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A panel project on purchasing power parity: Mean reversion within and between countries

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Abstract

Previous time-series studies have shown evidence of mean-reversion in real exchange rates. Deviations from purchasing power parity (PPP) appear to have half-lives of approximately four years. However, the long samples required for statistical significance are unavailable for most currencies, and are potentially inappropriate because of regime changes. In this study, we re-examine deviations from PPP using a panel of 150 countries and 45 annual post WWII observations. Our panel shows strong evidence of mean-reversion that is similar to that from long time-series. PPP deviations are eroded at a rate of approximately 15% annually, i.e., their half-life is around four years. Such findings can be masked in time-series data, but are relatively easy to find in cross-sections.

Key words: long-run; cross-section; time-series; real; exchange rate; inflation; variation

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1. Introduction

Purchasing power parity (PPP) is one of the most important theoretical concepts in international economics. Empirical work on the topic has most

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often used time-series data to compare the percentage changes in bilateral exchange rates with inflation differentials. Many early studies were based on short or medium-length time series, often consisting of post-1973 observations for a few major industrialized countries. They typically did not find strong evidence of PPP.[1] Concerned about inadequate power in their tests, researchers then turned to longer time samples, frequently up to a century or more of time-series data.[2] With longer samples, the evidence has swung back in favor of some long-run tendency toward PPP. At length, consensus has emerged from this literature that there is in fact a moderate tendency for real exchange rates to converge towards a long-run equilibrium. The half-life of PPP deviations appears to be around four years. Froot and Rogoff (1994) provide an excellent critical survey and review of this literature.

This short paper is an empirical re-examination of PPP. Instead of a time-series approach, we use a panel data set of 45 years of post WWII annual data for 150 countries. One motivation of the study is to reiterate the point that the ability to find evidence of PPP depends crucially on the total variation in the data used (including both the number of observations and their variability). A second motivation is to avoid concerns about the use of long time series, since they include potentially serious structural shifts. A typical 100-year or 200-year sample for the pound/dollar rate, for example, includes several shifts between fixed rates, floating, and intermediate regimes. It has been well known since at least Mussa (1986) that real exchange rates behave very differently under different exchange rate regimes. Thus it is reasonable to suppose that the speed of PPP adjustment may also vary with the nature of the exchange rate regimes. Our cross-section approach makes it possible to confine the estimation to the post-1973 period of generalized (dollar) floating, and still have plenty of data for powerful tests.[3]

[1] Examples include: Roll (1979), Frenkel (1981a), Frenkel (1981b),Adler and Lehman (1983), Darby (1981), Mishkin (1984), and Piggott and Sweeney (1985).

[2] Examples include Abuaf and Jorion (1990), Edison (1987), Edison and Klovland (1987), Frankel (1986), Frankel (1989), Froot and Rogoff (1994), Kim (1990), and Lothian and Taylor (1993).

[3] This approach has also been pursued independently on smaller panels of post-Bretton Woods OECD data by Lothian (1994), Wei and Parsley (1995), Wu (1994); see also Jorion and Sweeney (1994) and Taylor (1988). Reassuringly, all three studies find strong evidence that PPP tendencies can be found with panel data, a result consistent with our paper. Lothian uses both of our econometric techniques on 22 partners of the United States during the recent dollar float; Wei and Parsley use more dis-aggregated data for 91 country pairs during the post-1973 era, and find that the half-life of PPP deviations is between four and five years; Wu also rejects a unit-root in the real exchange rate on the basis of a panel of recent data. MacDonald (1995), Oh (1995), Papell (1995), and Pedroni (1995) also provide recent papers with similar and complimentary approaches and findings.