An Empirical Analysis of Foreign Exchange Reserves in Emerging Asia

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Over the last few years, the U.S. ability to finance its current account deficit has been facilitated by massive purchases of U.S. Treasury Bonds and agency securities by Asian central banks. As a result, Asian central banks have accumulated large stockpiles of U.S.-dollar foreign exchange reserves.

In theory, a country holds reserves as a buffer stock to smooth unexpected and temporary imbalances in international payments. In determining the optimal level of reserves, the monetary authority will seek to balance the costs of macroeconomic adjustment incurred if reserves are exhausted with the cost of holding reserves. Reserve hoarding entails sterilization costs stemming from the negative spread between the interest earned on reserves and the interest paid on the country's public debt. Moreover, if capital flows are not sterilized, sustained accumulation of reserves will, at some point, generate inflationary pressures that could threaten domestic financial stability. If Asian central banks decide to stop accumulating U.S.-dollar reserves, they could trigger an abrupt depreciation of the U.S. dollar. Given the potential impact on global interest rates, economic growth, and financial stability, the issue of Asian reserve accumulation is of considerable importance.

Our objective is to assess the degree to which the current level of foreign exchange reserves held by Asian central banks diverges from that predicted by the standard macroeconomic determinants.[1] To do so, we estimate a long-run demand function for reserves in a panel of eight Asian economies: China, India, Indonesia, South Korea, Malaysia, the Philippines, Singapore, and Thailand.

The International Monetary Fund (IMF 2003) uses a simple empirical model based on various determinants of reserve holdings to study a panel of 122 newly industrialized emerging-market countries. Predicted values from the Fund's model indicate that the acceleration in reserve accumulation in emerging Asia in 2002 was well in excess of expectations based on fundamentals.

The IMF study suffers from a number of shortcomings in our view. First, although the time series used are clearly not stationary, statistical inference is based on the assumption that the data are stationary.[2] Second, although there is evidence that Asian countries have increased their level of reserves for self-insurance purposes in the aftermath of the Asian financial crisis (Mendoza 2004; Aizenman, Lee, and Rhee 2004; Aizenman and Lee 2005), the IMF model does not allow for a structural break in the estimated demand for reserves. By using the panel cointegration tests of Pedroni (1999) as the basis for the specification and estimation of our long-run demand function for reserves and by allowing for structural breaks, we formally address these issues.

Results

Using data from 1980 to 2003, we find that the level of reserve holdings is a function of GDP, the ratio of imports to GDP, the ratio of broad money to GDP, the volatility of export receipts, as well as a break in the coefficient of imports to GDP, and a break in the coefficient of broad

1. In the literature, reserves are modelled as a function of economic size, current account vulnerability, capital account vulnerability, exchange rate flexibility, and opportunity cost.

2. It is well known in time-series econometrics that t-statistics of spurious regressions are invalid. Statistical inference in the existing literature on foreign exchange reserves ignores this fact.

money to GDP in the post-crisis period. By accounting for a positive structural break in the demand for international reserves by Asian central banks in the aftermath of the financial crisis of 1997–98, our model allows for a higher level of long-run reserves in the post-crisis period. While the Fund concludes that reserves in emerging Asia were in excess of their long-run level by US$73 billion in 2002, we find that reserves were essentially in line with their determinants that year. Nevertheless, our model cannot explain the large accumulation of international reserves by these countries in 2003 and 2004.

Reserve holdings in emerging Asia as a whole were above the level predicted by their determinants by US$52 billion in 2003 and by US$112 billion in 2004. China accounts for most of the increase in the reserves gap from 2003 to 2004. Furthermore, the error-correction equation associated with this cointegrating vector reveals that the reserves gap closes at an average rate of 56 per cent per year over the sample. These results suggest that, everything else remaining the same, a slowdown in the speed of accumulation of reserves is likely.

Implications for the U.S. Dollar

Our findings imply potential downward pressures on the U.S. dollar. But although the error-correction model suggests that adjustment could be relatively quick, changes in holding policies might actually be very gradual in the current context. Indeed, the amount of reserve assets held by Asian central banks is so large that any change in holding policies could have a substantial impact on the U.S. dollar and, consequently, on the balance sheets of Asian central banks. To avoid large capital losses, Asian central banks will be very cautious when slowing the rate of reserve accumulation. The recent announcement by the Bank of China to peg its currency against a basket of currencies reflects this cautious approach. As a result, the chance of a rapid depreciation of the U.S. dollar triggered by Asian central banks is not very high.

The currency composition of reserve stocks may pose an additional risk for the U.S. dollar. Diversifying away from the dollar would reduce capital losses in the event of a reduction in reserve holdings (autonomous or coming from a currency revaluation). But the currency composition of reserves in developing countries is remarkably stable over time. It is determined by factors that display substantial inertia, such as the choice of currency peg, the identity of the dominant trade partner, and the composition of foreign debt (Eichengreen and Mathieson 2000). A radical currency reallocation of reserves is thereby not very likely to happen within a short time. Hence, although the outlook for the U.S. dollar may not be favourable from the perspective of the currency composition of reserves, risks of an abrupt depreciation in the U.S. dollar coming from this source remain limited.

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