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Inflation Targeting Monetary Policy and Macroeconomic Performance: The Case of Middle Income Countries

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Abstract

The number of studies investigating the effects of inflation targeting (IT) on inflation and macroeconomic variables has increased with the rising number of countries adopting IT. The empirical evidence has, however, failed to converge. In line with the need for more such studies, this paper uses a difference-in-differences (DID) model with dynamic panel fixed effect and instrumental variable (IV) techniques to estimate the effect of IT on inflation and economic growth for a sample of 40 middle-income countries. Generally, we find that the effects of IT on inflation is quantitatively large but statistically insignificant. We, however, find strong evidence that IT leads to higher growth in middle-income countries.

Keywords: inflation targeting, inflation, economic growth, difference-in-difference

JEL Classification: E50, E52

1. Introduction

Does inflation targeting monetary policy address inflation variability/uncertainty, avert the ill-effects of macroeconomic shocks and ultimately improve the macroeconomic environment? Economists have long sought the ideal framework for monetary policy (Ball and Sheridan, 2004). The 1990s inflation targeting policy invention promised an answer to this quest. Inflation targeting as a monetary policy explicitly solidifies the idea that low and stable inflation is the ultimate goal of monetary policy (Bernanke and Mishkin, 1997). Proponents of the inflation targeting monetary policy, thus, make a case for its advantages in dealing with the dynamic consistency problem that produces high inflation (Ball and Sheridan, 2004). The expectation of low inflation, the argument goes, reduces the inflationary impacts on macroeconomic shocks, and if flexible, stabilizes output as well (Ball and Sheridan, 2004). Whiles these arguments animate the potency of inflation targeting as an effective monetary policy, the evidence in the empirical literature has failed to converge. The literature is fractured between supporters (Ball and Sheridan, 2004; Levin et al., 2004; Þórsson, 2004; Angeriz and Arestis, 2006; Willard , 2012) and contenders (Neumann and von Hagen, 2002; Wu , 2004; Batini and Laxton, 2007; de Mendonca, 2007; Mishkin and Schmidt-Hebbel, 2007;Siklos, 2008; Goncalves and Salles, 2008;Goncalves and Carvalho, 2009; Mollick, et al., 2011; Abo-Zaid and Tuzemen, 2012; Rose, 2014) of the inflation targeting monetary policy.

The diverging findings in the literature on the effects of IT on inflation performance and other macroeconomic variables at one hand and the increasing number of countries adopting the policy gives impetus to the need for more studies as more data and instruments for assessments become available. Importantly, there is the need to do a more disaggregated study of the data along the lines of economic characteristics and well-defined country classifications to ascertain how IT affects categories of countries differently. This provides the motivation for the current study of middle-income countries.

The purpose of our study is two-fold. First, we set out to deal with the issue of endogeneity of inflation targeting which has been acknowledged in the empirical literature as relevant in dissociating the effects of IT policy and yet received little attention in statistical treatments. Mishkin and Schmidt-Hebbel (2001), Gertler, (2005); Ball and Sheridan (2004), for instance, have raised the issue that the decision to be an inflation targeter is endogenous. Willard (2012) used three instruments to deal with this endogeneity question, including central bank independence index (CBII) constructed by Cukierman et al., (1992), covering 1980 to 1989. We note that the CBII used by Willard (2012) is less current. We use a

current CBII constructed by Garriga (2016) to address the endogeneity question in our sample.

