VOL. 4, NO. 1, January 2015 ISSN 2307-2466
International Journal of Economics, Finance and Management

http://www.ejournalofbusiness.org

Assessing the Macroeconomic Effects of Inflation Targeting: Evidence from OECD Economies

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ABSTRACT

With the numerous monetary policy reforms undertaken during the 1990s, inflation targeting emerged as one of the possible solutions. The macroeconomic performance of this regime has attracted the attention of recent research, yet no final consensus on its role is reached. The aim ofthis paper is to contribute to this debate through panoply of mixed results proven by the recent literature. Empirically, the purpose of this study is to assess the impact of inflation targeting on inflation and output based on a panel of 30OECD countries over theperiod1980_2012, using the "differences-in-differences" approach of Ball and Sheridan (2005). Our results indicate that inflation targeting helps to improve macroeconomic performance of targeted OECD countries more than non- marketers in terms of average inflation and volatility. Our findings corroborate previous studies like those of Wu (2004), Ball and Sheridan (2005) and Manai,O (2014). However, our results point to an insignificant impact of this regime on output consistent with Gonçalves- Salles (2008) and Ftiti & Essadi (2013).However, our results contrast those of S-Hebbel (2007) and Ftiti J. Goux (2011) which assume that there is no difference between targeted and non-targeted OECD countries.

Keywords: *Inflation targeting, Performance, Macroeconomic Dimensions, Monetary Policy, Panel Analysis.*

1. INTRODUCTION

The task of implementing price stability mechanisms by central banks began during the eighties as a framework of monetary policy reform. Indeed, the concern with price stability remains the primary objective of any central bank via a direct anchorage of a healthy and robust target, namely inflation, to reduce inflationary pressures. Therefore, inflation targeting, emerged in the early 1990s in New Zealand to spread later to both developed and emerging economies.

The global spread of monetary policy initiatives gave birth to the debate on the macroeconomic performance of this new strategy, which has even attracted attention of recent research, yet no final consensus on the role of inflation targeting has been reached so far.

An overview of the literature points to mixed results, which assume in the first place that inflation targeting contributes to an improved macroeconomic performance of inflation targeting-adopting countries than non-adopters. The effect is observable in terms of stability of average inflation, its volatility (Wu (2004)), and its anticipation (Lin Ye (2010)). However, other studies like that of Ftiti & Essaadi (2013) assumed that this new monetary policy does not stabilize inflation behavior.

Moreover, the macroeconomic effects of inflation targeting were evaluated in terms of output behavior. Some studies show that this new monetary policy does not affect either average level or volatility of output (Ball and Sheridan (2005)). This result seems to contradict that of Conçalvescarvalho (2009) which assumed that stability of the average level and volatility of output is observed for inflation targeted countries than non-marketers.

Bearing on these mixed results that are proven by recent research, this paper aims at assessing the macroeconomic effects of inflation targeting on a panel of OECD countries. Specifically, we study the relationship between inflation targeting, inflation and output, factors that are known to reflect the macroeconomic performance of these countries.

In other words, this study allows us to see whether inflation targeting is different between targeted and non-targeted OECD countries in terms of improved macroeconomic performance. To this end, we opt for a comparative empirical analysis, using a panel data approach based on the model of Ball and Sheridan (2005). This paper is structured as follows: the second section presents an overview of the literature. The third section presents the econometric methodology and the main results. Finally, a fourth section discusses the main findings.

2. THE RELEVANT LITERATURE

The spread of inflation targeting in developed countries during the nineties has touched as well many emerging countries. These latter engaged effectively in the practice of price stability or in the debate on its macroeconomic performance on which the recent literature focused in order to understand its impact on macroeconomic dimensions without nevertheless reaching consistent results.

According to the literature review, several studies confirm that such a system improves macroeconomic performance of countries that have adopted the new framework compared to those that have not. However, this assumption does not apply to other studies whose results showed that inflation targeting does not improve specific macroeconomic indicators, mainly inflation and output.

Inflation targeting as measured by changes in inflation levels remains the focus of many economists like Ball & Sheridan (2005), Lin & Ye (2007) & Angeriz Arestis (2008). These authors found that inflation targeting has an insignificant impact on average inflation and its volatility in OECD countries, unlike Batini & Laxton (2007) who studied a sample of emerging countries and found a significant effect of inflation targeting on average inflation as well as on its variability.

Wu (2004) studied a sample of 22 OECD countries divided into two groups of adopters and non-adopters of an inflation-targeting regime during the 1985-2002 periods using the "difference in difference estimation method". The results of this empirical methodology confirm that only countries integrating this new monetary policy came to significantly reduce their average inflation rate.

