Inflation Targeting: An Alternative to Monetary Policy

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Abstract

In a context marked by an overhaul of the monetary theory and the emergence of new monetary policy strategy based on inflation targeting regime, this work is part of monetary policy recently implemented by a set of emerging markets. It focuses on both theoretical and empirical analysis of the inflation targeting regime. At first, it treats the theoretical framework of inflation targeting from the conceptual and analytical aspects that seem complete reflection of the "rule versus discretion" debate. This paper focuses on the role of transparency and credibility of monetary policy as a performance criterion that motivate any country wishing to adopt inflation targeting regimes, this study shows these two basic principles which tends an inflation targeting regime cannot be attained without respect of institutional and technical conditions. The analysis of the operating mechanisms of the inflation targeting regime has allowed studying the experiences of a sample of emerging countries in this field and focus, on the initial findings and lessons learned from the implementation of anchor inflation. The analysis then focuses on the empirical verification. We use the panel data analysis through the model of Sheridon and Ball (2003). The results show without exception, that all inflation targeting countries has a lower and less volatile inflation. Similarly, we find that the policy rules for inflation targeting has macroeconomic performance of countries improved by providing a level of low and stable inflation with an economic growth sustainable and non-volatile.

Keywords: inflation targeting, monetary policy, credibility, transparency, performance, efficiency and stability

1. Introduction

The theory of monetary policy seems to have been, during the last fifteen years a reformulation of these ancient concepts and the emergence of new foundations dictated by the emergence of the concept of active monetary policy rule centered on the dominance of the objective (inflation targeting).

The conduct of monetary policy based on the concept of the rules is part of the line with the work on the problem of time inconsistency developed by Kydland and Prescott (1977). These, prefer instead the notion of rules that they opposed to discretionary decisions. This contradiction can be summarized in a maxim: "rule against discretion. This reasoning has been applied, a few years later, by Barro and Gordon (1983) to the monetary policy. Using a Phillips curve incorporating rational-expectations assumption in the model of R.Lucas (1972), these authors conclude that a discretionary use of monetary policy, challenging the existing rule would be certainly hampered by the reactions of economic agents and would actually produce the opposite effect to that desired. In the presence of asymmetric preferences, the monetary authorities eventually systematically produce inflationary bias and cause "inflation surprises". In the same sense, and in order to complete the "rule-discretion" antinomies, "flexibility-rigidity", recent research on the conduct of monetary policy has resulted in the emergence of the rule of Taylor (1993) is the best known simple instrument rule. Thus devolved place to the notion of optimal rule in the conduct of monetary policy is justified by criteria of credibility and transparency in a context where structural changes occur continuously and / or Central Bank is uncertain about the true structure of the economy J. Taylor rule as the beginning of active rules, owes its popularity to the subsequent theoretical clarifications by Svenson (1997, 1998, 1999). The latter presents the Taylor rule as a special case of stabilisation in inflation at a level target, his goal whether or not supplemented willingness to cyclical stabilization of activity ("strict" versus "flexible inflation targeting") (Note 1).

These theoretical studies are supported by abundant empirical literature to identify the exact forms of optimal

rules in order to prove their normative properties. The explicit inflation targeting as an alternative nominal anchor for monetary policy, embodies the 'forward looking' attitude based on the construction of a forecast inflation which emanates from a global structural model. From an operational point of view, this translates into an inclusive approach to all available information.

In practical terms, this revival in the conduct of monetary policy has become a monetary policy increasingly popular and is a global trend with currently twenty five countries had adopted inflation targeting (eight developed and emerging seventeen). Responding to these developments, it became useful and constructive to focus on the study of a new framework for conducting monetary policy which is the inflation targeting. This work focuses on assessing the experience of emerging countries that have adopted inflation targeting since the 1990s, by focusing on performance as the potential benefits and costs of adopting such a monetary policy framework and try to draw lessons from the twenty years of practice of this regime.

This paper is divided into two main parts. It treats inflation targeting policy and the rule of conduct and the study of efficiency and economic performance under Inflation Targeting. We present in this work analysis of the inflation targeting framework: the definition of this regime and its strategic choices. Particular interest is given to the transparency and credibility of monetary policy as a performance criterion that motivates any country wishing to adopt an inflation targeting regime.

