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INFLATION TARGETING AND MONETARY POLICY FUNCTIONS

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Abstract

Since the 1990s inflation targeting (IT) has been adopted by several central banks as a strategy for monetary policy. It is expected that the adoption of this monetary regime can reduce inflation and inflation volatility. His practice was marked by a large observed at the beginning of the 90s and 2000 stability a debate emerges on efficiency and economic performance of the scheme. Many studies have focused on this question has no authority to reach a final consensus. In the context of a simple empirical model, estimated with panel data for 17 emerging markets using both IT and non-IT observations, we find a significant and stable response running from inflation to policy interest rates in emerging markets that are following publically announced IT policies. By contrast, central banks respond much less to inflation in non-IT regimes. IT emerging markets follow a "mixed IT strategy" whereby both inflation and real exchange rates are important determinants of policy interest rates.

Keywords: Inflation targeting, performance, emerging markets, policy

INTRODUCTION

Since the early 90s, a new monetary policy, called "Inflation Targeting (IT) policy", has been adopted. It has been defined as a framework of monetary policy which consists in announcing an inflation target in advance to the public. The target level (or range) is the main argument in the central bank loss function. The Central Bank boards are independent in choosing the instrument to be followed in order to minimize the loss function. In the IT literature, Bernanke et al. (1999) define the IT in a relatively precise way as follows: "Inflation targeting is a framework for monetary policy characterised by the public announcement of official quantitative targets (or

target ranges) for the inflation rate over one or more time horizons, and by explicit acknowledgement that low, stable inflation is monetary policy's primary long-run goal. Among other important features of IT are vigorous efforts to communicate with the public about plans and objectives of monetary authorities, and in many cases, mechanisms that strengthen the central bank's accountability for attaining those objectives". Another aspect of IT regime considers it as a framework of constrained discretion on the part of the central bank. This aspect leads to different ways of implementing IT policy.. Researchers in favour of IT policy suggest that the increased monetary policy stability under IT regime is achieved through the medium-term target announced to the public and through the great communication, transparency, and Central Bank accountability imposed by this new framework. However, others suggest that this stability is achieved where the Central Bank exerts a greater control over the expectations of the forward-looking private sector. For this reason, a large debate in the literature has been emerged about the relevance of IT. Indeed, since two decades, there exists, in the academic literature, a rough debate between the proponents and the opponents to IT; such as the discussion opposing Mishkin, (2004) and Friedman (2004).

The growing interest of central banks in industrialized and emerging countries for Inflation Targeting goes naturally hand in hand with an intensification of academic research about it. The first parts of the work, essentially descriptive, have endeavored to discuss the various operational aspects of monetary policy, and the terms of its effectiveness and viability. Consequently, the second generation of work has in turn sought to test empirically the benefits in terms of macroeconomic performance of the adoption of Inflation Targeting. Long focused on industrialized economies because of a lack of a certain hindsight concerning emerging countries, these empirical studies have subsequently concentrated mainly on macroeconomic performance of Inflation Targeting at the heart of emerging economies whose adoption was a debate within the academic community for these category of countries. While these studies find mixed result, even contradictory in the case of industrialized countries, the results seem rather to highlight the positive impact of the adoption of Inflation Targeting on macroeconomic performance of emerging countries. In the sense that countries which have adopted Inflation Targeting would show macroeconomic performance superior in terms of level and volatility of inflation in particular, to the economies which would pursue another strategy of monetary policy.

The objective of this paper is then twofold. We propose initially, to reconsider empirically the impact of the adoption of Inflation Targeting on macroeconomic performance of emerging economies. The obtaining results will show that the adoption of Inflation targeting has effectively permitted to the emerging countries which have adopted it, to reduce the level and volatility of

Inflation, although some central banks have faced difficulties in the achievement of their official Inflation Targets.

STYLIZED FACT ABOUT INFLATION TARGETING COUNTRIES, AND RELATED LITERATURE

As a consequence, IT policy emerged in February 1990 in New Zealand as an alternative solution of nominal anchor. This policy has been developed in order to resolve the limits and the causes of failure for previous monetary policies based on intermediate targets such-as the lack of credibility, transparency and independence. The IT policy is based on the success to anchor inflation expectation of private sector through institutional and strategic conditions. The main institutional conditions consist in a high degree of central bank accountability, a high degree of central bank independence and a strong banking and financial system. Concerning the strategic conditions, central banks must have a high degree of communication with public; for example publishing a policy target agreement with all details for the monetary policy objective, the price index to be targeted, the horizon of the target, the range of inflation targets, and the instruments. All these conditions are known as pre-requisites of IT implementation.

