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How Good is PPP?

An important issue facing policymakers is the role of the exchange rate in the conduct of monetary policy. In recent years, some analysts have urged that U.S. monetary policy target the value of the dollar. Such a policy approach, they argue, would reduce the wide swings and "misalignments" in the value of the dollar and would diminish the associated effects on international competitiveness and macroeconomic activity experienced during the floating exchange rate period.

To target the exchange rate requires some notion of what is the "equilibrium" value of the exchange rate. One popular view is that a currency's equilibrium level is best associated with its international purchasing power parity (PPP). In its most common form, PPP asserts that the exchange rate between two currencies ought to adjust so that the real, or inflation-adjusted, price of a given basket of goods is the same in both countries.

A PPP targeting rule, then, implies that monetary policy should adjust whenever the actual value of the currency diverged sufficiently from its PPP "equilibrium" level. Based on PPP calculations, some have argued that, despite the dollar's recent rise, it is still undervalued by roughly 30 percent against the Japanese yen and 10 percent against the German Deutschemark. To raise the value of the dollar to its PPP level, they maintain that the Federal Reserve should promote the further *appreciation* of the dollar by tightening monetary policy.

This *Letter* evaluates whether purchasing power parity is an appropriate guide to monetary policy, finding that because the dollar's deviations from PPP appear to be large and persistent, the use of PPP as a target for monetary policy does not appear justifiable.

What is PPP?

There are several versions of PPP theory. The "absolute" form of purchasing power parity, sometimes referred to as the law of one price, implies that the price of a common basket of

goods in any two countries should be equal when measured in common currency. On theoretical grounds, the law of one price should be enforced by international arbitrage. For example, if automobiles were selling at a lower price in Japan than in the United States, international arbitragers could profit by buying them in Japan and selling them in the United States. This increased demand for Japanese goods would cause the value of the yen to rise, and car prices to rise in Japan and/or fall in the U.S. until equality was restored.

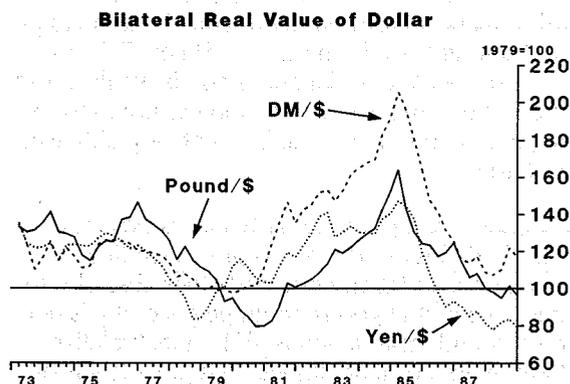
Of course, the prices of particular goods may vary in different locations at any given time, since transportation costs and other obstacles to trade mean that goods arbitrage generally is not perfect and instantaneous. PPP in its "relative" form maintains that although the price *levels* of goods in different countries may deviate from one another, the rate of *change* in goods prices should be roughly the same across countries, assuming that transportation costs, tariffs, and other barriers to trade remain roughly constant over time. In other words, starting from some base equilibrium period, this version of PPP implies that increases or decreases in the prices of the same products at home and abroad ought to be equal when valued in a common currency. Moreover, variants of this form of PPP often make allowances for lead/lag relationships between price and exchange rate changes, implying that prices and exchange rates are eventually, but not immediately, offsetting.

Short-run failure

There are different ways to test the PPP relationship. One approach is to compare price changes across countries at the level of narrowly-defined categories of manufactured goods, such as paper and apparel. Empirical analyses that have done so, however, have found evidence of persistent deviations from PPP for manufactured goods between prices of goods sold in the domestic market and of those sold for export, between prices of domestic goods and of competing import substitutes, and among the prices of goods sold for export to different markets.

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Empirical times-series studies using aggregate price indices also show evidence of persistent deviations from PPP. The chart shows the real foreign exchange value of the dollar relative to the yen, Deutschemark, and British pound over the period from the first quarter of 1973 through the last quarter of 1988. The measures plotted use GNP deflators and are based to 1979 (that is, 1979 = 100) when the U.S. current account was last near balance, and presumably, the dollar would be at its PPP equilibrium level.



During this period, the real exchange value of the dollar deviated substantially and persistently from its level in 1979. In the early 1980s, in particular, the real foreign exchange value of the dollar rose significantly above its level in 1979, implying the dollar was greatly overvalued relative to its purchasing power parity in 1979. (The general results are unchanged with the use of alternative price indices, such as consumer price or wholesale price indices, or with different choices of a base equilibrium year.)

