic changes. Although the inflation rate in developing countries declined from 5.6% between 2001–2010 to 4.8% between 2011–2020, it again surged to 6.3% in 2021 (UNDESA, 2022). This rise in inflation can be exceptionally challenging for developing countries with limited resources. Inflationary pressures are becoming more entrenched across South Asian countries, as highlighted by various international organisations.

Due to global economic uncertainties and regional factors, many South Asian and Southeast Asian countries witnessed moderate to high inflation rates in the early 2000s. Pakistan, in particular, experienced an increasing trend in consumer price inflation rate, reaching 20.3% in 2010 (World Bank, 2023). Although the inflation rate of Pakistan saw a declining trend till 2015, it has been consistently increasing since then. Coupled with political instability and rising energy prices, Pakistan's inflation rate soared to 19.9% in 2022 (World Bank, 2023). Since 1960, the inflation rate for consumer prices in Pakistan moved between -0.5% and 26.7% (World Bank, 2023).

India, the country with the largest GDP among South Asian nations, experienced a steady inflation rate with accelerated GDP growth in the early 21st century. However, as global commodity prices soared in 2008, India's wholesale price inflation surged above 10% ("India: Stabilizing Inflation," 2018, 187). Despite facing elevated CPI inflation in 2013, India's economy experienced a faster-than-expected decline in inflation from 10% in December 2013 to 4% in December 2014, attributed to factors such as tightening monetary policy, a negative output gap, a drop in commodity prices, stable exchange rates, and improved supply-management policies ("India: Stabilizing Inflation," 2018, 189). After 2014, the inflation rate of India remained moderately stable, fluctuating between 3.3% and 4.9% before rising to 6.6% during the 2020 pandemic situation (World Bank, 2023).

Over the years, the inflation situation in Sri Lanka has witnessed fluctuations influenced by both domestic and global factors. In the early 2000s, Sri Lanka saw a moderate GDP growth and a moderate inflation rate while recovering from the impact of prolonged civil war. Although the inflation rate remained a concern for Sri Lanka during the mid-2000s to 2010, it was simultaneously supported by steady economic growth during this time. Following

the end of the civil war in 2009, Sri Lanka achieved an annual growth of over 8% for the next three consecutive years (Weerasinghe, 2021). During this time the inflation rate fluctuated between 6.2% to 7.5% (IMF, 2022). Although the inflation rate remained single digit from 2013 to 2021, it rose to a record-high of 45.2% in 2022 (IMF, 2022). These cases highlight the challenges in managing inflation in developing countries like in South Asia, which may be influenced by various factors such as institutional differences, economic growth, macroeconomic policies and external factors like the global financial crisis.

However, Garcia & Poon (2022) argues that the Asian economies exhibit significant heterogeneity in their inflation experiences. Developed economies such as Japan and Singapore grapple with deflationary pressures due to ageing populations and slow economic growth. In contrast, emerging economies like India, Vietnam, and Indonesia face the challenge of managing higher inflation, often driven by domestic factors like food price spikes and infrastructure bottlenecks. Garcia & Poon (2002) explained that because Advanced Economies (AEs) implemented IT early on, inflationary pressures seem to have been relatively effectively restrained over the past two decades (e.g., New Zealand in 1990, Australia in 1993, Korea in 1998). In contrast, Emerging Markets (EMs) in Asia have had more volatile and higher average inflation. However, there have been periods of low inflation as well as occasional surges in inflation in every Asian nation. Negative or extremely low inflation rates were traditionally linked to cyclical downturns, whereas high inflation occurrences were typically concentrated in the earlier years of our sample. Lastly, even if the Asian financial crisis caused severe deflationary events in several nations, the majority of them managed to withstand the disinflationary forces that followed the global financial crisis very effectively.

Mishkin (2004) states that operating inflation targeting in emerging economies is far more challenging than in developed economies due to institutional differences. Hence, the diversity in the Asian economies highlights the need for nuanced policy approaches tailored to country-specific circumstances. Addressing the contrasting nature between the advanced and developing Asia, this paper seeks to analyse the impact of the IT policy in the EDA countries, particularly in the South and South-East Asia. Figure 1 testifies how the inflation dynamics across different regions of the world differs from each other, including within the Asian countries, as well as among the emerging and developing nations.

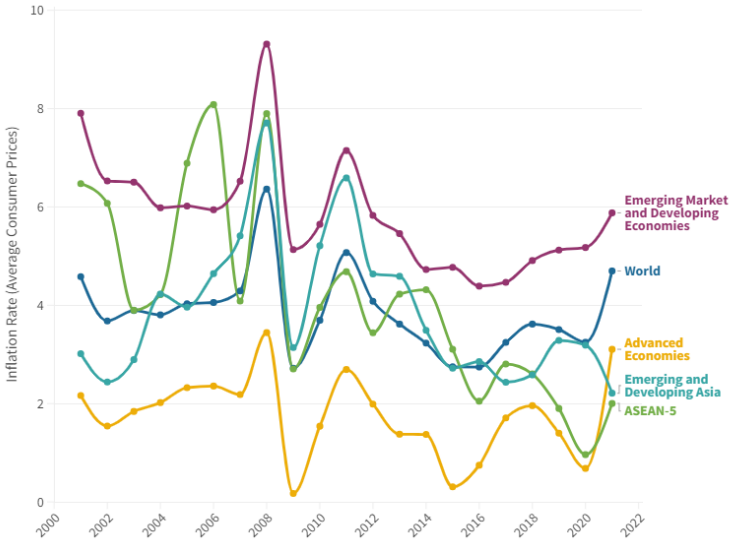


Figure 1: Inflation Rate (Average Consumer Prices)[4] in (a) World, (b) Emerging Market and Developing Economies, (c) Advanced Economies, (d) Emerging and Developing Asia, (e) ASEAN-5

2. Objectives and Research Questions

The debate surrounding effectiveness of the IT framework in achieving macroeconomic goals is complex and ongoing. While there are clear merits of IT in terms of price stabilization, concerns related to its limited scope, potential output volatility, and financial stability risks need to be addresses as well. Navigating this complex landscape necessitates a nuanced understanding of the framework's strengths and weaknesses. Additionally, considering its adaptability to diverse economic contexts and potential trade-offs with other macroeconomic objectives is essential. While studies on the effectiveness of IT in diverse economic setting such as advanced, developing or emerging countries persists, a gap in literature in the context of Emerging and Developing Asia (EDA) is identified. In emerging and developing economies, controlling inflation is a balancing act that is frequently intertwined with the pursuit of economic growth. Unchecked inflation can pose a serious threat to sustainable growth, jeopardizing the hard-achieved progress of developing countries, and causing widespread hardship. Against this backdrop, price stability and inflation targeting emerge as critical tools, offering a framework for navigating the complexities of these economies and fostering a fertile ground for sustained growth. Given the high degree of heterogeneity in the Asian countries, it

[4] Source: IMF World Economic Outlook database

is necessary to conduct rigorous analysis and continued research to assess whether IT serves as a panacea or merely a paradox for achieving sustained economic prosperity, particularly in the EDAs.

