

## **Challenges for Inflation Targeting: International Experiences with two different methods**

**Oifa MANAI DABOUSSI**

E-mail: [manaolfa@yahoo.com](mailto:manaolfa@yahoo.com)

Modeling and Analysis Statistics and Economic (MASE)-ESSAI.  
Higher Institute of Management of Tunis, University of Tunis, Tunisia.

**Amira MAJOUL**

[majoul\\_amira@hotmail.com](mailto:majoul_amira@hotmail.com)

Applied Quantitative Analysis Unit (UAQUAP) - ISG and GATE (UMR 5824- CNRS),  
Higher Institute of Management of Tunis, University of Tunis, Tunisia.

### **Abstract**

The purpose of this paper is to show the effects of inflation targeting on macroeconomic performance in emerging economies. We use two approaches. The first is differences-differences of Ball and Sheridan (2005) and the second is the great moderation approach of Pétursson (2005). Estimates are quarterly and cover the period 1980-2013. The results show that targeting contributes to the reduction of inflation, especially in emerging countries with hyperinflation, and it ensures macroeconomic performance.

**Keywords:** Inflation targeting, emerging economies, economic performance.

**JEL Classification Numbers:** E31, E52, E58.

## 1. Introduction

In recent times, an increasing number of developing countries have adopted inflation targeting as their monetary regime with the objective of disinflation processes that took place in the nineties. Recent empirical studies on the effects of the operation of this monetary regime in several emerging countries have been identified (Barbosa , Filho, (2008); Galindo and Ros, (2008); Loría and Ramírez, (2011). Since the 1990s, the policy of inflation targeting (IT) is adopted as an alternative to the policy of targeting monetary aggregates or the exchange rate fixed. Practice of inflation targeting made his theory. To study the impact of inflation target on macroeconomic performance, economists consider two approaches. The first approach measures the effects of the adoption of inflation targeting on the variability of inflation and economic growth. The second approach focuses on the process of adoption of inflation targeting by Central Banks and the conduct of monetary policy (Joshua Aizenman, Michael Hutchison and Ilan Noy (2008)). New Zealand was the first country adopting inflation targeting in 1990. While economists have explained theoretically targeting inflation only from 1995, Leiderman and Svensson (1995), Svensson (1997), Bernanke and Mishkin (1997) and Bernanke and al (1999). This lack theoretical caused a reticence in some countries to the adoption of inflation targeting. During the 20th century, the global economy has experienced several economic crisis quite significant. At this period, many economies have faced disturbances whose price instability was often the cause. During the two crises of the 70s (the Asian crisis and the South America crisis), the inflation rate was very high, resulting macroeconomic instability in different economies. Bernanke, Laubach, Mishkin and Posen (1999), Mishkin and Schmidt-Hebbel (2007) and Corbo, Landerrache and Schmidt-Hebbel (2002) concluded that the adoption of inflation targeting is an opportunity for countries adopting this monetary regime. Others, like Ball and Sheridan (2003) have shown that inflation targeting does not realize the performance for OECD countries.

Another topic that has attracted an important amount of interest in the economic literature is the relationship between the level of real exchange rates, inflation and economic growth (Bhalla (2008), Eichengreen (2008), Frenkel and Ros (2006), Gala (2008), Levy-Yeyati and Sturzenegger (2007) and Rodrik (2008).

The purpose of this paper is to build an analytical model that explains the links between the monetary regime and the growth rate and thus over the economic growth of emerging countries. To study the impact of inflation targeting on macroeconomic performance, we use two approaches that address two different methodologies well known in the literature. The first is that of Ball and Sheridan (2005) and the second is that of Pétursson (2005).

The paper is organized as follows. The first section presents the theoretical foundations of inflation targeting policy. In the second section we provide the empirical methodology to be adopted in this work and we give empirical results. Finally we conclude.

## 2- Empirical study

In this work, the focus will be on the emerging countries, because empirical studies dealing the case of these economies are rare and the results are sometimes contradictory. To test the effect of inflation targeting on macroeconomic performance, we evaluate its effect on inflation, output growth and their volatilities in emerging economies. For robustness reasons, our empirical study is based on the use of two different methods. The first is an approach that

has been extended by Ball and Sheridan (2005), this is the approach of “differences-in-differences” which consists in avoiding the selection-bias. The second approach is a methodology of Pétursson (2005). By using panel data, Pétursson test the effect of inflation targeting while controlling for the “Great Moderation”. The results will subsequently inform us about the advantage of using both approaches in overcoming the problems that might obscure the data.