The theory of inflation targeting has started with Leiderman and Svensson (1995), Svensson (1997, 1998, 1999), Bernanke and Mishkin (1997), Bernanke and al. (1999). It is with these authors first targeting policy definitions have emerged. The first works appeared, during the years four twenty - ten, show some differences in the definition of inflation targeting policy. We begin our analysis by presenting the main definitions of inflation targeting policy, which each show a particular characteristic of this regime. Then we suggest a definition that summarizes the main points that attach to most economists.

Table 1: Summary of some definitions.

Auteurs	Définitions
Leiderman and Svensson (1995)	"The inflation targeting regime has two characteristics: an explicit numerical inflation target by specifying the index, the target level, the tolerance interval, the horizon and the definition of possible situations which the monetary authorities will change the target. . . [And] the absence of an explicit intermediate target such as monetary aggregate target or exchange rate targeting."
Martin and Rogers. (1997)	"Inflation targeting is based on the definition of an explicit inflation target,..." [the definition] clear and unambiguous indications which constitute the overarching objectives leading to the stability of inflation [...].

	Method for Inflation Forecasting is to use all information that could provide an indication of future inflation and implement a procedure prospective (forward looking) in order to manage the driving instrument which will depend on the early assessment compared to the predefined target rate. "
Bernanke and Mishkin (1997)	The inflation targeting policyas a new framework for monetary policy analysis which consists of an official announcement from an interval target for one or more horizons. They evoke the uniqueness of the objective: that of price stability. They suggest the explicit announcement of this strategy. In addition, they consider that this policy generates a growth of the degree of communication with the public around the plans and objectives to be implemented.
Mishkin (2000)	Inflation targeting is a monetary policy strategy that encompasses five essential elements: (i) An announcement of a numerical inflation target over the medium term; (ii) an institutional commitment to consider the stability of prices as the overriding objective of monetary policy, which are subordinated the other objectives. (iii) An information strategy in which several variables are used (not not only monetary aggregates, the exchange rate) determining the implementation of the policy instrument. (iv) The increase of the degree of transparency via the communication with the public and the market on plans, objectives and decisions of the monetary authorities. (v) The increase in the responsibility of the Central Bank in order to achieve the inflation targets." A structure of monetary policy designed to redress inflation... The countries pursuing inflation targeting undertake to consider the price stability as their primary objective. They consider inflation as the single nominal anchor on the medium-term."
Capistrán, and Ramos-Francia. (2010)	Defines the inflation targeting policy as a monetary policy strategy aimed at maintaining price stability using all the information available to the Central Bank mainly the prices of financial assets.

Following these definitions, we propose a definition about which there is a consensus. The definition that we develop is similar to that of Bernanke and Mishkin (1999). Indeed, we consider the inflation targeting as a framework for the analysis of monetary policy and not as a simple rule for action on inflation. In other words, its primary objective is to maintain price stability without however excluding the autonomy of monetary authorities to pursue other secondary objectives such as such as stability of the economic activity, the stability of the exchange rate

(Aguir, 2014). According to this definition, the success of inflation targeting is based on the respect of certain institutional forms and some strategic choices.

The comparison of the performance of Inflation in countries adopting Inflation Targeting regime, compared to those practicing other monetary regimes, has recently experienced a particular interest in empirical studies (Mishkin and Posen (1997), Honda (2000), Ball and Sheridan (2003 and 2005), Brito and Bysted (2005), Vega and Winkelried (2005), Mollick et al (2008); these types of work were based on individual data. They differ considerably in the choice of control groups of countries not targeting Inflation and in valuation techniques. Therefore their results are different.

The question of the economic performance of the Inflation Targeting policy is at the heart of the economic debate during these last years. The purpose of this section is to evaluate the economic performance of the monetary policy according to the economic literature which an environment of stable monetary policy reflects good macroeconomic. In this section, we will focus on the study of the effect of the adoption of the policy of Inflation Targeting in emerging countries by the comparative performance of some macroeconomic indicators: Inflation, Growth rate interests and Exchange rates. The contribution lies in extending the previous literature, comparing the performance of emerging economies pursuing Inflation Targeting to those of a group of neighboring developing countries with comparable economic and social indicators (same series of countries in this chapter). And identify the factors influencing the volatility of Inflation in the countries adopting this monetary policy and the following methodology was established: Per Capita Income (PCI) is economically efficient when it generates a higher degree of stability in the macroeconomic environment.