The second objective, closely related to the first is with the issue of sample selection. An argument rife in the literature is that pre-targeting levels of inflation influence the outcome of the post-targets levels of inflation. We glean that data employed in the literature mostly contain either a mixture of developed (most OECD countries) and developing countries or only developed countries. The problem of such sample selection with a mixture of developed and developing countries may have results that may be driven by one category of countries due to the differences in their pre-targeting inflation levels and largely dissimilar economic characteristics. In studies where data employed are from only developed countries, the issues of already relatively low level of pre-targeting inflation may lead to a weak or insignificant effect of IT policy as has been observed by Mishkin and Schmidt-Hebbel (2006). They used several statistical techniques for developed and developing countries and found that IT is insignificant or marginally significant for developed countries while the story holds differently for developing countries. Lumping developed and developing countries data together in a study can thus be problematic. Positively, Ayres et al., (2014) have found significant regional variation in IT's impacts in developing countries in their statistical treatment. This suggests that sampling countries for the assessment of IT policy impacts on the basis of just targeters and non-targeters without paying attention to other variables such as economic classifications can be inherently problematic. We acknowledge that classification of countries, in themselves is inherently an arbitrary exercise, no matter how objective the criteria for classification. This makes broader classifications such as developing countries even more nagging. Indeed, developing countries by their nature are unique and a diverse group which has shown in the drastic variations in the statistical findings on the effectiveness of IT in these countries (Ayres et al., 2014). Moving closer to more discrete groupings within such broader categorizations is thus useful. This informs our sampling of a set of countries belonging to the middle-income category in the World Bank's classification. We reason that countries within this bracket have similar economic characteristics and thus face similar inflation uncertainty. This provides a basis to make a distinguishable statistical differentiation between the effects of IT on targeters and non-targeters. Our sampling technique thus affords us the latitude to select similar countries for comparison. This does not, however, immune our sample from the possibility of variable effects of IT for say lower middle income and upper-middle-income countries within. Perceptively, there is evidence that experience for inflation targeters is heterogeneous (Willard, 2012). Brito and Bystedt (2006), for instance, have found that there are even regional specific effects to inflation targeting. The characteristics of our data do not, however, allow for such statistical investigation. It is worth exploring this in future studies as more data become available to provide enough controls/reference groups. Such future exercise could have determining implications for policy choices and outcomes in countries in different levels of development and incomes. Another strength of our study is that our sample size is larger and more current than previous studies such as Jendoubi (2016) that have investigated our variables of interest.

Previewing our results, we find that inflation targeting does not affect inflation reduction positively as we find no evidence of reduced inflation after adopting IT policy. Our estimation, however, shows that IT policy affects growth positively. Specifically, IT policy leads to annual growth of about 0.56%.

The remainder of the paper is organized as follows. The next section reviews the relevant literature. Section three details our data and methodology. Section four explains our estimation technique, section five discusses our results. The final section concludes.

2. Literature Review

The literature on inflation targeting monetary policy has produced two contending evidence representing each side of the possible divide. The first part of the divide that sees no causative and/or positive relationship between inflation targeting and inflation performance is representative in the provoking paper by Ball and Sheridan (2004). The authors employed cross-sectional least squares analysis to a sample of 20 OECD countries and concluded that inflation targeting, though not harmful to an economy do not independently distill any positive effects for inflation stability and macroeconomic performance. Their statistical treatment observes that once controls for previous inflation performance are introduced, the statistical significance of IT on inflation performance go away, or at best become weak. This, they argue, is attributable to regression to mean. Ball and Sheridan further find no evidence of IT on macroeconomic variables such as output growth and interest rates. Several other studies on this side of the statistical divide have reached similar conclusions. For example, in a replicative study that sought to test the robustness of Ball and Sheridan, (2004), Willard (2012) employs several statistical identification techniques to a sample of OECD countries and reaches similar conclusions. Willard makes a further observation that there is little evidence to show that variables such as inflation variability, inflation uncertainty, inflation volatility or inflation expectation which are of interest to policymakers fall with targeting. In their application of structural time-series models to a sample of ten inflation targeters, Angeriz and Arestis, (2006) conclude that inflation-targeting central banks have not been successful in their pursuit. Ayres et al., (2014) employed an estimation technique by Brito and Bystedt (2010) to a group of 51 developing countries from 5

regions and conclude that overall, inflation targeting is beneficial for reducing inflation while its effect on stimulating economic growth is negative. It is worth pointing out that the result varied according to regions. There are several other notable studies (Levin et al., 2004; Pétursson, 2009; Angeriz and Arestis, 2006) on this side of the statistical divide that does not see IT policy to affect inflation rate positively.

