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Testing the monetary model of exchange rate determination: a closer look at panels

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Abstract

In this paper, we undertake an extensive evaluation of panel tests of the long-run monetary model of exchange rate determination. We first show how poorly the monetary model performs on a country-by-country basis for US dollar exchange rates over the post-Bretton Woods period for a large number of industrialized countries. In sharp contrast, we find considerable support for the monetary model using panel procedures, as in Groen (2000) and Mark and Sul (2001). Given the disparity in the country-by-country and panel approaches, we carefully analyze the homogeneity restrictions inherent in the panel procedures. The evidence on the appropriateness of the homogeneity restrictions is mixed. In the end, whether the monetary model conforms to post-Bretton Woods data largely depends on one's prior beliefs.
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1. Introduction

Empirical studies investigating the monetary model of exchange rate determination on a country-by-country basis over the modern floating exchange rate period find virtually no support for this long-standing theoretical model. In particular, empirical studies typically fail to find evidence of a cointegrating relationship between the nominal exchange rate and a simple set of monetary fundamentals—as

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required by the "long-run" monetary model—on a country-by-country basis during the modern float; see, for example, Meese (1986), Baillie and Selover (1987), McNown and Wallace (1989), Baillie and Pecchenino (1991), and Sarantis (1994). Even studies that find evidence of cointegration between nominal exchange rates and monetary fundamentals during the modern float lend little support to the monetary model, as the estimated cointegrating vectors themselves often fail to conform to the monetary model. For example, Cushman (2000) finds evidence of cointegration between the US dollar–Canadian dollar exchange rate and a set of monetary fundamentals over the modern float, but the estimated cointegrating coefficients differ widely from those predicted by the monetary model. Cushman (2000) therefore concludes that there is no support for the monetary model in US–Canadian data.[1]

It is not surprising that the monetary model performs poorly on a country-by-country basis during the modern float, as long-run purchasing power parity (PPP)—a building block of the monetary model—also fares poorly on a country-by-country basis during this period. That is, there is little evidence that nominal exchange rates and relative price levels cointegrate, as required by long-run PPP, on a country-by-country basis.[2] The failure of long-run PPP is typically attributed to the short spans of data available during the post-Bretton Woods float, so that standard tests (which take no cointegration as the null hypothesis) have extremely low power to reject the null hypothesis of no cointegration using data from the post-Bretton Woods period.[3] A popular response to the problem of low power in the PPP literature is the use of panel data, and, as initially shown by Levin and Lin (1992), combining cross-sectional and time-series information in the form of a panel can greatly increase the power of unit root and cointegration tests. In fact, a number of panel studies find support for long-run PPP using data from the post-Bretton Woods period, including Pedroni (1995), Frankel and Rose (1996), Oh (1996), Wu (1996), Papell (1997), and Taylor and Sarno (1998).

Two recent studies by Groen (2000) and Mark and Sul (2001) follow the PPP literature and test the monetary model using panels of post-Bretton Woods data. Groen (2000) considers a panel of US dollar nominal exchange rate, relative money supply, and relative real output level data for 14 industrialized countries covering the period 1973:1–1994:4. He obtains panel cointegration coefficient estimates that are reasonably consistent with the monetary model for his full panel

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[1] As another example, MacDonald and Taylor (1994) find evidence of cointegration between the US dollar-UK pound exchange rate and a set of monetary fundamentals using data covering 1976–1990, but their cointegrating vector is difficult to interpret theoretically. MacDonald and Taylor (1994) are only able to make the relatively weak assertion that the cointegrating vector "does not, in fact, do great violence to the monetary model."

[2] For surveys of the PPP literature, see Breuer (1994), Froot and Rogoff (1995), Taylor (1995), Rogoff (1996), and Sarno and Taylor (2002).

[3] As shown by Shiller and Perron (1985); Hakkio and Rush (1991), and Otero and Smith (2000), it is the span of the data, and not their frequency, that determines the power of unit root and cointegration tests.