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Should inflation-targeting central banks respond to exchange rate movements?

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This paper examines whether it is optimal for inflation-targeting central banks to respond to exchange-rate movements. The paper finds that exchange-rate movements can provide a signal on the developments in the economy that the central bank cannot perfectly observe. The results suggest that when the degrees of exchange-rate pass-through and international financial integration are high, it is optimal for the central bank to pay more attentions to exchange-rate movements. These results however depend on two conditions: 1) the ability of the central bank to observe the true exchange-rate process and 2) the number of real frictions in the model economy.

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1. Introduction

Over the past decade, one interesting trend in global financial markets has emerged. An increasing number of countries have abandoned exchange rate pegs to allow their currencies to float freely and adopted inflation targeting as their monetary policy framework.¹ Such a switch has led these countries to uncharted territory of volatile exchange-rate fluctuations. From a theoretical standpoint, exchange-rate volatility may have a negative effect on economic welfare.² From a policy perspective, excessive exchange-rate fluctuations may render macroeconomic instability.³ This raises a question whether

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¹ Between 1992 and 2003, there were twenty two countries that followed this pattern. This excludes small and less developed countries with GDP under US\$ 4 billion and countries with per capital GDP less than \$720. See also [Bhundia and Stone \(2004\)](#).

² See [Obstfeld and Rogoff \(1998\)](#).

³ This is particularly important for emerging-market countries. An excessive currency appreciation may cause these countries' exports to lose their competitiveness in the world markets. A currency depreciation, on the other hand, will increase foreign debt obligations via a balance-sheet effect and, depending on the degree of exchange-rate pass-through, may lead to inflationary pressures.

inflation-targeting central banks, most of which rely on short-term nominal interest rates as their instrument, should respond to exchange-rate movements.⁴

One of the earliest discussions on this topic is offered by [Obstfeld and Rogoff \(1995\)](#) who point out that it may be advantageous for the central bank to ease in response to a substantial appreciation. [Ball \(1999\)](#) and [Taylor \(1999\)](#) provide the first two formal analyses on whether the central bank should respond to exchange-rate fluctuations. These studies compare macroeconomic outcomes generated by Taylor interest-rate rules that respond to exchange-rate fluctuations with those that do not respond to the exchange rate. Subsequent studies are extensions of the Ball–Taylor framework whereby Taylor interest-rate rules are evaluated on a variety of open-economy dynamic stochastic general equilibrium (DSGE) models.⁵ The results from these studies suggest that including the exchange rate in a Taylor interest-rate rule yields either no gains or fairly small improvements in terms of economic stability.

In a recent contribution that is closely related to the present paper, [Leitemo and Soderstrom \(2005\)](#) [henceforth, LS] extend the Ball–Taylor framework by studying the gains from including the exchange rate in Taylor interest-rate rules when there is uncertainty regarding the exchange rate model. For a wide range of model specifications, their results confirm the findings in the literature that the gains from including the exchange rate in Taylor interest-rate rules are small and sometimes a separate response to the exchange rate can even reduce welfare. Furthermore, Taylor rules that respond to the rate of exchange rate depreciation are more sensitive to model uncertainty than the standard Taylor rules.

The present paper is an attempt to examine the role of the exchange rate in the conduct of monetary policy. Rather than relying on Taylor interest-rate rules, I pursue a different approach by deriving optimal monetary policy under commitment. Under the goal of maintaining price stability and full employment, optimal monetary policy under commitment, which can be implemented via *flexible inflation-targeting*, yields the best outcome that the central bank is capable of implementing. While the analysis of optimal policy under commitment has been applied to various issues before, to the best of my knowledge, this is the first attempt at deriving the optimal reaction function to study whether it is optimal for the central bank to respond to exchange-rate fluctuations.⁶

This paper also presents two other features that are relatively new in the literature of monetary analysis in open-economy settings and thus distinguish it from LS. First, this paper examines a scenario in which the central bank has an imperfect knowledge on the state of the economy. It has been generally agreed among academics and policymakers that modern-day central banks have to conduct monetary policy amid imperfect information and uncertainty.⁷ Note however that while LS focus the analysis on the full-information scenario as well as model uncertainty on the exchange-rate determination, this paper focuses on the analysis of partial information on the state of the economy in general. That is, the present paper examines the role of the exchange rate not only when the exchange rate process is uncertain but also when the inflation process is uncertain.⁸

Second, this paper examines optimal monetary policy in a large-scale open-economy DSGE model estimated by Bayesian techniques. The model features the export/import sectors, capital, money and net foreign assets, with several frictions including incomplete exchange-rate pass-through and imperfect capital mobility. LS, on the other hand, rely on a smaller model with fewer frictions and shocks.

⁴ A related question is, in practice, to what extent central banks respond to exchange rate movements when setting monetary policy. [Lubik and Schorfheide \(2007\)](#) estimate a number of generic Taylor-type instrument rules with a small-scale open-economy DSGE model, using Bayesian techniques. They find that the Bank of Canada and the Bank of England do while the central banks of Australia and New Zealand do not include the nominal exchange rate in its policy rule.

⁵ See for example [Adolfson \(2001\)](#), [Benigno and Benigno \(2001\)](#), [Cote et al. \(2002\)](#), [Kollmann \(2002\)](#), [Dennis \(2003\)](#) and [Batini et al. \(2003\)](#).

⁶ [Svensson \(2000\)](#) and [Flamini \(2007\)](#) examine optimal monetary policy in the open-economy environment, but *under discretion*. They also conduct monetary policy analysis in a general sense and do not focus on whether it is optimal for the central bank to respond to exchange-rate fluctuations. [De Paoli \(2004\)](#) derives a quadratic loss function from household utility, but on a stylized model without interest rates included. Therefore, his study is not intended to examine whether the central bank should respond to exchange-rate fluctuations.

⁷ See [Sims \(2002\)](#) and [Greenspan \(2004\)](#).

⁸ The determination of the inflation process has been one of the most contentious issues in the literature. See for example [Taylor \(2000\)](#) and [Cogley and Sargent \(2001\)](#). [Rudebusch \(2002\)](#), [Walsh \(2005\)](#) and [Coenen \(2007\)](#) have shown that model uncertainty in the determination of inflation can have an enormous impact on the performance of a given monetary policy rule.

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