On the other side of the statistical divide, Wu (2004) applied multi-period difference-in-difference estimation to the quarterly CPI inflation rates from the first quarter of 1985 until the third quarter of 2002 to 22 industrial OECD countries producing two sets of empirical results. The first set of findings demonstrate a reduction in average rates of inflation among targeters post-targeting, which is not attributable to a reversion of the mean process. Goncalves and Carvalho, (2009) conclude that OECD countries using inflation targeting monetary regimes suffer less output loses during deflationary periods, thus lending credence to IT policy. An extension of the study for 36 emerging market economies by Goncalves and Salles (2008) conclude that *"Compared to non-targeters, developing countries adopting the IT regime not only experienced greater drops in inflation, but also in growth volatility"*. deMendonca, (2007) concludes after investigating 14 IT countries that IT is *"a good framework for reducing inflation and thus contributes to diminished interest rate without apparent costs on economic growth, although unemployment increases*". Levin et al., (2004) produced evidence to demonstrate that IT is useful in anchoring inflation expectations and reducing inflation persistence among a group of inflation targeters. Neumann and von Hagen (2002) adduced evidence from using various statistical techniques to lead them to conclude that IT is useful in reducing the level and volatility of inflation. They, however, observed that IT central banks in their data did not outperform the central banks used as a reference group. In a case-specific study of monetary policy, they compared inflation and interest rates development after the 1978 and 1998 oil price shock and found, in the same paper, that IT central banks gained more credibility than the central banks in the reference group, suggesting that IT is an important strategy for communicating a monetary policy strategy aimed at achieving low inflation rates. Batini and Laxton, (2007) employ difference-in-difference estimation for the treatment of emerging market economies and conclude that inflation targeting is beneficial to inflation performance and inflation expectations in these economies. Brito and Bystedt (2006) explored the effects of IT as monetary policy in Latin American with a difference-in-difference estimation. They found that IT has been efficient in decreasing the level and volatility of inflation, as well as in the sensitivity of expected inflation to actual inflation. The study further demonstrates that output growth was not reduced nor did interest rate volatility ensued, rather, the overall market risk was diminished. Similar conclusions in other studies (Mishkin and Schmidt-Hebbel, 2007; Siklos, 2008; Mollick, et al., 2011; Abo-Zaid and Tuzemen, 2012) confirm this facet of the literature.

3. Data and Methodology

3.1 Data and Sample

To investigate the effect of inflation targeting on inflation and growth, we employ annual panel data spanning 1980 to 2016 on 40 middle income countries. The choice of the period and countries is largely due to data availability. Out of the 40 countries, 13 are adopting inflation targeting monetary policy while the remaining 27countries are not. These are as follows: Note that the years in the parenthesis are the years in which the country starts adopting inflation targeting.

a. 13 countries adopting inflation targeting (treatment group): Albania (2009), Brazil (1999), Ghana (2007), Guatemala (2005), Indonesia (2005), Mexico (2001), Peru (2002), Philippines (2002), Romania (2005), Serbia (2006), South Africa (2000), Thailand (2000), and Turkey (2006).

b. 27 non-adopting countries (control group): Belarus, Belize, Bolivia, Botswana, Bulgaria, China, Costa Rica, Dominica, Equatorial Guinea, Grenada, Honduras, Ivory Coast, Jamaica, Kenya, Malaysia, Nicaragua, Panama, Paraguay, Saint Lucia, Samoa, Solomon Islands, Saint Vincent and the Grenadines, Sudan, Suriname, Tajikistan, Ukraine, and Venezuela.

Data on inflation and real GDP (economic growth) were sourced from the World Bank's World Development Indicators (WDI) database. We use central bank independence index (CBII) constructed by Garriga (2016), spanning 1980 to 2012 as an instrument in our IV estimations.

