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Long-run Determinants of East Asian Real Exchange Rates

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Since the summer of 1997, when many East Asian currencies began to fall, a good deal of attention has been paid to the causes and consequences of exchange rate movements. This *Economic Letter* sheds some light on these issues by summarizing recent research into the long-run determinants of real exchange rates in East Asia (Chinn 1997).

I begin with a discussion of the theory underlying movements in real (that is, inflation-adjusted) exchange rates; this theory focuses on differences in the relative productivity of one country versus another, as well as on differences in the relative productivity of an individual country's tradable goods sector versus its nontradable goods sector. I then present results of empirical tests of the theory, which suggest that, in many instances in East Asia, enhanced productivity growth in the tradable goods sector is associated with a long-run strengthening of the real exchange rate. Finally, turning to the recent currency crisis, I examine whether these empirical tests could have helped anticipate it.

The determinants of real long-term exchange rates

The nominal exchange rate is the rate at which the currency of one country trades against that of another. The level of a country's economic activity, however, depends more on its *real*, or "inflation-adjusted," exchange rate, that is, the price at which goods and services produced at home can be exchanged for those produced abroad. It is movements in this variable we wish to understand.

Unfortunately, exactly what moves the nominal and real exchange rates day to day, let alone month to month, is difficult to determine. In the short run, nominal exchange rates depend primarily on financial market variables and expectations; and, if the prices of goods and services are slow to change, nominal exchange rate movements will be reflected immediately in real exchange rate changes. Over the longer horizon, economic theory suggests real-side variables come more into play in affecting the real exchange rate. In particular, assuming that financial capital is relatively free to move internationally, and that trade in goods is relatively unhindered by tariffs and quotas, a country's real exchange rate is determined by how efficient labor and capital are in producing tradable goods compared to producing nontradable goods. We can think of traded goods as "manufactured goods" and nontraded goods as "services." (This categorization seems appropriate since most services-such as haircuts-are difficult to trade.) According to the traditional model, (the "Balassa-Samuelson model"), if the productivity of a country's workers in producing manufactured goods relative to their productivity in producing services grows faster than abroad, then the country's currency will appreciate in real terms; i.e., the rate of exchange of domestic for foreign goods rises. Conversely, if the relative productivity growth of manufacturing goods workers is lower than abroad, the currency depreciates.

The logic of the Balassa-Samuelson model flows from several assumptions. The first is that domestic workers' wages are equalized by competition between the tradables and nontradables sectors. This implies that if the productivity of workers and capital in the sector producing traded goods grows faster than that of their counterparts in the sector producing nontraded goods, then the price of nontraded goods relative to traded goods should rise. Thus the price of haircuts and restaurant meals become more expensive relative to televisions and cars. The second is that traded goods prices in different countries are tied together by international arbitrage activities, so that the price (in a common currency such as the dollar) of a traded commodity — say a television — is the same in Korea or the U.S. (aside from the effects of tariff barriers and transportation costs which we are ignoring). Since a country's overall price level consists of the prices of both traded and nontraded goods and the prices of traded goods are (more or less) equalized across countries, it follows that the overall price level will tend to rise faster in countries where nontraded goods prices are rising faster, i.e., with relatively high productivity growth in the manufacturing sector (as compared to the service sector). In turn, this implies that countries with relatively high manufacturing productivity growth will have growing real purchasing power over foreign goods, and their currencies will appreciate in real terms.

At first glance, the model's conclusions would appear to suggest that it is desirable to have relatively low service sector productivity growth and consequently an appreciating strong currency; but that would represent an incorrect view, equating an appreciating currency with a higher level of economic welfare. In general, there is no straightforward link between how well an economy is doing and the real exchange rate. Consider the fact that society is usually made better, not worse, off by higher productivity in services (as well as in manufacturing).