The last axis is to assess and analyse the experiences of a sample of inflation targeting emerging countries. Previous studies such as Aizenman and Nancy (1993), Ramey and Ramey (1996), Martin and Rogers (2001), Stiroh (2008), which support the idea that the measure of environmental stability in monetary policy is based on the measurement of the degree of convergence of interest rates, inflation rates and the gross domestic product (GDP). It will also issue to verify empirically, whether the adoption of this system leads to significant differences in macroeconomic performance, by using the analysis of panel data through the model of Ball and Sheridan (2003) for even the allure of three variables (interest rate, inflation rate and gross domestic product).

2. Inflation Targeting: Some Definitions

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.

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

3. The Strategic Choices

The inflation targeting policy is an explicit, numerical announcement of the inflation target. However, the monetary authorities are forced to determine some strategic choices before announcing the inflation target. First, it comes to determining the choice of index to calculate inflation in general and in particular target, then it is necessary to determine the target horizon. Then, it is to choose the target level and its tolerance interval. Finally, it is to publish this information summarizing the different strategic choices.

The choice of the price index. The choice of the price index shows the existence of differences between inflation-targeting countries in the calculation of the consumer price index and their relative sensitivity to supply shocks.

Two indices are likely to calculate inflation: the consumer price index and gross domestic product (GDP) deflator. Although the latter reflects more the domestic inflation, most central banks use the IPC or variants of the latter. The reasons for this choice are motivated by several points. Firstly, it is the most familiar to the public index; on the other hand, this index is calculated monthly enabling its regular monitoring and is not subject to revision over time.

The choice of the target. The choice of the target is one of the fundamental issues in the success or failure of monetary policy. The strict sense of the term 'price stability' implies that the price index is fixed. Therefore, its growth rate which corresponds to inflation should be zero or close to zero. However, economically, the price stability implies a positive price index growth rate. Various works have shown that levels of inflation close to zero are not desirable. On the contrary, they showed that the inflation target should be higher than real inflation. Two arguments justify the need for a higher inflation target than real inflation. The first argument is the problems of measurement of nominal rigidities. These problems of measurement, known in the literature as the bias calculating the price index, emanate primarily from three factors: an adaptive consumer behavior in response to changes in commodity prices, the introduction of new goods on the market, the substitution bias markets. The second argument is the risks in the event of a close target of zero or null.

The target range. This strategy allows monetary policy to preserve the risk of uncertainty. In a context of economic shocks, this strategy allows monetary authorities to be more flexible to be able to provide the necessary answers to the various economic shocks. In addition, it reflects the desire of the monetary authorities to limit the variability of inflation. However, the benefit of this strategy does not exclude a matter of concern policy makers dealing with the nature of the width of this interval. A wrong choice of the width of the target range undermines the credibility of the policy and its objectives thereafter. A very narrow target range reflects a strong commitment of the authorities towards the target.

The target horizon. The choice of countries is to establish a multi-year target, that is to say predict two years in advance about the inflation target. This method takes into account the fluctuations in output in the objective function of the central bank. The approach in the pursuit of the inflation target becomes gradually (Svensson,

1997). Beyond the announcement of a specific target on a specific time horizon, inflation targeting implies a communication and a responsibility of the central bank. Thus, it is not enough to announce that the main objective of monetary policy inflation will be maintained at a particular level. It is also to explain how monetary policy should be oriented. In order to achieve this goal, but also the Central Bank is accountable for the results of this objective.

The communication. One of the fundamental properties of the inflation targeting is to ensure a high level of transparency. This property is based on the fact that policymakers must explain to the public approaches, objectives, plans and commitments in monetary policy. Setting objectives and strategies that we analyze is often performed by a group. The mission of this group is to discuss and to take the opinion of all members on the objectives of monetary policy. Due to constraint of transparency required by the policy of inflation targeting, this group was forced to issue a press release that it will report all points of inflation targeting: objective of monetary policy, level of the target, horizon and instruments so that their actions.