3.2 Model Specification

The economic model for inflation and economic growth can be specified, respectively as:

$$\Pi_{it} = f(\Pi_{it-1}, IT_{it}) \quad (1)$$

$$Y_{it} = f(Y_{it-1}, IT_{it}) \quad (2)$$

Note that in both equations 1 and 2, IT is a dummy variable which takes 1 for periods (t for time) where country i implements inflation targeting monetary policy and 0 otherwise. Also, Π and Y represent inflation and real GDP per capita, respectively. We created before and after IT policy adoption period for countries in the control group by setting

the after period at 2004 which corresponds to the average period of adopting IT policy by the countries in our treatment group. By applying the difference-in-difference (DID) technique, let $\bar{Y}_{B,1}$ and $\bar{\Pi}_{B,1}$ be the sample averages of real GDP per capita and inflation for countries where inflation targeting is practiced before the IT policy adoption. Also, let $\bar{Y}_{A,1}$ and $\bar{\Pi}_{A,1}$ be the sample averages of real GDP per capita and inflation for the same countries after the IT policy. In a similar fashion, the sample averages of real GDP per capita and inflation (before and after IT policy adoption) for countries where inflation targeting is not practiced can be obtained to be: $\bar{Y}_{B,0}$, $\bar{\Pi}_{B,0}$, $\bar{Y}_{A,0}$, $\bar{\Pi}_{A,0}$. Finally, let δ be the advantage/disadvantage (magnitude of the effect) of adopting inflation targeting over not adopting inflation targeting monetary policy. Then, by assuming a non-violation of the parallel trend assumption, δ can be obtained from the above for output growth and inflation respectively written as:

$$\delta_y = (\bar{Y}_{A,1} - \bar{Y}_{B,1}) - (\bar{Y}_{A,0} - \bar{Y}_{B,0}) \tag{3}$$

$$\delta_\pi = (\bar{\Pi}_{A,1} - \bar{\Pi}_{B,1}) - (\bar{\Pi}_{A,0} - \bar{\Pi}_{B,0}) \tag{4}$$

3.3 Estimation Technique

A simple econometric model for analyzing the impacts of IT policy on inflation and economic growth through the lenses of difference-in-differences model with dynamic panel fixed effect and instrumental variable (IV) techniques can be estimated. Thus, to analyze how inflation targeting affects inflation and economic growth, the following two equations are estimated.

$$\Pi_{it} = \beta_0 + \beta_1 \Pi_{it-1} + \beta_2 IT_{it} + \lambda_i + \kappa_t + \varepsilon_{it} \tag{5}$$

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 IT_{it} + \lambda_i + \kappa_t + \upsilon_{it} \tag{6}$$

In both equations 5 and 6, IT is our main variable of interest, β_2 and α_2 are DID estimates which capture the policy effects of inflation targeting by assuming that the parallel trend assumption is not violated. In order to understand how inflation targeting affects inflation, we define inflation by two measures: changes in consumer price index (CPI) and GDP deflator. Economic growth is measured by real GDP per capita (we take the natural logarithm of real GDP per capita). We allow both inflation and growth to depend on their own past (Π_{it-1} and Y_{it-1}) and their coefficients (β_1 and α_1) measure the long run effect of inflation targeting on inflation and output growth, respectively. Again, λ_i and κ_t represent country and time fixed effects, respectively with ε_{it} and υ_{it} being the error terms. In our IV estimations, we instrument the endogenous variable (IT) by the central bank independence following Willard (2012).

4. Results and Discussion

To elicit the actual impact of inflation targeting on inflation and economic growth, we estimate dynamic panel fixed effect (FE), IV, and IV-FE models with several specifications. The results are discussed as follows.