## 2.1. The approach of Ball and Sheridan (2005)

### Data and estimates

This is the approach of differences-in-differences developed by Ball and Sheridan (2005). It has been used to evaluate the effect of inflation targeting on some macroeconomic variables (Vega and Winkelried (2005), IMF (2005), Mishkin and Schmidt-Hebbel (2007), Batini and Laxton (2007) and Divino (2009)). This approach examines the effect of a certain treatment. As the case of our estimates, we compare the treatment group after treatment. For the treatment group, before treatment, is a control group that did not undergo treatment. A control group represents what would have happened in the absence of the treatment. For our sample of countries, we run the regression:  $X_{\text{post}} - X_{\text{pre}} = a_0 + a_1D + e_t$  (1)

Where  $X_{\text{post}}$  is a country's value of  $X$  in the post-targeting period,  $X_{\text{pre}}$  is the value in the pre-targeting period, and  $D$  is a dummy variable equal to 1 if the country is a targeter, and 0 otherwise.  $a_0$  is a simple constant and  $e_t$  is an error term. The coefficient  $a_1$  is meant to measure the effect of targeting on the variable  $X$ . For some versions of the variable  $X$ , the initial value,  $X_{\text{pre}}$ , is substantially different on average for inflation targeters and non-targeters. For a simple reason is that the average inflation in the pre-targeting period is higher for targeters. Our data includes 36 emerging economies (19 of which implemented the IT regime<sup>1</sup>). If  $X_{\text{pre}}$  is correlated with the targeting dummy, as happens in practice, then regression (1) produces a biased estimate of the dummy coefficient. There is a simple way to eliminate this bias: add the initial value of  $X$  to the differences regression. That is, we run:

$$X_{\text{post}} - X_{\text{pre}} = a_0 + a_1D + a_2X_{\text{pre}} + e_t \quad (2)$$

Including  $X_{\text{pre}}$  controls for regression to the mean. The coefficient on the dummy now shows whether targeting affects a country's change in performance for a given initial performance. Thus, we avoid out of proportion estimates due to a bigger drop of inflation in absolute terms. Equation (2) can be estimated through the OLS method and will yield consistent results. We employ inflation that is measured as quarterly percentage change in the Consumer Price Index (CPI) and GDP growth rates from the IMF's International Financial Statistics (IFS). We estimate the average volatility of inflation and output growth<sup>2</sup>. For robustness reason, we adopt two different periods (pre-targeting periods and post-targeting periods); it has been defined and represented in table 1 in appendix. The first sample starts in the first quarter of 1980 and ends before a period of the implementation of inflation targeting. The second is a post-targeting sample; this period begins on the date of adoption and ends in the second quarter of 2013.

<sup>1</sup> The inflation targeters in the sample are: Brazil, Chile, Colombia, Czech Republic, Hungary, Indonesia, Israel, Mexico, Peru, Philippines, Poland, South Africa, South Korea, Thailand, Turkey, Guatemala, Romania, Serbia and Ghana. The group of non inflation targeters is composed by: Argentina, Bangladesh, China, Ecuador, Egypt, India, Malaysia, Morocco, Pakistan, Panama, Saudi Arabia, Singapore, Uruguay, Venezuela, Tunisia, Lebanon and Nigeria.

<sup>2</sup> The volatility of inflation or output growth is calculated as the standard deviation from the average.

## 2.2. Effects on output growth

Dummy coefficient is equal to (- 0.26) and (-1.81), it is negative and insignificant, which shows that the adoption of IT is not relevant for the improvement of economic growth during the two periods. Contrary to the estimation of the equation of the volatility of output growth, the coefficient is positive and significant at 10% levels. These results confirm the work Mollik and al (2008). They showed that the IT has a positive effect on economic growth. The main results are reported in table 1.

