AN EMPIRICAL ANALYSIS OF THE INFLATION TARGETING FRAMEWORK IN A TIME OF FINANCIAL AND ECONOMIC CRISIS

by

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ABSTRACT

This paper seeks to assess the effectiveness of monetary management of inflation targeting and non-inflation targeting countries in the Latin American and Caribbean region during the global financial crisis. To facilitate such comparison, a panel data set comprising 30 countries was employed for the period 2007-2010. The Random Effects model finds little evidence that inflation-targeting central banks were less susceptible to the adverse effects of the economic crisis. Nonetheless, a review of the literature suggests that some elements of the inflation-targeting framework, such as increased transparency, can have a positive influence on the credibility of monetary policy.

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1. Introduction

Two decades ago, a number of countries adopted a monetary policy approach which stated the achievement of specified inflation targets as its core objective. Today, the inflation-targeting framework is a key pillar of the macroeconomic framework in 26 countries (appendix I). Inflation targeting is "a framework containing an explicit quantitative target for future inflation, a commitment to that target as an overriding objective, a model for predicting inflation, and an operating procedure for adjusting monetary instruments in case forecast inflation differs from its target" (Masson et al. 1997). Inflation targeting can be categorized as being either "strict" or "flexible".[1] According to Svensson (1997)

> *"Strict inflation targeting is when the central bank is only concerned about keeping inflation as close to a given inflation target as possible, and nothing else. Flexible inflation targeting is when the central bank is to some extent also concerned about other things, for instance, the stability of interest rates, exchange rates, output and employment."*

In the wake of the global economic and financial crisis (2007-2009), the effectiveness of the inflation targeting framework was put under great scrutiny. During the period, a number of inflation targeting countries experienced extremely low inflation and had to cut their policy rates substantially to stimulate economic activity. In most instances, the normal link between the short-term market rates and the policy rates also became disjointed (Wickman-Parak 2009). As a result, the interest spreads between policy and market rates widened.

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[1] In practice, inflation targeting is never "strict" inflation targeting but always "flexible" inflation targeting.

In general, central banks aim to achieve price stability and financial stability. In the inflation targeting regime, monetary policy decisions are mainly directed towards price stability. [2] However, in the recent financial crisis, inflation-targeting central banks across the globe were forced to modify their decisions, specifically related to interest rate policy, in order to increase liquidity in the financial system. Therefore, the impact of the world financial crisis on the financial sector was reflected in monetary policy decisions. Thus, the inflation-targeting regime in itself was found to be inadequate since financial stability became a special restriction of inflationary targeting as a monetary strategy (Marinković and Radojičić 2009).[3] Furthermore, financial stability is a key element to ensure the effective implementation of monetary policy. Hence, central banks may more than likely be unable to formulate and implement monetary policy without pursuing financial stability (Mnyande 2009).

This paper reviews the inflation targeting framework and provides an empirical assessment of the performance of inflation and non-inflation targeters during the global financial crisis. Section 2 provides a description of the inflation targeting mechanism, highlighting the essential elements of the regime, the benefits and challenges of the framework, and the pre-requisites for any country that is considering adopting the framework. This section also examines the relation between monetary policy and financial stability. Section 3 employs a panel data model to formally explore the performance of inflation targeting countries versus countries with other policy approaches during the financial crisis. Section 4 gives an overview of the lessons

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[2] Stiglitz 2009 notes that focusing on price or inflation only can be detrimental to an economy.

[3] Svensson 2010 also notes that even flexible inflation targeting is insufficient to achieve financial stability.

from the crisis. The final section concludes and provides some policy recommendations.

2 Key aspects of the inflation targeting framework

2.1 The elements of inflation targeting

According to Mishkin (2000) under an inflation targeting (IT) framework, the primary goal is to achieve and maintain price stability. The central bank is required to announce its inflation target and work towards achieving it by adjusting the policy instrument. In most cases, an information-inclusive strategy is employed by the monetary authority, which entails the use of many economic variables to assist in setting the policy instrument. Furthermore, the IT framework is characterized by transparency since the monetary authority communicates its plans, objectives, and decisions with the public. There is also increased accountability on the part of the central bank for attaining its inflation objective.

