The Quarterly Review of Economics and Finance xxx (2013) xxx–xxx

Contents lists available at ScienceDirect

The Quarterly Review of Economics and Finance

journal homepage: www.elsevier.com/locate/qref

Bond market co-movements, expected inflation and the GBP-USD equilibrium real exchange rate

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ARTICLE INFO

Article history:
Received 24 October 2012
Received in revised form 26 August 2013
Accepted 24 October 2013
Available online xxx

Keywords:
PPP
UIP
RIP
International parity conditions

ABSTRACT

Since the end of the fixed rates in 1973 and after the European Monetary System (EMS) sterling dismissal in 1992, the value of the pound has undergone large cyclical fluctuations on average. Of particular interest to policy makers is the understanding of whether such movements are consistent with the lack or not of a correction mechanism to some long-run equilibrium. The purpose of the present study is to understand those dynamics, how the external value of the British sterling (GBP) relative to the US dollar (USD) evolved during the recent floating experiences, and what have been the driving forces. In this paper we assume the real exchange rate to be determined by forces relating to the goods and capital market in a *general equilibrium* framework. This entails testing the purchasing power parity (PPP) and the uncovered interest parity (UIP) together. In doing so, we model inflation expectations explicitly. Our findings have two important implications, both for monetary policy. First, we show that some of the observed changes in the bilateral real exchange rate cannot be solely attributed to changes in inflation rates, but, also to capital markets. Secondly, we find a weaker behavior of the US bond rate on international markets, possibly explained by the special US dollar status of World reserve currency.

1. Introduction

Since the end of the fixed rates in 1973 and after the European Monetary System (EMS) sterling dismissal in 1992, the value of the pound has undergone large cyclical fluctuations on average. Of particular interest to policy makers is the understanding of whether such movements are consistent with the presence or not of a correction mechanism to some long-run equilibrium.

The purpose of the present study is primarily to understand those dynamics, how the external value of the British sterling (GBP) relative to the US dollar (USD) evolved during the recent floating experiences, and what have been the driving forces. In this paper we assume the real exchange rate (RER) to be determined by forces relating to the goods and capital market in a *general equilibrium* framework. Moving from the definition of two well known zero arbitrage conditions, the purchasing power parity (PPP) and the uncovered interest parity (UIP), it is assumed the RER observed deviations not to be exclusively explained by unidirectional inefficiencies on the goods markets (i.e. price stickiness, role of tradables vs. non-tradables goods, non linearities).[1] On the contrary these deviations are expected to involve real factors acting through the current account, as foreign net asset position or fiscal imbalances.[2] As the PPP does not to hold in the short run, the current account equality states that an increase in the domestic demand for goods can be satisfied by boosting imports and hence with a growing deficit on the balance of payment.[3] The latter can be financed by increasing the interest rate so to raise a relative supply of cash balances creating a wedge from one country to the other.[4] Using this approach, in a cointegrated VAR (CVAR) framework (Johansen,

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[1] The relation between exchange rates and national price levels might be affected by non linearities (international transaction costs) in the real exchange rate adjustments (Cheung & Lai, 1993; Peel, Sarno & Taylor, 2001). Equivalently sticky prices in local currency can lead to PPP deviations (Engel & Rogers, 1996).

[2] Edison (1987) argues that the failure of all prices to adjust *in unison* may be due to capital movements, changes in the international demand and other structural changes. See also Juselius (1991, 1992a, 1992b, 1995), Johansen and Juselius (1992), Pesaran, Smith and Shin (2000), Cheng (1999), Macchiarelli (2011a), and Macchiarelli (2013).

[3] From an empirical view point valid statistical results were achieved when the PPP was firstly tested as a long run condition. Milestone contributions (Edison, 1987; Lothian & Taylor, 1996; Sarno & Taylor, 2002; Taylor, 2002) found PPP to empirically hold in the long run (for one century data or more) with a half-life of about 4 years for the major industrialized countries. For a detailed overview see Frenkel (1980), Fisher and Park (1991), Froot and Rogoff (1994), Rogoff (1996), and Sarno and Taylor (2002).

[4] Zhou and Mahdavi (1996), among the others, provide evidence for the real exchange rate in the UK to appreciate against the US dollar as the gap between the UK cumulated current account to output ratio and the same ratio for the US grows.

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http://dx.doi.org/10.1016/j.qref.2013.10.008

1991, 1994), we are able to assess whether interest rates, prices and the real exchange rate are consistent with a UIP–PPP long-run equilibrium.

Based on previous empirical results, we deepen the evidence in favor of a PPP-UIP joint relation on two main grounds. First, we explore the "credibility" implicit in the special USD status as World reserve currency. This role is understood as a weaker behavior of the US bond yield in the system, possibly because of dollar-denominated assets appetite/safe-heaven effects. In particular, if a "special USD" status/safe heaven effect is to be observed in the data, the US bond yield should not necessarily be a driving force in a long run good-capital market equilibrium (especially to the extent that this equilibrium reflects fundamentals; e.g., relative inflation and real exchange rate). Instead investors' willingness to hold dollars and dollar denominated assets should exert downward pressure on both the US long term interest rate and the bilateral (£/$) spot nominal exchange rate, bringing them on a "bubble" path. Second, and most importantly, we assess the validity of previous empirical results (e.g., Johansen & Juselius, 1992; Jore, Skjerpen, & Swensen, 1993; Juselius & MacDonald, 2000, 2004; Pesaran et al., 2000; Sjoo, 1992) by including inflationary expectations, modeled here as long-run inflation forecast. In particular, with respect to the extant literature, modeling inflation expectations explicitly represents a useful addiction to the analysis as it allows to pay special attention to (i) *symmetry* and *proportionality* issues implicit in PPP/UIP testing; (ii) the role of accumulated shocks to nominal long term bonds onto inflation expectations. On this latter point, long term yields contain a premium for expected inflation, in line with the convention causality of Fisher's (1907) decomposition. Such a premium can be used as an important indicator of the credibility of a central bank's commitment to low inflation.

