HSBC Global Research

Macro
Asia Economics

Why is sterilization so hard?

Part two of our short primer on Asia's policy dilemma

- **Foreign exchange market intervention can affect domestic liquidity as cash is injected or withdrawn from an economy**
- **To maintain control over monetary conditions, central banks across Asia resort to various sterilization operations**
- **However, such strategy has its limits as it is rarely watertight and frequently proves too costly to maintain for long periods**

Hard triangle, again

As we explained elsewhere (see *Something's gotta give*, 11 May 2007), Asia grapples with the consequences of massive balance of payments surpluses. As central banks purchase foreign exchange to prevent their currencies from appreciating too rapidly, they inevitably inject liquidity into the local market. Officials therefore face a textbook dilemma: either they give up effective control over monetary policy, or seek to reduce the build-up in reserves by allowing the currency to appreciate faster or shut down inflows with various types of capital controls. None of these options, of course, are very desirable.

There is, however, another possibility, seemingly allowing central bankers to circumvent the iron law of this impossible trinity: they can use sterilization operations to offset the impact their foreign exchange market interventions have on the money supply. In essence, this requires two steps. First, the authorities purchase dollars in the foreign exchange market, thereby stabilizing the exchange rate but expanding the supply of local currency in the process. As a second step, officials drain the additional liquidity injected into the market using a host of different policy tools. Such sterilization operations, therefore, allow the central bank to maintain control over domestic monetary conditions while at the same time targeting a desired level of the exchange rate.

All of this sounds almost too good to be true; and essentially it is. Sterilization operations have three basic limitations. First, they are never as watertight as one might think, with domestic liquidity inevitably affected over time by foreign exchange market intervention. Second, sterilization operations only postpone the required adjustment, therefore doing little to resolve the underlying dilemma. Third, they are costly. Nevertheless, despite all of these limitations, sterilization operations are widely used, even if their exact extent is not always easy to ascertain. And this matters. If sterilization operations on a massive scale are not sustainable over time, the hard triangle will inevitably reassert itself. Sooner or later, therefore, Asia may have to come to terms with real exchange rate appreciation – via higher inflation or nominal adjustment – or restrict the inflow of capital.

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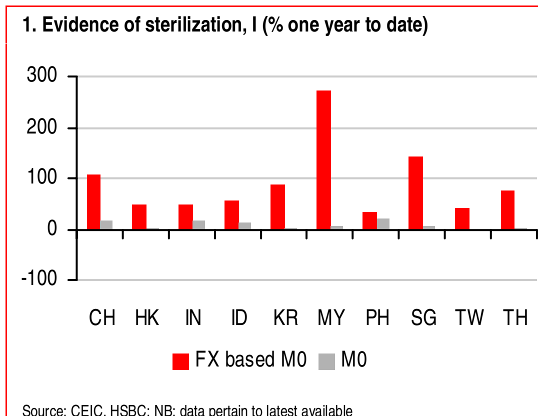
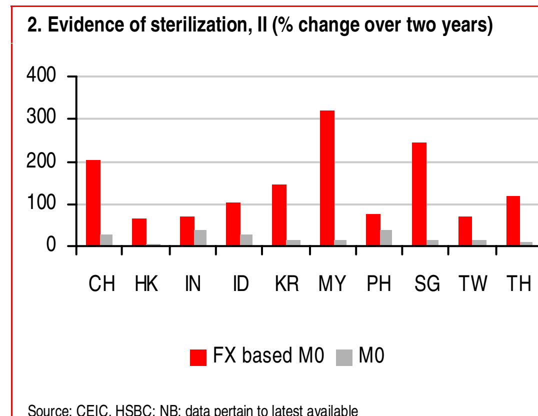
1. Evidence of sterilization, I (% one year to date)



Source: CEIC, HSBC; NB: data pertain to latest available

2. Evidence of sterilization, II (% change over two years)



Source: CEIC, HSBC; NB: data pertain to latest available

As superficial evidence of massive sterilization, consider the following. All else equal, a rise in foreign exchange reserves must lead to a corresponding growth in base money, or M0. We can therefore estimate the rise in M0 if no sterilization had occurred. This is shown by the red bars above, which track the projected FX based growth in M0 over the last year and the last two years, respectively. The grey bars show the actual rise in M0. As is evident, base money grew far less rapidly than the rise in FX reserves would suggest, and, therefore, central banks must have engaged in sterilization. Of course, our measure is far from perfect. For example, reserves can rise autonomously without intervention because of returns on the existing stock of foreign exchange holdings. But still, the graphs make the point quite clear: Asian central bankers had to apply considerable sterilization operations over the last few years to prevent base money from spiralling out of control.