**Table 1. Estimation of average output growth and output growth volatility**

<b>Dependent variable: Change in adjusted mean output growth between samples</b>				
	<b>Average output growth</b>	<b>Average output growth</b>	<b>Output growth volatility</b>	<b>Output growth volatility</b>
	<b>Period I (a)</b>	<b>Period II (b)</b>	<b>Period I (a)</b>	<b>Period II (b)</b>
<b>Constant</b>	-0.49*** (0.44)	2.72** (0.38)	3.45** (1.76)	2.82** (0.56)
<b>Initial mean</b>	0.69 (0.03)	-0.52 (0.16)	-0.81 (0.15)	-0.59 (0.17)
<b>IT Dummy</b>	-0.26 (0.62)	-1.81 (0.73)	1.23*** (2.49)	0.66*** (0.78)
<b>R<sup>2</sup></b>	0.91	0.53	0.418	0.52
<b>Observations</b>	36	36	36	36

Note: \*,\*\*,\*\*\* respectively denote significance at the 1%,5 % and 10 % levels. Standard errors within parenthesis. (a): Before IT and (b) After IT regime.

## 2.3. The approach of Pétursson (2005)

### Data and estimates

Pétursson (2005) focuses on the great moderation in global inflation since the 1990s. He argues that it is not clear whether this more moderate economic climate is associated with inflation targeting, or rather other economic phenomena. The model is estimated for the period 1980:1-2013:4, using different country samples. For robustness reasons, different country samples are being used. The first country sample includes all the 19 inflation targeting countries<sup>3</sup>. The second sample includes the 11 countries<sup>4</sup> that had adopted inflation targeting prior to 2002. The third sample includes the 6 countries<sup>5</sup> that had adopted inflation targeting prior to 2002 and had inflation on average below 25% in the 1980s. The fourth sample includes the 3 countries<sup>6</sup> that had adopted inflation targeting prior to 2002 and had

<sup>3</sup> Brazil, Chile, Colombia, Czech Republic, Hungary, Indonesia, Israel, Mexico, Peru, Philippines, Poland, South Africa, South Korea, Thailand, Turkey, Guatemala, Romania, Serbia and Ghana.

<sup>4</sup> Brazil, Chile, Colombia, Czech Republic, Hungary, Israel, Mexico, Poland, South Africa, South Korea and Thailand.

<sup>5</sup> Chile, Colombia, Hungary, South Africa, South Korea and Thailand.

<sup>6</sup> South Africa, South Korea and Thailand.

inflation on average below 15% in the 1980s. The final sample includes the 4 countries<sup>7</sup> that had adopted inflation targeting prior to 2002 and had an average inflation above 50% in the 1980s. The main results are reported in table 2.

**2.4. Effects on average growth**

In order to confirm if IT really delivers a performance macroeconomic, we estimate the following equation:  $y_{it} = \alpha_{yi} + \beta_y IT_{it} + \gamma_y y_{it-1} + \mu_y r_{it-1} + \phi_y e_{it-1} + \delta_{y0} y_{it}^w + \delta_{y1} y_{it-1}^w + \xi_{yit}$  (3)  
 $i = 1, \dots, N; t = 1, \dots, T.$

Where  $y_{it}$  output growth in inflation targeting country  $i$  at time  $t$ ,  $r_{it}$  is the real interest rate in inflation targeting country  $i$  at time  $t$ ,  $e_{it}$  is the real exchange rate in inflation targeting country  $i$  at time  $t$  (a rise in  $e_{it}$  denotes an appreciation) and  $y_t^w$  is average output growth in non-targeting emerging countries and  $IT_{it}$  is a dummy variable which equals one from the first quarter after the adoption of inflation targeting and zero otherwise. The results are shown in table 2. We define another model which includes all emerging markets. Just as in previous equation the averages  $y_t^w$  and  $y_{t-1}^w$  are replaced with a time trend  $\delta_y(t)$ .

$$y_{it} = \alpha_{yi} + \beta_y IT_{it} + \gamma_y y_{it-1} + \mu_y r_{it-1} + \phi_y e_{it-1} + \delta_y(t) + \xi_{yit} \quad (4)$$