4.1 Dynamic Panel Fixed Effect Results

We report the results obtained from the dynamic panel fixed effect model in Table 1. Specifications 1 and 2 display the results from the growth equation while specifications 3 to 6 show the results from the inflation equation. Specifications 3 and 4 are for the case where inflation is measured using the GDP deflator while specifications 5 and 6 are for the case where CPI is used as a measure of inflation. It can be seen that, although the effect of inflation targeting on inflation is quantitatively large and the coefficients are negatively signed in all the specifications with and without country and time fixed effects, they are statistically insignificant. Inflation lagged one period which measures the long run impact of inflation targeting on inflation is seen to be statistically significant at 1% level of significance and the coefficient is positively signed irrespective of the measure of inflation and specification used. It can be observed that its quantitative importance is almost the same for both measures of inflation and under all specifications. Particularly, the long run

effect of inflation targeting leads to an annual deflation of about 0.3%.

Turning on to the effect of inflation targeting on economic growth, we find that the coefficient on inflation targeting is positive and statistically significant at 1% and 10% levels of significance for specifications 1 and 2, respectively. The results suggest that adopting inflation targeting helps to increase growth by about 0.1% under this scenario. Also, the coefficient on the lagged growth which captures or measures the long run impact of inflation targeting on growth is positive and statistically significant at 1% level of significance under both specifications. This means that the long run impact of inflation targeting helps to increase growth by about 0.8%, also under this scenario.

Table 1. Estimation results: Panel Fixed Effect (FE)

	Growth		Inflation			
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	real GDP	real GDP	Deflator	Deflator	CPI	CPI
Inflation Targeting	0.161***	0.0591*	-132.8	-103.3	-118.0	-89.22
	[0.0368]	[0.0334]	[84.88]	[87.63]	[73.42]	[76.19]
Growth lagged	0.781***	0.770***				
	[0.0786]	[0.103]				
Inflation lagged			0.304***	0.301***		
			[0.0890]	[0.0844]		
Inflation lagged					0.368***	0.366***
					[0.126]	[0.122]
Constant	1.770***	1.325	55.77***	18.20	51.39***	18.61
	[0.638]	[0.925]	[11.10]	[19.46]	[11.69]	[18.98]
Observations	1,472	1,472	1,466	1,466	1,424	1,424
R-squared	0.780	0.851	0.100	0.126	0.143	0.174
Countries	40	40	40	40	40	40
Year FE	NO	YES	NO	YES	NO	YES
Country FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parenthesis, ***, **, * 1, 5, and 10 percent significance levels, respectively.

4.2 IV and IV-FE Estimation Results

By considering that our policy variable of interest is endogenous, the next step after the dynamic panel fixed effect estimation is to estimate an IV model. As stated before, we instrument IT with central bank independence index (CBII) constructed by Garriga (2016). The exogeneity condition for the instrument is assumed as in Willard (2012). However, first, we test for the correlation between our instrument (CBII) and the endogenous variable (IT) which is one of the conditions for a valid instrument. The first stage results from a linear probability model (LMP) are shown in Table 2 with different specifications. The correlation between the instrument and the endogenous variable is positive and statistically significant at 1% level of significance under all the specifications. Second, we test whether or not the instrument is weak. From the results, the F-statistics value obtained for all specifications is above the rule of thumb for an F-statistic value of 10 suggested in the standard literature for a weak instrument. Moreover, all the associated probability values are well below 1% suggesting that the instrument is at least not weak. This, therefore, allows us to estimate the second stage equation.

The results obtained from the second state estimation are reported in Table 3. The results for specifications 1, 2, and 3 are for IV without fixed effects. Specifications 4 to 9 introduce fixed effects in the IV model. Again, specifications 1, 4, and 5 show the results from the growth equation while specifications 2, 3, 6 through to 9 show the results from the inflation equation. Also, the results under specifications 2, 6, and 7 are for the case where the GDP deflator is used to compute inflation, while the results in specifications 3, 8, and 9 are for the case where CPI is used as a measure of inflation.