You may get creative

Sterilization operations come in various forms, all of which aim to offset the impact on the domestic money supply of foreign exchange market intervention. To keep matters straightforward, consider the four most common sterilization tools. First, the central bank may sell domestic securities into the open market, thereby withdrawing cash from circulation. Clearly, the central bank needs to possess an adequate amount of such paper to conduct the operation. Moreover, domestic markets have to be liquid enough for such policy to have the desired effect, something which cannot be taken for granted in all Asian markets. In some countries, central banks are also authorized to issue paper directly to manage domestic liquidity. The Bank of Korea, for example, has issued an impressive number of Monetary Stabilization Bonds in recent years, with the amount of outstanding MSBs today about 30% larger than all corporate bonds combined.

Second, authorities may temper money supply growth by raising reserve requirements for the banking system. This, especially, is a potent sterilization tool in many Asian markets still heavily reliant on bank lending. Changing reserve requirements helps to sterilize foreign exchange market intervention via two channels: it directly siphons off cash from circulation as banks park more funds with the central bank, and it raises the effective costs of money in the economy and, therefore, reduces loan demand. Various countries in Asia, most notably China, have in recent times raised reserve requirements to cool money supply growth.

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Third, central banks can sterilize their intervention with forward exchange contracts. By lending out their acquired dollars in return for domestic currency, they can drain the cash previously infused into the market to control the spot exchange rate. Once a forward contract comes due, of course, the central bank has to decide whether to accept a rise in base money or roll over the contract. While data is not readily available for all Asian countries, some central banks in the region have seen a rapid rise in forward positions over the past year, which suggests that they play an increasingly important role in sterilization in such countries as Singapore, Thailand, Malaysia, and the Philippines.

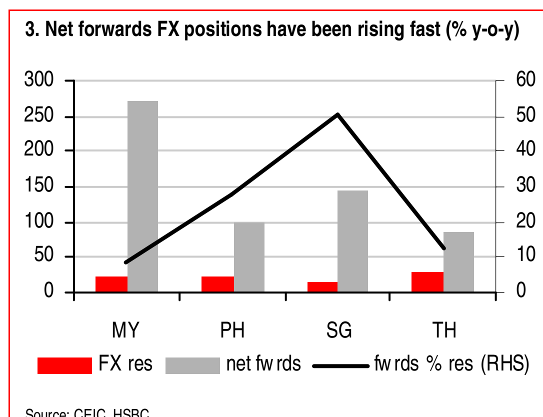
Fourth, authorities can use fiscal policy to minimize the effect foreign exchange market intervention has on the money supply. More directly, governments can shift their short-term cash deposits from commercial entities to the central bank. More broadly, the authorities can run counter-cyclical fiscal policies to dampen the money multiplier and, therefore, broad money growth; this, of course, is a heavy-handed tool, but it works nevertheless: by helping to reduce aggregate demand, a fiscal contraction lowers loan growth in an economy. While there is currently little evidence of the use of counter-cyclical fiscal policy for sterilization in Asia, several governments have used their cash balances to help actively manage domestic liquidity. For example, the Philippines recently announced that government social security funds may transfer more of their deposits to the central bank, while the government in Singapore continues to use cash management to help control money supply growth.

Not as easy as it looks

Of course, none of these policies in themselves represent an optimal solution. Moreover, depending on the structure of the economy and the particular macroeconomic environment, a different policy mix may be appropriate for different countries at different times. But apart from finding the optimal set of tools for a particular economy, there are broader problems with sterilization, which render it unsuitable as a long-term solution to the challenges facing Asian central banks, namely the massive build-up in foreign exchange reserves. At a fundamental level, of course, sterilization does not resolve the inherent dilemma of the iron triangle: it may serve to buy some time, but inevitably the authorities will have to address the underlying imbalances.