4. Performance of Inflation Targeting Regime: Empirical Validation

The comparison of the performance of inflation (Note 2) in countries adopting inflation targeting regime compared to those practicing other monetary regimes has recently known a particular interest of empirical studies (Mishkin and Posen (1997), Honda (2000), Ball and Sheridan (2003 & 2005), Brito and Bysted (2005), Vega & Winkelried (2005), Brito and Bysted(2006), Mollick and al (2009)). All these studies are based only on individual data, but they significantly different in the choice of control groups of no inflation targeting countries and estimation techniques. Thus, their results were considerably different.

The question of the economic performance of inflation targeting policy is at the heart of the economic debate in recent years. Our objective is attempting to measure economic performance of monetary policy in the economic literature that a stable monetary environment reflects a good macroeconomic performance.

In this section, we focus on the study of the effects of inflation targeting in emerging market countries by the comparative performance of some macroeconomic indicators such as; Inflation, growth, interest rates and exchange rates. The contribution of this study is to extend the earlier literature, comparing the performance of emerging economies pursuing the inflation targeting to those of a group of neighbouring countries with economic indicators developing and comparable social (Appendix 1). And on the other hand, identify the factors influencing the volatility of inflation in countries adopting this monetary policy and establish the following methodology: **The Inflation targeting policy is economically efficient, when it generates an increased degree of stability in the macroeconomic environment.** And establish a relationship between stability and performance.

The table below illustrates the review of literature since the 1980s, on the relationship between volatility of cycles and economic growth, the main work investigating the effect of macroeconomic stability on growth; the work identifies a link between the stability of the monetary environment and economic performance through the effect on the determinants of growth.

Table 2. Summary of work identifies a link between the stability of the monetary environment and economic performance through the effect on the determinants of growth

Studies	Problematic	Methodology	Result
Ho (1996)	What is the effect of monetary instability on economic growth (the accumulation of capital through)?	Monetary instability is measured by the volatility of money growth and the inflation volatility. It adopts an endogenous growth model where the currency is introduced.	High monetary cash creates an increase in the desired level of capital. High inflation generates a reduction in the desired capital.
Beaudry and *al.* (2001)	What is the impact of monetary instability on economic performance (via the investment rate)?	This effect is studied via the impact of currency instability (measured by the volatility of inflation) on the distribution rate of investment. This study is conducted on English firms during the period 1961-1990.	Monetary policy in an uncertain Environment. The uncertainty of the monetary policy environment negatively affects the distribution rate of investment.
Kormendi and Meguire (1985)	To examine the effect of monetary instability (via the volatility of inflation on economic growth).	the average growth of output as a function of aggregate inflation volatility.	The results were in favor of a negative effect.

The thesis which was supported is that the inflation targeting policy is economically efficient, when it generates a higher degree of stability in the monetary environment.

Stable monetary environment→low degree of uncertainty→degree of interaction between the variables high→convergent responses to shocks.

The purpose of this study is to establish the methodology we adopt to assess the economic performance of the inflation targeting policy. We will try in what follows to judge the performance of the inflation targeting policy based on the effect of macroeconomic stability and in particular the environment of monetary policy.

In this section we focus on the comparative performance of some macroeconomic indicators such as; inflation, economic growth, the interest rate and the exchange rate. The contribution of this study is to extend the previous literature by comparing the performance of emerging markets pursuing inflation targeting to those of neighboring countries having economic and social indicators comparable. Our study focused on 13 emerging countries practicing the inflation targeting (South Africa, Brazil, Chile, Colombia, Hungary, Indonesia, Mexico, Peru, Philippines, Poland, Romania and the Turkey) and 11 emerging countries practicing other policies monetary (Argentina, Bolivia, Bulgaria, Croatia, Georgia, Jordan ,Malaysia , Morocco, Indonesia , Paraguay, Uruguay).

4.1 Methodology

The methodology that we are developing to answering this question is as follows: a monetary policy is considered economically efficient if it generates a stable monetary environment. Like previous research including the approach known as "differences in differences" Ball and Sheridan (2003), any measure of macroeconomic performance (X) is considered to be dependent in part on his own past and part of its underlying average.

Where we are interested in the inflation rate, the underlying average corresponds to the inflation target for countries practicing the IT; for other countries, this average is simply the 'normal' level to which inflation converges in the long term.