It can be seen that the results with no fixed effect maintained the economic importance of inflation targeting on inflation (that is the coefficient is negatively signed). Also, the coefficient is quantitatively large as compared with the ones obtained from the panel fixed effect estimation. Consistent with the results from the panel fixed effect, the coefficients are again not statistically significant irrespective of the measure of inflation used. Again, the coefficient of the lagged inflation is positive and statistically significant. This suggests that the long-term effect of inflation targeting amounts to a reduction in inflation by 0.3%. Considering the results with fixed effects, inflation targeting is again not statistically significant for the case where both year and country fixed effects are controlled for. This insignificant effects of inflation targeting on inflation are in line with the findings of Willard (2012) for developed countries as well as Ball and

Sheridan (2004)'s seminal paper. However, while Willard (2012) finds the effects of IT policy to be small and insignificant, we arrived at a quantitatively large effect, albeit weak quantitatively to espouse economically significant arguments for IT.

However, with country but without year fixed effect, the results turn out to be different. Inflation targeting is still negatively signed and statistically significant at 10 percent significance level for both measures of inflation. This may mean that there are some timing policies within each country which differ among them, the reason the specifications with time fixed effect yielded insignificant results. It can also be seen that the coefficients for both measures are quantitatively large and similar. This means that adopting inflation targeting reduces inflation by about 250% and 267% per year depending on how inflation is defined. This result is consistent with the one Jendoubi (2016) found using generalized methods of moment (GMM) estimation technique.

Table 2. Estimation results: IV and IV-FE, First Stage

	IV			IV-FE				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. Var.	IT	IT	IT	IT	IT	IT	IT	IT	IT
CID	0.199***	0.200***	0.198***	0.598***	0.371***	0.823***	0.462***	0.814***	0.462***
	[0.0587]	(0.0574)	(0.0596)	(0.0597)	[0.0678]	[0.0558]	[0.0668]	[0.0572]	[0.0680]
Growth lagged	0.00483			0.176***	0.120***				
	[0.0119]			[0.0195]	[0.0208]				
Inflation lagged (DF)		-1.20e-05***				-2.91e-05**	-2.46e-05**		
		(4.18e-06)				[1.14e-05]	[1.09e-05]		
Inflation lagged (CPI)			-1.42e-05***					-3.14e-05**	-2.64e-05**
			[3.97e-06]					[1.22e-05]	[1.17e-05]
Constant	-0.0420	-0.00235	0.000653	-1.634***	-1.204***	-0.321***	-0.218***	-0.317***	-0.227***
	[0.0921]	[0.0289]	[0.0304]	[0.148]	[0.178]	[0.0295]	[0.0504]	[0.0305]	[0.0532]
F test: IV	11.52***	12.17***	11.00***	100.44***	30.04***	217.65***	47.91***	202.00***	46.09***
	(0.0007)	(0.0005)	(0.0009)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.000)
Observations	1,217	1,214	1,185	1,217	1,217	1,214	1,214	1,185	1,185
R-squared	0.018	0.018	0.017	0.214	0.299	0.164	0.281	0.158	0.276
Year FE	NO	NO	NO	NO	YES	NO	YES	NO	YES
Country FE	NO	NO	NO	YES	YES	YES	YES	YES	YES
Countries				40	40	40	40	40	40

Note. Robust standard errors in parenthesis and p-values in brackets, *** and ** 1 and 5 percent significance

With regard to the effect of inflation targeting on economic growth, the results show that, indeed, adopting inflation targeting leads to higher economic growth. Except for specification 2, the results under all the specifications had the coefficient of inflation targeting to be positive and statistically significant. Specifically, the IV estimation without fixed effect saw the coefficient of inflation targeting to be statistically significant at 10 percent level of significance. Also, the results with both fixed effects had that coefficient to be positive and statistically significant at 1% level of significance. This result indicates that adopting inflation targeting increases the level of growth by about 0.56% per year and this result is consistent with the findings by Jendoubi (2016). It is, however, worth noting that while Jendoubi observes a slight improvement in growth after targeting inflation suggesting a non-obvious IT-economic growth linkage, our evidence shows strongly that IT leads to higher output growth in IT adopting countries. This difference may be attributable to our use of more current data. Our finding also compares and contrasts with Ayres et al., (2014) whose findings suggest that Asian, Sub-Saharan Africa, and Oceanic countries do not experience any positive economic growth after inflation-targeting since they experience higher inflation rates instead of lower rates post-IT thus affecting growth. However, Middle Eastern and North African, and Southern and Eastern European nations are able to lower

their inflation rates substantially along with Latin American and Caribbean nations and, thus, are able to turn that into direct success in short-term economic growth.