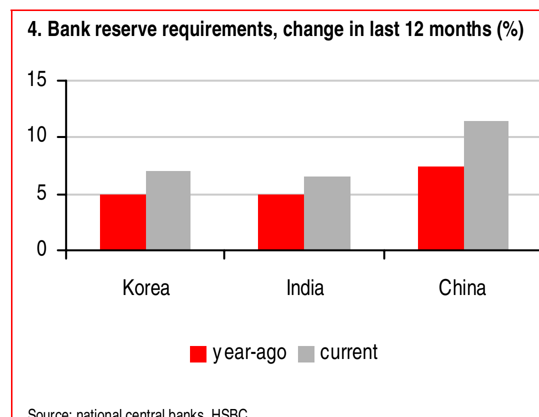
More concretely, however, there are two operational problems with sterilization that deserve scrutiny because they set a more immediate limit to the ability of central banks to continue to intervene and keep exchange rates from appreciating in light of massive balance of payments surpluses. First is the problem

3. Net forwards FX positions have been rising fast (% y-o-y)



Source: CEIC, HSBC

4. Bank reserve requirements, change in last 12 months (%)



Source: national central banks, HSBC

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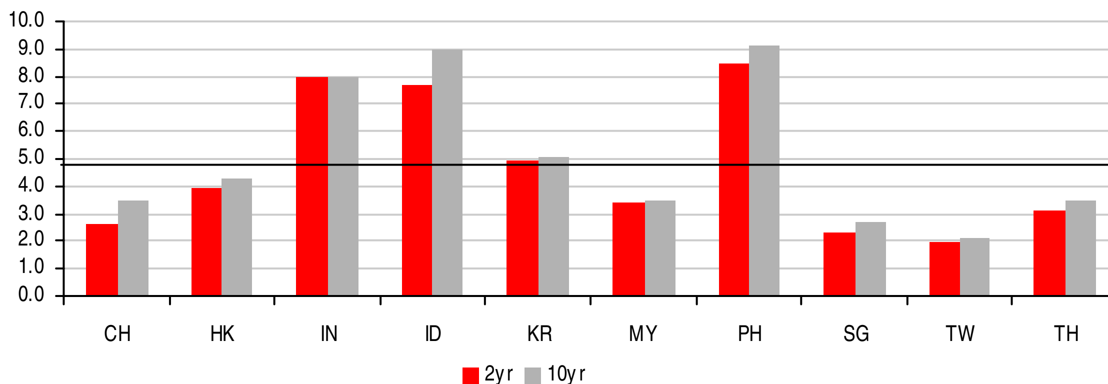
of leakage. For various practical reasons it remains difficult for authorities to neatly offset the effect of their FX market intervention. For example, while it is relatively easy for the authorities to sterilize the impact on base money by draining cash, their ability to control the money multiplier and, therefore, broad money is more tenuous. Particularly in economies with large balance of payments surpluses, the perceived macroeconomic risks are small, fuelling confidence and a boom in lending that the authorities are ill-equipped to fully contain.

Moreover, tightening monetary conditions aggressively to dampen the money multiplier is, in practice, difficult to do. For one, the authorities find it tricky to raise interest rates as long as high money supply growth has not yet filtered through into more rapid inflation. Given the long-lagged effect of liquidity growth on the price level, even central banks using an inflation targeting regime often are hesitant to tighten pre-emptively. Even more importantly, tightening monetary conditions in an environment of high capital mobility is ultimately self-defeating: high interest rates only serve to attract more inflows, which sets in motion a perpetual cycle of sterilization and tightening. Ultimately, the price, both economic and political, of high interest rates needed to maintain real exchange rate competitiveness may be too great to render sterilization feasible in the long-run.

