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Purchasing power parity and the theory of general relativity: the first tests

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Abstract

We implement novel tests of general relative purchasing power parity (PPP), defined as a long-run unit elasticity of the nominal exchange rate with respect to relative national prices, allowing for potentially permanent real exchange rate shocks. The finite-sample properties of the estimators used are analyzed through Monte Carlo analysis, allowing for country heterogeneity, cross-sectional dependence and non-stationary disturbances. Application to panel data sets of industrialized and developing economies reveals that inflation differentials are on average reflected one-for-one in long-run nominal exchange rate depreciation—i.e. that general relative PPP holds.

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1. Introduction

Purchasing power parity (PPP) involves a relationship between a country's foreign exchange rate and the level or movement of its national price level relative to that of a foreign country. *Absolute PPP* states that the purchasing power of a unit of domestic currency is exactly the same in the foreign economy, once it is converted into foreign currency at the absolute PPP exchange rate. *Relative PPP* implies that changes in national price levels are offset by commensurate changes in the nominal exchange rates between the relevant currencies. The voluminous research literature on PPP published in recent decades has been driven by econometric problems relating to univariate and panel unit root tests of necessary conditions for long-run absolute PPP to hold, in particular whether the real exchange rate has any tendency to settle down to a long-run equilibrium level.¹ These include issues such as low power, possible structural breaks, the mixture of stationary and non-stationary error terms in the relevant regressions, and neglected cross-sectional dependence when real exchange rate panel data are used.

In this paper, we generalize the concept of long-run *relative PPP* to the case where the *long-run* elasticity of the nominal exchange rate with respect to relative national prices is unity without restricting the innovation sequence to be stationary. This is what we term *general relative PPP*. We then develop methods to test for general relative PPP in a panel regression framework that is robust to country heterogeneity and cross-sectional dependence as well as—most importantly—permanent and transitory shocks to the real exchange rate. Thus, we allow for the long-run equilibrium real exchange rate to shift while still testing for a long-run unit elasticity of the nominal exchange rate with respect to the price relative.

In contrast, the extant empirical analysis of PPP generally precludes permanent shocks to the long-run real exchange rate. It is widely accepted, however, that over long periods, real shocks may permanently impact on the long-run equilibrium real exchange rate level due to productivity differentials as in the Harrod-Balassa-Samuelson effect (Froot and Rogoff, 1995; Sarno and Taylor, 2002; Lothian and Taylor, 2004; Bergin et al., 2003). By exploiting recent developments in the econometrics of non-stationary panel data, we can accommodate such shocks alongside transitory or monetary shocks. Moreover, Taylor (2001) has demonstrated how two problems—trading costs and risk aversion on the one hand and temporal aggregation on the other—can make the regression errors of nominal exchange rates on price relatives appear rather persistent or even non-stationary. In developing our test procedures, we extend the relevant econometric literature to allow for cross-sectional dependence and mixed stationary and non-stationary errors and compare the finite-sample properties of several panel estimators using Monte Carlo simulations.

Our empirical analysis is based on a unique, large data set for the 1970:1–1998:12 period that comprises 19 Organizations for Economic Cooperation and Development (OECD) member countries and 26 developing countries and both consumer price

¹ See Taylor (1995), Sarno and Taylor (2002) and Taylor and Taylor (2004) for overviews.

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