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## Central Bank Foreign Currency Reserves Management Opportunities to Expand Investment Horizons

This document is intended only for Professional Clients and Financial Advisers in Continental Europe; for Qualified Investors in Switzerland; for Professional Clients in Dubai, Ireland, the Isle of Man, Jersey and Guernsey, Malta and the UK; for Institutional Investors in Australia; for Professional Investors only in Hong Kong; for Persons who are not members of the public (as defined in the Securities Act) in New Zealand; for Qualified Institutional Investors, pension funds and distributing companies in Japan; for Institutional/Accredited Investors in Singapore; for certain specific Qualified Institutions/Sophisticated Investors only in Taiwan and for Institutional Investors in the USA. The document is intended only for accredited investors as defined under National Instrument 45-106 in Canada. It is not intended for and should not be distributed to, or relied upon, by the public or retail investors.

# 01

Central banks with large foreign currency positions have increasingly come under financial pressure as they face diminished or negative returns on traditional reserve assets.

Our first whitepaper in the central bank series assesses this topic and argues for greater differentiation in central banks' investment strategies based on reserves adequacy considerations rather than short-term accounting concerns. By basing the investment horizon on reserves adequacy considerations, central banks with ample reserves can seek to generate higher investment returns to build reserves buffers during good times, enhance financial stability and contribute positively to national income.



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## Abstract

Central banks with large foreign currency positions have increasingly come under financial pressure as they face diminished or negative returns on traditional reserve assets. In emerging market central banks, foreign currency reserves typically dominate central bank balance sheets and are invested in conservative asset classes—short duration USD, EUR and JPY government bonds. The low returns on these assets over the past several years have depleted income and capital and current yields, many in negative territory, do not bode better for the future. Some central banks have taken the opportunity of stronger reserves positions to seek to improve risk-adjusted returns potential through diversification and extending investment horizons. As high-grade government bonds with negative yields may not meet capital preservation requirements, the focus on portfolio diversification has taken on more urgency.

This whitepaper approaches this topic from the somewhat atypical intersect between macroeconomics and portfolio management and argues for greater differentiation in central banks' investment strategies based on reserves adequacy considerations rather than short-term accounting concerns. Over the past 15 years, global reserves more than quadrupled and the level of reserves today represents 15% of GDP on average with the level in some countries exceeding GDP.<sup>1</sup> Such large pools of foreign currency assets have the potential to generate significant income but the return objective has typically been treated as a residual in formulating the strategic asset allocation. Foreign currency reserves portfolios are typically constrained by highly restrictive guidelines and risk limits, which can reflect historical antecedents or perceived political constraints rather than actual market risk tolerances. By basing the investment horizon on reserves adequacy considerations, central banks with ample reserves can seek to generate higher investment returns to build reserves buffers during good times, enhance financial stability and contribute positively to national income.



## I. Shifting foreign currency reserve dynamics

The state and practice of central bank reserves management has undergone a sea-change from 2000-2015. During the second half of the 20th century, countries generally pegged their exchange rate to the USD or a currency basket. Central bank reserves were held to defend a system of fixed exchange rates, which periodically came under pressure due to unsustainable external deficits and, at times, speculative attacks. During this period, virtually all of a country's reserves could be called upon to defend the currency regime at any time. Consequently, the bulk of reserves were held in risk-free assets denominated in the currency or currency basket underpinning the peg.