Therefore, the primary research objective of the paper is to evaluate the effectiveness of inflation targeting in the EDAs. For this analysis, answers to the following research questions are critical:

- Is IT effective in reducing inflation in EDAs?
- Does IT have any impact on EDA economic growth?
- Does IT affect the volatility of inflation and output growth?

3. Review of Literature

3.1 Determinants of Inflation

Asfuroğlu, D. (2021) investigates the determinants of inflation in emerging markets and developing countries. According to the study, Inflation is still a monetary phenomenon in emerging markets and developing nations. Monetary aggregates drive inflation either directly (i.e. money supply, money growth) or indirectly (via government debt, fiscal shocks, demand-pull shocks, exchange rate regime changes). The importance of monetary factors in explaining inflation varies depending on the countries under study and the time horizon, i.e., short- or long-run. Inflation inertia is also a crucial determinant in understanding inflation changes, particularly in economies with high inflation. The significance of the monetary variables in explaining inflation depends on both the countries under study and the time horizon, namely, short- or long-run. Inflation inertia is a significant variable in explaining inflation variations, particularly in high-inflation economies specifically more than 10%.

The study further finds that although studies covering the period up to the beginning of the 2000s supported the strong relationship between money and inflation, the analysis of the drivers of inflation shifted to external effects rather than domestic ones at the beginning of the 2000s due to the emergence of globally linked economies. The presence of open economies, more democratic countries, more independent central banks, trade and monetary unions, and the transition from fixed to flexible exchange rate regimes reduced the importance of domestic factors in explaining inflation while increasing the importance of global determinants. Depending on whether a country is a member of a trade or monetary union, the

appreciation/depreciation of the local currency, exchange rate and inflation spillovers, and commodity prices became essential in determining inflation variances.

3.2 Inflation and Output

The relationship between inflation and growth has been thoroughly studied, with varying conclusions. Malla (1997), for example, used panel analysis to analyse the influence of inflation on growth in 11 OECD and Asian nations. Contrary to inflation and growth ideas, the results demonstrated that there was no association between inflation and growth in OECD countries. However, there was a significant negative link between inflation and growth in Asian countries. Bruno and Easterly (1998) established, using the threshold model for 26 nations, that higher inflation slows growth and lower inflation costs an economy less.

3.3 Effectiveness of IT

The literature suggests that the debate regarding the effectiveness of the IT framework is ongoing and did not reach any consensus, particularly in terms of the EDAs. While numerous research supports the advantages of an IT regime, others fail to find any significant effect. However, there is no empirical work that has found that IT has delivered worse outcomes in comparison to pre-adoption ones.

Studies primarily focus on the effect of inflation targeting on key macroeconomic variables, such as growth rate and inflation rate, in order to assess whether IT is an efficient mechanism. Mishkin and Schmidt-Hebbel (2007) contend that in developed nations, IT lowers inflation. Johnson (2002) notes that economies with advanced IT witness a decrease in anticipated inflation. Research by Levin et al. (2004) demonstrates that, as compared to industrialized countries, developing markets are more successfully able to minimize inflation persistence. They claim that the global decreasing trend in inflation rates may be the cause of the inflation reduction, but they are skeptical about the rationale for it. According to Svensson (1997), a consistent fall in inflation variability will make production less variable.

According to Neumann and von Hagen (2002), IT facilitates convergence by assisting lagging economies in catching up with leading ones. The findings of Vega and Winkelried (2005) indicate that IT has significantly reduced mean inflation and that the benefits are stronger in cases of soft IT adoption. Using forward-looking dynamic panel data models in a difference-in-difference framework, Dubey and Mishra (2003) find that inflation targeting is successful in locking-in already low inflation rather than reducing high inflation in the

emerging market economies. Mishkin (2000) also examines IT in emerging-market economies, focusing on Chile and Brazil. He concludes that while Chile's implementation of IT was successful, Brazil's experience was not.

Gonçalves and Salles (2008) examines the impact of IT in 36 emerging market economies and finds that these countries experienced greater reductions in both inflation and growth volatility compared to non-adopters. This outcome highlights the effectiveness of IT in stabilizing economic parameters in developing countries.

The study by Lin and Ye (2009) explores the effectiveness of inflation targeting (IT) in 52 developing nations. Their findings indicate that IT has had large and significant effects in reducing both inflation and inflation variability in the countries that implemented it. This outcome demonstrates the potential of IT as a tool for stabilizing economic conditions in developing economies. Gerlach and Tillmann's 2010 study finds that inflation persistence tends to decline following the adoption of IT.

Ardakani et al. (2018) demonstrates a complex picture of IT's effectiveness. The study finds no significant difference in the levels of inflation and inflation volatility between the targeters and non-targeters. However, the study highlights some specific benefits of IT. In developed economies, IT was found to reduce the sacrifice ratio (the cost of reducing inflation in terms of lost output) and interest rate volatility. Additionally, IT appears to have promoted fiscal discipline in both industrialized and developing countries.

Arsić at al (2022) focuses on the macroeconomic performance of IT in European and Asian emerging economies covering from 1997 to 2019. The study uses dynamic panel modelling and propensity score matching to evaluate IT policy effects and finds the policy effective in reducing inflation rate, inflation volatility, and GDP volatility.

Advocates of IT emphasises on price stability more than production stability (Ito,2010). The short-run trade-off between inflation and output targets is elaborated in the IT literature. Clarida et al. (1999) mentioned that *to the extent cost-pull inflation is present, there exists a short-run trade-off between inflation and output variability*.[5] Ito (2010) claims that while the flexible IT policy advantages reducing volatility in shocks resulting from variations in inflation

[5] This narrative was originally emphasised by Taylor (1979) and supported by Williams (1997), Fuhrer (1997a), and Orphanides et al. (1997). However, Joanovic and Ueda (1997) showed that increased dispersion of prices may reduce output, then stabilising the prices raises the production in case of incomplete contracting.

expectations, there will be some room for flexibility against transient shocks since inflation anticipation will be centred around the targeted inflation rate.

