European Economic Review 57 (2013) 98–107

Contents lists available at SciVerse ScienceDirect

European Economic Review

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

# Revisiting the importance of non-tradable goods' prices in cyclical real exchange rate fluctuations

Ida Wolden Bache [a], Tommy Sveen [b,*], Kjersti Næss Torstensen [c,d]

[a] Handelsbanken, Norway
[b] Department of Economics, BI Norwegian Business School, Nydalsveien 37, N-0484 Oslo, Norway
[c] European University Institute, Italy
[d] Norges Bank, Norway

ARTICLE INFO

*Article history:*
Received 29 December 2010
Accepted 27 October 2012
Available online 7 November 2012

*JEL classification:*
F31
F41

*Keywords:*
Real exchange rates

ABSTRACT

In an influential paper Engel (1999) argues that essentially all the fluctuations in the real exchange rate can be attributed to fluctuations in the relative price of traded goods, and that only a small part of the fluctuations can be attributed to changes in the relative price of non-tradables. We revisit this important issue and our main finding suggests that the relative distribution wedge, i.e. the relationship between traded goods' prices at-the-dock and the retail prices of those goods, is key to understanding real exchange rate fluctuations. Importantly, our results suggest that variations in the relative wedge are driven by fluctuations in mark-ups and not in distribution costs.



## 1. Introduction

What drives fluctuations in real exchange rates? This is an important question in open economy macroeconomics. One key issue is whether volatility in the real exchange rate can be attributed to deviations from the law of one price of traded goods or to differential movements in the relative price of non-traded goods across countries. In traditional macroeconomic models the real exchange rate is driven entirely by the latter. In these models traded goods are assumed to obey the law of one price.

In an influential paper Engel (1999) finds that fluctuations in the price of non-traded to traded goods account for essentially none of the observed fluctuations in the real exchange rate based on consumer price indices (CPI). Specifically, using data for bilateral real exchange rates between several OECD countries and the US, he finds that over 90 percent of the fluctuations in the real exchange rate can be attributed to fluctuations in the relative price of traded goods.[1] Similar results are reported by Chari et al. (2002). This evidence has motivated much research on macroeconomic models that focus exclusively on traded goods prices in explaining the cyclical fluctuations in the real exchange rate (see, e.g. Betts and Devereux 1996, 2000; Chari et al., 2002).

An important issue when decomposing the real exchange is how to measure traded goods prices. Engel (1999) uses traded goods' prices at the retail level. Burstein, Eichenbaum and Rebelo (2005, 2006) argue, however, that a potential

* Corresponding author. Tel.: +47 46410097.
*E-mail address:* tommy.sveen@bi.no (T. Sveen).

[1] When Engel uses producer price indices (PPI) to measure traded goods' prices instead of retail prices, the relative importance of the fluctuations in the traded component in explaining fluctuations in the CPI-based real exchange rate is somewhat lower for Canada and some European countries. However, as Engel emphasises, there are several problems with using PPI.

0014-2921/$ - see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.euroecorev.2012.10.007

problem with this measure is that it is contaminated by non-traded components such as retailing and transportation.[2] Moreover, not all goods that are classified as tradables in the CPI are indeed traded. The use of retail prices may thus overestimate the importance of tradables. Using aggregate import prices and export prices at-the-dock, Burstein, Eichenbaum and Rebelo (2006, BER hereafter) find that the non-traded component accounts for about half of the fluctuations in the real exchange rate.[3] Likewise, using PPI to measure traded goods' prices, Betts and Kehoe (2006) find that the non-traded component accounts for about one fourth of the fluctuations in the US real exchange rate.[4] These results therefore suggest that the distinction between non-traded and traded goods is indeed important for understanding real exchange rate fluctuations, and that it was too early to abandon the traditional theory for understanding cyclical variations of the real exchange rate.

In this paper we revisit the importance of non-tradable goods' prices in cyclical real exchange rate fluctuations. To this end we decompose the real exchange rate into three terms: the relative price of traded goods at-the-dock, the relative retail price of non-traded to traded goods, and the relative distribution wedge. Variations in the latter could be caused by cross-country variations in local distribution costs or time-varying mark-ups reflecting non-constant demand elasticities and/or price stickiness. Along the way, we use our decomposition to understand why Engel and BER obtain so different results.