2.2 The pros and cons of inflation targeting

IT has several advantages as a monetary policy strategy. According to Jonsson (1999), adopting the regime increases the possibility that a central bank will attain and maintain a lower inflation rate. In addition, the transparency and accountability features of the framework, as well as the explicit announcement of the target, will help to ease pressures that may otherwise arise from price and wage setters, who tend to be informed about the future path of prices. Also, increased collaboration between the central bank and key stakeholders would contribute to stabilizing inflation expectations.

The IT regime reinforces communication, transparency and accountability. Bernanke et al. (1999) noted that subsequent

to the adoption of the framework there has been increased communication between the central bank and the public, as well as substantial improvement in monetary policy transparency[4]. Finally, the framework brings about better cyclical adjustment of the economy (Jonsson 1999). This is because it leaves scope for the central bank to apply discretion in the conduct of monetary policy and the monetary authority is given the flexibility to contain aggregate demand and supply shocks.

However, the IT monetary policy regime is not without criticism. Kadioğlu et al. (2000) noted that the framework overemphasizes inflation and has adverse consequences for economic growth. Furthermore, Mishkin (1999) argued that targeting inflation may lead to low and unstable growth in output and unemployment. Additionally, Mnyande (2009) noted that the IT regime is too narrow, since it mainly focuses on consumer price developments. Hence, broader prices and market developments are ignored. If in practice, inflation targeting is narrowly interpreted, then the framework in itself may not be sufficient to prevent asset price and credit booms, while controlling consumer prices. For instance, the recent global financial crisis was triggered by the Federal Reserve's narrow focus on inflation instead of asset prices, specifically housing. Therefore, the deceleration in the Consumer Price Index (CPI) caused the organization to err on the side of caution in order to avoid deflation. As a result, the Federal Reserve lowered interest rates in the aftermath of the recession of 2001 to stimulate the economy. Further, by 2003, interest rates reached a historic low of one per cent (Feldstein 2007). This action led to a substantial fall in mortgage rates, which made it less costly to get a mortgage.

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[4] For example, after adopting inflation targeting, most central banks began publishing inflation reports which contain forecasts for inflation.

The resultant increased demand contributed to a significant rise in housing prices.

Another criticism is that there is only weak central bank accountability in targeting inflation. This is because the lagged effects of policy changes on prices will cause short- and medium-term forecasts to be substantially off and this will impact negatively on central bank credibility (Kadioğlu et al. 2000). In addition, IT in itself may not be sufficient to ensure fiscal discipline, since even under the IT framework governments can still pursue irresponsible fiscal policy and finance their deficits by monetization (Mishkin 2000). These actions will intensify inflationary pressures, thus making it more difficult for the monetary authority to achieve the target.

Moreover, the IT regime may not be feasible in small open developing countries which are highly dependent on imports of key commodities. This is because inflation in these economies is highly influenced by international prices. Therefore, price stability cannot be fully controlled by the respective central banks.

2.3 Prerequisites for inflation targeting

The first requirement in order to adopt IT is that the central bank must be capable of conducting its monetary policy with a degree of independence.[5] Therefore, the central bank should have at least instrumental independence to adjust its instruments of monetary policy in order to attain its inflation objective (Debelle and Lim 1998). A second prerequisite is the absence of any commitment by the authorities to target

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[5] This independence does not mean full independence as defined by Cukierman 1992.
See Primus (2009) who employed a survey approach to test the degree of Central Bank Independence in Trinidad and Tobago.

any other nominal variable, such as the nominal exchange rate. Where there are dual targets, the credibility of both anchors may be destroyed and there might be conflicts among the objectives. Nonetheless, other economic objectives can be achievable once they are consistent with the inflation target (Masson et al. 1997). In addition, Christoffersen et al. (2001) stated that the third requirement is for there to be a predictable relationship between inflation and the monetary policy instruments.[6] Therefore, the monetary authorities should possess inflation forecasting capacity and the money and capital markets should be sufficiently developed.

