

# Reserve management in emerging market economies: trends and challenges

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## Abstract

Foreign exchange (FX) reserves are an integral part of emerging market (EME) central banks' policy toolkit. They insure against shocks and complement monetary policy to achieve price and financial stability. But building and holding FX reserves is costly. Drawing on a recent survey of 21 EME central banks and their contributions published in this volume, this paper highlights that most have gradually broadened the range of assets and currencies in their reserve portfolios, to diversify and to raise their portfolios' return. Exposure to credit risk remains very low, and risk-sharing arrangements with the Treasury reduce some central banks' exposure to market and exchange rate risk. While the US dollar dominates most portfolios, the currency composition also shows strong regional patterns.

Keywords: Foreign exchange reserves, central bank balance sheets, emerging market economies

JEL classification: F31, E58, G11

## 1. Introduction

Central banks in emerging market economies (EMEs) have over time broadened the range of assets and currencies in which they invest FX reserves, and sharpened their focus on generating returns. After reviewing common trends and differences, this note takes up three policy issues. First, under what conditions might EME reserve management practices generate significant spillovers to advanced economy (AE) financial markets? Second, does the impact of reserve holdings on the central bank's balance sheet influence the portfolio allocation? And finally, what trade-offs does the disclosure of reserve management face?

## 2. Shifts in the composition of reserve portfolios

### Common trends

Over the decades, central banks have gradually broadened the range of assets and currencies in their reserve portfolios. This was a reflection of several factors: financial market development; the higher level of reserves (see Note 1 prepared for this meeting); pressure to offset the costs of reserve holdings; and, interrupted by the Great Financial Crisis (GFC) of 2007–09, a certain search for yield.

Investments in the US dollar, the dominant reserve currency, illustrate these trends (Fung and McCauley (2003)). The 1970s saw a shift towards bank deposits and money market instruments, arguably owing to higher returns in the euromarket. In the 1980s, the duration of investments in US Treasuries lengthened, following a long bull market in bonds. And in the 1990s, reserve managers started to accept more credit risk, investing in the bonds of US government-sponsored enterprises (agency bonds).

The GFC interrupted this trend only temporarily. Reserve managers de-risked their portfolios, shifted assets away from both money markets and bank deposits, cut back on securities lending, and reduced investments in agency paper (McCauley and Rigaudy (2011)). In subsequent years, however, monetary policy accommodation in AEs provided a renewed incentive to take on more risk to generate higher returns and diversify portfolios.

By now, most EME central banks are investing in a wide range of currencies and asset classes.<sup>1, 2</sup> Widespread investments in high-grade sovereign and supranational bonds reflect the overriding need to provide a safe and liquid portfolio as insurance against external shocks (Note 1). Safety has typically been required for each position,

<sup>1</sup> To derive the strategic asset allocation (SAA), which defines the broad investment guidelines, central banks typically follow a number of steps (for details, see eg Borio et al (2008a,b), Bernadell et al (2004) and the country notes submitted to this meeting). Most EME central banks divide their portfolio into a liquidity and an investment tranche. Next, they set the currency allocation, benchmark, and risk parameters for each tranche. Finally, they select the assets for each.

<sup>2</sup> See eg the notes from Korea (Table 1), Israel (Graph 2) and Poland in this volume.

but some EME central banks place increasing weight on the safety of the portfolio as a whole by putting a premium on diversification benefits.

Safety considerations also play a key role in currency selection. Investments privilege instruments denominated in currencies from jurisdictions with a credible monetary policy, a reliable market infrastructure and easily enforceable creditor rights.<sup>3</sup> Over the past two decades, most reserves have remained invested in the US dollar (about 60%), while the share invested in the euro has fallen back to about 20% since the GFC.

The desire to invest in assets with higher expected returns without, as far as possible, compromising safety has favoured investment diversification into non-traditional reserve assets, such as corporate bonds and equities.<sup>4</sup> Some central banks also report having broadened the range currencies in their investments,<sup>5</sup> to diversify risks but also to avoid low, sometimes negative, interest rates, particularly in the euro.<sup>6</sup>

### Cross-country heterogeneity

Despite these common trends, the composition of reserve portfolios differs substantially across EMEs.