Indicators of macroeconomic performance considered in our work are: the level and volatility of inflation, the level and volatility of the gross domestic product (GDP) and finally the level and the volatility of the interest rate. Indeed, in the case of these countries, the environment for monetary policy targeting inflation is governed mainly by the following variables: inflation, Gross Domestic Product (GDP), interest rates and exchange rate.

Mathematically, a performance measure can be expressed by the following equation:

$$X_{i,t} = \lambda \, [\alpha^T d_{i,t} + \alpha^N (1-d_{i,t})] + (1-\lambda) \, X_{i,t-1}$$

whether,

$$X_{i,t} = \lambda \, \alpha^N + \lambda \, (\alpha^T - \alpha^N) \, d_{i,t} + (1-\lambda) \, X_{i,t-1} \tag{1}$$

with:

$X_{i,t}$ is a value of the macroeconomic performance of indicator X in country i at time t;

α^T is the average that X converges for countries with IT;

α^N is the average that X converges for countries without the IT;

$d_{i,t}$ is a dummy variable equal to 1 if country i target inflation in time t, and 0 otherwise.

The parameter λ represents the speed with which X converges to the specific α value; a value of λ equal to 1 equivalent full convergence after a period, while a value of λ equal to 0 means that X depends only on its past with no tendency of convergence towards a particular value.

Ball and Sheridan (2003) have shown that the introduction of the term $X_{i,t-1}$ in equation (1) is crucial to having a coefficient $\lambda \, (\alpha^T - \alpha^N)$ unbiased reflecting the impact of the inflation targeting policy through the performance differential, given its initial level.

We adopt for our study, the regression used by lease and Sheridan (2003). It is a version of the previous equation rewritten in terms of difference of X assuming that there are two periods: "pre" and "post".

$$X_{i,post} - X_{i,pre} = \lambda \, \alpha^T d_i + \lambda \, \alpha^N (1-d_i) - \lambda \, X_{i,pre} + e_t$$
$$= \lambda \, \alpha^N + \lambda \, (\alpha^T - \alpha^N) d_i - \lambda \, X_{i,pre} + e_t \tag{2}$$

With $d_i = d_{i,post} - d_{i,pre}$;

d_i is a dummy variable which takes 1 when inflation targeting is adopted and 0 otherwise.

If we assume that $a_0 = \lambda\,\alpha^N$, $a_1 = \lambda\,(\alpha^T - \alpha^N)$ and $b = -\lambda$.

And

$$X_{i,post} - X_{i,pre} = a_0 + a_1\,d_i + b\,X_{i,pre} + e_t \tag{3}$$

With X_{Post}, value of one of the variables investigated during the period after inflation targeting; X_{pre}, the value of one of the variables studied during the period before inflation targeting.

For countries pursuing the IT, the "pre" period starts from the first quarter of 1990 through the first quarter before the date of adoption of the IT. The "post" is the period from the date of adoption of IT until the fourth quarter of 2012. We identify, then two periods separate post adoption based on inflation targets stationary.

During the period of convergence of the target, the inflation targeting is adjusted downward and is based on annual or multi-annual announcements. While during the stationary target period, , inflation targets are arranged at a constant level or aligned for a future undefined, although some countries make slight adjustments to the targets.

For countries not pursuing the IT, the date that separates two periods" pre" and" post" is set in the fourth quarter of 1999 which corresponds to the average dates of adoption of IT. The data are collected mainly from the International Monetary Fund quarterly (Note 3) data for the period 1990–2012 (June 2013).