2.4 Inflation targeting, monetary policy and financial stability

It has been argued that the recent crisis was due to the monetary policy mistakes, particularly in the United States, where low interest rates triggered excessive increases in asset prices, which is known as the asset bubble. Associated with this bubble was a significant increase in the value of real estate assets which subsequently fell, causing the financial meltdown. A post assessment of the recent crisis brought the issue of financial stability to the forefront and is forcing central banks to reconsider their thinking about the links between financial stability and monetary policy. The question that arises is whether the IT monetary policy regime can react to asset price movements and assist in achieving financial stability.

Research revealed that the narrowness of the IT framework restricts it from dealing with sharp rises in asset prices and credit booms (Mnyande 2009). Hence, the short-term interest rate (the key monetary policy tool used in the IT framework) in itself is not sufficient to control consumer prices, manage

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6 Also see Debelle and Lim (1998 p. 9) who expressed a similar view.

asset price bubbles and maintain financial stability. For all these to be pursued simultaneously, it is necessary for central banks to use additional policy instruments, since the short-term interest rate is not well suited to perform all these tasks. Further, Svensson (2010) noted that financial-stability policy and monetary policy are conceptually distinct, with different objectives and therefore require distinct suitable instruments. Thus, if the short-term interest rate is to be effective in suppressing rapid rises in asset prices and credit growth, it would have to be held substantially high for a persistent period. This policy action is likely to cause considerable damage to the real economy (Dale 2009; Svensson 2010). Therefore, since the short-term interest rate is not effective to ensure that financial stability is sustained, then the IT framework will be incapable of maintaining financial stability.

3 Methodology

3.1 *Econometric specification*

In an effort to determine the impact of adopting an IT framework had during the economic crisis, the paper compares the performance of the various countries in Latin America and the Caribbean[7]. It is anticipated that based on the benefits of the IT framework, the IT countries should perform far better than non-IT countries during the crisis period. While the methodology employed follows in the vein of Filho (2010), that author noted the deliberate exclusion of small developing countries in his analysis. This paper seeks to fill the gap by including small developing countries in the

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[7] The countries included in the analysis are Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Suriname and Uruguay.

analysis. Within the Latin American and Caribbean region there are six countries which have adopted the IT framework: Chile, Brazil, Columbia, Guatemala, Mexico, and Peru. The data used in this paper are at monthly and quarterly frequency and cover the period January 2007 to March 2010, thus focusing on the economic crisis period and its immediate pre and post periods. Filho (2010) estimated a fixed effect model of the form:

$$\gamma_{it} = \lambda_i + \lambda_t + \Phi_t IT + \varepsilon_{it}$$

where γ_{it} is the dependent variable of interest, λ_i is a country specific effect, λ_t is a time effect, and ε_{it} is an idiosyncratic shock. Φ_t, the parameter of interest, measures the difference in variable γ_{it} between IT and non-IT countries. However, in this paper the model was reduced to a random effects model, given that the six IT countries all adopted the monetary framework prior to 2007[8]. Hence, we augment the model to estimate:

$$\gamma_{it} = c + \Phi_t IT + \varepsilon_{it}$$

Four separate equations are estimated with robust standard errors in which the respective dependent variables are the policy rate of the respective central banks, the inflation rate, the unemployment rate and the real GDP growth rate.

3.2 Results

The first estimation focuses on the policy rates of the countries. Here the available data from the International Monetary Fund's (IMF) International Financial Statistics (IFS) database allows for analysis based on monthly data for 20 countries. An examination of the policy rates in both sets

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[8] Brazil adopted IT in June 1999, Chile in September 1999, Colombia in October 1999, Guatemala in 2005, Mexico in 2001 and Peru in January 2002.

of countries finds that there was a rise in the policy rates during the pre-crisis period. This was followed by a decline as the crisis deepened. The results from the estimation illustrate that the difference in the mean policy rates across the two groups is statistically insignificant. This finding is the opposite of the results obtained by Filho (2010) who found that the difference in the mean policy rates between the IT and non-IT groups was statistically significant.

