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Purchasing power parity and country characteristics: Evidence from panel data tests

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Abstract

We examine long-run purchasing power parity (PPP) using panel data methods to test for unit roots in US dollar real exchange rates of 84 countries. We find stronger evidence of PPP in countries more open to trade, closer to the United States, with lower inflation and moderate nominal exchange rate volatility, and with similar economic growth rates as the United States. We also show that PPP holds for panels of European and Latin American countries, but not for African and Asian countries. Our findings demonstrate that country characteristics can help explain both adherence to and deviations from long-run PPP.

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1. Introduction

Purchasing Power Parity (PPP) has been one of the most enduring concepts in international economics. In its strongest form, absolute PPP implies that one could buy the same basket of goods in any country for the same value when prices are denominated in a common currency. This concept is based on the law of one price, which presumes that arbitrage in a wide range of goods equalizes prices across countries. After the collapse of the gold standard during World War I, Cassel (1922) proposed the use of PPP to restore relative gold parities. He suggested that countries set their post-war exchange rates according to PPP by setting the change in their post-

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war and pre-war exchange rates equal to the difference between their post-war and pre-war inflation rates. Since that time, economists have used PPP in setting and forecasting exchange rates, in adjusting for cross-country incomes to account for differences in prices and as a foundation of models in international macroeconomics.[1]

Despite a vast empirical literature, many questions remain regarding the validity of PPP. Since short-run PPP is almost never an economically relevant proposition, empirical investigation has focused on long-run PPP. This usually involves testing for unit roots in real exchange rates. If the test rejects the unit root hypothesis, the real exchange rate reverts to its mean and long-run PPP holds. In addition, because price indexes are used to construct real exchange rates, these methods are necessarily tests of a weaker, relative, form of PPP. Since the price indexes are equalized in an arbitrary base year, what can be tested is whether relative prices denominated in the same currency revert to a constant long-run mean, not whether one could ever buy the same basket of goods for the same prices in different countries.

The first studies on PPP in developed countries use univariate Augmented Dickey–Fuller (ADF) tests with post-1973 flexible (nominal) exchange rate data and often do not find evidence for long-run PPP.[2] A common explanation why these studies mostly failed to find evidence of PPP is the lack of power of unit root tests in small samples. To address the small sample problem, researchers use long horizon (up to 200 years) data of developed countries and generally show stronger rejections of the unit root hypothesis. However, long horizon data combine fixed and floating exchange rate periods and cannot determine whether PPP would hold over a century (or more) of a stable exchange rate regime.[3]

To address the low power of the univariate unit-root tests with post-1973 data, researchers have turned to panel methods that allow for cross-section variation, as developed by Levin et al. (2002) and Im et al. (2003). The empirical evidence has been, overall, supportive of PPP. While early studies such as Frankel and Rose (1996) and Jorion and Sweeney (1996) find strong support for PPP, work incorporating serial correlation in Papell (1997) and contemporaneous correlation in O'Connell (1998) find much weaker evidence. More recently, panel unit root tests that extend post-1973 quarterly real exchange rate data with the US dollar as numeraire currency through 1997 or 1998 tend to provide strong support of PPP for developed countries. Examples of this work include Higgins and Zakrajšek (2000), Wu and Wu (2001) and Papell (2006). Papell and Theodoridis (2001) show stronger rejections of the unit root hypothesis with European rather than non-European numeraire currencies.

For less developed countries, panel unit root tests have not provided much support of PPP. Using real exchange rates constructed from price indexes and black market quotations of nominal exchange rates, Phylaktis and Kassimatis (1994) reject the unit root hypothesis for eight Pacific Basin countries. Oh (1996) uses data from Summers and Heston's (1991) Penn World Table and mostly fails to reject the unit root hypothesis in real exchange rates of less developed countries during the flexible rate period. Both studies use Levin et al. (2002) tests. Holmes (2001) uses

[1] Rogoff (1996) surveys the literature on PPP.

[2] Early investigations of PPP sometimes also tested for cointegration among nominal exchange rates, domestic price levels and foreign price levels, and rejection of the null hypothesis of no cointegration was interpreted as even weaker evidence of long-run PPP. Cointegration, however, is a necessary but not a sufficient condition for long-run PPP, which holds only if domestic and foreign prices are symmetric and relative prices and the nominal exchange rate are proportional.

[3] Another approach is to use more powerful univariate tests. Cheung and Lai (2000), using the DF-GLS tests of Elliott et al. (1996), report more rejections of the unit root hypothesis, but mostly at a weak (10%) significance level. Elliott and Pesavento (2004) and Amara and Papell (2006) find stronger rejections using covariate-augmented tests.