According to Mishkin and Schmidt-Hebbel (2007), the selection of the control group is a critical factor in determining whether IT is effective in reducing inflation. Specifically, IT does not seem to produce better results than a collection of prosperous non-targeters. Their primary view of the benefits of IT is that it serves as a disciplinary tool to bring potentially irresponsible nations closer to the performance of this effective control group.

Opponents of inflation targeting contend, however, that achieving a drop in the inflation rate comes at the expense of other economic objectives. A common critique of the flexible IT regime is that the GDP growth and full employment, which are the other key macroeconomic variables, are disregarded from the monetary policy goal. IT, according to Cecchetti and Ehrmann (1999), increases production variability. This policy has no discernible effect on inflation or its fluctuation, according to Lin and Ye's 2007 analysis of the technology's impact in seven developed economies. Moreover, Ball and Sheridan (2005) observe the sample for IT and non-IT developed economies with low rates of inflation and find little empirical support for the notion that IT enhances economic performance.

Brito and Bystedt (2010) reach the same conclusion that there is no meaningful evidence that IT boosts economic performance in emerging economies. Inflation represents a poor drop, yet IT causes a decrease in growth rate, which can be regarded as evidence that IT has no impact on economic performance. Willard (2011) also finds that targeting has an insignificant effect on inflation in almost all specifications. Naqvi and Rizvi (2011) examine the IT framework's effectiveness in 10 Asian countries. Their difference-in-differences analysis shows that IT's role in improving economic performance in targeting countries is not significant.

Bhalla et al. (2022) investigate the influence of formal implementation of inflation targeting (IT) on inflation, growth, and the anchoring of inflation expectations in advanced economies and emerging markets and developing economies (EMDEs). According to the study, although all early IT adopters (pre-2000) witnessed decreases in inflation rates following adoption, IT adopters since then have had such success in approximately one-third of the cases. According to their country-level analysis, IT adoption results in considerable inflation gains in roughly one-third of the cases. The study also finds little support for the concern that systematic IT adoption leads to inferior development outcomes.

From the above empirical literature, there is a mixed conclusion regarding the effectiveness no IT regimes. While the proponents of IT highlight its success in reducing inflation and enhancing macroeconomic stability, critiques argue that it may come at the cost of sacrificing output growth and exacerbating financial instability. Furthermore, no comprehensive study has examined the efficiency of IT in EDAs to date, considering the diverse structure of the Asian economies.

3.4 Literature on Methodologies

Several empirical works on the effectiveness of IT follows Propensity Score Matching (PSM) between targeters and non-targeters (Lin & Ye, 2007; Lin & Ye, 2009; Ardakani et al., 2018, Arsić et al., 2022), while some studies follow difference-in-difference (DID) approach (Ball & Sheridan, 2005; Vega & Winkelried, 2005; Batini & Laxton, 2007; Gonçalves & Salles, 2008; Naqvi & Rizvi, 2010). Other studies employ dynamic Generalised Method of Moments (GMM) (Brito & Bystedt, 2010; Dubey & Mishra, 2023), panel estimation (Berganza & Broto, 2012; Rizvi & Pathirage; 2023), Hausman and Taylor (1981) estimation procedure (Aizenman et el., 2011), univariate autoregressive process (Levin & Piger, 2004), low-order autoregression (Gerlach & Tillmann, 2010) and so on.

Gertler (2005) points out that the cross-section DiD OLS technique employed by Ball & Sheridan (2005); Batini & Laxton (2007); Gonçalves & Salles (2008) might not be suitable for evaluating the efficiency of the IT policy. Because IT is an endogenous choice, adopted at different time frames by different nations, the above methodology does not consider the potential bias stemming from the endogeneity or control for time and country fixed effects (Brito & Bystedt, 2010). Similarly, Brito & Bystedt (2010) mentions that the cross-section PSM method employed by Lin & Ye (2007) fails to control for time trends, and the unobservable characteristics of the countries.

In studies, notably Wu (2004) and Willard (2006), panel estimates of the IT treatment with fixed time and country effects by Difference GMM (DGMM) have already been attempted, but only for industrial countries. Evaluations have been attempted using instrumental variable (IV) within-group-estimation, including time and country effects by Mishkin and Schmidt-Hebbel (2007); DGMM and System GMM (SGMM) with fixed time effects for inflation, and FGLS with fixed time and random country effects by Biondi and Toneto, among other methods, for both developed and developing economies (2008).

Brito & Bystedt (2010) applies a panel methodology to assess the performance of IT in developing countries that captures the effect of IT policy exclusively by isolating it from other sources such as common time-varying effects, country fixed effects and endogeneity. Instead of averaging the pre- and post-IT variables in cross section, they take into account the country-specific dimensions, which in turn, attempts to address the potential bias coming from the omitted variables. In this case, the self-selection bias resulting from different countries' adopting IT at different times is mitigated by the endogeneity control alone. That is, the approach considers the national circumstances that influenced the choice to adopt IT. A threshold dummy is also used for inflation rates higher than a specific ceiling. The inflation rate is logarithmically increased to account for mean reversion. For methodological consistency, they also apply this natural logarithm to the actual output growth rate.

Brito & Bystedt (2010) objects the choice of IV within-group estimator by Mishkin & Schmidt-Hebbel (2007) mentioning that it is inefficient as it does not account for the past information. Because of these issues, they evaluate every macro determinant by the two-step SGMM panel estimator as it controls for simultaneity and omitted variable bias (Roodman, 2009). Brito & Bystedt (2010) prefers the SGMM method over DGMM as the former is better instrumented to capture the effects of highly persistent variables (Arellano & Bover, 1999; Blundell & Bond, 1998), which was suitable for their chosen sample where the IT-ers persist in the regime till the end of period of assessment.

From the econometric literature, it is evident that a few studies examined the performance of IT regime by employing the efficient and flexible SGMM method. Hence, this study aims to contribute to the IT literature by employing this method.

4. Data Description

The empirical study is based on a panel data set covering 12 EDA countries – Bangladesh, Cambodia, India, Indonesia, Lao P.D.R., Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam, over the period of 2001-2021. All the data used in this study are secondary data collected from the IMF's World Economic Outlook database and World Development Indicator database publications by the World Bank. The choice of the sample countries is based on the availability of data covering the period of study and the similarities in their macroeconomic variables' trends. Figure 2 shows the inflation trend of the sample countries over the chosen period.

Among the 12 sample countries, the four countries that pursued flexible IT regime are Thailand, Philippines, Indonesia and India. These countries adopted the policy in different years between 2000 and 2016 (See Table I in Appendices). Figure 2 shows the adoption period of these countries and the trend of their inflation rates over the years.