Table1. Period pre and Post inflation targeting

IT countries	Period Pre targets		period Post Ciblage			
			Period of convergence targets		Period of stationarity	
Czech Republic	1990: Q1	1997: Q4	1998: Q1	2004: Q4	2005: Q1	2012: Q4
Korea	1990: Q1	1998: Q1	1998: Q2	2004: Q4	2005: Q1	2012: Q4
Poland	1990: Q1	1998: Q4	1999: Q1	2004: Q4	2005: Q1	2012: Q4
Brazil	1990: Q1	1999: Q1	1999: Q2	2004: Q4	2005: Q1	2012: Q4
Chile	1990: Q1	1999: Q2	1999: Q3	2004: Q4	2005: Q1	2012: Q4
Colombia	1990: Q1	1999: Q2	1999: Q3	2004: Q4	2005: Q1	2012: Q4
South Africa	1990: Q1	1999: Q4	2000: Q1	2000: Q4	2001: Q1	2012: Q4
Thailand	1990: Q1	2000: Q1	*	*	2000: Q2	2012: Q4
Mexico	1990: Q1	2000: Q4	2001: Q1	2002: Q4	2003: Q1	2012: Q4
Hungary	1990: Q1	2001: Q2	2001: Q3	2004: Q4	2005: Q1	2012: Q4
Peru	1990: Q1	2001: Q4	2002: Q1	2004: Q4	2005: Q1	2012: Q4
Philippines	1990: Q1	2001: Q4	2002: Q1	2003: Q1	2003: Q2	2012: Q4
Turkey	1990: Q1	2005: Q4	*	*	2006: Q1	2012: Q4

The coefficients a_1 on dummy variables d_i is interpreted as a measure of the impact of inflation targeting regime on the X variable (measuring the impact of inflation targeting on foreign exchange X). This coefficient is the difference in average ($X_{Post} - X_{pre}$) between countries with IT and countries without IT.

Given the coefficient b tells us about the behavior of the variable X in the long term (shows what extent the inflation targeting affect the change of variable to an initial value of X_{pre}).

In fact, the equation (3) assumes that $a_0 = \lambda\,\alpha^N$, $a_1 = \lambda\,(\alpha^T - \alpha^N)$ et $b = -\lambda$ once a1 and b are estimated, we can write: $\alpha^T - \alpha^N = a_1 / -b$.

The difference $\alpha^T - \alpha^N$ is interpreted as the long-term difference in the X variable between countries practicing inflation targeting and those without inflation targeting.

To determine the impact of the IT, our approach is to calculate X_{pre} and X_{post} for each country and make alternative comparisons across countries and periods:

Panel 1: Comparison between indicators of inflation-targeting countries and countries that do not target inflation.

($X_{pre\,n\,IT}$ and $X_{pre\,CI}$ # $X_{post\,n\,IT}$ and $X_{post\,CI}$).

Panel 2 : Comparison between indicators of inflation-targeting countries and countries that do not target inflation during the convergence period.

($X_{pre\,n\,IT}$ and $X_{pre\,IT}$ # $_{post\,n\,IT}$ and $X_{post\,IT\,Convergence}$).

Panel 3: Comparison between indicators of inflation-targeting countries and countries that do not target inflation

during the stationary phase.

($X_{pre\,n\,IT}$ and $X_{pre\,IT}$ # $X_{post\,n\,IT}$ and $X_{post\,CI\,stationary}$).

We proceed to the estimation of the equation (3) by the method of Ordinary Least Squares (OLS) for each variable X that is the growth rate and the interest rate.

After estimating the impact of the adoption of IT on macroeconomic performance assuming that the study period is divided into two sub-periods "pre" and "post", We extend our study using the best available data, by comparing the performance of the X variable between countries pursuing the IT and countries without the IT through quarterly data observed during the period (1990–2012).

Thus, we estimate the equation (1) which can be rewritten as follows:

$$X_{i,t} = a_0 + a_1\,d_i + c\,X_{i,t-1}$$

With: $a_0 = \lambda\,\alpha^N$, $a_1 = \lambda\,(\alpha^T - \alpha^N)$ et $c = 1 - \lambda$.

In contrast to the equation (2), this equation has the particularity of introducing as an explanatory variable, the level of the X delayed variable by one period instead of the average of the variable during the pre targeting period.

We use the estimation method of ordinary least squares for dynamic panels (pooled OLS) for the same three panels above. With OLS, we study each country both and for pooled OLS it comes to mention a result of the whole panel (i.e., all countries) because if the countries are heterogeneous, then the analysis with pooled OLS will give us significant and in very low coefficients.

4.2 Estimation Results

To facilitate the reading and interpretation of results, we treat successively the performance of inflation, the interest rates growth and the exchange rates (Note 4).