Likewise, Gonçalves & Salles (2008) examined a sample consisting of 36 emerging countries of which only 13 countries have adopted inflation targeting while the remaining 23 countries have adopted alternative monetary regimes, during the period 1980- 2005. The results show that emerging countries with inflation targeting regimes registered reduced average inflation than those with no inflation targeting regimes.

The findings of the study of Ftiti & Essadi (2013) were inconsistent with those of earlier studies on industrialized countries. Specifically, these authors studied the performance of the inflation-targeting regimes in New Zealand and Canada during 1990s and found that these regimes could not control nor stabilize inflation in these countries.

Almeida &Goodhart (1998) and Bernanke et al. (1999) found that inflation forecast errors were reduced gradually over time for the countries that have adopted an inflation-targeting regime. Lin Ye (2010) using a VAR model shows that inflation forecast errors have decreased with the progressive adoption of inflation targeting. They also showed that persistence of inflation has declined sharply for marketers countries during the 1990s.

Moreover, Friedman &Kuttner (1996), Friedman (2002) and Ehrmann&Ceccheti (2002), Shmidt Hebbel (2007) Ftiti (2010) studied average output growth and its volatility for OECD countries as well as for emerging countries. The authors conducted a comparative analysis of a panel of OECD inflation marketers and non-marketers from the year 1998. The same comparative analysis is conducted on a panel of emerging inflation targeted and non-targeted countries from 2001. The results indicate that inflation targeting does not negatively affect output growth and its volatility. In other words, inflation targeting is not affected by a high level of output under lower inflation.

Furthermore, Ball & Sheridan (2005) studying a sample of 20 OECD countries, found that inflation targeting has no effect on average output growth as well as its variability, suggesting that this regime does not in any way explain any changes in output in the real economy. Goncalves&Carvalho (2009), examining a sample of 30 OECD countries, found that countries adopting an inflation targeting regime suffer an output loss much higher than that registered by non-targeted countries. In other words, targeted OECD countries earn 7% of output loss compared to countries adopting other monetary regimes which lose more production as inflation decreases.

Batini&Laxton (2007) and Goncalves&Salles (2008), who studied a sample of emerging countries, found that inflation targeting reduces output volatility in emerging economies in favor of lower inflation, while a negligible impact on the average output growth in this group of countries is observed. Line & Ye (2010) found that output volatility is reduced for both emerging and industrialized countries. Vega &Winkelried (2005), Batini&Laxton (2006), Goncalves&Salles (2008) Armando FA Roger (2013) assume that inflation marketers countries still have average low volatility of inflation in addition to a high output growth than non-targeted countries, allowing therefore for economic stability.

Carlos Eduardo Gonçalves S, Joao M rooms. (2008) and Lin Ye (2010) studied interest rates behavior explained by inflation targeting in a sample of 36 emerging economies over the period 1980 -2005. The Panel data analysis concluded that inflation targeting stabilized average short-term interest rates for targeted than non-targeted countries, which corroborates the results of Ball and Sheridan (2005). The results point also to a reduced level of volatility for both groups of countries, but it remains lower for targeted countries than those adopting alternative monetary regimes.

3. ECONOMETRICS AND MAJOR FINDINGS

3.1 Data and Model

Our study aims at evaluating the macroeconomic performance of inflation targeting in terms of inflation behavior, output as well as their volatilities. Indeed, our study examines a sample of 30 OECD industrialized countries during the period 1980-2012, using an annually frequency data extracted from the World Bank's CD statistics (World Development Indicators).

The 30 OECD countries in our sample are 15 adopting inflation targeting, labeled inflation marketers, or the treatment group (Australia, Canada, Chile, Korea Republic, Finland, Israel, Norway, New Zealand, Slovak Republic, Czech Republic, Poland, United Kingdom's,

VOL. 4, NO. 1, January 2015 ISSN 2307-2466
International Journal of Economics, Finance and Management

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Sweden, Switzerland), and 15 countries that have adopted alternative monetary regimes, labeled inflation non-marketers, or the control group (Austria, Belgium, Denmark, Estonia, USA, France, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, Portugal, Slovenia).

The study of the impact of inflation targeting regime on macroeconomic performance measured by the behavior of inflation and output growth uses the dual "the differences in differences" approach of Ball and Sheridan (2005).

$$X_{post} - X_{pré} = \alpha_0 + \alpha_1 D + \alpha_2 X_{ipré} + \varepsilon$$

where
X_{post}: value of X during the post-targeting phase.
$\Delta X = X_{post} - X_{pre}$
X_{pre}: value of X during the pre-targeting phase..

α_0: a Constant
=1 if the country adopts inflation targeting.
D : Dummy Variable
=0 otherwise.

α_1: The coefficient of the dummy variable to measure the real impact of inflation targeting on the variable X.