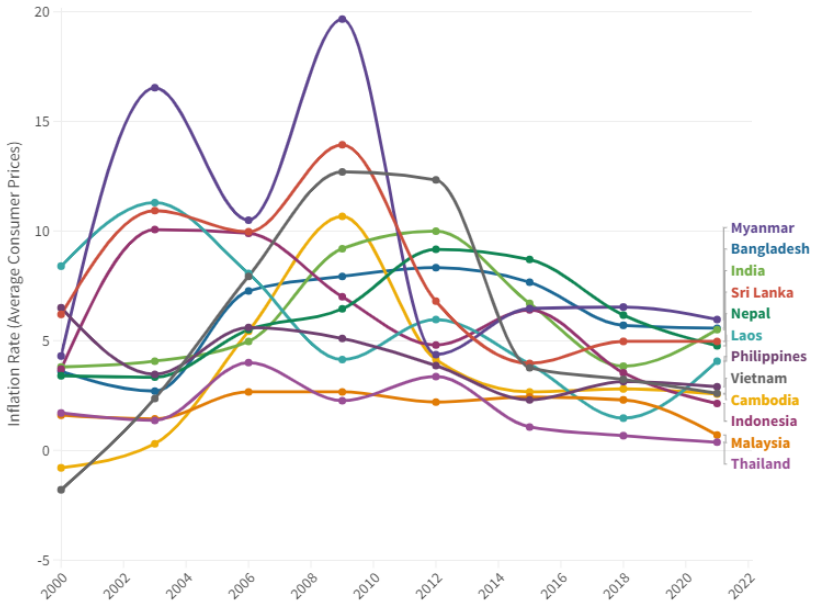


Figure 2: Inflation rates in the selected EDAs

[Source: IMF database]

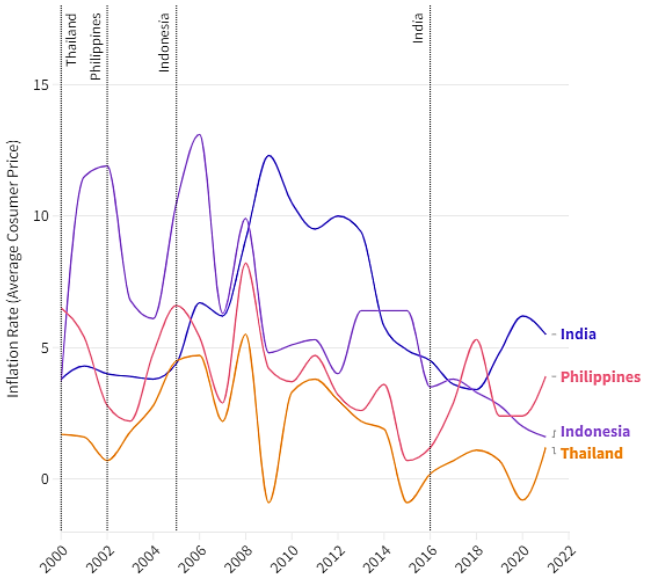


Figure 3: Inflation rates and IT adoption dates of targeting EDAs

[Source: IMF database and IMF staff calculations]

a. Variable Description[6]

The variables used in our dynamic panel model are described in Table 1.

Table 1: Variable Description

Variable Name	Description	Source	Mean	Standard Deviation
Inflation (%)	Inflation rate at current consumer Prices	IMF World Economic Outlook	5.59	3.69
Output Growth (%)	Annual percentage change of real GDP growth rate	IMF World Economic Outlook	5.49	2.57
Unemployment (%)	Percentage of total labour force unemployed	World Development Indicators	4.33	2.90

[6] See Definitions in Appendices

Interest Rate (%)	Real interest rate	World Development Indicators	4.95	4.43
Exchange Rate	Real effective exchange rate	IMF International Financial Statistics	5423.08	8921.16

5. Research Methodology

This study uses the two-step SGMM developed by Arellano and Bover (1995) to examine how successful IT is in influencing the macroeconomic variables such as inflation, output, inflation volatility, and output volatility. Although the methodology design of this paper draws inspiration from the techniques used in Brito & Bystedt (2010), it adjusts for the small, homogenous panel which is different from the sample used in the stated study.

The GMM estimation techniques may be problematic in macroeconomics, where the number of instruments (a function of T) rises toward the number of countries (N) in small samples (Brito & Bystedt, 2010), albeit they are well suited to micro data, where the number of time periods (T) is small in relation to the number of individuals (N). An excess of instruments might lead to an overfitting of the instrumented variables, hence introducing bias into the results.

In this context, we aggregate data over several three-year intervals to enable the input of information from larger time series while minimising the number of instruments. This approach of averaging data over multiple three-year intervals is a reasonable trade-off between allowing sufficient time for the slow reactions of macro variables and isolating the impacts of the IT policy from those of other nearby occurrences. Moreover, it takes care of the business cycle fluctuations and smooths out the effects of the shocks in the macroeconomic variables. Therefore, our annual time-series from 2001 to 2021 took the shape of a small panel of 7 periods, which denotes a "small T, large N" panel, as suggested by Roodman (2009). According to Roodman (2009), although the dynamic panel bias becomes insignificant and a simpler FE estimator works instead as T becomes large, the instrument count in DGMM and SGMM tends to explode with T.

Additionally, like in Calderon et al. (2002) and Beck and Levine (2004), we collapse the columns of the instrument matrix to lower its dimensionality and prevent the overfitting issue. A finite sample correction to the two-step standard errors was applied, as recommended by Windmeijer (2005), to ensure proper inference. Windmeijer's (2005) finite-sample

correction involves a two-step estimation, without which those standard errors tend to be severely downward biased, called "Nickel bias" (Nickel, 1981). It provides a better control over the instrument matrix. Lastly, we applied orthogonal deviation transformation by Arellano and Bover (1995), so that the error terms remain spherical (Roodman, 2009).

5.1 Model Specification

We employ Brito & Bystedt's (2010) partial adjustment model as follows:

$$y_{it} = \alpha y_{n,t-1} + \beta IT_{n,t} + \gamma X_{n,t} + \delta_t + \eta_n + \nu_{n,t}$$

where,

$IT_{n,t}$ = 1 if the country is adopting IT, 0 otherwise

y_{it} = dependent variables (inflation, real output growth, inflation volatility, or output growth volatility)

$X_{n,t}$ = possible endogenous regressors

δ_t = time effect

η_n = cross-country fixed effects

$\nu_{n,t}$ = disturbance term

The subscript n = 1, 2, 3, …, N denotes the country

t = 1, 2, 3, …, T denotes the period

The lagged value of the dependent variable $y_{n,t-1}$captures persistence and mean-reverting dynamics. However, it reduces the sample to (T – 1) as a result. The main variable of focus is the treatment variable $IT_{n,t}$, which measures the average effect of IT policy across the targeting countries. We calculate the volatility by taking the first difference of the chosen variables (i.e., inflation and output growth).