$i = 1 \dots N + M; t = 1 \dots T.$

For missing data we used the annual base given by the World Bank. The majority of studies have interpreted the targeting of inflation as a strict monetary rule (see Gonçalves and Salles (2006) and Lin and Ye (2009)). Some work argues that the inflation targeting can be harmful for the growth (see Friedman and Kuttner 1996). Pétursson (2005) confirms these arguments showing the average growth performance in targeting countries. The growth has fallen slightly on average after inflation targeting. This is however reversed when the hyperinflation countries are excluded. The positive effects of inflation targeting on output growth is significant in country groups including hyperinflation countries and in countries adopting the inflation target prior 2002 (table 2). In other works there is no evidence suggesting that inflation targeting has harmed growth (see Ball and Sheridan (2005) and Truman (2003)). Pétursson (2005), compare fluctuations in output growth<sup>8</sup> before and after inflation targeting. He seems that growth variability has decreased in general after the adoption of inflation targeting, with largest gain in emerging countries. The significant coefficient states that inflation targeting had a negative effect in countries with an average inflation rate under 15 and 25 percent in the 1980s. However, it has a positive effect in the countries adopting effect prior 2002. The exchange rate and the interest rate generally yield insignificant results, as expected. These findings confirm the studies of Pétursson (2005), who concluded that inflation targeting has led to fall in nominal interest rate. It is however appropriate to keep in mind, as pointed out by Ball and Sheridan (2003), that any effects of this new regime on growth are likely to take some time to emerge. The history of inflation targeting is therefore probably too short to give a definite answer on the link between inflation targeting and economic growth, even in the countries with the longest targeting history.

**Table 2: Estimation of the effects of inflation targeting output growth.**

**Estimation equation (3) and (4)**

**Dependant variable: Output growth**

	All emerging market	Adoption prior to 2002	Adoption prior to 2002	Adoption prior to 2002 and	Adoption prior to 2002
--	---------------------	------------------------	------------------------	----------------------------	------------------------

<sup>7</sup> Brazil, Israel, Mexico, Peru and Poland.

<sup>8</sup> Output growth fluctuation is measured with standard deviation of output growth.

	economies with an inflation targeting regime				and average inflation below 25% in 1980s		average inflation below 15% in 1980s		and average inflation above 25% in 1980s	
	Eq.3	Eq.4	Eq.3	Eq.4	Eq.3	Eq.4	Eq.3	Eq.4	Eq.3	Eq.4
Constant	6.19 (0.51)	7.97 (1.02)	1.78 (1.59)	4.05** (1.96)	2.34* (1.4)	5.09*** (1.75)	3.38** (1.59)	8.93 (2.18)	4.66** (2.06)	9.24* (3.66)
$y_{it-1}$	0.06* (0.02)	0.05** (0.02)	0.24* (0.03)	0.23** (0.04)	-0.24* (0.04)	-0.25 (0.04)	-0.56 (0.045)	-0.57 (0.04)	-0.39 (0.06)	0.37 (0.06)
$\Gamma_{it-1}$	0.019 (0.01)	0.015 (0.01)	0.015 (0.001)	-0.14 (0.02)	-0.05* (0.06)	0.03 (0.01)	0.062** (0.091)	0.01* (0.06)	0.01 (0.01)	0.37 (0.22)
$y_t^w$	0.76** (0.19)	-	0.32** (0.27)	-	0.56 (0.62)	-	0.49* (0.34)	-	0.39* (0.16)	-
$y_{t-1}^w$	-0.05* (0.17)	-	-0.07 (0.14)	-	-0.03 (0.27)	-	-0.09 (0.18)	-	-0.1* (0.35)	-
$e_{it-1}$	0.07 (0.01)	-0.01 (0.01)	0.025 (0.015)	-0.02 (0.05)	0.08 (0.012)	-0.05 (0.01)	0.013 (0.04)	0.36 (1.04)	0.02 (0.017)	0.021 (0.01)
IT Dummy	-3.77* (0.67)	-2.45* (0.94)	-2.58* (0.76)	-1.22** (1.035)	-0.74 (0.78)	-0.06 (0.88)	-1.44 (1.08)	-6.02 (1.05)	-6.09* (1.87)	-3.52* (2.58)
Time trend	-	0.03** (0.05)	-	-0.03*** (0.07)	-	-0.024* (0.02)	-	-0.59 (0.03)	-	-0.06*** (0.04)
$R^2$	0.81	0.78	0.97	0.96	0.42	0.79	0.37	0.35	0.99	0.97
Observations	1233	1425	884	866	730	562	328	408	341	357
Wald test (Chi2)	818	824	1046	1053	39	43	158	178	595	599
P- Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**Source:** Author's estimations- Numbers in parenthesis are standards errors- The Wald test tests the hypothesis that the inflation targeting impact was equal in all the countries- see the P-Value. \*,\*\*,\*\*\* respectively denote significance at the 1%,5 % and 10 % levels.