In line with the importance of precautionary motives, one factor explaining such differences is the source of external vulnerabilities. This is most evident for the currency composition of portfolios. The share of a given currency rises in line with its role in trade invoicing, its debt denomination and its liquidity vis-à-vis the domestic currency – factors that are highly correlated within regions. Thus, the US dollar's dominance is particularly pronounced in reserve portfolios in Latin America and Asia, while the euro share is quite high in central and eastern Europe (eg Ito et al (2015, forthcoming)). By contrast, investments in other currencies do not show a marked regional pattern, as they are likely to be included in the portfolios primarily for their return generation and diversification benefits.<sup>7</sup>

The same factors influence the choice of numeraire (unit of account), which in turn exerts a powerful influence on currency composition by determining how returns are measured (Borio et al (2008a), McCauley (2008)). The numeraire acts as a kind of magnet for the currency composition, tilting it in its favour. This is so regardless of whether the numeraire is an individual foreign currency or a basket. For example, the Bank of Israel takes into account the currency composition of Israel's imports in normal and emergency situations, the composition of short- and medium-term external debt, and the liquidity of the respective currencies when defining the numeraire, and limits strategic currency exposures relative to the numeraire to 10% (Bank of Israel (2017)). When the domestic currency is the numeraire, portfolio

<sup>3</sup> See the note from the Czech Republic on this point.

<sup>4</sup> See eg Yue (2017a) and the note from Israel.

<sup>5</sup> See eg the notes from Brazil and Poland (Graph 5).

<sup>6</sup> For the role of negative yields on the currency allocation, see the note from the Philippines.

<sup>7</sup> For example, the central banks of Brazil, Chile and Poland report investing roughly 5% of their reserves in the Australian dollar. See Central Bank of Brazil (2016), Central Bank of Chile (2018) and National Bank of Poland (2018).

allocations tend to be tilted towards those foreign currencies vis-à-vis which the domestic currency is more stable.<sup>8</sup> As a result, currency allocations also reflect the exchange rate regime and the way market forces drive exchange rates.

Reserve adequacy is an additional key factor. The larger the reserves relative to liquidity needs, the higher the risk the central bank can afford to take, in terms of duration, asset class and currency. The degree of reserve adequacy is sometimes embodied in the practice of dividing the portfolio into a liquidity tranche, with short duration, and an investment tranche. Lu and Wang (2019) present evidence that the smaller the investment tranche relative to the liquidity tranche, the greater the role that trade invoicing and external debt play in determining the currency composition, and the smaller the role of returns.

Another possible determinant of asset composition is the correlation of returns with external shocks (Box 1; see also the note from Argentina). However, there is little evidence that this is systematically the case.

Box 1

### Selecting reserve assets on the basis of their correlation with economic shocks

Holding reserves is one way of insuring a country's wealth against external risks (Claessens (1993)). It would thus seem appropriate to invest in assets likely to rise in value as a crisis looms or materialises, thereby maximising the central bank's ammunition to fight it (Borio et al (2008a)).

Sturzenegger (2018) shows that the duration of Argentina's reserve portfolio would be longer if assets were selected on the basis of their correlation with external shocks. The central bank constructed a synthetic asset whose return mirrored the impact of terms-of-trade and financial shocks on the country's wealth. This asset was included in a portfolio optimisation model, together with investable financial assets. Roughly speaking, the optimisation algorithm then chose a combination of investable assets that was negatively correlated with the synthetic asset – that is, it favoured those whose value tended to rise when wealth in Argentina declined. The variance-minimising portfolio was mostly invested in 10-year US Treasuries instead of three-month T-bills. Intuitively, the value of the 10-year US Treasury bond rises when EMEs are hit by a sudden stop.

In contrast, including assets whose value increases after a poor harvest of key export commodities might not be necessary. As an example, consider soybeans. Because Argentina is an influential producer of soybeans, the crop's export price tends to rise after a poor harvest there, providing a natural hedge.

Implementation of this approach, however, appears to be rare. One reason might be that investment in assets that are negatively correlated with economy-wide shocks could increase the volatility of the central bank's income and capital, which may expose the central bank to reputational risk (see the section on the financial implications of reserve management). Alternatively, it may reflect the fact that, in some cases, the corresponding assets are more illiquid (eg investment in commodities).

<sup>8</sup> See Borio et al (2008b) for the reasons for choosing a domestic currency numeraire.