With regards to inflation, monthly data are available for all countries in the sample with the exception of Belize. In the dataset, the pattern of the rate of change of prices was similar in both the IT and non-IT countries, as countries generally experienced a decline in their annualized inflation rate in the pre-crisis period. However, as the crisis began and commodity prices rose, there was a dramatic increase in inflation. The results from the estimation procedure indicate that there was no statistical difference in the mean inflation rates between the IT and non-IT countries. This is in line with the findings of Filho (2010). This result is not surprising as our sample, in contrast to Filho's sample, primarily consists of developing countries. Additionally, the domestic inflation rates of the countries would have been impacted by the changes in the global commodity prices, particularly food. One observation made by Filho (2010) was that IT countries were less likely to go through a deflationary episode. Among the IT countries in our sample, Chile and Guatemala experienced deflation for five months, while among the non-IT countries many of the smallest economies, such as Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines and Suriname experienced deflationary periods of between three and 11 months.

Figure 1.0
Economic snapshot of selected countries during the crisis period (2007-2010)

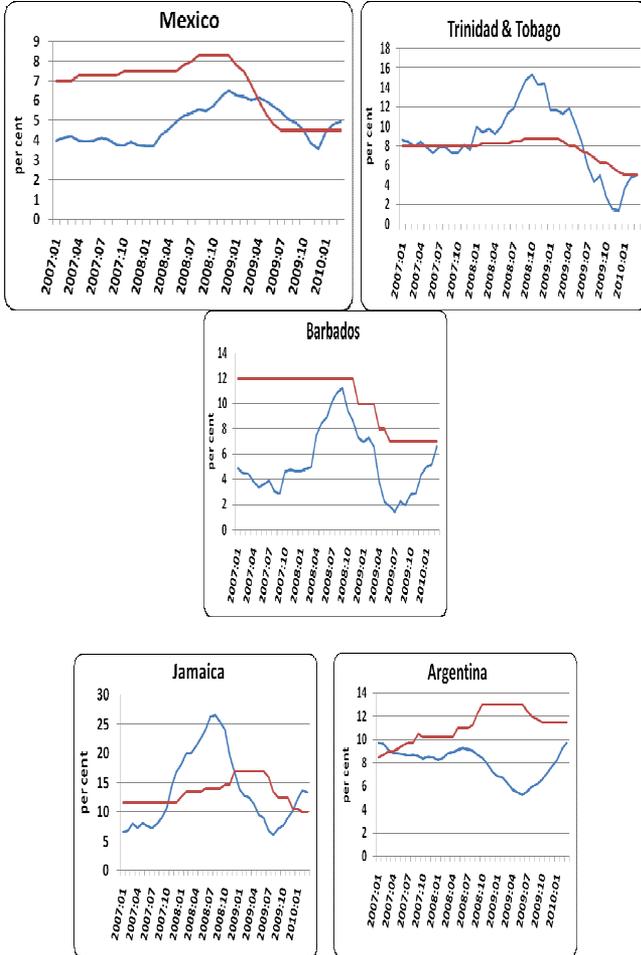### Inflation Rate   ### Policy Rate
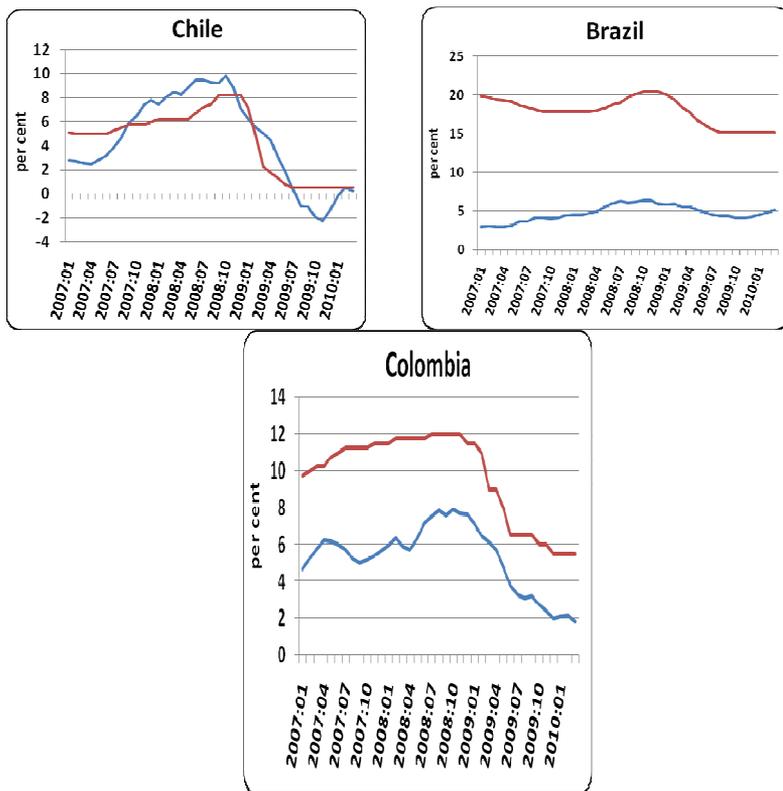
Sources: IMF's International Financial Statistics Database, Bloomberg and various central banks.