EMPIRICAL ANALYSIS

Table 2 describes the main variables examined and their descriptive statistics for our sample of emerging markets. The first column shows the mean and standard deviation for those country-quarter observations in which an inflation-targeting regime was in place. The second column includes the sample of observations consisting of countries who never adopted an IT regime and IT countries before their adoption of an IT regime. GDP growth is virtually the same in the IT and non-IT samples, while inflation is about half of the level on average in IT regimes (5.1 percent) compared to non-IT regimes (9.8 percent). The average level of nominal interest rates is 3.7 percentage points less in the IT sample compared with the non-IT sample, a somewhat smaller difference than the 4.2 percentage point difference in inflation rates between the two regimes, indicating somewhat higher average short-term real interest rates in the IT sample.

The external variables indicate that IT emerging markets appear to experience a substantially higher rate of average depreciation of the real exchange rate and lower rate of international reserve accumulation. This suggests less exchange rate management on the part of the IT countries. Due to the large variability of the sample observations, however, none of these differences are statistically significant using standard thresholds.

In order to examine the time-series properties of our data and assess the appropriate estimation methodology we conduct panel unit root tests (Appendix 1).

Table 2 : Descriptive Statistics for Macroeconomic Variables

Variable	IT Sample (456 obs.)	Non-IT Sample (577 obs.)
GDP growth (%)	1.11	1.00
	(5.93)	(7.84)
GDP gap (%)	-0.11	0.29
	(3.86)	(4.62)
Inflation (%)	5.10	9.80
	(4.21)	(9.15)
Interest rate (%)	7.92	12.60
	(6.09)	(10.25)
Real exchange rate change (%)	2.50	-0.49
	(5.76)	(13.27)
Foreign reserve change (%)	3.25	4.66
	(7.89)	(22.82)

Note : Mean and (standard deviation) for all variables

Table 3 presents the estimates for the benchmark Taylor rule regressions employing a fixed-effects least-squares estimation procedure (LSDV) (Aguir, 2014). Column (1) and (4) presents the benchmark model without external variables for the IT and non-IT samples, respectively. The other columns extend the benchmark to the external variables.

Columns (2) and (5) combine the benchmark model with the percentage change in the real exchange rate, and columns (3) and (6) combine the benchmark model with the percentage change in international reserve holdings.

The model explains much of the variability in interest rates, with explanatory power ranging from 72-81% (adjusted R^2). The degree of persistence, measured by the lagged interest rate coefficient, is quite high. The persistence in the IT group is marginally higher than in the non-targeting group. The coefficient on inflation is highly significant, large and stable (with a narrow 0.23-0.29 range) in the inflation-targeting regime but *not* generally in the non-IT regime. Given the estimated impact effects and persistence, the long-term response for the IT targeters to a one percentage point rise in inflation is to increase interest rates by between 1.3-1.8 percentage points. Non-IT policymakers do not respond to inflation rates in the same

pronounced and significant way that their IT counterparts do, i.e. the impact response of 0.16 implies a 0.59 percentage point long-term response in the non-IT group. The output gap is not significant in any of the regressions. (The output gap is not a significant variable in practically any of the regressions we ran. For robustness, we also estimated the benchmark regressions using the Clarida (2001) specification that includes both contemporaneous and lagged inflation as independent variables. Results on the magnitude of the effect of inflation on the interest rate are practically the same. The external variables are also very important in distinguishing the operating procedures of the IT and non-IT groups. Both IT and non-IT emerging market central banks respond to real exchange rates in setting interest rates-- the coefficients are large and highly statistically significant. It is noteworthy, however, that the real exchange rate response is much smaller in the IT countries (0.08) compared to the non-IT countries (0.14). The IT group attempts to “lean against the wind” and stabilize the exchange rates by increasing interest rates in response to real exchange rate depreciation, but their actions are apparently more constrained by the commitment to target inflation than the non-IT group in how proactively this objective is pursued. In a similar vein, it is only the non-IT group that takes into account changes in international reserves in setting interest rates. In particular, a one percent increase in reserves leads to a 6 basis point decline in domestic short-term interest rates for non-IT countries (23 basis point long-run effect). Only the non-IT group eases policy in response to international reserve inflows.

Table 3: Interest rate policy functions : Reference model

		IT			Non IT	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Taux d’intérêt (t-1)	0.84***	0.83***	0.84***	0.76***	0.74***	0.77***
	(43.97)	(43.36)	(43.91)	(22.50)	(22.48)	(23.17)
Inflation	0.22*	0.29**	0.22*	0.01	0.15***	0.01
	(1.86)	(2.43)	(1.86)	(0.72)	(5.08)	(0.62)
L’écart de production (%)	0.03	0.05	0.03	0.02	0.03	0.02
	(1.05)	(1.55)	(1.05)	(0.37)	(0.62)	(0.52)
Taux de change réel		0.07***			0.13***	
		(3.46)			(5.78)	
Reserve de change						-0.06***
						(-3.95)
Observations	387	387	387	472	472	472
R^2	0.76	0.77	0.76	0.79	0.80	0.73
F-test	272.10	206.89	203.60	177.55	151.01	141.35

