Error Correction Exchange Rate Modeling: Evidence for Mexico

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Abstract

A set of error correction models are proposed for the nominal exchange rate between the Mexican peso and the United States dollar. The basic theoretical frameworks utilize balance of payments and monetary constructs. Empirical estimation results are fairly weak for both specifications irrespective of the interest rate variable selected. Although dynamic simulation properties of the equations are acceptable, in no case do they generate levels of accuracy that exceed those associated with a random walk. (JEL F31)

Introduction

Nominal exchange rate analysis continues to be an area of strong interest for applied econometric research. In spite of many years of theoretical and statistical modeling efforts, numerous conceptual and empirical mysteries remain prominent within this particular field of economic analysis. Among developing economies, Mexican currency movements continue to receive enormous amounts of attention from scholars as well as policy analysts and market traders. The latter is reflective of both Mexico's importance in global financial markets as well as its periodic large-scale devaluations during the past quarter century.

The objective of this paper is to examine the empirical behavior of the peso/dollar exchange rate during the 1976-2000 era in which Mexico abandoned its traditional fixed peg approach to currency policy. Because exchange rate markets exhibit both short-run and long-run behavioral characteristics, an error-correction modeling framework is utilized. Although the analysis is carried out with respect to Mexico, regional moves toward flexible exchange rates imply that the topic is also of interest to other economies in Latin America. Data availability will influence the ultimate applicability of the steps taken herein with respect to other currency markets in the hemisphere.

Organization of the paper is as follows. The second section provides a brief review of the literature. The third section summarizes the theoretical models underlying the econometric
analysis. Data and empirical results are reviewed in the fourth section. A summary and suggestions for future research comprise the conclusion of the study.

Literature Review

As discussed by Isard (1987), numerous factors affect nominal exchange rate movements. Examples include national price levels, global interest rates, and international balances of payments. Cointegration and error-correction theory suggest that short-run as well as long-run factors also play potentially important roles in developments observed in currency and other financial markets (Engle and Granger 1987; Modeste and Mustafa 1999). Under such a framework, long-run forces on the dependent variable of interest are represented by variables in level form. System short-run dynamics are captured by the error-correction mechanism built into the model.

With respect to non-random components of exchange rate behavior, Macdonald (1995) argues that a substantial body of empirical evidence supports the existence of some form of long-run relationship between relative prices and exchange rates. This frequently does not conform to traditional purchasing power parity (PPP) constructs and implies that successful modeling efforts must generally be carried out within a dynamic context. His findings are incorporated with a discussion of the applicability of dynamic exchange rate modeling in conclusion. Along these lines, Baillie and Selover (1987) test whether a version of the sticky price variant of the monetary model can produce a valid cointegrating vector. Similarly, McNown and Wallace (1994) find partial empirical support for PPP for countries that have experienced high rates of inflation. In particular, models combining monetary and PPP characteristics are found to provide plausible specifications for exchange rates in Latin American countries with high rates of liquidity growth relative to the United States.

In general, most evidence favorable to PPP has involved either extensive time periods or large differences in price movements between country pairs except for the notable cases presented by Choudhry, McNown, and Wallace (1991). Formal recognition that exchange rate behavior is also influenced by variations in international balance of payments trends has long characterized much of the work in this field. Models developed by Dornbusch (1976) and Dornbusch and Fischer (1980) involve simultaneous determination of the exchange rate, prices, and the current account. These studies indicate that long-run equilibrium exchange rate levels are dependent upon stationary net foreign asset positions, i.e., balanced current account positions.

Granger (1981) provides some of the initial evidence on the implications of cointegrating and error correction relationships for econometric model specification. Subsequent work by Engle and Granger (1987) offers time series insights into the reasons why simple models may fail to provide statistically defensible equation fits, or forecasts, of nominal exchange rates. Reinton and Ongena (1999) take advantage of these advances to design structural exchange rate models for the Norwegian currency market. Results for both flexible- and sticky-price monetary constructs indicate that error correction equations incorporating long-run proportionality between exchange rates and money growth differentials will outperform random walk currency predictions in statistically significant manners.

Kim and Mo (1995) utilize a multivariate cointegration technique to generate long-run forecasts of the dollar/Deutsche Mark (DM) exchange rate. Empirical results suggest that a random walk outperforms short-run monetary model forecasts, but that error-correction formulations of the structural model generate superior long-run out-of-sample predictions of this exchange rate relative to the random walk. Fritsche and Wallace (1997) also employ cointegration methods in comparing forecasts of error-correction versions of the PPP hypothesis to a random walk. Mixed results obtained therein partially support PPP.