Figure 1.0 *(Continued)*

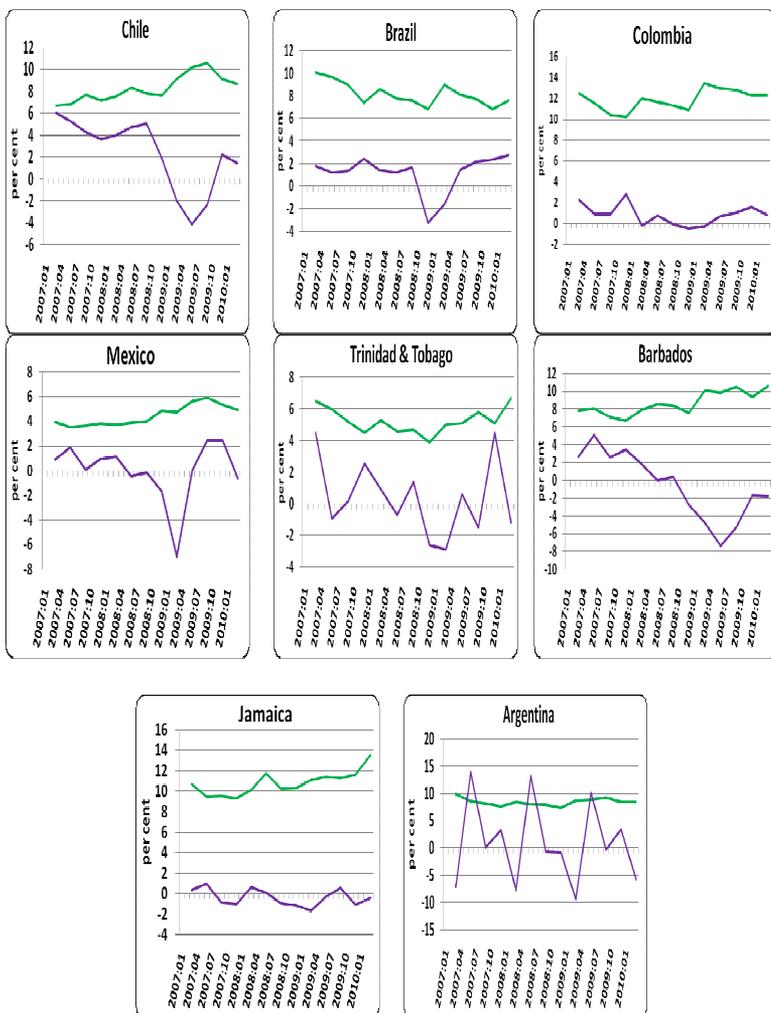## Inflation Rate   ## Policy Rate

Sources: IMF's International Financial Statistics Database, Bloomberg and various central banks.

Figure 1.0 *(Continued)*

Unemployment (%)   **GDP (%)**

Sources: IMF's International Financial Statistics Database, Bloomberg and various central banks.