We plan to employ three OLS models with time and country fixed effects. In the first model, we avoid the time and country effects. However, according to Bertrand et al. (2004), since all the countries did not adopt IT at the same period, the time variation effect cannot be ignored in the IT analysis.

It is also important to consider the country effects, η_n, to examine the within country differences so that we can understand if a country is likely to have lower inflation if it follows the IT regime. The issue with the OLS estimates is that they are biased and inconsistent where the error term and country fixed effects are related with the explanatory variables. Furthermore, reverse causality is another common issue in macroeconomic studies, which is why a better

strategy like difference GMM (DGMM) by Arellano & Bond (1991) is preferred. However, some other issues arise if we plan to employ this methodology.

The DGMM uses lagged levels of the dependent variable as instruments, assuming they are uncorrelated with the differenced error term, which may not happen in our model. Secondly, IT dummy is a persistent variable. For this reason, its past value provides little information about the future values. So, its lag becomes a weak instrument for the difference in IT. Therefore, the SGMM approach by Blundell & Bond (1998) is preferable. According to Roodman (2009), time-invariant regressors, which disappear in DGMM, can be included in SGMM. Given that all the instruments for the levels equation are supposed to be orthogonal to fixed effects and, in fact, to all time-invariant variables, this has no asymptotic influence on the coefficient estimates for other regressors. As anticipated, their removal from the error term has no effect on the moments that serve as the foundation for identification.

Therefore, we skip the DGMM analysis by Brito & Bystedt (2010) and use SGMM, while assuming that IT dummy is predetermined. Other than the variables already discussed we take high inflation dummy (1 if inflation rate is greater that 9.28%)[7], unemployment rate, and interest rate. The control variables include lags of the above variables and the difference in exchange rate between two consecutive periods.

We provide three tests in each case to support the hypotheses that the error terms are not serially correlated, the instruments are valid, and changes in the instruments are uncorrelated with the fixed effect. To ensure no serial autocorrelation we check whether the error terms is not second order correlated. Secondly, we examine the Hansen J test of over-identifying limitations, which examines the moment conditions to assess the instruments' overall validity. Third, to confirm the exogeneity of the variables, we employ the difference-in-Hansen C test. The model is supported if it fails to reject the null hypothesis.

6. Empirical Findings

The empirical findings of the first equation in which the dependent variable is the inflation rate is shown in Table 2. Table 3 shows the results of the second equation in which the dependent variable is the output growth. The first columns of Tables 2 and 3 show the estimates of simple pooled cross-section OLS, without considering the common time and

[7] The mean inflation rate of the panel is already higher than 5%. Hence, we take the high inflation threshold that is one standard deviation above the mean.

country effects. The p-values of the robust standard errors clustered by countries are given in parentheses.

Table 2: Inflation Equation

	OLS (1)	TE-OLS (2)	CTE-OLS (3)	S-GMM (4)
Inflation Targeting Dummy	-1.09**	-1.10**	1.71	-2.08**
	(0.047)	(0.045)	(0.136)	(0.02)
Lagged Inflation	0.29	0.29***	0.28	-0.04
	(0.12)	(0.01)	(0.765)	(0.893)
High Inflation Dummy	5.33***	4.61***	5.20***	11.20***
	(0.00)	(0)	(0)	(0.001)
GDP Growth	0.18**	0.04	-0.09	0.30**
	(0.07)	(0.841)	(0.553)	(0.048)
Lagged GDP Growth	0.14	0.28	0.21	-1.31***
	(0.455)	(0.201)	(0.331)	(0.01)
Unemployment	0.10	0.10	0.07	-0.15
	(0.219)	(0.258)	(0.584)	(0.842)
Interest Rate	-0.11**	0.13*	-0.04	0.12
	(0.04)	(0.053)	(0.631)	(0.678)
AR(1) Test				0.293
AR(2) Test				0.17
Hansen J Test				1.00
Difference-in-Hansen				1.00
Observations	53	53	53	44
Instrument Columns				26
R-squared	0.7424	0.7897	0.9101	

,,*** indicate significance at 10%, 5%, and 1% level accordingly.*

Several coefficients of the first equation are found to be statistically significant alongside IT, including GDP growth, and high inflation dummy. It is evident from the model that IT has a considerable impact in reducing inflation in the EDAs. The first column (OLS) indicates that IT can reduce inflation rate by 1.09 percentage points in each period in the sample countries. The introduction of time effects (TE-OLS) gives a similar picture if not the same. However, introducing both time and country effects with robust standard errors in the model (CTE-OLS) in the third column modifies the result, making it insignificant. The high R-squared

value of the model warns us about the overfitting issues. In this situation, we check the two-step SGMM coefficient suggested by Brito & Bystedt (2010) in column 4, which indicates that IT can effectively curb inflation in the sample countries.

Another interesting result is given by the high inflation dummy variable. The high inflation dummy in Table 2 is significant for all the four measures, that indicates the inflation persistence in the region and potential spillover effects. This may also indicate that the macroeconomic indicators in the periods of high inflation have a different long-run average (Brito & Bystedt, 2010).

Table 3: Real Output Growth Equation

	OLS (1)	**TE-OLS (2)**	**CTE-OLS (3)**	**S-GMM (4)**
Inflation Targeting Dummy	-0.60	-0.70*	-0.68	3.15
	(.398)	(0.09)	(0.178)	(0.171)
Lagged Output Growth	0.15	0.42***	-0.04	0.23
	(0.462)	(0.003)	(0.841)	(0.201)
High Inflation Dummy	-2.35**	-0.60	-0.34	0
	(0.017)	(0.394)	(0.758)	(omitted)
Inflation	0.31**	-0.03	-0.09	0.05
	(0.027)	(0.84)	(0.564)	(0.671)
Lagged Inflation	0.10	-0.03	-0.05	0.53*
	(0.217)	(0.674)	(0.5)	(0.069)
Unemployment	0.08	0.14	0.08	-1.26*
	(0.555)	(0.917)	(0.305)	(0.066)
Interest Rate	-0.13	0.00	-0.11	0.11
	(0.17)	(0.917)	(0.259)	(0.238)
AR(1) Test				0.997
AR(2) Test				0.761
Hansen J Test				1.00
Difference-in-Hansen				1.00
Observations	53	53	53	44
Instrument Columns				26
R-squared	0.2321	0.5672	0.8476	

,,*** indicates significance at 10%, 5%, and 1% level accordingly.*

In the second equation presented in Table 3 in which the dependent variable is output growth, the IT dummy is marginally significant for the TE-OLS model, while showing insignificant estimates in the other models. This suggests that we may not worry about the potential trade-off between disinflation and output growth as a consequence of IT adoption in the EDAs. The positive marginally significant coefficients of inflation in the OLS and lagged inflation in the SGMM model does not negate the possibility of the trade-off between inflation and output growth. Therefore, further investigation is needed to reach a conclusion about the short run trade-off between disinflation and output growth in the EDAs.