The reasons for focusing on the US vs. UK data owe to the fact that (i) the US is Britain's largest single export market, and (ii) the UK and the US are each other's single largest investor.[5] As discussed before, those are key features if one shares the idea that goods and capital markets may interact in keeping the exchange rate in line.[6] Moreover, when dealing with dollar-based bilateral parities, it is worth noticing that the dollar benefits from an "exceptional" reserve currency status (the "credibility" issue mentioned in earlier); the implication being a feebler interest rate pressure in the US. Agents' high willingness to hold dollar-denominated assets (Juselius & MacDonald, 2000; MacDonald, 1998) can possibly dampen the necessary US capital adjustment on international markets. Secondly, as interest rates in the US do not have to raise as much as in the UK to finance a given current account deficit, such a "status" for the USD will result into a weaker pressure over US current account imbalances. Especially the latter result implies that the argument according to which (short run) good markets misalignments may prompt a capital market reaction in the proportion of 1:1 is undermined in this setting.

To preview the results in the paper, we find that the special USD status possibly plays a role, as the US bond displays a weaker behavior on international markets, compared to the UK bond rate, and consistent with Juselius and MacDonald (2000). Inference based on a standard cointegration analysis (Johansen, 1991, 1994) shows moreover that – when inflation expectations are explicitly modeled – a combined UIP–PPP relation is found to hold as a long run condition, albeit not strictly mainly because of UK misalignments. Looking to the adjustment to the long run equilibrium, goods market adjustment is found to be very slow, whilst a major adjustment occurs on the capital and on the exchange rate markets. Nonetheless, the US bond rate is found to contribute to PPP-UIP misalignments by "pushing" in the opposite direction; reconciling with a failure of the UIP itself (e.g. Bekaert, Wei, & Xing, 2007; Macchiarelli, 2011a, 2011b, 2013), and possibly being consistent with a dollar appetite/safe heaven effect explanation. Finally, looking at how the accumulated empirical shocks to each variable affect the others, we find that shocks to the UK and the US long term yields respectively increase expected inflation in the US but not in the UK; consistent, in the former case, with a Fisherian (1907) view of nominal rates. Instead, the fact that empirical shocks to the bond rate do not increase expected inflation in the UK is broadly consistent with the idea that the relationship between the UK real rate and expected inflation tend to become very little at long horizons (see Barr & Campbell, 1997). Finally, the accumulated shocks to the RER significantly affect the expected inflation in the UK but not in the US. Those latter findings signal imperfect price/capital adjustments on the international markets, and may account for the widespread finding of rejection of the UIP/PPP conditions when tested separately.

Overall, our analysis has two important implications, both for monetary policy. First, we show that some of the observed changes in the real exchange rate can not be solely attributed to changes in inflation rates, but, also to capital markets, overall adjusting to a long run PPP-UIP equilibrium. When expected inflation is taken into account, this relationship is, anyhow, not found to hold strictly mainly because of UK misalignments. Secondly, we find a weaker behavior of the US bond rate on international markets, possibly explained by the special US dollar status of World reserve currency.

The reminder of the paper is organized as follows. Section 2 presents the theoretical model. Section 3 goes through the econometric strategy and the empirical results. Section 4 is devoted to summary and conclusions.

2. International parity conditions

With the purpose of proving co-movements between goods and capital markets, we aim at combining the PPP and the UIP relations. Capital markets are described by the UIP in its standard formulation, stating that for a financial instrument with l periods to maturity to be comparable in a home and a foreign economy it must be:

$$\frac{1}{l}\left(E_t s_{t+l} - s_t \,\middle|\, \Im_t\right) = E_t(\Delta^l s_{t+l} | \Im_t) = i_t^l - i_t^{l*} - \upsilon_t, \qquad (1)$$

where s is the (log) home vs. foreign nominal exchange rate and Δ is the difference operator, i_t^l represents the yield of a bond with maturity l at time t for the home country and υ_t is a time-varying risk-premium. $E_t(\cdot|\Im_t)$ is the expectation conditional on the information set, $\Im_t$, available at time t.

Eq. (1) suggests that the excess of home interest rate over the foreign one (i^{l*}), compounded over l periods, is equal to the

Throop (1993) analogously emphasizes the role of government budget deficits in determining *disequilibria* on the real exchange rate.

[5] Johansen and Juselius (1992) have first applied the testing of international parities condition for the case of UK versus a panel of trade weighted foreign countries. They analogously conclude that the "determination of prices, interest rates and exchange rates should be investigated in a balance of payment framework with interrelated movements in the current account and capital account" (Johansen & Juselius, 1992, p. 66). For an empirical extension see also Hunter (1991).

[6] Additionally, there is an obvious constraint in considering the same set of parities for, e.g., the euro area vs. the US, given the information on Treasury bond rates for the euro area is clearly missing. Also admitting an analysis of this kind could be replicated, the economic and policy interpretation of the results would be difficult, not only because of the aforementioned asymmetry on the EMU capital markets, but also because many exchange rate movements would be related to structural changes, especially at the beginning of the sample. Even if such an analysis could clearly bear on German bonds, this would possibly bias the effect on the existing spot nominal exchange rate. For a similar analysis applied to Germany and the US data see Juselius and MacDonald (2000).

Please cite this article in press as: Macchiarelli, C. Bond market co-movements, expected inflation and the GBP-USD equilibrium real exchange rate. *The Quarterly Review of Economics and Finance* (2013), http://dx.doi.org/10.1016/j.qref.2013.10.008