



# **MACROECONOMIC EFFECTS OF INFLATION TARGETING IN EMERGING MARKET ECONOMIES**

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# MOTIVATION

- Since the late 1990s, inflation targeting has been increasingly adopted by emerging market economies (EMEs).
- The benefits of inflation targeting: focus on price stability along with a built-in flexibility to cope with short-run circumstances.
- It is presumed that inflation targeting reduced inflation rates and output volatility in EMEs.
- Distinctive institutional and macroeconomic features of EMEs hindering the design and implementation of effective monetary policy: fiscal dominance, weak banking systems, low credibility of the central bank, vulnerability to sudden stops of foreign capital...

# MOTIVATION

- EMEs provide much more valid evidence on the true effects of inflation targeting due to their varying historical experiences in controlling inflation (Walsh 2009).
- The selection bias can be minimized by focusing on EMEs (Gonçalves and Salles 2008).
- There is no consensus in the empirical literature on the macroeconomic effects of inflation targeting in EMEs.

# LITERATURE REVIEW

- The early studies cover the experience of developed countries.
- Based on the difference-in-difference framework, Ball and Sheridan (2004) show that inflation targeting does not lead to better performance in terms of average inflation rates, inflation variability, inflation persistence and inflation expectations. Neither does inflation targeting matter for output variability, long-term interest rates, and volatility of short-term interest rates.

# LITERATURE REVIEW

- The early studies for EMEs employ the difference-in difference methodology.
- Batini and Laxton (2007) and Gonçalves and Salles (2008) find that inflation targeting has led to a significant decrease in both inflation and inflation expectations with no adverse effects on output.
- Thornton (2016) finds that inflation targeting had not reduced average inflation and growth volatility.
- Caveats:
  - Failure to account for the potential endogeneity of inflation targeting.
  - Arbitrariness with respect to determining the initial period for nontargeters.

# LITERATURE REVIEW

- Brito and Bystedt (2010) employ the General Method of Moments (GMM) and provide evidence that inflation targeting in EMEs associated with lower average inflation accompanied by lower output growth, whereas the effects on inflation and output volatility are either small or insignificant.
- Over time, a number of studies employing alternative econometric techniques and leading to conflicting evidence.

# THE CONTRIBUTION OF OUR PAPER

- Working with panel data enables us to avoid the arbitrariness with respect to determining the initial period for non-targeters.
- By adding dynamics, our empirical model incorporates the entire history of the variables.
- Our estimation procedure is capable of dealing with the endogeneity of inflation targeting.
- We follow Brito and Bystedt (2010) in estimating a dynamic panel model by the GMM estimator.
- Unlike Brito and Bystedt (2010), we investigate the effects of inflation targeting by controlling for several factors, such as: trade openness, foreign shocks, fiscal variables, exchange rate regimes, political factors.

# DATA ISSUES

- Annual data for a panel of 44 EMEs during 1970-2017.
- 17 inflation targeters: Brazil, Chile, Colombia, Czech Republic, Ghana, Hungary, Indonesia, Israel, Mexico, Peru, Philippines, Poland, South Africa, Serbia, South Korea, Thailand, and Turkey.
- 27 EMEs with different monetary regimes, serving as a control group.
- An eclectic approach in defining inflation targeters by including all the countries that have been characterized as EMEs in the empirical literature.
- As for the dates of adopting inflation targeting, we rely on the classification by Hammond (2012).
- Data sources: the World Bank's World development indicators, the IMF database, and the Carmen Reinhart's website: <http://www.Carmenreinhart.Com/data/>



# MODEL SPECIFICATION

- The baseline specification of our empirical model:

$$y_{it} = \theta + \alpha y_{i,t-1} + \beta IT_{it} + \delta_k \sum_{k=1}^K X_{k,it} + \mu_i + \varepsilon_{it}$$

- $i = 1, 2, \dots, N$ , represents the cross-sections.
- $T = 1, 2, \dots, T$ , represents the time period.
- $y_{it}$  denotes the dependent variable for each separate specification: average inflation, inflation volatility, output growth, and output growth volatility, respectively.
- $IT_{it}$ , is a dummy variable which equals 1 if country  $N$  is an inflation targeter in period  $T$ , and 0 otherwise.
- $\mu_i$  is the unobserved, country-specific and time-invariant effect.
- $\varepsilon_{it}$  represents the idiosyncratic error term.

