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Mean reversion in long-horizon real exchange rates: Evidence from Latin America☆

Pablo Astorga

Institut Barcelona de Estudis Internacionals (IBEI), Elisabets 10, 08001 Barcelona, Spain

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A B S T R A C T

This paper examines mean reversion in real effective exchange rates in six leading Latin American economies during the XXth century using a new data set. A unit-root approach is complemented by an error-correction model including key fundamentals such as terms of trade, trade openness and relative productivities. Unit-root testing shows a very slow process of reversion – if any – to a constant mean in the original series, rejecting the strict PPP hypothesis; however, mean reversion is found after allowing for trends and structural breaks with a half-life average of 1½ years for the six countries. We also found reversion to a conditional mean defined by the co-integrating relationship with an average half-life of 2½ years. Our estimates, although lower than the 3–5 year range that motivated the Rogoff's puzzle, still indicate the presence of important obstacles to the adjustment process that need further investigation.

1. Introduction

Long-run quantitative research on countries of the periphery remains an exotic subject: both interesting and elusive. Interesting by virtue of these countries' distinct features, varied experiences and, somehow, from a combination of failure and success in their development efforts. Elusive as a consequence of data limitations. For such countries "periphery" denotes a double condition. On the one hand, it describes their subordinate position in the world economic system and, on the other hand,

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E-mail address: pastorga@ibei.org.

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refers to a relatively marginal attention paid to them by economic studies, particularly those focusing on the long term.

The revival of research on the behaviour of real exchange rates (RER) over a long time horizon conforms to this situation. One key concern of such research is assessing the validity of the Purchasing Power Parity (PPP) as an equilibrium condition for the nominal exchange rate.[1] The PPP doctrine requires that real exchange rates exhibit mean reversion. That is, that the impact of shocks should be temporary, and that, in the absence of further disturbances, the RER should move back towards its mean value. Recent unit-root studies (which conditioned the real exchange rate on its lagged values) covering a time span of over a century or more, largely in developed economies, have supported the PPP hypothesis by finding mean reversion in real exchange rate series. Mark Taylor (2003) provides a relatively recent survey on this empirical work. Meanwhile, Alan Taylor (2002) extended the long-run analysis to a set of twenty countries and also found support for PPP – although after allowing for deterministic trends in a number of cases. This outcome is at odds with most of the evidence coming out of the analysis during the post Bretton Woods period dominated by the floating of the major currencies (Adler and Lehmann, 1983; Enders, 1988).

A commonly-used measure of the speed of mean reversion is the half-life of the process.[2] The prevailing consensus in the long-span and panel unit-root studies focusing on industrialised economies is that the half-life process of real exchange rates (in levels) ranges between 3 and 5 years (Rogoff, 1996; and Frankel and Rose, 1996), an outcome that motivated the Rogoff's puzzle.[3] However, this apparent slow speed of reversion can be caused in part by trend behaviour or/and the presence of one or more structural breaks, implying the absence of a constant mean for the entire period (i.e., a departure from the strict PPP hypothesis). For instance, Taylor (2002) reports half-lives for the detrended series in the range of 2–3 years, while Lothian and Taylor (2008), after allowing for shifts in the equilibrium dollar-sterling real rate over two centuries, suggest that the half-life deviations from PPP may be as low as 2½ years (compared to 6 years in the original series). Also, Hegwood and Papell (1998) found in their long-span study of six RER series (all from OECD economies) that reversion to the changing mean is much faster than reversion to a fixed mean. After accounting for structural breaks, they estimated half-life values of between 0.5 and 2½ years.

In recent years the possibility that the RER adjustment process may be non-linear has increasingly received attention by researchers (e.g., Taylor et al., 2001; Sager, 2006). For instance, deviations from parity can persist in the presence of transaction costs affecting the arbitrage of international goods, while large deviations will be offset. In addition, non-linearity implies that adjustments to large deviations from equilibrium are made quicker (e.g., because it increases the likelihood of an intervention from the monetary authority) whilst small deviation can be more persistent. This seems to be particularly relevant for the case of pegged regimes (Taylor, 2004).

The inclusion of trends and shifts in the unit-root studies can be interpreted as the need to account for systematic movements of the equilibrium RER (i.e., departing from the constant mean assumption) which may reflect the action of fundamentals (Lothian and Taylor, 2008; Taylor, 2002). The empirical modelling of the role of fundamentals usually involves the use of a co-integration equation to capture the long-run equilibrium and the associated error-correction specification (ECM) to estimate the speed of adjustment (in this case to time-varying equilibrium).[4] For instance, using this approach, Clark and MacDonald (1998) in their analysis of the US dollar exchange rate system (including rates to seven key trading partners) during the period 1960–1996 found that when deviations are measured relative to a changing RER equilibrium a much faster mean reversion results with 40% of the gap between the actual and the equilibrium rate closed within a year (equivalent to half-life values of about 1½ years.

[1] In its absolute version, PPP states that the equilibrium nominal exchange rate between two countries will equal the ratio of the countries' price levels. In its relative version it states that the nominal exchange rate equilibrium will change according to the relative change in the countries' price levels.

[2] The number of years that it takes for deviations from equilibrium to subside permanently below 0.5 in response to a unit shock in the level of the series.

[3] Rogoff (1996) argues that the estimated speed of adjustment of real exchange rates is difficult to justify in terms of wage or price stickiness, or shocks related to real factors such as technology or tastes.

[4] See MacDonald (1998) for a survey.