Note: dependent variable: the nominal interest rate money market. Fixed effect panel estimation. Statistical tests "t" associated are indicated below each coefficient estimate

*** significative à 1% ** significative à 5% ***significative à 10%

Table 4 investigates whether the response of policy interest rates to real exchange rates is also related to the degree of trade openness. From our theoretical discussion, we expect countries that are more open to trade to be more vulnerable to real exchange rate changes and this in turn would affect their response in setting interest rates. We test this hypothesis by including a term capturing the interaction of trade openness and real exchange rate change. Column (2) presents the baseline results for the IT group. The interest rate response to real exchange rates of the IT group does not appear to be affected by the degree of trade openness and the estimated coefficients on the other variables are nearly identical to the specifications reported in Table 3. Column (5) in Table 3 reports the results for analogous specification of non-IT group. Firstly, this specification provides strong evidence of a significant interest rate response to inflation for the non-IT group. This response is less that half of that of the IT group, but highly statistically significant. A one percentage-point rise in inflation leads to an 11 basis point rise in the nominal interest rate (50 basis point long-term response). Secondly, the interest rate response to real exchange rate changes is less in the non-IT group the larger is the degree of trade openness. This effect is significant, robust and economically important. For example, a non-IT country that has a trade openness measure of 0.50 (export plus imports divided by GDP) will raise interest rates by about 115 basis points in response to a 10 percent rise (depreciation) in the real exchange rate. This response falls as the degree of trade openness increases. If countries are open to trade, they are also more likely to be open to international capital movements. In this case, they may have less control over domestic interest rates and limited ability to respond to real exchange rate changes. This effect may dominate their desire to stabilize the economy by more aggressively responding to real exchange rate changes.

Table 4 : Policy Functions: Real Exchange Rates and Trade Openness

		IT	N= 355		Non IT	N= 415
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Interest rate (t-1) (t-1)	0.8***	0.83***	0.83***	0.82***	0.78***	0.78***
	(39.64)	(37.37)	(37.38)	(26.26)	(24.22)	(25.08)
Inflation	0.21*	0.26**	0.26**	0.07**	0.11***	0.10***
	(1.65)	(2.06)	(2.06)	(2.06)	(4.40)	(3.75)
GDP gap (%)	0.03	0.04	0.04	0.05	0.07*	0.07**
	(1.05)	(1.55)	(1.05)	(0.37)	(0.62)	(0.52)
RER change		0.10**	0.10**		0.17***	
		(2.21)	(2.31)		(5.78)	
RER change* trade openness		-0.04	-0.05		-0.11**	-0.11**
		(-0.45)	(-0.84)		(-1.98)	(-2.07)
Reserve de change			0.01			-0.06***
			(0.66)			(-4.80)
R^2	0.83	0.84	0.84	0.84	0.84	0.85
F-test	594.44	365.97	304.55	143.51	155.73	140.83

CONCLUSION

In this paper we explore the nature of inflation targeting in emerging market and transition economies. IT has become a popular operating procedure for many central banks. This is also true in emerging market and transition economies. In the context of an estimated panel data for 16 emerging markets over 1989Q1 to 2006Q4 (using both IT and non-IT observations), we find clear evidence of a significant and stable response running from inflation to policy interest rates in emerging markets that are following publically announced IT policies. By contrast, we find that non-IT central banks place much less weight on inflation in setting interest rates. We emphasize that external considerations should play an important role in central bank policy in emerging markets, and more so than in advanced industrial countries. Emerging markets generally have a low level of financial market development, characterized by few instruments and thin trading, which in turn are not able to play a significant role in stabilizing domestic output in the face of external shocks (Aghion et al., 2006). Other considerations also suggest that external factors are more important in emerging markets. To motivate our empirical work, we present a simple model that illustrates the linkages between external vulnerability and the role of the real exchange rate in optimal policy rules.

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APPENDIX

Appendix 1: Emerging Markets Sample

IT countries	Start of Inflation Targeting Regime	Non-IT countries
Brazil	1999Q1	Argentina
Colombia	1999Q1	Indonesia
Czech Republic	1998Q1	Jordan
Hungary	2001Q1	Malaysia
Israel	1992Q1	Morocco
Korea	1998Q1	Uraguay
Mexico	1999Q1	Paraguay
Peru	1994Q1	Georgia
Philippines	2001Q1	Croatia
Poland	1998Q1	Bulgaria
Thailand	2000Q1	Bolivia
South africa	2000Q1	
Turkey	2006Q1	

Source for IT start dates: Mishkin and Schmidt-Hebbel (2007)