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Is exchange rate volatility excessive? An ARCH and AR approach☆

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Abstract

Since the implementation of the floating exchange rate system in 1973, world leaders, policy makers and researchers have been seriously concerned with the volatility of foreign exchange rates. Financial crises in Mexico, Russia, and Asia renewed the debate about whether increased volatility may suppress international trade and what can be done to discourage currency speculation. The earlier literature using unconditional dispersion measures strongly suggested that exchange rate changes are less volatile than those of other asset prices. This paper shows that this result holds up under a battery of tests that try to elicit the statistically appropriate measure of conditional variance. While the discussion of the econometric issues is a major part of the paper, the readers are reminded that the issue is not that the hypothesized variance processes differ dramatically; rather the issue is that, even after applying the battery of tests, the conditional and unconditional results suggest similar conclusions.

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1. Introduction

Since the change by most industrialized nations from the Bretton Woods system of fixed exchange rates to a flexible-rate regime, there has been serious, and as yet unabated concern over

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the volatility of floating exchange rates. Those who advocate a return to a fixed rate system—politicians, bureaucrats and academics from around the world—argue that the increased risk generated by the volatility of flexible rates causes a severe dampening of the level of international trade and investment, thus lowering the welfare of residents of all trading nations. While admitting that theoretical possibility in imperfect markets, proponents of flexible rates argue that the case is overstated: foreign exchange markets for major currencies are at least as efficient as those for any other asset, and the volatility that is observed in such markets is not "excessive," but an efficient mechanism for exchanging information, certainly preferable to the enforced disequilibrium of a fixed-rate system in a rapidly changing global economy. The 1992 pound crisis and the 1997 Asian financial crisis illustrate that the fixed exchange rate system is very difficult, if not impossible, to maintain, especially within a more integrated global market in which information and monetary assets can be transferred within several seconds.

The 1992 pound crisis not only shook the currency markets but also triggered extremely large devaluations of French franc and Italian lira (*The Wall Street Journal*, September 17, 1992). While the crisis was directly caused by the British government's announcement to withdraw from the Exchange Rate Mechanism (ERM) in Europe, it was indirectly set off by the German reunification. It is well known that Germany suffered significant expenses and inflation following reunification. As a result, the German central bank tightened its monetary policy to reduce the inflation rate. Interest rates rose significantly because of the new policy. The higher interest rate caused capital to flow into Germany and out of other European Monetary System countries, such as U.K. and Italy. Great Britain found that it could no longer afford to raise interest rates high enough to keep the capital at home, and therefore withdrew from the ERM, a fixed exchange rate system.

The financial crisis in Asia that forced the Thai baht to devalue more than 20%, and the Malaysian ringgit, the Phillipine peso, and the Indonesia rupiah to devalue almost 10% within 1 or 2 weeks, illustrates that trade deficits, budget deficits, inflation rates, and volatility of foreign exchange rates are closely related. However, without a ruler or a target for comparison, one cannot judge whether these changes are indeed excessive.

Tobin (1978) argued that exchange rates are too variable because financial markets are "excessively efficient"—that capital sloshed back and forth among countries in response to trivial disturbances. Tobin (1978) and Dornbusch (1976) recommended that a tax on foreign exchange transactions would reduce volatility. Asking a question similar to this study, Frankel and Meese (1987) used several techniques to assess the out-of-the-sample forecasting properties of typical exchange-rate models. They found that the models were not satisfactory even after the consideration of rational expectations, risk premia, "peso-problems," bubbles, etc. Flood (1987, p. 157) recommended asking ourselves the following question: "Have flexible exchange rates in other episodes been inexplicably *more variable than other asset prices?*" This is the criterion that will be used to assess "excessiveness" in this study.

Early work on the volatility of exchange rates as an asset price (e.g., Frenkel, 1981; Bergstrand, 1983) used measures of unconditional variability and monthly data. More recently, researchers (Lastrapes, 1989; Engle, Ito, & Lin, 1990) have phrased the problem in terms of a variance process over time (autoregressive conditional heteroskedasticity, ARCH) and have estimated volatility of weekly and daily series. The first approach led to the conclusion that exchange rates are probably no more volatile than other asset prices. Using the second, modeling variance as