In examining the impact of the adoption of the IT framework on the economic activity of the adopting countries, we analyze quarterly data for the real GDP growth rate and the unemployment rate (notably, for Dominican Republic, Costa Rica and El Salvador, only annual unemployment rates are available). Quarterly GDP figures are available for 18 countries, while unemployment data are available for 21 countries. Similar to Filho (2010) our results show that the unemployment rates for both groups of countries are not statistically different. While the IT and other countries were experiencing declining unemployment rates before the crisis, the deepening of the crisis saw an increase in the unemployment rates, which in some cases have continued into 2010.

With regards to the performance of GDP during the crisis, we find that there is no statistical difference between the IT and non-IT countries. Again this confirms the findings of Filho (2010), though he noted that while there is no statistical significance to the differences observed in his sample, it appears that "IT countries do relatively better when the economy is doing worse". However, in our sample an examination of the differences in the growth rate does not lead to a similar conclusion.

Table 1: Results from Random Effects Model

	Policy Rate	Inflation Rate	Unemployment Rate	GDP Growth
IT	-0.317 (-0.100)	-1.515 (-1.619)	-0.248 (-0.202)	0.803 (1.318)
No. of Obs.	771	1127	171	233
No. of Countries	20	29	21	18

Note: value of robust t-statistics in brackets.
Full results are available in Appendix C

3.3 Robustness

As a test of the robustness of the results, the dataset was expanded to cover the period January 2005 to March 2010. Re-estimation of the various equations produces the same results, thus suggesting that for the Latin American and Caribbean region, the adoption of an IT framework has not resulted in improved macroeconomic conditions in the respective economies. However, there is some evidence to suggest that the adoption of such a framework may assist during periods of deflation.

Given the lack of strong empirical evidence to indicate that inflation targeting has positively impacted on the macroeconomic stability of the IT countries during the period of the global crisis, we investigate further some possible factors that may have had an impact on the economic growth through the crisis. Filho (2010) notes that the literature identified variables such as the ratio of short-term external debt to GDP, the degree of openness to trade, the change in the commodity terms of trade, and the average GDP growth of trading partners as being important influences in the global economic contraction. We sought to undertake a similar analysis for our sample of Latin America and Caribbean

countries. The variables examined (based on availability of the data) were trade as a percentage of GDP, the change in the real effective exchange rate and short-term debt as a percentage of external debt. However, after controlling for inflation targeting, we do not find that, for our sample of countries, these variables significantly affected economic growth during the crisis period.

4 Inflation targeting: Lessons from the financial crisis

During the pre-crisis period, IT central banks were more likely to adopt a tight monetary policy position in pursuit of their inflation target. Thus, while most non-IT countries were grappling with high inflation, IT countries maintained prices within their desired ranges (Appendix A Table A2). Furthermore, since IT countries had higher nominal interest rates before the crisis, during the crisis they had more room for rate cuts and therefore less need for costly extraordinary fiscal measures (Filho 2010). As the global financial crisis deepened, IT countries eased their monetary policy stance, cutting their policy rates by at least two percentage points. Also, some central banks decreased their interest rates very close to zero. With the collapse of Lehman Brothers in August 2008, monetary easing was necessary since there were significant risks of a large and persistent undershoot of the inflation target. Thus, some IT countries experienced an unprecedented sequence of events that forced the monetary authorities to re-assess policy decisions in order to keep the inflation rate within the target. This was necessary since, in light of the slowing of the economy, inflation threatened to fall substantially below the target (Dale 2009).

Moreover, as shown by De Gregorio (2009), the short-term interest rate is insufficient to steer macroeconomic variables in the favourable direction. Therefore, during the crisis, countries which adopted the IT monetary policy framework found that the interest rate was a useless tool in reversing the

negative growth and spiraling unemployment levels which they experienced.

Additionally, since the IT regime also provided an explicit target for headline inflation and an anchor for managing inflation expectations, this has been instrumental in shaping the response of policy makers to the current crisis. Furthermore, the responsibility of the central bank to provide the public with explanations about the direction of monetary policy has been important to developing countries since the central bank is recognized as a representative and a defender of the wider public.