Empirical evidence

What is the empirical evidence regarding a relationship between relative productivity levels and real exchange rates? In Figure 1, the average annual change in the real exchange rate is plotted against the average annual change in relative productivity levels for seven different countries vis-à-vis the United States, where the exchange rate is defined in terms of how many real U.S. dollars are needed to obtain a single unit of the local currency, and productivity growth is defined as productivity in manufacturing relative to services. The scatter plot indicates that the fewer U.S. dollars that are needed to buy local currency, that is, the more rapidly the local currency is appreciating against the dollar, the more rapidly local productivity (in traded to nontraded production) is gaining on U.S. productivity.

In a recent study (Chinn 1997), I verify that there is time-series evidence of a similar nature for the Indonesian rupiah, the Korean won, the Malaysian ringgit, and the Philippine peso. Roughly speaking, a 1% increase in the level of local productivity in the manufacturing sector causes a ½ % appreciation in

the real value of the currency, holding everything else constant. Hence, it appears that, like the experience of the Japanese yen, more rapid productivity growth is associated with a more rapid secular appreciation over long spans of time in Asian countries.

While trends in productivity matter for long-run exchange rates movements, other factors, such as oil dependency and government spending, also appear to influence the real exchange rate. For instance, due to the Indonesian economy's reliance on oil exports, a permanent 1% increase in the real price of oil induces a permanent appreciation of the rupiah of 0.4%. For the oil-importing dependent economy of Korea, a growth rate of 1% in the real price of oil causes a tenth of a percentage point depreciation of the won, in real terms. In the short run at least, there is also evidence that higher government spending appreciates a country's currency. For to the extent that such spending falls on local goods, it creates domestic price pressure that, in turn, induces a real appreciation of the local currency to dampen demand. The Malaysian ringgit proves to be the only exception to this pattern.

Exchange rate overvaluation on the eve of the fall?

A natural question to pose is whether, using the estimated relation between the exchange rate and productivity, the East Asian currencies were overvalued in June 1997; i.e., had they appreciated in value above the equilibrium level implied by productivity growth trends? Unfortunately, the sectoral productivity and price deflator data necessary for calculating equilibrium exchange rates extend only up to 1991. However, as an approximation, we can extrapolate from 1977-1991 trend data in relative productivity. Thus, for example, in Thailand, assuming the exchange rate was at equilibrium in 1991, I find that the Thai baht was overvalued by approximately 18% in 1996. If Thai manufacturing productivity growth was less than is assumed in this scenario, then the actual degree of overvaluation could have been even more pronounced than implied by my calculations. (It must be noted, however, that the 95% confidence band on the predicted exchange rate encompasses the observed rate in 1996, so, statistically speaking, even this seemingly obvious overvaluation cannot be classified as such with statistical certainty.)

How did this overvaluation occur? The Thai authorities implicitly pegged the baht to a basket of currencies which placed a heavy weight on the U.S. dollar. As Thai inflation exceeded U.S. inflation and Thai manufacturing productivity slowed, the Thai baht became increasingly overvalued relative to the U.S. dollar. This finding of overvaluation accords with one's intuition and is consistent with Thailand's trade deficits recorded in recent years (the cumulative 1990-1996 trade deficits amounted to 36% of 1996 GDP).

Conclusions

There is substantial evidence in favor of the hypothesis that over long periods of time, relative productivity growth (between sectors and between countries) determines the strength of a currency's real purchasing power. In the short run, other variables, such as government spending, oil price changes, and monetary policy can move the exchange rate from its long-run path.

Implementing the calculations for policy purposes is complicated by the fact that the requisite productivity data are not available on a "real-time" basis. This is not an irrelevant criticism. In the months preceding the 1994 Mexican peso crisis, some observers argued that the peso was not overvalued given purported (but unmeasured) rapid productivity growth in the Mexican manufacturing sector. With hindsight, one knows that these assertions were incorrect. These data difficulties suggest that government policies that seek to stabilize currencies may prove problematic, if policymakers should happen to misidentify the equilibrium rate.

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