Moreover, the coefficient of lagged growth positively signs and it is statistically significant at 1% level of significance in all the specifications. Thus, the long-term effect of inflation targeting helps increase output growth by approximately 0.7%. Our identification of a strong economic growth jells with cognate findings by Abo-Zaid and Tuzemen (2012) who find IT to have a positive effect on GDP growth for both developed and developing countries at 1% level of significance. A 1 percentage point higher difference in GDP growth rate between IT countries and non-IT countries was quantitatively found. A figure which our finding approximates. They also found lower GDP growth volatility among IT countries than their non-IT counterparts post-targeting.

Table 3. Estimation results (second stage): IV and IV-FE

	IV			IV-FE					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Growth	Inflation		Growth		Inflation			
Dep. Var.	real GDP	Deflator	CPI	real GDP	real GDP	Deflator	Deflator	CPI	CPI
Inflation targeting	0.350*	-568.2	-569.1	0.851***	0.564***	-266.2*	-99.64	-249.9*	-102.4
	[0.191]	[464.0]	[406.1]	[0.104]	[0.156]	[160.1]	[363.3]	[149.2]	[330.2]
Growth lagged	0.969***			0.584***	0.698***				
	[0.00950]			[0.0329]	[0.0290]				
Inflation lagged		0.314***				0.262***	0.269***		
		[0.119]				[0.0275]	[0.0286]		
Inflation lagged			0.352**					0.304***	0.312***
			[0.146]					[0.0266]	[0.0277]
Constant	0.218***	94.42	92.09*	3.297***	1.915***	67.57***	7.600	62.42***	-1.658
	[0.0715]	[57.41]	[49.77]	[0.259]	[0.256]	[22.92]	[114.4]	[21.47]	[115.5]
Observations	1,216	1,211	1,179	1,216	1,216	1,211	1,211	1,179	1,179
R-squared	0.922	0.041	0.063	0.7224	0.8759	0.0967	0.1348	0.1344	0.1751
Year FE	NO	NO	NO	NO	YES	NO	YES	NO	YES
Country FE	NO	NO	NO	YES	YES	YES	YES	YES	YES
Countries				40	40	40	40	40	40

Robust standard errors in parenthesis, ***, **, and * indicate 1, 5, and 10 percent significance levels, respectively

5. Conclusion

We set out in this study to identify the effects of inflation targeting monetary policy on inflation and on economic growth. We do this by applying a difference-in-differences model with dynamic fixed effects and instrumental variable techniques to a sample of 40 middle-income countries. Our instrumental variable technique uses more recent data on central bank independence index as an instrument for our endogenous variable (IT). We conclude from our statistical analysis that there is a weak evidence that inflation targeting leads to a reduction in inflation (at least in middle-income countries). We, however, find a strong evidence that inflation targeting contributes to an increase in economic growth in these countries. Our findings are theoretically and evidently grounded in the empirical literature, showing statistical regularity with a section of the literature while departing from, if contradicting others, with refreshingly useful insights. We, for instance, reason that the positive effect of IT on economic growth is an indication that, IT may not necessarily distinguish IT countries from non-IT countries, statistically, in terms of inflationary rate, as our evidence shows. But, publicly declaring inflation targets has a bearing on credibility and transparency which signals confidence to investors, both local and international, of a country's commitment to stabilizing the macroeconomic environment. This is one possible explanation for our identification of differences in economic growth between IT countries and non-IT countries.

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