### 3. Policy issues

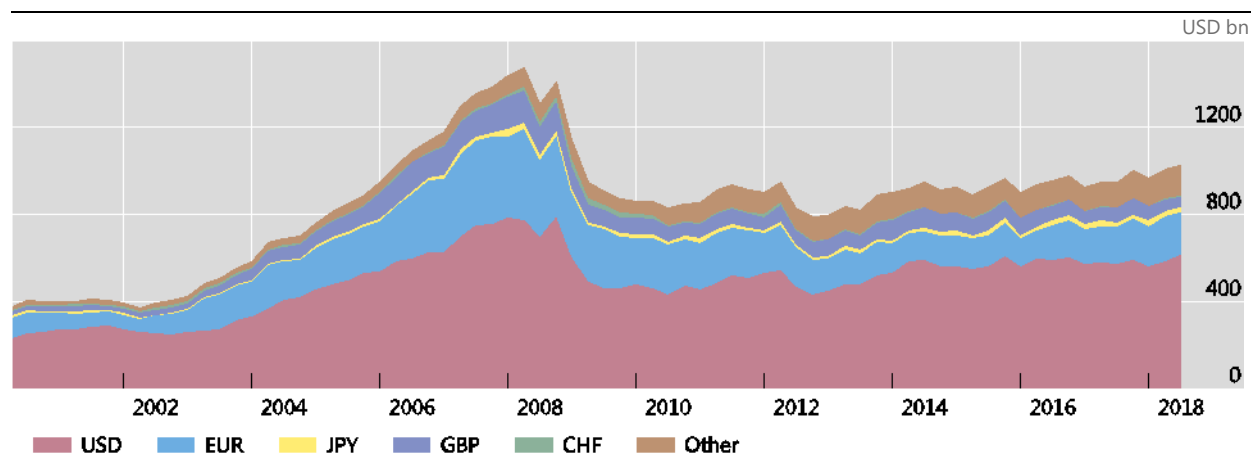
#### 3.1 International spillovers and the asset allocation of reserves

There is evidence that the joint and rapid liquidation of EME reserves can under some conditions exert a material influence on global financial markets.<sup>9</sup> Beyond the size of the liquidation, the strength of such an effect depends in part on asset composition.

The effect is likely to be smaller for investments in assets that become more attractive when risk aversion spikes and EME currencies come under pressure. For example, in mid-2015, concerns about excessive debt in China put pressure on various EME currencies, some of which were already under strain owing to country-specific factors (eg Brazil's fiscal position and Turkey's current account deficit). In response, major EMEs intervened in FX markets, apparently selling US Treasury bonds (Sundaresan and Sushko (2015)). This may have contributed to the 10-year Treasury yield rising above the generic private sector yield of 10-year interest rate swaps – an unusual configuration (Clark and Mann (2016)). That said, while visible, the effects of reserve managers' joint liquidations were short-lived. The increase in risk aversion boosted other market participants' demand for US Treasuries, offsetting the effect of the sales.

Central banks withdrew deposits with commercial banks during and after the GFC<sup>1</sup>

Graph 1



<sup>1</sup> Cross-border liabilities of banks vis-à-vis central banks. Amounts outstanding at quarter-end. Liabilities denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. Data do not distinguish between collateralised and uncollateralised deposits.

Sources: US Treasury; Bloomberg; BIS locational banking statistics.

By contrast, the GFC illustrates how the impact of reserve liquidations could be significant, in particular if reserves are held in banks. Reserve managers globally withdrew around USD 550 billion of bank deposits within a year (Graph 1), contributing to AE banks' FX funding shortages (Pihlman and van der Hoorn (2010), Jones (2018)). Other examples are EME reserve managers' divestment in agency bonds in the GFC's aftermath, and the withdrawal of cash received as collateral in securities lending operations. In these cases, official sector interventions in AEs

<sup>9</sup> *The size of foreign exchange reserves* discussed the potential spillovers from EMEs' accumulating large reserves.

arguably ensured that the respective markets remained liquid (McCauley (forthcoming)). Investments in riskier corporate securities could raise similar issues (Borio et al (2018a)) if central banks expand their investments in this asset class.

