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Measuring the dollar–euro permanent equilibrium exchange rate using the unobserved components model☆

Xiaoshan Chen [a, *], Ronald MacDonald [b]

[a] Durham University Business School, Mill Hill Lane, Durham DH1 3LB, UK
[b] Economics, Adam Smith Business School, Gilbert Scott Building, University of Glasgow, Glasgow G12 8QQ, UK

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ABSTRACT

This paper employs an unobserved component model that incorporates a set of economic fundamentals to obtain the Euro–Dollar permanent equilibrium exchange rates (PEER) for the period 1975Q1 to 2008Q4. The results show that for most of the sample period, the Euro–Dollar exchange rate closely followed the values implied by the PEER. The only significant deviations from the PEER occurred in the years immediately before and after the introduction of the single European currency. The forecasting exercise shows that incorporating economic fundamentals provides a better long-run exchange rate forecasting performance than a random walk process.

1. Introduction

The Euro–Dollar exchange rate has become the pivotal exchange rate in the international monetary system, much as the German mark–US dollar rate was prior to the formation of the euro. Since its launch in 1999, the Euro–Dollar exchange rate has experienced large fluctuations. As Fig. 1 shows, it

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* Corresponding author.
E-mail addresses: xiaoshan.chen@durham.ac.uk (X. Chen), Ronald.MacDonald@glasgow.ac.uk (R. MacDonald).

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depreciated steadily from 1999 to 2002 before steadily rising until 2008. This behaviour has puzzled many commentators because it did not seem to be warranted by the traditional set of economic fundamentals (see, for example, Belloc and Federici, 2010). Indeed, at the inception of the Euro the perceived wisdom was that it would stay at parity with the US dollar. The study of such anomalous behaviour has given rise to a growing literature that investigates the relationship between the Euro–Dollar exchange rate and economic fundamentals. They include the productivity differential between Europe and the US (Corsetti and Paolo, 1999; Alquist and Chinn, 2002; Schnatz et al., 2004; Miller, 2008); the growth rate, inflation differentials, current account patterns (De Grauwe, 2000; De Grauwe and Grimaldi, 2005); interest rate differentials and relative rates of return in the US and euro area (Bailey et al., 2001; Heimonen, 2009). Others have focused on non-fundamental factors, such as order flows (Dunne et al., 2010); different quoting activity of investors in response to announcements (Omrane and Heinen, 2009) and the existence of chaotic dynamics in the Euro–Dollar exchange rate when investors have heterogeneous beliefs (Federici and Gandolfo, 2012).

Despite the large body of research in this area, the depreciation of the Euro against the dollar remains a puzzle. Understanding movements of the Euro–Dollar exchange rates also remains an important issue for both academics and policy makers. In this paper, we study the equilibrium values of the Euro–Dollar exchange rate as, in theory, a currency's value should gravitate in the direction of its long-run equilibrium over time.

There are a large variety of methods available for calculating a country's equilibrium exchange rate, from the internal-external balance approach, to the behavioural and permanent equilibrium approaches (BEER and PEER), through to the new open economy macroeconomic (NOEM) approach (see MacDonald (2000) and Driver and Westaway (2005) for a survey of the literature). All of these approaches have their own advantages and disadvantages.[1] This is perhaps why end users (such as central banks and practitioners) use a range of estimating techniques in coming to a view as to whether an exchange rate is misaligned.

In this paper we focus on an extension to the so-called PEER approach. In summary, this approach relies on decomposing an actual real exchange rate into its permanent and transitory components, and then using the permanent component as a measure of the equilibrium exchange rate. A variety of time series methods have been used to extract the permanent component including the Beveridge and Nelson (1981) decompositions (Huizinga, 1987; Cumby and Huizinga, 1990), structural vector autoregression (Clarida and Gali, 1994), cointegration-based methods (Clark and MacDonald, 2004), and the unobserved components (UC) approach (Berger and Kempa, 2011).

This paper estimates the Euro–Dollar PEER using the UC framework. However, in contrast to the UC model specification in Berger and Kempa (2011), which is based on a small open economy model, our UC model incorporates a set of economic fundamentals that are most frequently applied when using the BEER approach (see Clark and MacDonald, 1999). We analyse the PEER, instead of a BEER, because there are two major advantages of using the UC model specified in this paper to obtain the PEER. First, compared to the BEER approach, our UC model setup clearly distinguishes between the impact of the long-term and short-term components of an economic fundamental on the real exchange rate. This helps us to separate business cycle factors from the equilibrium exchange rate movements. This addresses the weakness of the BEER approach discussed in Égert et al. (2006). Second, the UC model enables us to obtain true, ex-ante exchange rate forecasts incorporating long-run relationships between the real exchange rate and economic fundamentals. In contrast to the VECM or error correction models used in MacDonald and Taylor (1994), Chinn and Meese (1995) and Cheung et al. (2005), we do not have to impose a pre-estimated cointegration vector or long-run relationship prior to producing

[1] The equilibrium exchange rate determined under the internal-external balance framework requires that any current account imbalance must be sustainable. However, this approach contains a normative element in defining what is meant by sustainability and internal balance. In contrast, the BEER approach is not normative. The exchange rate relationship determined under the BEER approach is subject to statistical testing. However, the BEER is consistent with the observed economic fundamentals. Therefore, business cycle factors may contribute heavily to the measure of equilibrium exchange rates. Finally, the NOEM models assume the optimising behaviour of consumers that has implications for the current account and exchange rates. However, the NOEM models cannot produce a trend appreciation of real exchange rates such as these observed for the Central and Eastern Europe economies (Égert et al., 2006).