In Section 2 we derive the analytical decomposition. The apparatus is applied in Section 3 using quarterly data on bilateral real exchange rates between Australia, Canada, Denmark, Germany, Japan, New Zealand, Norway, UK, and US from 1980Q1 to 2007Q4. We find that movements in the relative distribution wedge on average account for close to 50 percent of real exchange rate fluctuations, while – as in Engel – fluctuations in non-tradable goods' prices are largely unimportant. This finding suggests that the relationship between traded goods prices at-the-dock and retail prices of traded goods is important to understanding real exchange rate fluctuations, as conjectured by Engel (1999),[5] and supports BER's conclusion that distribution costs may be important.[6] In Section 4 we analyze further the distribution wedge, since identifying the cause for fluctuations in the wedge is crucial for designing optimal exchange rate policies (see, e.g. Engel, 2011). The main finding is a surprisingly low correlation between the relative non-traded component and the distribution wedge for most country pairs, indicating that local distribution costs only explain a minor part of the variation in the wedge. Moreover, this result does not change if we use relative unit labor costs instead of non-traded goods' prices to proxy for distribution costs. Last, and importantly, we find a strong correlation between the distribution wedge and the bilateral nominal exchange rate. We interpret this as evidence for mark-up fluctuations being important for understanding volatility in the distribution wedge. Section 5 concludes.

## 2. Real exchange rate decompositions

The bilateral CPI-based real exchange rate, $RER_t^{CPI}$, can be written as

$$RER_t^{CPI} = \frac{S_t P_t^*}{P_t}, \tag{1}$$

where $S_t$ is the period $t$ nominal exchange rate, and $P_t$ and $P_t^*$ are the CPI in the home and foreign country, respectively. Throughout, variables with a star superscript correspond to the foreign country.

We decompose the real exchange rate along the lines of Betts and Kehoe (2006). In addition we make a distinction between at-the-dock prices of traded goods, denoted $\overline{P}_{T,t}$ and $\overline{P}_{T,t}^*$, and the retail prices of those goods, $P_{T,t}$ and $P_{T,t}^*$. We therefore rewrite the real exchange rate as follows:

$$RER_t^{CPI} = \frac{P_{T,t}/P_t}{P_{T,t}^*/P_t^*} \frac{S_t \overline{P}_{T,t}^*}{\overline{P}_{T,t}} \frac{P_{T,t}^*/\overline{P}_{T,t}^*}{P_{T,t}/\overline{P}_{T,t}}. \tag{2}$$

Letting lower case letters denote variables in logs, Eq. (2) implies

$$rer_t^{CPI} = rer_t^N + rer_t^T + rer_t^D, \tag{3}$$

[2] Burstein et al. (2003) document that distribution costs account for more than 40 percent of the price of the average US consumer good. Goldberg and Campa (2010) find distribution costs of similar magnitudes for 6 of the countries discussed above. In a recent paper, Berger et al. (2012) analyze at-the-docks and retail prices for specific goods and argue that distribution costs account for an even larger fraction of US retail prices, more precisely, between 50 percent and 70 percent.

[3] Burstein et al. (2005) focus on countries experiencing large nominal devaluations and show that the lack of adjustment of non-traded prices is the main force behind the large real exchange rate change that takes place.

[4] Betts and Kehoe (2008) find similar results for an extended set of countries.

[5] In his conclusion Engel writes: "It is tempting to attribute the movements in the traded-goods price indexes to failures of the law of one price…. However, there are many issues to be resolved in that area: What determines export prices to different regions from the same country? How important is pricing to market in determining real exchange rate movements? What systematic relationship is there between the price of a good at the port and at the consumer outlet? To what extent do the degree of product differentiation and the competitiveness of the industry determine differences in prices between locations? What role does nominal price stickiness play, and how is it related to these other questions? The key to understanding real exchange rate movements may be found in the answers to these questions".

[6] BER's main motivation for using export and import prices rather than CPI data to measure traded goods' prices is that the latter may be contaminated by (nontraded) distribution services.