## Conclusion

The results reported in this paper are generally conforming to what has already been found. However, it not provides an argument against inflation targeting in emerging countries. A significant effect on inflation and its volatility was found. Based to the results, it seems that inflation target have an important role in reducing inflation rates in emerging economies.

The use of two approaches to test the effects of inflation targeting in emerging countries is one of the first attempts in emerging economies. This choice is highly beneficial. Method of Ball and Sheridan (2005) is widely used among authors, because the authors can easily compare the results. In addition, the Pétursson (2005) approach is clear and intuitive; it used the time dimension of the data with use of panel data. These two approaches allow us to use different sample groups. Finally, we conclude that inflation targeting may be desirable for economic reasons and it might improve economic performance in the future. Other political and institutional factors must be taken into account to judge properly the effect of inflation targeting on economic growth in emerging market.

## References

Armand Fouejieu A. and S, Roger. (2013) "Inflation Targeting and Country Risk: an Empirical Investigation" IMF/WP/13/21.

Ball, L. and N. Sheridan (2005). "Does Inflation Targeting Matter?" In *The Inflation Targeting Debate*, edited by B. S. Bernanke and M. Woodford, 249-76. University of Chicago Press for the National Bureau of Economic Research.

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

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

Capistrán, C. and M. Ramos-Francia (2006), "Inflation Dynamics in Latin America", Working Paper/ 2006-11, Banco de Mexico.

Corbo, C., C. Landarretche Moreno and K. Schmidt-Hebbel. (2002). "Does Inflation Targeting Make a Difference?", in N. Loayza and R. Soto (eds), *Inflation Targeting: Design, Performance, Challenges*, Central Bank of Chile: Santiago, 221–69.

De Mello, Luiz and Diego Moccero (2008). "Monetary Policy and Macroeconomic Stability in Latin America: The Cases of Brazil, Chile, Colombia and Mexico." OECD (Paris 2008).

Gonçalves, C. E. S., and J. M. Salles (2008). "Inflation Targeting in Emerging Economies: What Do the Data Say?". *Journal of Development Economics*, 85(1), 312–18.

IMF (2005) . *World Economic Outlook*. Washington, DC.

Levin, A. T., F. M. Natalucci and J. M. Piger. (2004). "The Macroeconomic Effects of Inflation Targeting". *Federal Reserve Bank of St. Louis Review*, 86(4), 51–80.

Lin, S., and H. Ye. (2009). "Does Inflation Targeting Make a Difference in Developing Countries?". *Journal of Development Economics*, 89, 118–123.

Mishkin, F. S., and K. Schmidt-Hebbel. (2007). "Does Inflation Targeting Make a Difference?". in F. S. Mishkin and K. Schmidt-Hebbel (eds), *Monetary Policy under Inflation Targeting*, Santiago, Banco Central de Chile: Santiago, 291–372.

Manai Daboussi, O. (2014). Economic performance and inflation targeting in developing economies. *Journal of World Economic Research*. 3(1), pp1-7.

Pétursson. T. (2005). "Inflation Targeting and Its Effects on Macroeconomic Performance", SUERF – The European Money and Finance Forum Vienna 2005.

Rose, A. K. (2007). "A Stable International Monetary System Emerges: Bretton Woods, Reversed". *Journal of International Money and Finance*, 26(5), 663–81.

Roger, S. (2009). "Inflation Targeting at 20: Achievements and Challenges". IMF Working Paper, WP/09/236.

Svensson, L.E.O (1997). "Inflation Targeting in an Open Economy: Strict or Flexible Inflation Targeting ?". *European Economic Review*, 41, p. 111U'1146.

Svensson L. E.O. (2007) "Inflation Targeting". Princeton University CEPS Working Paper No. 144.

Truman, Edwin M. (2003). "Inflation Targeting in The world Economy (Peterson Institute for International Economics).

Vega, M. and Winkelried, D. (2005). "Inflation Targeting and Inflation Behavior: A Successful Story ?" *EconWPA*, 0502026.

Wu, T. (2004). " Does Inflation Targeting Reduce Inflation?". An Analysis for the OECD Industrial Countries, Banco Central do Brazil, Working Paper No. 83.