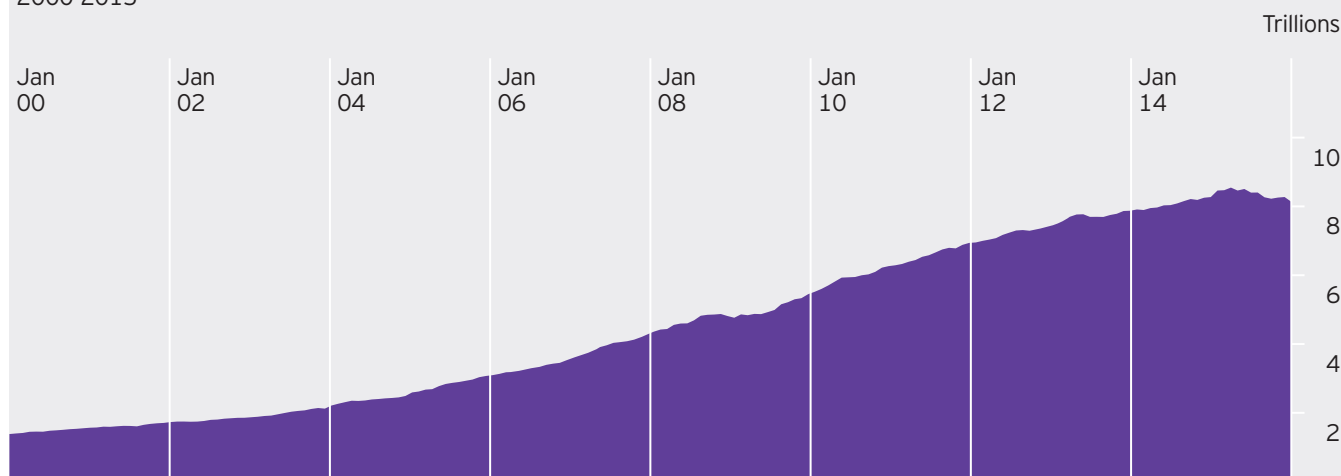
Since 2000, several factors have contributed to a broadening spectrum of reserves management practices so that today reserves management ranges from short-term liquidity management to multi-asset class investment portfolios. This evolution can be attributed to changes in the role and level of central bank reserves, central bankers' level of portfolio management expertise and, most recently, global trade and market developments.

The most striking change over the past 15 years has been the outright increase in foreign currency reserves, which more than quadrupled to \$8.3 trillion as of the third quarter of 2015.<sup>2</sup> (See Figure 1) While this increase is often ascribed to a deliberate building of precautionary reserves, in many instances, the increase was simply the by-product of export-oriented growth strategies, the commodity super-boom and better management of revenues from natural resources. With the reversal of the commodity super-boom, oil producing

countries have drawn down on sovereign wealth funds (SWF) for domestic budgetary support, resulting, in the first instance, in a transfer of foreign currency balances from the SWF to central bank reserves. While a few vulnerable countries have lost substantial reserves, global reserves have remained fairly constant despite external shocks, reflecting a general trend towards more flexibility in the execution of exchange rate policy (see Appendix).

The strengthening of reserves positions over this period can be seen not only in levels but also with respect to reserves adequacy, a measure of external financial vulnerability. Following the emerging market crises of the 1990's, governments sought to reduce external vulnerability by improving financial sector management. Reserves adequacy levels improved as governments reduced their reliance on foreign borrowing, developed domestic capital markets, limited domestic banks' open foreign currency positions and made headway in protecting the value of the currency through fighting inflation. Today, in the face of the rising USD, emerging market concerns are more focused on the rapid increase in open foreign currency positions in the corporate sector rather than at the national balance sheet level. And, as authorities increasingly question the wisdom of spending reserves to defend a currency peg, pressure on the balance of payments has generally had more of an impact on the level of the exchange rate rather than reserves. Despite record capital outflows from emerging markets in 2015, emerging market reserves declined by only 2% if one excludes China and Saudi Arabia, both of which lost substantial reserves defending a target currency rate.<sup>2</sup>

Figure 1  
Increase in global foreign currency reserves  
2000-2015



Data: IMF International Financial Statistics (IFS): Central Bank Foreign currency reserves in USD, ex-SDR and Gold. As at 31 December 2015.

In theory, this metric would suggest a reallocation of about \$750bn into RMB assets. In practice however, the actual level is likely to be much less. Global reserves today have remained overweighted to the USD relative to its trade weight, due to its importance as an invoice currency, role in global finance and depth of its capital markets.

Central banks seek to hold sufficient reserves to buffer disruptive exchange rate volatility during crisis periods. As exchange rates regimes have shifted from hard pegs towards managed floating rate regimes, central banks have gained flexibility to balance exchange rate and reserves adequacy considerations. Moreover, the shift has reduced speculative attacks on the currency. Few central banks now offer currency speculators the one-sided bet to force a devaluation by shorting the currency beyond the central bank's ability to defend it. The greater stability of reserves over this period is illustrated in the Appendix, which compares the level and evolution over time of the worst case declines in reserves during crisis periods.

