

# Inflation Targeting and Real Exchange Rates in Emerging Markets

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**Summary.** — We investigate inflation targeting (IT) in emerging markets, focusing on the role of the real exchange rate and the distinction between commodity and non-commodity exporters. IT emerging markets appear to follow a “mixed strategy” whereby both inflation and real exchange rates are important determinants of policy interest rates. The response to real exchange rates, however, is more constrained than in non-IT regimes. We also find that the response to real exchange rates is strongest in those countries following IT policies that are relatively intensive in exporting basic commodities; and present a theoretical model that explains these empirical results.  
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## 1. INTRODUCTION

Inflation targeting is becoming a standard operating procedure for central banks around the world. By mid-2008, most central banks in the OECD countries<sup>1</sup> and a growing number of developing economies had adopted inflation targeting. There is no international coordination to promote this monetary regime change, and countries do not join an internationally recognized monetary system nor follow common “rules of the game.” Adopters of inflation targeting do so primarily because of the framework’s perceived success in delivering low and stable inflation.

Despite its popularity, there is substantial controversy and mixed empirical evidence in the evaluation of the inflation-targeting framework. There are two main empirical approaches. The first approach focuses on the macro-economic outcomes of countries following inflation-targeting regimes as compared to non-targeting countries. Although few argue that inflation targeting has harmful effects, there remains a vigorous academic and policy debate over whether the adoption of this monetary regime in advanced industrial countries has contributed to substantial declines in average inflation, lower inflation volatility, and general macro-economic stability compared to those countries not following inflation-targeting rules.<sup>2</sup>

The second empirical approach evaluating inflation-targeting (IT) policies focuses on central bank behavior under inflation targeting and non-targeting and how they operate in an IT environment. Even in this strand of the literature there is mixed evidence over whether formal adoption of an inflation-targeting regime substantively changes the behavior of central banks, and in particular their responses to inflation and output gaps.

This paper investigates the empirics of inflation targeting in emerging-market economies within the context of the second strand of the literature—central bank operating behavior. We focus in particular on emerging-market central banks’ responses to inflation, output gaps, and real exchange rates using Taylor rule models (as in Clarida, Gali, & Gertler, 1998). Our aim is to distinguish between episodes when central banks are committed to an explicit inflation-targeting monetary regime and those periods of time when they are not

(including central banks that have never followed inflation targeting). We focus on two factors critical to the conduct and control of monetary policy in emerging markets—wide swings in the real exchange rate and the extent to which the countries are concentrated in commodity exports. We demonstrate, in the context of a simple illustrative model, that these distinguishing characteristics are in principle important in designing the form of the monetary policy rule. For a commodity exporting country that is vulnerable to terms-of-trade shocks, in particular, when experiencing large real exchange rate shocks that can affect potential output a modified version of inflation targeting dominates a pure inflation targeting strategy.

Our empirical work is based on panel-data so as to distinguish between group characteristics, respectively, of the inflation-targeting and non-targeting central banks in emerging markets and further between commodity exporting inflation targeters from other IT regime countries. We characterize inflation targeting strategies in the context of a modified Taylor rule operating procedure, and demonstrate that this rule varies markedly from non-targeting emerging markets (as well as inflation-targeting industrial countries). Moreover, our focus is on the role of the real exchange rate in the policy rule and how this is affected by the countries’ exposure to commodity-intensive production (and, hence, terms-of-trade shocks).

Four factors motivate our empirical research. Firstly, the great bulk of the research in this area is concerned with inflation targeting in advanced industrial countries and relatively less research addresses the particular features of inflation targeting in emerging markets.<sup>3</sup> There are many reasons that

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emerging markets may differ from industrial countries in the approach to inflation targeting. These reasons include different institutional arrangements, especially those relating to the credibility and political independence of the central bank, different inflation and macro-economic histories, different exposures to terms-of-trade shocks, and different levels of financial development. Aghion, Bacchetta, Ranciere, and Rogoff (2009) demonstrate that countries with relatively less developed financial sectors are more likely to suffer output losses associated with exchange rate volatility. In this case, greater concern for real exchange rate volatility may lead central banks in emerging markets—countries with lower levels of financial development than industrial countries—to follow a monetary policy rule (Taylor rule) that captures some form of target inflation, output deviations from the natural rate, and real exchange rate fluctuations.

Secondly, our emphasis is on introducing real exchange rate fluctuations into the inflation-targeting framework. Real exchange rates are likely to play an important role in the formulation of optimal monetary policy in emerging markets, as shown theoretically in our illustrative model (Appendix A), and we examine this connection in our estimations of *de facto* policy rules.