The impact of joint liquidations can be larger if reserve managers are prone to sell in a falling market to protect the portfolio, ie if they act procyclically. Private sector investment funds, even those with a long-term perspective, tend to behave this way (eg Papaioannou et al (2013), Bank of England (2014)). Reserve managers might act similarly – for example, if prompted by counterparty limits or similar risk management tools. Indeed, Pihlman and van der Hoorn (2010) suggest that this may have happened during the GFC, when their withdrawal of bank deposits seems to have exceeded liquidity needs.

How might EME central banks reduce the impact of their joint sales on international financial markets?<sup>10</sup> The design of internal governance and risk management arrangements could help if it provides incentives to look through market turbulence. One possibility is evaluating fund managers' performance over long periods. Survey results suggest that these range from one month to one year (Annex Table A1). The same may be true for the evaluation of tactical asset allocation (TAA). Another example is accounting methods that smoothen the impact of changes in the market value of the reserve portfolio on central bank capital. Yet another might be risk-sharing arrangements with the government that insulate the central banks from losses (see below).

In principle, and much more ambitiously, another solution might be to coordinate investments or liquidations *ex ante*. However, just as in the case of monetary policy, coordination faces obstacles, in particular as central bank mandates focus on national interests. Beyond enlightened self-interest, assessing common vulnerabilities of EME economies, and, perhaps, exchanging information about investment and intervention strategies, might help inform the calibration of liquidity risk at the national level.

### 3.2 Do the financial consequences of reserve holdings influence portfolio allocation?

Because of reputational costs or political exposure, a central bank may find it more difficult to fulfil its core monetary policy and financial stability objectives when faced with major losses or a weak capital position.<sup>11</sup> In this respect, reserves may have a notable influence, as they constitute on average 80% of EME central banks' assets.<sup>12</sup> Accordingly, should a central bank's financial health become a factor in shaping policy choices, financial exposures may have an undesirable impact on investment decisions.

<sup>10</sup> IMF (2013) called on reserve managers to give consideration to the risk of market disruptions induced by their actions.

<sup>11</sup> For the relevance of a central bank's capital strength, see eg Milton and Sinclair (2011) and Archer and Moser-Boehm (2013).

<sup>12</sup> The flip side is that governments may, on occasion, be tempted to decapitalise central banks when reserves appear plentiful (see BIS (2011) for historical examples).

The degree of influence in practice is not clear cut. It depends not only on the financial risks associated with reserve holdings but also on accounting, loss-sharing agreements and other country specific factors.

From a financial perspective, two factors in particular mean that large reserve holdings can affect the central bank's financial position.

The first factor is the inherent risk of the positions. Even those in relatively safe assets such as AE government bonds are exposed to market risk because of changes in exchange rates and interest rates.<sup>13</sup> However, whether the realisation of market risk translates into losses and capital shortfalls depends importantly on accounting rules. For instance, the effects are muted if reserves are accounted for at historical cost (as in Korea) or at the lower of historical and current values (eg in Singapore).<sup>14</sup>

The second is the cost of carry. Given that the focus on safety and liquidity favours large investments in government bonds from AEs, costs of carry can be significant whenever countries have lower credit ratings.<sup>15</sup> These costs can be regarded as the price paid for providing insurance against large macroeconomic fluctuations or accumulating reserves in pursuit of other policy goals (*The size of foreign exchange reserves*). Conceptually, though, it could be argued that some part of these costs should be paid by the government, as the benefits of reserve holding and accumulation are often not only related to monetary policy or financial stability objectives but accrue to the wider economy.

The extent of risk-sharing between the central bank and the government depends on distribution rules. For example, in South Africa, the government absorbs changes in the domestic currency value of the reserve assets due to exchange rate fluctuations and those caused by its gold operations. More comprehensively, the Central Bank of Brazil transfers to the government its entire profits and losses.<sup>16</sup>

Distribution rules often tend to operate asymmetrically, which leaves significant financial risk with the central bank with little upside. In many countries, profits trigger payments to the government; by contrast, losses do not trigger receipts as automatic recapitalisations. Examples of such recapitalisations, such as in Hungary, Korea and Peru, appear to be rare. Thus, even temporary losses on the reserve portfolio can erode capital unless offset by other income streams, such as seignorage or profit retentions in good years.

Moreover, even when rules are symmetrical, central banks may not be insulated from political pressures. Failure to provide a dividend to the government can lead to

<sup>13</sup> The importance of exchange rate risk is strongly influenced by the question of the numeraire (see discussion above).

