Time-varying foreign-exchange risk and central bank intervention: estimating profits from intervention and speculation

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Abstract

Failure to risk-adjust estimates of profits, from central-bank foreign exchange intervention or from private speculation, can have large effects on the estimated profits, including changing signs. Many choices arise in deciding how to adjust profits for risk. The time period over which a market model is fit has mixed effects on calendar-year profits; variations in profits across calendar years is much more important than the period over which the market model is fit. In some cases, but not in all, results are sensitive to whether a US stock market index is used or a world market index. For non-US central banks or private speculators, the relevant market index might be denominated in USD, but alternatively might be denominated in a foreign currency. For the Swedish central bank, estimated profits decline importantly if an index measured in USD is used instead of an index measured in SEK. In estimating market models where beta is conditioned on some measure of intervention, likely candidates are intervention or cumulative intervention; the first has an effect for one or a few days, the second has long-term effects. Estimates show that the choice can make an important difference, though the effects are not all one way. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Central banks are often accused of making large losses on their foreign-exchange market intervention, even in periods without acute balance of payment crises. The literature contains many estimates of central bank profits and losses from foreign-exchange intervention (Sweeney, 1997 gives a review). Recent work suggests that most estimates are unreliable for a number of reasons (Sweeney, 1997, 1999a,b; Sjöö and Sweeney, 2001). Past work fails to adjust estimated profits for the foreign-exchange risk premium that exposed positions are expected to earn part of the estimated profits is payment for risk. These reported profits, therefore, are flawed estimates of economic profits, sometimes seriously flawed. Further, much work fails to take account of the fact that the exposed position on which the central bank earns intervention profits is an integrated variable, or at the least a near integrated variable, so that usual statistical inference can be badly misleading.

This paper explores risk-adjustment of estimated profits; Sjöö and Sweeney (1999) discuss the integrated variable issue. Most previous work on central-bank intervention profits uses simple rates of return rather than abnormal rates of return, i.e., rates of return adjusted for risk. Even with risk adjustment, work in other asset markets shows that inferences can depend strongly on how returns are adjusted for risk, a major issue in event studies. Frequently, abnormal returns are found from market models, the simplest of operational asset pricing models. For analyzing global investments, the market proxy used is critical for results (Reilly and Akhtar, 1995), and may well be critical for judging intervention profitability.

The same risk-adjustment issues apply to estimated profits earned by foreign-exchange speculators, for example, from following mechanical trading rules. Early work on trading rules does not risk-adjust profits, for example, Fama and Blume (1966) on the US stock market. Sweeney (1988) discusses shortcomings in their work and proposes profit measures that use mean-adjustment for risk. Early work on speculative profits in foreign-exchange markets does not adjust for risk (Dooley and Shafer, 1976; Logue et al., 1978). Later work uses mean-adjustment for risk (Sweeney, 1986; Surajaras and Sweeney, 1992; Levich and Thomas, 1993, for example), and in a few cases uses market-model adjustment (for example, Sweeney, 1990; Sweeney and Lee, 1990).

Several issues arise in using market models to find abnormal rates of return on foreign-currency positions. First, market-model parameter estimates often vary over time. Experiments below show no clear pattern in estimated calendar-year profits from using shorter or longer estimation periods. The profit variations across calendar years are much more important than the period over which the market model is fit.

Second, beginning in the 1980s event-study researchers often take care to allow for the possibility that changes in betas are associated with the events studied (Brown et al., 1988; Chan, 1988, for example). A central bank may take a long position when risk is high, earn a risk premium as a result, and appear to make profits. In estimating profits, variations in beta that are associated with intervention