Thirdly, the distinction between heavily concentrated commodity-exporting emerging markets and non-concentrated emerging markets is potentially important in how inflation targeters work in practice. This difference accounts for different vulnerability to terms-of-trade shocks. We explore this distinction.

Fourthly, we follow a panel methodological approach in examining these issues. Most other studies in this area have relied upon individual country time-series analysis. A panel analysis provides some advantages since it allows clear focus on characteristics of policy rules common to inflation-targeting countries treated as a group and allows us to distinguish them from non-inflation-targeting countries.

Our results indicate that the publically announced adoption of inflation targeting strategies by central banks in emerging markets, often with much fanfare, is a substantive deviation from past monetary policy formulation and sharply different from non-targeting emerging markets. As our theoretical model predicts, however, inflation targeting emerging markets are not following “pure” inflation targeting strategies. Rather, we find that external variables play a very important role in the policy rule—inflation-targeting central banks in emerging markets systematically respond to the real exchange rate. Of the inflation targeting group, those with particularly high concentration in commodity exports change interest rates much more pro-actively to real exchange rate changes than do the non-commodity-intensive group. Overall, our results are robust to a variety of model formulations and estimation strategies.

The next section discusses the inflation targeting literature as it applies to emerging markets, and highlights the gap in the empirical literature which we address in our contribution. Section 3 presents the data, descriptive statistics, and empirical model. Section 4 presents the empirical results and Section 5 concludes. Appendix A presents the theoretical model that motivates our empirical formulation of the policy rule equations.

## 2. INFLATION TARGETING IN EMERGING MARKETS

There is a large empirical literature on inflation targeting, most of which focuses on advanced industrial countries. These studies generally take one of two approaches. The first approach

measures the effects of inflation targeting on inflation, inflation volatility, and other macro-economic variables. The second approach focuses on characterizing central bank operating procedures, attempting to distinguish between policy functions of inflation-targeting countries and those not targeting inflation. Studies in the first strand of the empirical literature employ both individual country time-series and multi-country panel methods, while the second strand of literature is almost exclusively focused on individual country time-series.

### (a) *Macro-economic effects of inflation targeting*

Empirical studies generally find mixed results on the effects of inflation targeting on inflation and other macro-economic variables. For example, Johnson (2002) undertakes a panel study consisting of five IT (Australia, Canada, New Zealand, Sweden, and the United Kingdom) and six non-IT advanced industrial countries. He finds that the announcement of inflation targets materially lowers expected inflation (controlling for business cycle effects, past inflation, and fixed effects). Also in the context of a panel regression framework, Mishkin and Schmidt-Hebbel (2007) similarly conclude that inflation targeting does make a difference in advanced industrial countries by helping them achieve lower inflation in the long run and have smaller inflation responses to oil and exchange rate shocks. However, the results for advanced country inflation-targeters are very similar to their high-performing country control group.<sup>4</sup> Rose (2007) argues that inflation targeting is a very durable (long-lasting) regime compared to other monetary regimes and that inflation targeters have both lower exchange rate volatility and less frequent “sudden stops” of capital flows. By contrast, Ball and Sheridan (2005), in a cross-section investigation, reject any long-term differences between advanced industrial inflation targeters (7 countries) and non-targeters (13 countries).

The experience and relative success of emerging markets with inflation targeting is somewhat more supportive, although this remains controversial. Mishkin and Schmidt-Hebbel (2007) find that inflation targeting in emerging countries performs less well than in advanced industrial countries, although the pre- and post-inflation targeting reductions in inflation in emerging markets are substantial.<sup>5</sup> The International Monetary Fund (2005), using the methodology of Ball and Sheridan (2005), presents results of a study focusing on 13 emerging market inflation targeters compared with 29 other emerging markets. They report that inflation targeting is associated with a significant 4.8 percentage point reduction in average inflation, and a reduction in its standard deviation of 3.6 percentage points relative to other monetary strategies.

Gonçalves and Salles (2008) and Lin and Ye (2009), using different methodologies, reach similar conclusions to the IMF study; they find that adoption of an inflation-targeting regime leads to lower average inflation rates and reduced volatility compared to a control group of non-targeters. A recent edited volume on inflation targeting in emerging markets, focusing mainly on individual country case studies, also finds quite positive outcomes associated with the adoption of IT regimes (De Mello, 2008). In contrast, a more recent paper argues that once common time trends are accounted for, this positive benefit of IT regimes disappears and even argues that the disinflation period is potentially more recessionary under IT (Brito & Bystedt, 2010).

### (b) *Policy functions in IT regimes*

In terms of central bank policy functions, Clarida *et al.* (1998) focus on six major industrial countries and suggest

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