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Pass-through of exchange rates and purchasing power parity

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Abstract

In this paper we develop and test two hypotheses about purchasing power parity (PPP). The first is that changes in the price of traded goods relative to domestic substitutes will affect the PPP relation, due to the partial pass-through of exchange rates. The second is that PPP should hold on forward rather than spot exchange rates, due to hedging by firms, which implies that the interest rate differential should enter the PPP relation for spot rates. Using quarterly data for several countries, we find support for both these hypotheses, though the magnitude of the interest rate effect is very small.

Keywords: Purchasing power parity; Pass-through; Forward rate; Interest rate differential

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1. Introduction

In this paper we develop and test a model of purchasing power parity (PPP) derived from the optimal pricing behavior of exporting firms. Under imperfect competition, exporting firms will likely adjust their prices by less than the full change in the exchange rate. For example, as their currency appreciates, firms may lower their profit margins to absorb part of the exchange rate change, thereby

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passing through only part of the appreciation to the importer's price. This change in the price of traded goods relative to domestic substitutes, due to pass-through behavior, should be taken into account when measuring the parity between prices in the exporting and importing countries. This is the first hypothesis that we shall investigate.

The second hypothesis we consider is that parity should hold between the prices in trading partners and their forward rates of foreign exchange, rather than their spot rates. From covered interest parity, the difference between the spot and forward rates equals the interest rate differential, so this second hypothesis implies that PPP equations of spot rates should include the interest rate differential as an explanatory variable. We will find considerable support for our first hypothesis, but less support for the second: while the interest rate differential is a significant variable in the PPP relation, we find that the magnitude of this effect is very small. One reason for this is that the interest rate differentials between most countries are stationary, or nearly so, so they cannot explain the nonstationary deviations from PPP. A significant portion of these deviations are, however, explained by the price of traded goods relative to domestic substitutes.

There is ample precedent in the literature for both the hypotheses that we test. The idea that partial pass-through of exchange rates may affect PPP is considered by Froot and Rogoff (1995), though they devote greater attention to a more conventional hypothesis: that deviations from PPP will arise due to the inclusion of nontraded goods in the wholesale or consumer price indexes. The implication of this hypothesis seems to be that we should correct the aggregate price indexes, possibly by including the relative price of traded goods as another variable in the PPP relation. Thus, the correction implied by the mismeasurement of the indexes (due to nontraded goods) is quite similar to the correction we propose to account for pass-through behavior, and in this sense the two hypotheses are similar. Nevertheless, we will argue that there are some subtle differences in the exact manner that these two hypotheses should be tested (see Section 3.2).

The idea that the forward rate determines the price and/or output for exporters is also not new, and is an example of the separation theorem discussed by Ethier (1973); Baron (1976a); Eldor and Zilcha (1987). We will derive this result from a model of a risk-averse, exporting firm, that must set the prices for its products before the exchange rate is known. The firm may set prices in either its own currency, or the currency of the importing country, and will optimally engage in transactions in the forward market. In either case, we show in Section 2 that the optimal price for the firm is determined by the forward rate, even if only partial covering is optimal.

The optimal pricing relation for the firm can be estimated as a pass-through equation between forward rates and product prices, or alternatively, inverted to obtain a PPP relation between the product prices and the forward rate, as described in Section 3. In Section 4 we estimate the latter as a cointegrating relation, using quarterly data for the United States, Canada, Germany, and the United Kingdom

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