# MODEL SPECIFICATION

- We estimate four variants of the general specification which differ by the dependent variable: inflation, inflation volatility, output growth, and growth volatility, respectively.
- Instead of CPI-based inflation, we work with the transformed inflation rate:  $infltr = infl / (1 + infl)$
- Control variables: output gap, trade openness, foreign shocks, public debt, budget surplus, exchange rate regimes, and political factors.

# ESTIMATION STRATEGY

- We employ the system GMM estimator
- In order to reduce the number of instruments, we have restricted the number of lags used as instruments for endogenous and predetermined variables along with collapsing the instrument set.
- We apply the Windmeijer (2005) finite sample correction of the two-step variance-covariance matrix.

# Main findings (1)

TABLE 1. THE EFFECTS OF INFLATION TARGETING ON AVERAGE INFLATION

	OLS (1)	FE (2)	sGMM (3)
Lagged inflation	0.767*** (0.029)	0.640*** (0.064)	0.653*** (0.072)
IT dummy	-0.008*** (0.002)	-0.024*** (0.008)	-0.014** (0.006)
Foreign inflation	0.432*** (0.-056)	0.560*** (0.060)	0.645*** (0.126)
Output gap	-0.275*** (0.073)	-0.305*** (0.078)	-0.667*** (0.235)
Public debt	0.007 (0.006)	0.034*** (0.012)	0.051* (0.030)
Fixed exchange rates dummy	-0.009*** (0.003)	-0.010* (0.005)	-0.018** (0.008)
Trade openness	-0.011** (0.003)	0.012 (0.010)	-0.015* (0.008)
Constant	0.012** (0.005)	-0.005 (0.010)	-0.0006 (0.015)
AR(1) Test			0.006
AR(2) Test			0.601
Hansen J Test			0.317

Notes: standard errors in parenthesis are clustered per cross-sections units (robust in OLS and FE regressions, and Windmeijer-corrected in system GMM); \*, \*\*, and \*\*\* denote significance at 10, 5, and 1 percent level, respectively.

# Main findings (1)

- We find relatively high inflation persistence in EMEs due to: long experience with high inflation rates, widespread presence of indexation, relative price adjustment, low aversion to inflation, and lack of credibility of both macroeconomic policies and policy makers.
- Inflation targeting has negligible effects on average inflation.
- Inflation targeting is not superior to fixed exchange rate regimes.
- Our estimates are much lower than those in the existing literature (dynamic specification plus rich set of control variables).

# Main findings (2)

TABLE 2. THE EFFECTS OF INFLATION TARGETING ON INFLATION VOLATILITY

	sGMM (1)	sGMM (2)	sGMM (3)
Lagged inflation volatility	0.406*** (0.131)	0.437*** (0.139)	0.405*** (0.113)
IT dummy	0.005*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
Foreign inflation volatility	0.250** (0.123)	0.326*** (0.121)	0.333*** (0.114)
Output gap volatility (Hamilton filter)	0.398** (0.184)		
Output gap volatility (H-P filter)		0.560*** (0.171)	
Output growth volatility			0.348*** (0.084)
Budget surplus	0.006 (0.015)	0.009 (0.013)	0.013 (0.015)
Fixed exchange rates dummy	0.007** (0.003)	0.005** (0.002)	0.005** (0.002)
Terms of trade volatility	0.027* (0.014)	0.031** (0.013)	0.025* (0.013)
Constant	0.001 (0.001)	0.0008 (0.001)	0.001 (0.001)
AR(1) Test	0.102	0.091	0.119
AR(2) Test	0.573	0.518	0.636
Hansen J Test	0.542	0.442	0.486

Notes: standard errors in parenthesis are clustered per cross-sections units (Windmeijer-corrected); \*, \*\*, and \*\*\* denote significance at 10, 5, and 1 percent level, respectively.

