

# Real exchange rates, trade balances and nominal shocks: evidence for the G-7

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## Abstract

To identify nominal shocks in structural VAR models of open economies, it is common practice to use purchasing power parity as a long-run identifying restriction so that there are no long-run effects of nominal shocks on real exchange rates. However, in some recent open economy intertemporal models with sticky prices, nominal shocks can have long-run effects on both real exchange rates and trade balances. In this paper, structural VAR models for the G-7 are identified in such a way that nominal shocks, at least potentially, can have long-run effects on a country's real exchange rate. For the G-7, nominal shocks are found to have a significant long-run effect on each country's trade balance over the post-Bretton Woods period. We do not have to appeal to hysteresis effects to explain this finding for trade balances, since nominal shocks are found to have a significant long-run effect on each country's real exchange rate. © 2002 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

A feature of many open economy models is that purchasing power parity (PPP) applies in long-run equilibrium. Long-run PPP is an implication of these models because nominal shocks, which can be interpreted as shocks to money demand or supply, have no long-run effects on the real exchange rate. An example is Clarida

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and Gali's (1994) stochastic formulation of Obstfeld's (1985) open economy IS–LM model. Nominal neutrality, and in particular PPP, is a long-run feature of their model since, in the long run, prices fully adjust. In the short run, however, there is sluggish price adjustment and the model displays the same features as the standard Mundell–Fleming model. Prasad (1999) extended the model of Clarida and Gali to include the trade balance. In his model, nominal shocks have no long-run effects on both the real exchange rate and the trade balance.

However, the evidence for long-run PPP is far from conclusive. Studies that use very long samples (typically, in excess of one hundred years) provide the strongest evidence for PPP since, in very long samples, it is possible to reject the null hypothesis of a unit root in real exchange rates, consistent with PPP. Examples are Frankel (1986) and Lothian and Taylor (1996). However, Engel (2000) suggests that, even in very long samples, it is difficult to detect small non-stationary components in real exchange rates when there are highly persistent transitory components. There is a consensus, however, that if PPP does in fact hold, the speed of convergence of relative prices and the real exchange to PPP is extremely slow. Deviations from PPP appear to damp out at a rate of roughly fifteen percent per year (Rogoff, 1996).

Since long-run PPP is a feature of many open economy models, PPP is often used as a long-run identifying assumption in empirical studies, even though the evidence for it is inconclusive. In particular, Clarida and Gali, and Prasad estimate structural VARs and impose as one of their identifying restrictions long-run PPP. Lee and Chinn (1998) also do this in VAR models of the current account. Under long-run PPP, nominal shocks are restricted to have no long-run effects on the real exchange rate. These studies find that nominal shocks explain a significant fraction of the short-run variability in real exchange rates. Although nominal shocks do not have a long-run effect on the trade balance in Prasad's model, he does not impose that as an identifying restriction in his structural VAR. He finds that nominal shocks have significant long-run effects on the trade balances of the G-7 and, in a related paper (Prasad and Gable, 1998), on the trade balances of twenty-two developed countries. However, he is unable to attribute that finding to long-run movements in real output or the real exchange rate since, in the long run, both real output and the real exchange rate are unaffected by nominal shocks as a consequence of his identifying restrictions. Consequently, he suggests that hysteresis and beach-head effects of the type suggested by Baldwin (1988, 1990), which could translate short-run real exchange rate movements into long-run effects on the trade balance, may account for that result.

However, in some recent open-economy sticky-price intertemporal models, most notably Lane (2001), if nominal shocks have a long-run effect on the trade balance, they will also have a long-run effect on the real exchange rate. Nominal shocks can have a long-run effect on both the real exchange rate and the trade balance in Lane's model because aggregate consumption is modeled as a constant elasticity of substitution index over consumption of traded and non-traded goods. If, instead, aggregate consumption is modeled as a log separable index over consumption of traded and non-traded goods, nominal shocks have no such long-run effects. That specification for preferences is used in the open-economy sticky-price intertemporal model developed in the appendix to Obstfeld and Rogoff (1995) and in Chapter 10 of their

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