Xpre: The initial value of each variable.

α_2: Coefficient of the initial value that indicates the impact of the latter on macroeconomic indicators.

ε: Error term

Xi: Takes the values of the following variables

Average inflation (measured by the Index Consumption Price)

Inflation volatility (measured by standard deviation)
Average output growth (measured by GDP growth rate)

Output growth volatility (measured by standard deviation)

Our study examines two sampling periods in order to assess robustness and to compare the actual effect of inflation targeting on macroeconomic variables between the period prior to targeting and the one that follows it. To compare the two groups of targeted and non-targeted countries, it is necessary to assess macroeconomic improvement generated by the monetary system. Then, we develop a first period called the pre-targeting period that begins in 1980 and finishes before the post-targeting date, respecting the date of adoption of inflation targeting by each country. The post-targeting period begins at the date of adoption of inflation targeting by each country until the end of 2012.

In fact, dividing in such a way our sampling periods is not adequate for non-targeted countries where Ball and Sheridan (2005) propose that the end date of the period of pre-targeting is the average inflation targeting adoption date. Then, the adoption date for non-targeted countries is the average date of the adoption dates of targeting countries which corresponds to the year 1995, as shown in Table 3.1.

Table 3.1 : Adoption date and sampling periods

Country	Adoption date	Pre-targeting period	Post-targeting period
Targeters countries			
Australia	1994	1980-1993	1994-2012
Canada	1991	1980-1990	1991-2012
Chile	1999	1980-1998	1999-2012
Republic of Korea	1998	1980-1997	1998-2012
Spain	1995	1980-1994	1995-2012
Finland	1993	1980-1992	1993-2012
Israel	1997	1980-1996	1997-2012
Norway	1993	1980-1992	1993-2012
New Zealand	1990	1980-1989	1990-2012
Slovakia	2005	1980-2004	2005-2012
Tchec Republic	1997	1980-1996	1997-2012
Poland	1998	1980-1997	1998-2012
United Kingdom	1992	1980-1991	1992-2012
Sweden	1994	1980-1993	1994-2012
Switzerland	1993	1980-1992	1993-2012

VOL. 4, NO. 1, January 2015 ISSN 2307-2466
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3.2 The Main Results

3.2.1 Effect on Inflation Behavior

In what follows, we will study the real impact of inflation targeting on average inflation rate for each group of targeted and non-targeted countries. The results in Table 3.2 indicate that the dummy variable for targeted country is negative and statistically significant where P-value = 0.000, less than 10% indicating that inflation targeting adversely affects inflation by 4.575%, less than non-marketers, whose inflation rate fell by only 3.92%.

The coefficient of the initial inflation value (Xpre) which represents the impact of this latter on average inflation is positively and statistically significant at the 5% level. Specifically, when the initial inflation value of targetercountries increases by 1%, this positively affects average inflation rate by 14.3%. However this value is less important for non-marketers, whose initial inflation value increases inflation level by 35%.

Adoption of inflation targeting affects negatively and statistically on explaining average inflation behavior of OECD targeted countries, suggesting that they are better able to improve their macroeconomic performance in terms of inflation than most countries that have adopted alternative inflation plans. Regression of our model can tell us about the real impact of inflation targeting on inflation volatility, as indicated by the dummy variable.

Table 3.2: Estimation of annual average inflation
Dependent Variable: Inflation

	Targeter countries	Non-targeted countries
Constant	4.694*(4.83)	1.564*** (1.88)
Dummy Variable	-4.575*(-15.63)	-3.924*(-11.09)
Initial value (X_{pr})	0.143** (2.06)	0.350*(6.09)
R^2	0.456	0.399

Notes: *, **, *** denote respectively significance at the 1%, 5%, 10% levels.

In Table 3.3 the dummy variable is negative and statistically significant at the 1% level and the P value = 0.00 <10%. This implies that inflation targeting for targeted countries can reduce inflation volatility by 0.487% more than that of non-marketers whose inflation rate declined by only 0.318% following the adoption of alternative monetary regimes.

The coefficient of the initial value (0.101) for targeted countries is positively and statistically significant at the 5% level with a P-value = 0.031 <10%. This result indicates that any increase in the initial inflation volatility by 1% for marketers countries leads to an increase in average inflation volatility by 0.101%. However, the effect of the initial value for non-marketers is positive and statistically non-significant with a P-value = 0.262> 10 %, indicating that the initial value does not explain average inflation volatility of for this group of countries.

Adoption of inflation targeting negatively and statistically explains inflation volatility for OECD targeted countries, reflecting a reduction and a stability of inflation volatility for these countries, which remain more performing than those adopting alternative inflation regimes.