5 Conclusion and policy recommendations

This paper compared the performance of inflation targeters and non-inflation targeters in Latin America and Caribbean countries during the global financial crisis. Based on the results from our empirical analysis, countries utilizing the IT framework did not weather the financial crisis significantly better or worse than those with other policy frameworks. Also, the crisis showed that even the flexible IT regime was not sufficient for countries to achieve inflation and other real targets. Furthermore, the lack of emphasis in the IT framework on economic variables such as growth and employment means that the framework is not geared towards the management of the impact of a shock that adversely affects these macroeconomic variables.

In light of the above findings, some IT central banks may find it more effective to modify their application of the IT regime. We therefore recommend that price stability should not be the sole target of central banks. Another important lesson from the financial crisis is the need to expand the range of instruments available to policy makers to strengthen their scope in responding to asset price bubbles. This is

important since the short-term interest rate is not well suited to managing such risks.

Furthermore, although the results revealed that IT countries did not perform better than non-IT countries during the crisis, certain features of the IT framework are beneficial and could be considered by countries with other monetary policy frameworks. In particular, central banks can consider increasing transparency through communication with the public and the markets about the plans, objectives, and decisions of the monetary authorities. This will assist the policy makers in managing inflation through inflation expectations.

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Appendix A
Table A1
Inflation Targeting Countries

Country

Australia	Brazil	Canada
Chile	Colombia	Czech
Republic Ghana	Guatemala	Hungary
Iceland	Indonesia	Israel
Korea	Mexico	New
Zealand Norway	Peru	Philippines
Poland	Thailand	Romania
Serbia	South Africa	Sweden
Turkey	United Kingdom	

Appendix II
Table A2
Inflation Rate in IT Countries

IT	Columbia	Peru	Chile	Mexico
2002	6.35	0.19	2.49	5.03
2003	7.14	2.26	2.82	4.56
2004	5.91	3.66	1.06	4.68
2005	5.05	1.62	3.05	4.00
2006	4.30	2.00	3.40	3.63
2007	5.54	1.78	4.39	3.97

Appendix II *(Continued)*
Table A2
Inflation Rate in Non-IT Countries

Non-IT	Suriname	Jamaica	Argentina	Dominican Republic
2002	15.41	7.10	25.94	5.21
2003	23.88	10.25	14.86	27.20
2004	10.05	13.70	4.41	52.41
2005	9.83	15.30	9.62	4.42
2006	11.49	8.70	10.92	7.63
2007	6.41	9.25	8.84	6.13

Source: IMF's International Financial Statistics Database.

Appendix B
Data sources and country coverage of variables

Policy rate (n=20) comes from the IMF's IFS database. The countries included are Antigua and Barbuda, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Ecuador, Grenada, Guyana, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago and Uruguay.

Inflation rate (n=29) is sourced from the IMF's IFS database. The countries covered are Antigua and Barbuda, Argentina, Bahamas, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and Uruguay.

Unemployment rate (n=21) is sourced from the ILO database and the respective countries central banks/national statistical agencies. The countries covered are Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago and Uruguay.

Real GDP (n=18) is sourced from the databases of the respective countries central banks/national statistical agencies. The countries covered are Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Jamaica, Mexico, Nicaragua, Panama, Peru, Trinidad and Tobago and Uruguay.

Appendix C
Table C4A
Regression Results from Random Effects Model

Dependent Variable: Policy Rate

Total panel (unbalanced) observations: 771

Variable:	Coefficient	Std. Error	t-statistic	p-value
Targeter	-0.3169	3.1565	-0.1004	0.9201

Table C4B
Regression Results from Random Effects Model

Dependent Variable: Inflation Rate

Total panel (unbalanced) observations: 1127

Variable:	Coefficient	Std. Error	t-statistic	p-value
Targeter	-1.5152	0.9356	-1.6194	0.1056

Table C4C
Regression Results from Random Effects Model

Dependent Variable: Unemployment

Total panel (unbalanced) observations: 171

Variable:	Coefficient	Std. Error	t-statistic	p-value
Targeter	-0.2481	1.2275	-0.2021	0.8400

Table C4D
Regression Results from Random Effects Model

Dependent Variable: Real GDP

Total panel (unbalanced) observations: 233

Variable:	Coefficient	Std. Error	t-statistic	p-value
Targeter	0.8032	0.6094	1.3180	0.1888