4.2.1 The Performance of Inflation

The (Table 2), shows that, in all countries the level of inflation declined during the practice of targeting inflation relative to the experiences of other monetary policies. The results of the panel 1 show the significance of the dummy variable, measuring the impact of IT policy.

The coefficient of the dummy variable is negative (-0.28). This implies that the IT inflation reduces the level of inflation of 28% (Table2, 3rd column). This difference is even higher (0.33%) when comparing inflation countries without IT to countries practicing this regime during the period of convergence targets.

Table 2. Level of inflation

Estimation method	Panel 1		Panel 2		Panel 3	
	OLS	*POOLED OLS*	*OLS*	*POOLED OLS*	*OLS*	*POOLED OLS*
Constant	2.46	0.33	1.99	0.30	3.22	n.a
coefficient of dummy (inflation targeting)	(0.65)***	(0.07)***	(0.69)*	(0.07)***	(0.85)***	
	0.51	-0.28	1.20	-0.33	-0.86	n.a
	(0.85)	(0.09)***	(0.93)	(0.12)***	(1.09)	
Variable pre inflation targeting (delayed variable)	-0.87	0.94	-0.82	0.94	-0.94	n.a
	(0.04)***	(0.01)***	(0.04)***	(0.01)***	(0.05)***	
R^2	0.97	0.90	0.96	0.95	0.97	
Observations	24	1310	23	1143	24	
Number of countries	24	24	24	24	24	

The (Table 3) informs us about the results relating to the assessment of inflation volatility. The results of panel 1 show the significance of the dummy variable, measuring the impact of IT policy. The same behavior is observed for the volatility of inflation. Indeed, it appears from the results of the estimation (Table 3, 1st and 3rd column) the volatility of inflation is, on average, lower than 0.67% in emerging economies who practice IT compared to countries without IT.

This difference is almost the same (0.63%) during the period of convergence targets. The fact that we have not found any country that had a level of inflation and/or lower volatility during the period preceding the inflation targeting, leaves us thinking strongly about the effectiveness of this monetary regime. From this first comparison,

we conclude the effectiveness of inflation targeting because it leads to a low level of inflation compared to previous experiences. Our estimation results are consistent with previously submitted descriptive statistics.

Table 3. Inflation volatility

Estimation method	Panel 1	Panel 2	Panel 3
	OLS	OLS	OLS
Constant	1.62	1.60	1.75
	(0.648)***	(0.77)**	(0.45)***
coefficient of dummy (inflation targeting)	-0.67	-0.63	-0.55
	(0.675)**	(0.81)*	(0.47)
Variable pre inflation targeting	-0.93	-0.93	-0.95
	(0.064)***	(0.07)***	(0.04)***
R^2	0.94	0.92	0.96
Observations	24	23	24
Number of countries	24	24	24

4.2.2 The GDP Growth Performance

In a second step, we will assess the impact of the policy of targeting inflation on economic growth. By the method of dynamic panel (Table 4, 2nd column), we find that the impact of inflation targeting regime is to increase the growth level by 85%. The results concerning panel 1 show the significance of dummy variable, measuring the impact of IT policy. The coefficient of the dummy variable is positive (0.59). This implies that the CI increases the level of growth by 58%. (Table 4, 3rd column). This difference is even higher (67%) when comparing the level of the country's growth without the CI to countries practicing this regime during the period of convergence targets.

Table 4. GDP growth

Estimation method	Panel 1		Panel 2		Panel 3	
	OLS	POOLED OLS	OLS	POOLED OLS	OLS	POOLED OLS
Constant	3.67	1.95	3.43	1.97	4.02	n.a
	(0.62)***	(0.307)***	(0.72)***	(0.353)***	(0.62)***	
coefficient of dummy (inflation targeting)	0.32	0.85	-0.04	0.76	0.92	n.a
	(0.59)	(0.355)***	(0.67)	(0.490)***	(0.59)	
Variable pre inflation targeting	-0.89	0.34	-0.82	0.33	-0.99	
(delayed variable)	(0.14)***	(0.050)***	(0.16)***	(0.061)***	(0.14)***	n.a
R^2	0.75	0.16	0.64	0.14	0.80	
Observations	24	320	23	208	24	
Number of countries	24	24	24	22	24	

According to this analysis, we find that the inflation targeting policy does not penalize the level of economic growth in return for the reduction of inflation. In the following table (5), we will analyze the effect of this policy on the volatility of growth.

