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A transaction level study of the effects of central bank intervention on exchange rates

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Abstract

We study the effects of sterilised intervention operations executed on behalf of the Swiss National Bank (SNB) using tick-by-tick transactions data between 1986 and 1995. We extend the preliminary analysis of [Economic Journal 109 (1999) 662] by matching these data with indicative intra-day exchange rate quotes and news-wire reports of central bank activity. Using an event study approach we find that intervention has important short-run effects on exchange rate returns. In particular, among various results, we find that i) intervention has a stronger impact when the SNB moves *with-the-market* and when its activity is *concerted* with that of other central banks and ii) exchange rate returns move in the 15 min interval prior to interventions.

Keywords: Sterilised intervention; Foreign exchange market; Market microstructure

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1. Introduction

Scholars have long debated whether central bank intervention operations in the markets for foreign exchange have important effects on exchange rate levels and volatility and on market conditions. While it can be theoretically established that

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sterilised intervention affects the value of currencies and level of activity in FX markets, either through a portfolio-balance effect or via a signalling channel (Mussa, 1981; Bhattacharya and Weller, 1997; Vitale, 1999, forthcoming), the effectiveness of sterilised intervention remains an unresolved issue from an empirical point of view.

A contributory factor to the unresolved nature of this issue has been a lack of adequate data on central bank intervention transactions. Indeed, until recently, researchers only had access to data sets in which intervention operations were aggregated to daily or lower frequencies.[1] This has proved a serious impediment to empirical analysis of the effects of intervention on exchange rates as, with coarsely sampled data, it is difficult/impossible to overcome simultaneity problems and to characterise the high-frequency effects of intervention on market conditions.

However, recently the Swiss National Bank (SNB) has made an innovative data set available to researchers, containing tick-by-tick observations on its intervention operations in FX markets between 1986 and 1995. We extend a preliminary analysis of this data set by Fischer and Zurlinden (1999), by combining the information it contains with indicative exchange rate quotes recorded by Olsen and Associates and with Reuters news-wire reports of central banks' activity.

These data allow us to conduct a high-frequency analysis of the effects of signed intervention operations on exchange returns. We construct time-series for the USD/CHF exchange rate and signed intervention quantities sampled once every 15 min and use these data to analyse the effects of intervention via an event study.[2]

The particular focus of our study is the empirical relevance of the *signalling hypothesis*. This hypothesis suggests that intervention operations are used by monetary authorities to convey information to FX markets and hence alter market expectations and exchange rates. Thus, if central bank operations are informative signed intervention should have a significant and permanent effect on the value of currencies.

Other important issues we can analyse using the event study methodology include: i) the speed with which intervention influences markets, ii) the impact of intervention size and iii) the effects of market conditions on the effectiveness of intervention. With respect to the first issue, it is usually presumed that FX markets are very resilient and process information very quickly. The current analysis gives us an opportunity to test this assertion. Analysis of the impact of intervention size is also important, in that the signalling hypothesis suggests that intervention is

[1] See Dominguez and Frankel (1993b), Dominguez and Frankel (1993a). Edison (1993) and Sarno and Taylor (2000) contain extensive reviews of this literature.

[2] Several recent studies also focus on the intra-day effects of intervention on exchange rates (Peiers, 1997; Dominguez, 2003; Evans and Lyons, 2000) although none of these use actual intra-day intervention data.