Table 3.3: Estimation of inflation rate volatility
Dependent Variable: Inflation volatility

	Targeter countries	Non-targeted countries
Constant	1.124*(8.75)	0.852*(5.72)
Dummy Variable	-0.487*(-3.67)	-0.318*(-3.70)
Initial value (Xpre)	0.101** (2.17)	0.109***(1.12)
R^2	0.064	0.043

Notes: *, **, *** denote respectively significance at the 1%, 5%, 10% levels.

3.2.2 Effect on Output

The real effect of inflation targeting on output growth is assessed by the regression of the econometric model to estimate the dummy variable that reflects the true effect of the adopted regime on average output and its volatility.

Table 3.4 below shows the overall results on the real effect of inflation targeting on average output. For marketers countries, the coefficient of the dummy variable = -0223 is negative and statistically significant (p value = 0.412> 10%), which shows that inflation targeting does not explain the increase in average output growth.

The coefficient of the initial value Xpre = 0.408 is positive and statistically significant (P value = 0.00 <10%) at the 1% level. This finding helps explain the increase in average output of targeted countries despite the non-significance of the dummy variable. In other words, increasing the level of initial output positively effects level of average output growth by increasing it by 0.408, more than that of non-marketers whose initial value does increase average output by only 0.053. The regression results indicate that the increase in average output growth can be explained only by other different exogenous variables other than inflation targeting.

VOL. 4, NO. 1, January 2015 ISSN 2307-2466
International Journal of Economics, Finance and Management

http://www.ejournalofbusiness.org

Table 3.4: Estimation of average GDP growth
Dependent Variable: average output

	Targeter countries	Non-targeted countries
Constant	2.155^{*}(7.26)	2.444^{*}(9.28)
Dummy Variable	-0.223^{***} (-0.82)	-0.818^{*}(-3.53)
Initial Value ($X_{pré}$)	0.408(5.61)*	0.053^{***} (0.37)
R^2	0.113	0.03

Notes: *, **, *** denote respectively significance at the 1%, 5%, 10% levels.

In what follows, we examine the real effect of inflation targeting on output volatility. According to the results shown in Table 3.5 below, the coefficient of the dummy variable for targeted countries is negative (-0250) and not statistically significant (P value = 0.132> 10%). This indicates that introducing inflation targeting does not explain output growth volatility in these targeted countries, because of the insignificant impact of the exogenous variable on the endogenous variable (output volatility).

Coefficient of the initial value (Xpre) is statistically significant (P value = 0.000 <10%) at the 1% level. This means that any increase in the initial value of output volatility for targeted countries positively effects average output volatility, increasing it by 0.222, in contrast to non-marketers whose initial value of output volatility does not affect this latter, because of the non-significance of its coefficient (P value = 0.277 <10%).

From these results, we may conclude that introducing inflation targeting generates an insignificant impact on the performance of OECD targeted countries, in terms of the stability of average output volatility, which remains determined by other exogenous variables other than inflation targeting.

Table 3.5: Estimation of output growth volatility
Dependent Variable: average output growth

	Targeter countries	Non-targeted countries
Constant	1.151^{*}(6.48)	1.208^{***} (5.79)
Dummy Variable	-0.250^{***} (-1.51)	0.125^{***} (1.09)
Initial value	0.222^{*}(3.64)	-0.022^{*}(-0.18)
R^2	0.044	0.003

Notes: *, **, *** denote respectively significance at the 1%, 5%, 10% levels.

4. CONCLUSION

The discussion of the macroeconomic performance of inflation targeting remains controversial as our results confirm previous studies and refute others. Specifically, our results indicate that inflation targeting actually improves macroeconomic performance of OECD targeted countries in stabilizing average inflation and its volatility, as inflation targeting is found to have a negative and statistically significant impact on inflation, as reflected by the significance of the dummy variable.

This trend is different for output behavior of targeted countries, where inflation targeting has no impact on either average output growth or its volatility, given the non-significance of the exogenous variable (Dummy), suggesting that output behavior of targeted countries is explained by external determinants other than inflation targeting.

In our study, we conclude that inflation targeting for OECD targeted countries improve their macroeconomic performance only in stabilizing average inflation and its volatility than for non-targeted countries, which score low performance. Accordingly, an improvement in output remains unaffected by this regime, which is consistent with Wu (2004), Ball and Sheridan (2005), Lin Ye (2010), Ftiti Z (2013), and Manai, O (2014) who assume that there is a difference between performance of targeted and non-targeted countries, ultimately favoring targeted countries. However, our study seems to contradict those of Neumann Von Hagen (2002), Truman (2003), MishkinShmidt Hebbel (2007), Brito&Bystedt (2010) who found no difference between performance of targeted and non-targeted OECD countries.

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