In terms of growth volatility we observe that the adoption of inflation targeting regime led to a decrease in the volatility of 46% in emerging markets operating the IT compared to countries without the IT and during the convergence period. This difference is even higher (82%) when comparing the level of growth volatility in countries without the IT than in countries operating this regime during the period of stationary targets. Again, we observe a macroeconomic performance, in terms of volatility of economic growth higher in countries operating inflation targeting than countries without the IT.

Our results show that this monetary regime is favorable for sustainable economic growth. The countries that target inflation have a higher macroeconomic performance, than the other countries, ensuring a level of low and stable inflation with sustainable economic growth.

Table 5. GDP volatility

Estimation method	Panel 1	Panel 2	Panel 3
	OLS	OLS	OLS
Constant	1.72	1.58	1.52
	(0.53)***	(0.70)**	(0.38)***
coefficient of dummy (inflation targeting)	0.28	0.46	-0.82
	(0.44)	(0.56)	(0.32)**
Variable pre inflation targeting	-0.98	-0.94	-0.92
	(0.13)***	(0.18)***	(0.09)***
R^2	0.78	0.66	0.87
Observations	23	22	23
Number of countries	24	24	24

4.2.3 The Performance of Interest Rates

Significant results on the performance of interest rates (show only the countries pursuing inflation targeting have a level of interest rates less 0.49% than the countries pursuing other monetary policy regimes. This difference is (38%) when comparing the level of a country's growth without the IT to countries practicing this regime during the period of convergence targets (Table 6).

Table 6. Interest rate

Estimation method	Panel 1		Panel 2		Panel 3	
	OLS	POOLED OLS	OLS	POOLED OLS	OLS	POOLED OLS
Constant	3.23	1.10	2.73	1.13	4.84	n.a
	(1.07)***	(0.177)***	(1.20)**	(0.195)***	(1.24)***	
coefficient of dummy (inflation targeting)	-1.14	-0.49	0.48	-0.38	-0.32	n.a
	(1.35)	(0.212)***	(1.60)	(0.283)***	(1.56)	
Variable pre inflation targeting	-0.66	0.90	-0.61	0.90	-0.82	n.a
(delayed variable)	(0.07)***	(0.011)***	(0.09)***	(0.013)***	(0.09)***	
R^2	0.89	0.84	0.85	0.82	0.91	
Observations	22	1223	21	1056	23	
Number of countries	24	24	24	24	24	

Likewise, we find a decrease in the volatility of the interest rate under the inflation targeting regime (Table 7) by -35% when comparing the interest rate volatility of the country without the IT to countries practicing this regime during the period of stationary targets.

Table 7. Interest rate volatility

Estimation method	Panel 1	Panel 2	Panel 3
	OLS	OLS	OLS
Constant	0.59	0.52	1.27
	(0.67)	(0.62)	(0.35)**
coefficient of dummy (inflation targeting)	0.93	0.50	-0.35
	(1.00)	(0.94)	(0.52)
Variable pre inflation targeting	-0.62	-0.58	-0.97
	(0.14)***	(0.13)***	(0.07)***
R^2	0.61	0.66	0.95
Observations	21	20	21
Number of countries	24	24	24

Monetary policy is considered economically efficient if it generates a stable monetary environment. This environment of monetary policy is characterized as stable because it identifies a long-term equilibrium toward which tend the main variables involved in this converged environment to significant macroeconomic

performance.

4.4.4 The Performance of Exchange Rate

In this stage we will evaluate the impact of inflation targeting policy on the exchange rate. The Table (8) shows that, in all countries the level of exchange rate increased during the practice of inflation targeting relative to the experiences of other monetary policies.