5. Below the line: several Asian countries have rates below the US benchmarks, making sterilization easier to sustain



Source: Bloomberg, CEIC, HSBC; NB: the black line represent the current yield of 10yr US Treasuries

The second operational limitation of sterilization is cost. Of course, the price tag of different policies can vary considerably. But, apart from fiscal contraction, all sterilization strategies ultimately involve a cost, which needs to be either fiscalized or is borne directly by the private sector. Most commonly, the cost of sterilization is taken to be equal to the negative carry of the central bank: when acquiring foreign exchange and issuing or selling domestic securities in turn, the authorities effectively forego revenue if the returns on their FX holdings are lower than the cost of servicing domestic obligations. Since generally the domestic returns are likely to be higher than dollar returns – a yield differential which serves to attract capital inflows in the first place – most central banks can be safely assumed to suffer from such a negative carry. Interestingly, as the chart shows, in Asia domestic returns are sometimes below, and often not much higher, than dollar interest rates so that central banks in the region have a relative advantage in pursuing sterilization operations.

However, simply looking at yield differentials between, say, domestic 2yr and 10yr yields and their dollar counterparts may understate the true costs of sterilization. Firstly, in illiquid bond markets, yields are a

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poor measure for the marginal cost of capital in the economy. Issuance or sale of securities by the authorities, therefore, crowds out the private sector towards more expensive bank borrowing, a process that is evident for example in the Philippines. Of course, this does not represent a direct cost to the central bank, but it does impose a burden on the economy as whole. Second, the illiquid nature of long-term bond markets has meant that central banks needed to issue or sell shorter-term securities. Here, the costs may be lower, and the consequent profits from sterilization greater, but it exposes central banks to balance sheet risks given the maturity mismatch between their foreign exchange assets and domestic obligations. Third, there is an appreciation risk, where over time the value of foreign exchange assets in domestic currency diminishes relative to the value of the authorities' liabilities.

Other sterilization tools similarly involve costs. Take reserve requirements. These fall into two categories: remunerated and unremunerated. In a banking system with a remunerated reserve requirement, the central bank compensates the commercial bank for the holding of reserves, paying a set rate of return. Raising the required reserve threshold in order to sterilize intervention, therefore, represents a direct cost to the authorities. In other banking systems, however, reserves are unremunerated so that the cost of holding higher reserves falls squarely on the banking sector, likely to be passed on in some form via higher borrowing costs to the private sector. Forward contracts also involve a cost, depending on the relative domestic and foreign rates of return, and even shifting government cash deposits to the central bank involves a cost as the state foregoes interest revenue.

In a broader sense, the question remains whether the costs of sterilization represent a hard constraint for the pursuit of sterilization. The central bank, of course, can always stuff the holes in its balance sheet by printing money, unless inflation is a concern. Moreover, officials may have reason to believe that the sterilization costs are outweighed by the benefits of maintaining a competitive exchange rate. Still, the direct costs involved, even if hard to ascertain precisely, render it on balance more difficult to maintain sterilization operations indefinitely. Whether countries in Asia have yet reached breaking point with regard to the costs or the effectiveness of their sterilization operation is difficult to say and beyond the scope of this primer. What is certain, however, is that sterilization is never a lasting solution to the underlying dilemma of massive balance of payments surpluses. For that, it is too hard to maintain.

6. Preferred set of sterilization tools

	Monetary instruments		Fiscal policy	
	Market	Non-market	Fiscal stance	Cash balances
China	PBoC bills, deposit rate adjustments, FX swaps	Reserve ratios	No	
Hong Kong	No sterilisation	No sterilisation	No	Yes
India	Bond issuance, liquidity adjustment facility, repos and reverse repos	Reserve ratios	No	Yes
Indonesia	use of SBIs	Reserve ratios (seldom)	No	
Korea	Monetary Stabilisation Bonds	Reserve ratios	No	
Malaysia	Money market borrowing; CB's own securities, FX swaps	Reserve ratios	No	Yes
Philippines	Repos, reverse repos and outright transactions, FX swaps	Tiering, SDA expansion	No	Yes
Singapore	FX swaps, money mkt intervention, reverse repo		limited	Yes
Thailand	Repos, FX swaps, CB securities	No	No	Yes

Source: BIS, HSBC observations

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