Table 4: Inflation Volatility Equation

	OLS (1)	**TE-OLS (2)**	**CTE-OLS (3)**	**S-GMM (4)**
Inflation Targeting Dummy	0.219	0.21	5.05*	-2.15
	(0.736)	(0.755)	(0.056)	(0.192)
Lagged Inflation Coefficient of Variation	-0.13*	-0.18**	-0.27***	-0.39***
	(0.065)	(0.015)	(0.003)	(0.001)
High Inflation Dummy	5.43***	4.9***	8.44***	3.55
	(0.007)	(0.004)	(0.001)	(0.496)
GDP Growth	-0.12	-0.06	0.013	-0.81*
	(0.404)	(0.784)	(0.973)	(0.085)
Lagged GDP Growth	-0.2277	-0.19	.054	-1.29*
	(0.308)	(0.359)	(0.928)	(0.082)
Unemployment	-0.0723	-0.12	-0.48**	-3.39*
	(0.533)	(0.183)	(0.018)	(0.054)
Interest Rate	0.22*	0.21**	0.28**	-0.89
	(0.062)	(0.037)	(0.024)	(0.143)
AR(1) Test				0.16
AR(2) Test				0.92
Hansen J Test				1.00
Difference-in-Hansen				1.00
Observations	**44**	**44**	**44**	44
Instrument Columns				26

R-squared	**0.3292**	**0.3995**	**0.631**

,,*** indicates significance at 10%, 5%, and 1% level accordingly.*

Table 4 represents the estimates of the inflation volatility. It is clear that IT regime has no influence on inflation volatility. However, the lagged inflation coefficient of volatility showing negative and significant estimate indicates that past fluctuations in inflation may is associated with lowering inflation volatility in the next period, which is contradictory to the findings of Brito & Bystedt (2010). However, given that we are working with a short panel, this can also mean that inflation volatility in these countries has lowered in the recent years. The positive significant coefficient of the high inflation dummy indicates that high inflation generates more inflation volatility.

Table 5: Output Growth Volatility Equation

	OLS	**TE-OLS**	**CTE-OLS**	**S-GMM**
Inflation Targeting Dummy	0.11	-0.37	0.34	10.20
	(0.861)	(0.479)	(0.876)	(0.109)
Lagged Output Growth Coefficient of Variation	-0.399*	-0.35***	-0.34**	-0.74***
	(0.076)	(0.003)	(0.017)	(0.000)
High Inflation Dummy	-3.55	-1.44*	-0.17	0
	(.054)	(.069)**	(.925)	(Omitted)
Inflation	0.29	0.047	-0.12	0.20
	(0.216)	(0.78)	(0.691)	(0.306)
Lagged Inflation	0.1	-0.049	-0.14	0.06
	(0.527)	(0.728)	(0.615)	(0.886)
Unemployment	0.044	0.14	0.16	1.6
	(0.676)	(0.14)	(0.401)	(0.112)
Interest Rate	-2.4*	-0.09*	-0.099	0.53*
	(0.058)	(0.068)	(0.393)	(0.051)
AR(1) Test				0.832
AR(2) Test				0.223
Hansen J Test				1.00
Difference-in-Hansen				1.00

Observations	44	44		44	44
Instrument Columns					26
R-squared	0.2476	0.7441	0.7791		

,,*** indicates significance at 10%, 5%, and 1% level accordingly.*

In the output growth volatility equation represented in Table 5, we find that inflation targeting has no significant effect on the output growth volatility. Lagged output growth volatility has a negative and significant effect on the fluctuation of output growth in the next period, which indicates the opposite results from Brito & Bystedt (2010). Again, the reason of this might be the contrast in the macroeconomic features of the sample countries taken by this study. Like the other volatility model, this result can possibly occur by the macroeconomic feature of declining fluctuations in the output growth of the EDA nations.

7. Implications for Policy Recommendations

This study contributes to the IT literature by assessing its impact on inflation, output growth and their fluctuations in the EDAs. Employing system GMM estimators with fixed effects, this study unveils a statistically significant positive relationship between IT and disinflation. This corroborates the notion that by fostering transparency, competition, and efficient resource allocation, IT can contribute to lowering inflation rates. This finding aligns with earlier studies by Mishkin (2000) and Svensson (2010), who observed similar disinflationary effects of IT in emerging economies. The study found no conclusive evidence of IT impacting GDP growth in the selected EDAs. This could potentially suggest that the disinflationary benefits of IT may not necessarily come at the cost of sacrificing economic expansion. However, it is crucial to acknowledge that no studies have identified negative connections between IT and output growth, highlighting the innocuous nature of this policy. However, continuous monitoring of the inflation-output dynamics under IT frameworks, coupled with ongoing research efforts to understand the underlying mechanisms better, is still necessary.

Recognising the heterogeneity across EDAs also proves vital. Each country within this diverse region possesses unique economic structures, institutional frameworks, and development challenges. A one-size-fits-all approach to IT implementation is unlikely to yield optimal results. Instead, tailoring IT frameworks to the specific circumstances of each EDA is essential to maximise their effectiveness. This could involve, for instance, designing targeted

interventions to address structural bottlenecks in key sectors or prioritising investments in human capital development to enhance productivity and competitive advantages.

Moving forward, regional cooperation and knowledge sharing among EDAs can provide valuable insights and best practices for navigating the uncertainties surrounding IT implementation. Collaboratively analysing successes and challenges, exploring alternative policy configurations, and fostering technical assistance can collectively propel the region towards a more stable and prosperous future.

Acknowledging uncertainties, embracing heterogeneity, and fostering regional collaboration are key to harnessing the full potential of IT frameworks while navigating the ever-changing economic landscape of emerging and developing Asia.

