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Cross-section dependence and the monetary exchange rate model – A panel analysis

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ABSTRACT

This paper tackles the issue of cross-section dependence for the monetary exchange rate model in the presence of unobserved common factors using panel data from 1973 until 2007 for 19 OECD countries. Applying a principal component analysis we distinguish between common factors and idiosyncratic components and determine whether non-stationarity stems from international or national stochastic trends. We find evidence that the common factors are $I(1)$ while the idiosyncratic components are $I(0)$. This finding indicates that cross-member cointegration exists and non-stationarity in exchange rates and fundamentals is mainly driven by common international trends. We find evidence that the common factors of the exchange rates and fundamentals are cointegrated. In addition, the estimated long-run coefficients of this common international relationship are in line with the suggestions of the monetary model with respect to income and money.

1. Introduction

The question whether exchange rates are cointegrated with fundamental factors is still a controversial research area in economics. On a country base, the results crucially depend on the sample and the

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countries under investigation. Although fundamental factors suggested by the monetary model have mostly been unsuccessful at forecasting exchange rates, a result first highlighted in the seminal study by Meese and Rogoff (1983), many studies have found evidence of a long-run relationship between exchange rates and fundamentals when more sophisticated econometrics such as non-stationary panel methods are applied.[1]

In the context of market efficiency and exchange rates, another strand of literature focuses on the question whether major exchange rates share common stochastic trends or, more precisely, whether co-movements between exchange rates can be identified. Considering that the forex market is one of the world most unregulated financial markets, the issue of cross-section cointegration seems important in this context. If for instance, the US dollar appreciates against a particular currency, safe arbitrage opportunities are immediately ruled out by other exchange rate movements.[2] Evidence for this kind of relationships has been found both before and after the introduction of the Euro by different authors (see, e.g., Haug, MacKinnon, & Michelis, 2000; Kühl, 2010).

Kühl (2008) shows that not only exchange rates share common stochastic trends but that also cointegration between fundamentals across the economies exists. For instance, cointegration across countries might occur if monetary policies are coordinated to limit exchange rate fluctuations such that currency prices cannot permanently diverge from each other (Phengpis & Nguyen, 2009).

Evident, the issue of co-movements is of crucial importance when more than one economy is analysed simultaneously. Compared to country by country studies, panel data analyses of the monetary model have the advantage to increase the sample size and ceteris paribus lead to more precise estimates due to the improved statistical power. Considering that the empirical evidence for the monetary model is country and sample dependent, it seems advisable to analyse several countries simultaneously when focusing on exchange rates.

However, first generation panel unit root and cointegration tests do not account for any relationship of dependency across countries. Breitung and Pesaran (2008) proposed similarly that in many empirical analyses, especially those on the exchange rate, it is inappropriate to assume that cross-section members are independent. Indeed, the assumption of independence is usually not valid, in particular in the analysis of macroeconomic or financial data that have strong inter-economy linkages (Urbain & Westerlund, 2006), such as exchange rates and income used in our analysis. Moreover, the presence of cointegration between these exchange rates and/or fundamentals, i.e. cross-section cointegration, can have distortionary impacts on the panel inference as showed by Banerjee, Marcellino, and Osbat (2004) by means of simulation experiments. Thus, they argued that the conclusions of many empirical studies may be based upon misleading inference since the assumption of independent panel members is often likely to be violated because of economic linkages across those members (see Banerjee, Marcellino, and Osbat (2005) for evidence of cointegration between exchange rates.)

However, Wagner and Hlouskova (2010) stated that this for many empirical analyses unrealistic assumption is still commonly used for the development of panel cointegration techniques. One reason might be that the asymptotic theory is still more complicated in panel econometrics due to the introduction of the cross-section dimension in addition to the time series dimension while it is even less straightforward in the presence of cross-section dependence. Additionally, the presence of unobserved $I(1)$ common factors arises the problem of potential cross-section cointegration. Hence, only few so-called second generation panel tests have been recently developed that allow for different forms of cross-section dependence. Moreover, no consensus regarding the strategy to model cross-section dependence has yet been reached (Wagner & Hlouskova, 2010). Since the panel cointegration analysis is a relatively nascent area of research, it is not surprising that most panel data studies do not consider cross-section dependence so far.

[1] In the time series dimension these econometrics include non-linear approaches such as non-linear error correction models (see, e.g., McMillan, 2005; Taylor & Peel, 2000; Taylor, Peel, & Sarno, 2001) or models with time varying coefficients (see, e.g., Frömmel, MacDonald, & Menkhoff, 2005a, 2005b; Goldberg & Frydman, 2001; Yuan, 2011).

[2] Although Granger (1986) raised the argument that cointegration between two or more asset prices violates the weak form of market efficiency due to the predictability of asset prices based on the past prices of other assets, it is controversially discussed whether cointegration between exchange rates actually implies market inefficiency (see, e.g., Phengpis & Nguyen, 2009).