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The central bank and speculators in the foreign exchange market under asymmetric information: A strategic approach and evidence

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Abstract

This paper studies the central bank sterilized intervention in the foreign exchange market in an asymmetric information framework. The central bank has inside information of its target, and the speculators have private information of fundamentals. The model suggests that if market expectations are precise about the central bank's target, or about liquidity trades, the foreign exchange market will more likely move in the direction opposite to the central bank's intervention direction. Following the hypothesis of Diebold and Nerlove [Diebold, F. X., & Nerlove, M. (1989). The dynamics of exchange rate volatility: A multivariate latent factor Arch model. *Journal of Applied Econometrics*, *4*, 1–21] regarding the relationship between preciseness of information and the market volatility, the model provides a possible theoretical explanation for Hung's [Hung, J. H. (1997). Intervention strategies and exchange rate volatility: A noise trading perspective. *Journal of International Money and Finance*, *16*, 779–793] noise trading channel hypothesis. Empirically, the paper shows that actual daily intervention data of the Fed, the Bundesbank, and the BOJ generally support the theoretical implications.
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1. Introduction

The central bank's sterilized intervention in foreign exchange markets draws strong interests not only from policy-makers and those from the academic circles, but also from investors. In

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the late 1990s, along with the actual daily intervention data being released by several central banks,[1] empirical work has tended to use these data sets to test the actual effect of a central bank's intervention. Some find that sterilized intervention systematically affects the exchange rate in the short-run (Fatum & Hutchison, 2003); others find that the intervention exerts an incorrectly signed effect on the levels of exchange rates and tends to increase exchange rate volatility in the short-run (Beine, Benassy-Quere, & Lecourt, 2002). The literature also shows that the traditional arguments for sterilized intervention – the portfolio-balance channel and the signaling channel (the two major theories underlie the effectiveness of a central bank's sterilized intervention) – are weak, and the results are mixed.[2]

The disputes and mixed results call for further research. Bhattacharya and Weller (1997) look at this issue from a totally different perspective. Their paper studies the strategic aspects of a central bank's intervention by exploiting an asymmetric information model of sterilized intervention. The central bank has 'inside information' about its exchange rate target and trades with risk-averse speculators who have private information about future spot rates. The existence of private information means that an informed trader in the foreign exchange market will have an incentive to act strategically.[3] Therefore, based on the strategic behavior of informed and uninformed traders, the model provides the circumstances where the central bank buying a currency is associated with depreciation of that currency (named "perverse response") or with appreciation of that currency (named "normal response"). Furthermore, the model provides explanations for a puzzling issue in the intervention literature: the secrecy of central bank's intervention. It shows that secrecy about the scale of an intervention operation is always desirable, and secrecy about the target is sometimes desirable.

This paper extends the work of Bhattacharya and Weller (1997) by modifying their model in two respects. First, Bhattacharya and Weller (1997) motivations for intervention are questioned based on results from a recent survey, available in Neely (2000).[4] In Bhattacharya and Weller (1997), the profit made from forward transactions is part of the objective function of the central bank (together with limiting the variability of the exchange rate around target value T). However, the new survey shows that the profitability of intervention, as a motivation, is uniformly rejected by all central banks responding to the survey. Instead, two major motivations of central banks, 'resist short-run trends' and 'seek to return exchange rates to fundamental values', are supported by the survey results. This paper explicitly models these two motivations of the central bank. In this respect, the model, compared with that of Bhattacharya and Weller (1997), will be more realistic. The second improvement in the paper is that a noise term is included in the market clearing condition, which makes our model similar to the model introduced by Grossman and Stiglitz (1980).[5] The noise term may exist due to the random reduction/increase in demand for currency caused by 'liquidity' or reasons other than favorable private information. Bhattacharya and Weller (1997) argue that including the noise term in the market clearing condition makes

[1] The literature shows that daily-intervention-data is released by authorities from the USA, Germany, Switzerland, Australia, and Japan.

[2] Fatum and Hutchison (1999) reject the signaling hypothesis; Lewis (1995) find evidence for the signaling argument; Edison (1992) finds no evidence of a portfolio balance channel; but Ghosh (1992), Dominguez and Frankel (1993) find some support.

[3] For more strategic trader theories and models, see O'Hara (1995), Chapters 4 and 5.

[4] The survey was conducted in 1999. The purpose of the survey is to investigate the practice of foreign exchange intervention. Neely (2000) indicates that among 44 authorities asked, 22 responded to some or all of the questions asked.

[5] The usefulness of the noise term is equivalent to the randomness of supply of risky asset in Grossman and Stiglitz (1980): confusing the uninformed traders about the information held by the informed traders.

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