8. Conclusions

We investigated the impact of the IT framework on the level and volatility of EDA countries' inflation and economic growth in this article. This method of estimating instrumental variables is more suited to inferring the causal effect of IT on macroeconomic performance. The addition of a common time effect variation, which adjusted for global trends, decreased the cross-country negative relationship of the IT regime with average inflation and volatility measures, and revealed a strong negative relationship between IT disinflation and output growth. After correcting for the IT regime's endogeneity, we found that there is evidence that IT considerably lowered inflation in EDAs.

When investigating a possible causative relationship, one must consider the data's dynamic nature as well as its high persistence (Naqvi & Rizvi, 2010). This study examines the influence of IT in emerging and developing Asian economies using system GMM estimators with convention OLS with time and country fixed effects. The results indicate a statistically significant positive relation between IT and disinflation, which further indicates the success of IT in reducing inflation. We also attempted to check whether the adoption of IT comes with the sacrifice of reduced output growth in the selected EDAs, as indicated by the theoretical and empirical literature composing of trade-off between the macroeconomic pursuits of output growth and price stability. However, no concrete evidence of the impact of IT on GDP growth

is found. We further find that the IT regime does not have any impact on the fluctuations in price increase or output growth in the chosen countries.

VI. References

Adrian, T., Laxton, D., & Obstfeld, M. (2018). *Advancing the frontiers of monetary policy*. International Monetary Fund. https://doi.org/10.5089/9781484325940.071

Aizenman, J., Hutchison, M., & Noy, I. (2011). Inflation Targeting and Real Exchange Rates in Emerging Markets. *World Development*, 39(5), 712-724.

Ardakani, O. M., Kishor, N. K., & Song, S. (2018). Re-Evaluating the Effectiveness of Inflation Targeting. *Journal of Economic Dynamics and Control*, 90, 76–97. doi:10.1016/j.jedc.2018.01.045

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.

Arsić, M., Mladenović, Z., & Nojković, A. (2022). Macroeconomic Performance of Inflation Targeting in European and Asian Emerging Economies. *Journal of Policy Modeling*, 44(3), 675-700.

Arteta, C., Kose, M. A., Stocker, M., & Taskin, T. (2016). Negative interest rate policies: Sources and implications. *Policy Research Working Paper 7791*. World Bank, Washington, DC.

Asfuroğlu, D. (2021). The determinants of inflation in emerging markets and developing countries: A literature review. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, *21*(2), 483-504.

Ayales, E. (2002). Inflation Targeting: Statistical Issues Suggested by the Experience of Six Emerging Market Countries. Statistical Implications of Inflation Targeting. pp. 289-307. *International Monetary Fund.*

Ball, L. M., & Sheridan, N. (2004). Does Inflation Targeting Matter? In the Inflation-Targeting Debate, (pp. 249-282). *University of Chicago Press*.

Ball, L. (2017). Inflation: The new monetary policy. Routledge.

Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance*, *28*(3), 423-442.

Benigno, P., & Woodford, M. (2003). Monetary policy in the information age. Princeton University Press.

Berganza, J. C., & Broto, C. (2012). Flexible inflation targets, forex interventions and exchange rate volatility in emerging countries. *Journal of International Money and Finance*, 31(2), 428-444.

Bernanke, B. S., & Mishkin, F. S. (1997). Inflation Targeting: A New Framework for Monetary Policy?. *Journal of Economic Perspectives*, 11(2), 97-116.

Bhalla, S., Bhasin, K., & Loungani, M. P. (2023). *Macro Effects of Formal Adoption of Inflation Targeting*. International Monetary Fund.

Blanchard, O., Dell Ariccia, G., & Mauro, P. (2010). Rethinking macroeconomic policy. *Revista de Economía Institucional*, *12*(22), 61-82.

Blanchard, O., & Gali, J. (2007). The monetary policy transmission mechanism: An empirical review. Journal of Economic Perspectives, 21(1), 19-48.

Blinder, A. (1999). *Central Banking in Theory and Practice 2nd ed*. Cambridge, Mass.: MIT Press

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, *87*(1), 115-143.

Blundell, R., and S. Bond. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115–143.

Bond, S. (2002). Dynamic panel data models: A guide to micro data methods and practice. Working Paper CWP09/02, *Institute for Fiscal Studies*. Available at http://cemmap.ifs.org.uk/wps/cwp0209.pdf.

Bordo, M. D., & Jeanne, O. (2013). Inflation targeting and financial stability. Oxford Handbooks Online, Oxford University Press.

Bordo, M. D., Filardo, A., & Orphanides, A. (2010). Have central banks become more effective? International Finance, 23(1), 1-38.

Brito, R. D., & Bystedt, B. (2010). Inflation Targeting in Emerging Economies: Panel Evidence. *Journal of Development Economics*, 91(2), 198-210.

Bun, M. J., & Windmeijer, F. (2010). The weak instrument problem of the system GMM estimator in dynamic panel data models. *The Econometrics Journal*, *13*(1), 95-126.

Calderon, C. A., Chong, A., and Loayza. N. V. (2002). Determinants of current account deficits in developing countries. *Contributions to Macroeconomics 2*. Article 2.

Cecchetti, S., & Ehrmann, M. (1999). Does Inflation Targeting Increase Output Volatility? An International Comparison of Policymakers' Preferences and Outcomes. Central Bank of Chile, Working Papers Central Bank of Chile.

Cecchetti, S., & Ehrmann, M. (2015). The enduring quest for monetary policy frameworks. International Journal of Central Banking, 11(3).

Clarida, R., Gali, J., & Gertler, M. (1999). The Science of Monetary Policy: A New Keynesian Perspective. *Journal of economic literature*, *37*(4), 1661-1707.

Debelle, G. (2001). The Case for Inflation Targeting in East Asian Countries. *Future directions for monetary policies in East Asia*, 65-87.

Garcia, J. A., & Poon, A. (2022). Inflation trends in Asia: implications for central banks. *Oxford Economic Papers*, *74*(3), 671-700.

Gerlach, S., & Tillmann, P. (2010). Inflation Targeting and Inflation Persistence in Asia.

Gonçalves, C. E. S., & Salles, J. M. (2008). Inflation Targeting in Emerging Economies: What Do the Data Say?. *Journal of Development Economics*, 85(1-2), 312-318.

Ha, J., Kose, M. A., & Ohnsorge, F. (2019). Understanding Inflation in Emerging and Developing Economies. *World Bank Policy Research Working Paper*, (8761).

IMF (International Monetary Fund). (2001). "The Decline of Inflation in Emerging Markets: Can It Be Maintained?". *World Economic Outlook*. Washington, DC: IMF.