Other tests of PPP theory have focussed on correlations between the rates of change in GNP deflators in different countries, with inflation rates measured in dollar terms. The relative PPP theory predicts a high degree of positive correlation. However, when these correlations are calculated for the U.S., Japan, and Germany, the correlations found are often *negative*. Even if allowances are made for price adjustment over longer periods, the correlations found are weak.

Reasons for failure

PPP clearly does not hold in the 1970s and 1980s. One obvious explanation is that goods are not identical across countries, even when

analyzed for relatively narrow commodity categories. Is a Honda Accord the equivalent of a Ford Taurus? Another explanation is that tests of PPP generally fail to recognize that many goods and services (the prices of which are included in measures of a country's price level) are not traded across borders. Housing, land, and services such as haircuts and golf lessons, for example, are not traded goods. Commodity arbitrage will equalize prices of internationally-traded goods, but not of nontraded goods.

However, these "measurement" problems are not the whole story behind failures of PPP. Calculations using alternative measures that to some extent better capture the prices of traded goods alone, such as producer price indices, still show significant and persistent deviations from PPP over time.

Thus, it appears that PPP does not hold in the short run primarily because other factors, such as fiscal deficits, oil supply changes, and productivity growth, also affect the equilibrium exchange rate. The significant deterioration in the explanatory power of PPP in the 1970s and 1980s has been attributed by many analysts to the greater extent of real shocks in the world economy in that period, including fiscal spending imbalances and changes in oil supply. For example, much of the real appreciation of the dollar in the early 1980s generally is attributed to the U.S. fiscal stimulus at that time.

The existence of differential rates of productivity growth also can lead to the failure of PPP. Productivity gains in the tradable goods sector will cause wages to rise economy-wide on account of competitive increases in wages in the nontraded sector. In the absence of accompanying productivity gains in the nontraded goods sector, these wage increases will cause the general price level to rise. This increase in the country's price level relative to that abroad implies a real appreciation of its currency. Many argue that the much higher productivity growth of Japan has contributed to a trend of real appreciation of the yen relative to the dollar.

Movements in the real exchange rate away from its long-run equilibrium level also occur when nominal exchange rates are extremely sensitive to changes in asset markets while goods prices are "sticky." Thus, for example, a disturbance

that leads to an immediate response in the nominal exchange rate but only sluggish response in prices can lead to a departure from PPP.

PPP works in the long-run

While PPP fails in the short run, over a sufficiently long period, it is possible that the effects of disturbances and structural changes will tend to cancel out, and that deviations from PPP will dissipate.

Professor Jeffrey Frankel has used annual data over the period from 1869 to 1984 to estimate the extent to which the dollar/pound exchange rate returns to PPP equilibrium. For the period as a whole, he finds that the estimated speed of adjustment to PPP is 14 percent per year. In other words, after four and a half years, 50 percent of the adjustment towards PPP takes place and after fifteen years, 90 percent of the adjustment takes place. Within shorter subperiods there is also evidence of adjustment towards PPP, but the estimates are less reliable statistically.

These results indicate that although the exchange rate takes a long time to adjust to its equilibrium level, economic forces appear to be at work to maintain PPP levels. Thus it may be said that PPP provides a fair, though rough, approximation of the long-run exchange rate if the adjustment process is viewed over many years.

Policy implications

To be useful as a guide to monetary policy, the purchasing power parity value of a currency needs to be stable. While there is some evidence that PPP holds over the long run when measured by several decades, an horizon of this length is of little relevance to policymakers. Over a shorter horizon, there is no evidence that PPP holds. During the 1970s and 1980s, deviations from PPP apparently were large and persistent, largely because real disturbances altered the equilibrium real exchange rate.

Thus, attempts by monetary authorities to reduce the variability of exchange rates around their PPP levels likely would have been unsuccessful in the sense that distortions in individual countries' price levels would have been introduced. If, for example, the Federal Reserve had been targeting the dollar around its PPP value and attempted to offset the appreciating dollar associated with the persistent fiscal stimulus between 1982 and 1985, monetary policy would have been significantly more expansionary than actually was the case. This monetary stimulus would have kept the nominal value of the dollar from appreciating, but would have pushed inflation significantly higher, making U.S.-produced goods more expensive, despite the unchanged nominal value of the dollar. The real value of the dollar still would have tended to rise on account of the fiscal stimulus. Hence, it is apparent that an attempt by the Fed to maintain a PPP target for the dollar primarily would have shifted the effects away from the nominal exchange rate towards the domestic price level.

In view of the evidence against the existence of stable PPP relationships, the use of PPP currency levels as a target of monetary policy does not appear justifiable, particularly when real shocks also affect the equilibrium value of a given currency. This does not mean, however, that the exchange rate should not play any role in the conduct of monetary policy. Exchange rate changes can have an effect on domestic price stability and real growth. In response to these potential effects, it still may be appropriate for policymakers to alter the conduct of monetary policy.

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