## Main findings (2)

- Inflation is quite volatile in EMEs, possibly reflecting the unfavorable macroeconomic and institutional environment compared to the advanced economies, i.e. their frequent exposure to adverse external shocks as well as weak institutions accompanied by long experience with high inflation (Fraga et al. 2003).
- The coefficient of Inflation targeting is positive and with low magnitude.
- Inflation targeting has no effects on inflation volatility.

# Main findings (3)

TABLE 3. THE EFFECTS OF INFLATION TARGETING ON OUTPUT GROWTH

	OLS (1)	FE (2)	sGMM (3)
Lagged output growth	0.266*** (0.036)	0.186*** (0.060)	0.194*** (0.076)
IT dummy	-0.0077*** (0.0023)	-0.0056 (0.0044)	-0.010 (0.0073)
Inflation	-0.060*** (0.0159)	-0.061*** (0.019)	-0.0011 (0.045)
Fixed exchange rates dummy	0.0012 (0.0030)	0.0044 (0.0057)	0.0178 (0.0122)
Change of exports	0.103*** (0.0122)	0.100*** (0.018)	0.107*** (0.021)
Short-term foreign debt	-0.0013 (0.0096)	0.0024 (0.016)	-0.062 (0.045)
Public debt	-0.0093** (0.0044)	-0.0177** (0.0062)	-0.030* (0.015)
Constant	0.038*** (0.0037)	0.044*** (0.0062)	0.053*** (0.0124)
AR(1)			0.003
AR(2)			0.500
Hansen J test			0.326

Notes: standard errors in parenthesis are clustered per cross-sections units (robust in OLS and FE regressions, and Windmeijer-corrected in system GMM); \*, \*\*, and \*\*\* denote significance at 10, 5, and 1 percent level, respectively.



# Main findings (3)

- We find low output growth persistence in EMEs.
- The coefficient of inflation targeting is negative, very low and insignificant.
- Hence, inflation targeting has no effects on output growth in EMEs.
- EMEs have worse performance than advanced economies due to the several factors, such as: the worse inflation-output trade-off, the presence of fragile institutions, low central bank credibility as well as the nature and magnitude of shocks.

# Main findings (4)

TABLE 4. THE EFFECTS OF INFLATION TARGETING ON OUTPUT GROWTH VOLATILITY

	sGMM (1)	sGMM (2)	sGMM (3)	sGMM (4)
Lagged output growth volatility	0.125*** (0.042)	0.139*** (0.042)	0.114*** (0.042)	0.122*** (0.042)
IT dummy	-0.001*** (0.0004)	-0.0009* (0.0005)	-0.001** (0.0004)	-0.0008** (0.0003)
Inflation volatility	0.014 (0.029)	-0.0008 (0.038)	0.022 (0.051)	0.012 (0.044)
Foreign inflation volatility		0.162*** (0.049)		0.135* (0.068)
Change of exports volatility	0.083*** (0.017)	0.072*** (0.018)	0.070** (0.029)	0.063*** (0.019)
Budget surplus			-0.003 (0.019)	-0.006 (0.014)
Budget surplus volatility	0.127 (0.104)	0.161 (0.105)		
Fixed exchange rates dummy	0.0006 (0.001)	0.0007 (0.001)	0.0008 (0.001)	0.001 (0.001)
Constant	0.002*** (0.0005)	0.001*** (0.0005)	0.002*** (0.0004)	0.002 (0.000)
AR(1) Test	0.000	0.000	0.000	0.000
AR(2) Test	0.203	0.182	0.240	0.234
Hansen J Test	0.740	0.735	0.602	0.706

Notes: standard errors in parenthesis are clustered per cross-sections units (Windmeijer-corrected in system GMM); \*, \*\*, and \*\*\* denote significance at 10, 5, and 1 percent level, respectively.

# Main findings (4)

- We find low persistence in growth volatility.
- The coefficient of inflation targeting is negative, but virtually zero.
- Inflation targeting does not affect output growth volatility.
- The role of foreign shocks as sources of output growth volatility.

# CONCLUSIONS

- We examine the macroeconomic effects in the 44 EMEs during 1970-2017,
- The effects of inflation targeting on average inflation is negligible,
- We provide firm evidence against the proposition that inflation targeting lowers inflation volatility,
- There is no evidence whatsoever that inflation targeting has favorable effects on output growth,
- Inflation targeting does not affect output growth volatility.