<sup>14</sup> See Archer and Moser-Boehm (2013) for an overview of accounting practices.

<sup>15</sup> Strictly speaking, whether, on balance, a central bank will make gains or losses over time will also depend on what happens to valuations. A positive cost of carry is the flip side of a carry trade position (borrowing in a currency with a lower interest rate than one is investing in). If such strategies are, on average, profitable, the central bank's position will make a loss once valuation changes are taken into account. But even when the central bank eventually makes a gain as the domestic currency depreciates, it will typically take a long time. Such persistent losses can put the central bank under pressure.

<sup>16</sup> A similar outcome is achieved in the few countries where the reserve portfolio is not part of the central bank's but of the government's balance sheet (eg Canada, Japan, the United Kingdom and the United States).

intense political debates. A clear example is Switzerland, where the dividends help buttress the finances of cantons (states) and the central bank has sometimes found itself in the eye of a storm when dividends have fallen short of expectations. Moreover, political pressure may extend to the way reserves are invested (eg to what degree they should be held in the form of gold or environmentally friendly assets).

As a result, either directly or indirectly, by influencing the central bank's and the government's financial position, exposures stemming from the reserve portfolio may end up having an impact on the central bank's effective risk aversion (eg Ramaswamy (2008)). If so, this would in turn influence portfolio choice.<sup>17</sup> Whether and how far this is the case will also depend on other country-specific circumstances.

### 3.3 Disclosure and communication

Disclosure influences the effectiveness of both external governance and the central bank's pursuit of monetary and financial stability (Borio et al (2008a)).

There may be trade-offs here. The demand for disclosure to foster accountability has grown alongside the level of reserves, the range of asset classes and the complexity, and hence opaqueness, of investment strategies. More disclosure, however, may sometimes make it harder for the central bank to discharge its responsibilities for monetary and financial stability. For example, information about changes in the currency composition might enable the detection of discreet interventions or even be interpreted as foreshadowing changes in exchange rate regimes.

Disclosure policies reflect how jurisdictions balance perceived benefits and costs. Some central banks publish only a few aspects of the reserve composition (see country contributions). The Bank of Korea, for instance, argues that, if wrongly interpreted, disclosure can trigger unnecessary controversy. Other central banks provide more detailed disclosures to explain reserve management choices and their implications as part of a broader communication strategy. Indeed, a few central banks have explicitly warned that their investment performance might deteriorate if macro-financial conditions become less favourable (eg Yue (2016, 2017)). Clarifying reserve management choices may sometimes be challenging, however, as the Bank of Israel found in explaining the performance of its multi-numeraire, multi-asset class portfolio.<sup>18</sup>

There may be a case for targeting communication at the broader public. As the Bank of Mexico points out, an informed public might be less likely to pressure the central bank to generate higher returns or to distribute its reserves to fulfil objectives other than those assigned. Indeed, a number of central banks, including in EMEs, have started initiatives to raise awareness of the various roles they play in the economy and to strengthen their standing in an environment in which trust in public institutions appears to have fallen globally. However, engaging in a public debate specifically about reserve management is not without risks. Questions regarding the optimal composition of reserves are difficult to separate from those regarding their optimal

<sup>17</sup> This could occur long before the central bank is in any danger of serious undercapitalisation. Clearly, however, the central bank is not confronted with a formal bankruptcy constraint, or a liquidity one (in its own currency). Some central banks have operated comfortably with lengthy periods of negative equity. See Archer and Moser-Boehm (2013) for a discussion of these issues.

<sup>18</sup> Contribution from Israel.



size and the central bank's capital, neither of which has clear answers (*The size of foreign exchange reserves*). Without a good narrative, the central bank might not have much influence over the outcome of the debate.

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## Annex

Performance evaluation of reserve managers

Table A1

Performance evaluation	Criteria			Frequency			
	Excess return over benchmark	Risk-adjusted return	Other	Monthly	Quarterly	Annually	Less than annually
Internal portfolio managers	100	43	14	48	62	38	0
External portfolio managers	71	29	29	38	33	43	0
TAA	73	36	9	41	55	27	0
SAA	41	50	27	23	45	45	9

<sup>1</sup> Percentage of respondents, based on the replies received from 21 of the 22 countries approached.

Source: BIS survey of meeting participants.