Table 8. Real exchange rate change

Estimation method	Panel 1		Panel 2		Panel 3	
	OLS	*POOLED OLS*	*OLS*	*POOLED OLS*	*OLS*	*POOLED OLS*
Constant	102.53	1.78	97.51	2.15	110.53	n.a
	(29.09)**	(0.785)**	(19.02)***	(0.855)**	(34.98)***	
coefficient of dummy (inflation targeting)	1.82	0.29	2.32	0.52	3.03	n.a
	(6.47)	(0.220)	(5.32)	(0.260)**	(9.80)	
Variable pre inflation targeting	-1.03	0.98	-0.98	0.97	-1.11	n.a
(delayed variable)	(0.22)**	(0.008)	(0.18)***	(0.008)***	(0.33)**	
R^2	0.72	0.99	0.77	0.99	0.57	
Observations	16	1223	16	1056	16	
Number of countries	24	16	24	16	24	

The results of panel 1 show the significance of the dummy variable, measuring the impact of the IT policy for the rate of 0.52%. The coefficient of the dummy variable is positive (0.52).

The estimation results on the performance of the real effective exchange rate (TCER) show that the TCER is about 0.52% higher in the countries pursuing inflation targeting than in another country.

Table 9. Real exchange rate change volatility

Estimation method	Panel 1	Panel 2	Panel 3
	OLS	*OLS*	*OLS*
Constant	5.81	5.77	5.80
	(1.34)**	(1.45)**	(1.89)**
coefficient of dummy (inflation targeting)	3.80	1.14	0.46
	(1.43)**	(1.55)	(2.02)
Variable pre inflation targeting	-1.04	-1.03	-1.03
	(0.10)***	(0.11)***	(0.14)***
R^2	0.92	0.90	0.85
Observations	16	16	16
Number of countries	21	21	21

The impact of inflation targeting on the volatility of the TCER (9) is to increase by 3.80%. The effect long-term remains almost the same as short-term is 3.65%.

5. Conclusion

The inflation targeting is a monetary policy regime, characterized by an explicit announcement of inflation targeting and the explicit recognition that low inflation is the important long term goals. The theoretical foundations of such a scheme are being thorough. Indeed, much of the literature on the subject was published after the implementation of this policy by the first central banks in developed countries (New Zealand, Canada and the United Kingdom) with the emergence of the J.B. Taylor rule in 1993 and mainly with the development brought to this rule by Lars. O. Svensson (1997, 1998, 1999). This latter approach presents the Taylor rule as a particular case of optimal targeting rule for a Central Bank which pursues an objective of stabilization in the inflation targeting. The implementation of such a regime requires that beforehand, some prerequisites must be met. The theory summarized them as follows:

-A high degree of the Central Bank independence;

-An appropriate technical structure;

-Stability of the macroeconomic framework;

-A developed financial market;

-A floating exchange rate regime;

-The existence of a stable and predictable relationship between the monetary policy instruments and the inflation and the strategic choices, in the definition of the target, the choice of the range, the target horizon, the press release.

In other words, the use of seigniorage revenue as a major source of financing public debt, lack of commitment to price stability as a primary objective for monetary authorities, the excessive intervention of the political authorities and the Central Bank in the foreign exchange market, the lack of a substantial operational independence of the Central Bank and powerful models to forecast inflation affect the operation of any monetary policy that aims at transparency and credibility. Disruption of any credible commitment of the Central Bank sets its reputation to anchor public and market expectations and thus to gain their support and their trust.

In order to judge the performance of the inflation targeting policy, the application of the Panel data analysis method according to the model of Ball and Sheridan (2003) shows that all inflation targeting countries had a low and stable inflation rate as the subsequent periods (the inflation targeting efficiency in terms of the price stability), with sustainable and stable economic growth. Similarly, our results show that the monetary policy environment is qualified as stable, predictable and favorable to sustainable economic growth, because it identifies a long term equilibrium to which the shapes of the main variables involved in this environment (the inflation rate, the gross domestic product (GDP) and the interest rate) converge to significant macroeconomic performance.

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Notes

Note 1. Martin.F (2000). Term structure of interest rates, monetary rule and identification of shocks activity. CREREG, University Rennes 1.

Note 2. Level, volatility persistence.

Note 3. On the growth rate, the available data are annual.

Note 4. ***, **, * indicate the significance level at 1, 5, and 10 percent, respectively.

Appendix A. 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).

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