IMF. (2021). *IMF Data Mapper* ®. IMF Data Mapper. https://www.imf.org/external/datamapper/profile/LKA

India: Stabilizing Inflation. (2018). In T. Adrian, D. Laxton, & M. Obstfeld (Eds.), *Advancing the Frontiers of Monetary Policy* (pp. 187-189). INTERNATIONAL MONETARY FUND. https://doi.org/10.5089/9781484325940.071

Ito, T. (2010). Monetary Policy and Financial Stability: Is Inflation Targeting Passé?. *Asian Development Bank Economics Working Paper Series*, (206).

Jahan, S. (2020). Inflation targeting: Holding the line. *International Monetary Fund, Finance & Development*, 72-73. https://www.imf.org/external/pubs/ft/fandd/basics/72-inflation-targeting.htm

Jonsson, M. G. (1999). The Relative Merits And Implications Of Inflation Targeting For South Africa. *International Monetary Fund*.

Lanzafame, M. & Qureshi, I. A. (2023, June 13). Inflation In Asia and the Pacific: The Good, The Bad, And How to Prevent The Ugly. *Asian Development Blog*. Retrieved from https://blogs.adb.org/blog/inflation-asia-and-pacific-good-bad-and-how-prevent-ugly? Accessed on December 14, 2023

Levin, A. T., Natalucci, F. M., & Piger, J. M. (2004). The Macroeconomic Effects of Inflation Targeting. *Review-Federal Reserve Bank of Saint Louis*, 86(4), 51-8.

Lin, S, & Ye, H. (2009). Does Inflation Targeting Make a Difference in Developing Countries?. 89(1), 0–123. doi:10.1016/j.jdeveco.2008.04.006

Lin, S., & Ye, H. (2007). Does inflation targeting really make a difference? Evaluating The Treatment Effect of Inflation Targeting in Seven Industrial Countries. *Journal of Monetary Economics*, 54(8), 2521-2533.

Mishkin, F. S. (2000). Inflation Targeting for Emerging-Market Countries. *American Economic Review*, 90(2), 105-109.

Mishkin, F. S., & Schmidt-Hebbel, K. (2007). Does inflation targeting make a difference?.

Mishra, P. K., & Montiel, P. J. (2009). Inflation targeting in developing countries: Experience, lessons, and challenges. World Bank Publications.

Naqvi, B., & Rizvi, S. K. A. (2010, June). Inflation Targeting Framework: Is the Story Different for Asian Economies?. *In 27th Symposium of Money, Banking and Finance, Bordeaux, France*.

Nickell, S. J. (1981). Biases in dynamic models with fixed effects. *Econometrica, 49*. pp. 1417–1426.

Rizvi, S. A. R., & Pathirage, K. (2023). COVID-19 Policy Actions and Inflation Targeting in South Asia. *Journal of Asian Economics*, 84, 101576.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, *9*(1), 86-136.

Stojanovikj, M., & Petrevski, G. (2021). Macroeconomic effects of inflation targeting in emerging market economies. *Empirical Economics*, *61*(5), 2539-2585.

Svensson, L. E.O. (2010). Inflation Targeting. *NBER Working Paper No. w16654.* Available at SSRN: https://ssrn.com/abstract=1732924

UNDESA. (2022, May 3). *World Economic Situation and Prospects*. United Nations Department of Economic and Social Affairs Economic Analysis. Retrieved 2023, from https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/Monthly_Briefing_160.pdf

Vega, M., & Winkelried, D. (2005). Inflation Targeting and Inflation Behavior: A Successful Story?. *International Journal of Central Banking*, 1(3), 153-175.

Weerasinghe, P. N. (2021, June). *Sri Lanka's macro-financial developments: issues and challenges in structural transformation and lessons from China's Experi*. UNCTAD. https://unctad.org/system/files/official-document/BRI-Project_RP13_en.pdf

Willard, L. B. (2012). Does Inflation Targeting Matter? A Reassessment. Applied Economics, 44(17), 2231-2244.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126, pp. 25–51.

World Bank. (2023). *Inflation, consumer prices (annual %) - India | Data*. World Bank Data. https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=IN

World Bank. (2023). *Inflation, consumer prices (annual %) - Pakistan | Data*. World Bank Data. https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=PK

Wu, T. Y. (2004). *Does inflation targeting reduce inflation? An analysis for the OECD industrial countries* (No. 83).

Appendices

A. Definitions[8]

Unemployment Rate: The share of the labour force that is without work but available for and seeking employment.

Inflation Rate: The lending interest rate adjusted for inflation as measured by the GDP deflator.

Exchange Rate: The price of one currency in terms of another. Most commonly, exchange rates are expressed as the number of units of domestic currency that will purchase one unit of foreign currency (e.g., units of currency per U.S. dollar). An exchange rate may also be defined as the inverse: the number of units of foreign currency that one unit of domestic currency will purchase.

B. Tables

Table I: Dates and Target of IT Adoption by Targeting Countries[9]

Country	*IT Adoption Date*	*Target at Adoption*
New Zealand	1990	1 - 3
Canada	1991	2+/-1
United Kingdom	1992	2
Australia	1993	2 - 3
Sweden	1993	2
Czech Republic	1997	3 +/-1
Israel	1997	2 +/-1
Poland	1998	2.5 +/-1
Brazil	1999	4.5 +/-2
Chile	1999	3 +/-1
Colombia	1999	2 - 4
South Africa	2000	3 - 6
Thailand	2000	.5 - 3
Hungary	2001	3 +/- 1
Mexico	2001	3 +/- 1
Iceland	2001	2.5 +/- 1.5
Korea, Republic of	2001	3 +/- 1

[8] Definitions are according to the glossary of the database sources.
[9] Data Source: IMF Staff Calculations and the websites of the respective central banks of the countries

Norway	2001	2.5 +/- 1
Peru	2002	2 +/- 1
Philippines	2002	4 +/- 1
Guatemala	2005	5 +/- 1
Indonesia	2005	5 +/- 1
Romania	2005	3 +/- 1
Serbia, Republic of	2006	4 - 8
Turkey	2006	5.5 +/- 2
Armenia	2006	4.5 +/- 1.5
Ghana	2007	8.5 +/- 2
Uruguay	2007	3 - 7
Albania	2009	3 +/- 1
Georgia	2009	3
Paraguay	2011	4.5
Uganda	2011	5
Dominican Republic	2012	3 - 5
Japan	2013	2
Moldova	2013	3.5 - 6.5
India	2016	2 - 6
Kazakhstan	2015	4
Russia	2015	4