Over the period 2000-15, central banks and sovereign wealth funds developed a professional cadre of public sector portfolio managers. In 2000, reserves management was effectively treated as a cash management function and, in part, outsourced to other official institutions or, to a lesser extent, private sector asset managers. But this had to change as the size of the reserves ballooned, and reserves dynamics evolved. Central banks, long the domain of economists, invested substantial resources in training staff in finance and portfolio management and developed more robust governance structures for risk and performance oversight. Meanwhile, reserves began to be invested differently based on discrete objectives. Central banks with ample reserves set up long-term investment tranches and those with revenues from extractive industries hived off their management either within the central bank or to a separate sovereign wealth fund, which enjoyed greater degrees of freedom with respect to investments.

Despite enhanced skills and reserves adequacy positions, central bank reserves generally remained invested within the traditional universe of high-grade government fixed income securities. Central bankers sought to increase returns by modestly extending duration rather than significant diversification into credit or

equity markets. And the strategy paid off. During the period, 2000-2009, the 15 year rally in US government securities continued, with US Treasury bonds with a remaining maturity of 1-3 years returning nearly 4% annually. Following the culmination of quantitative easing, however, returns sank to only 0.70% per annum on the same strategy from 2010-15.<sup>3</sup> And, current yields offer little respite as can be seen in Figure 2.

With respect to currency composition, reserves managers diversified moderately away from the USD and this trend is likely to continue, albeit modestly, with the recent inclusion of the Renimbi (RMB) in the IMF's Special Drawing Rights (SDR) basket. The SDR is often used as a proxy for the optimal currency mix of reserves as its composition reflects countries' relative shares of global trade—a factor that contributes to the investment objective of protecting the value of reserves in terms of purchasing power. As of October 1, 2016, the RMB will be incorporated into the SDR basket at a weight of 10.92%, reflecting China's share of global trade of 13%-up from 3% over the last 15 years. In theory, this metric would suggest a reallocation of about \$750bn into RMB assets. In practice however, the actual level is likely to be much less. Global reserves today have remained overweighted to the USD relative to its trade weight, due to its importance as an invoice currency, role in global finance and depth of its capital markets.<sup>4</sup>

Finally, techniques for assessing reserves adequacy are becoming more sophisticated. With more complex global linkages, reserves adequacy can no longer be reduced to simple rules of thumb such as three months import and 12 months short-term debt coverage. Simulation of a country's balance of payments dynamics provides a more refined approach and the IMF is increasingly encouraging countries to engage in their own analysis, incorporating multiple parameters and sensitivity analysis to determine optimal reserves levels for financial stability.<sup>5</sup> A more refined approach to assessing reserves adequacy can provide a stronger foundation for formulating the optimal strategic asset allocation.

With more complex global linkages, reserves adequacy can no longer be reduced to simple rules of thumb such as three months import and 12 months short-term debt coverage.

Figure 2 (%)  
**Yields on government securities in reserve currencies**

	6 months	1 year	3 years	5 years
Germany	-0.45	-0.48	-0.44	-0.25
US	0.42	0.52	0.87	1.23
Japan	-0.10	-0.18	-0.19	-0.15
Switzerland	-0.99	-0.88	-0.93	-0.75
UK	0.48	0.35	0.50	0.87

Data: Bloomberg L.P., as at 4 February 2016.

## II. Aligning policy objectives, investment objectives and guidelines

Central banks' policy objectives inform investment objectives, which in turn inform investment guidelines. High level policy objectives for holding foreign exchange reserves include to:

- provide foreign exchange to the government to meet external payments;
- execute exchange rate policy by holding financial assets denominated in relevant currencies to support a currency peg or manage undesirable exchange rate volatility;
- improve financial stability by providing backing against external open foreign currency positions or exposures, which may include short-term foreign currency borrowings, unstable capital market inflows and, most recently, a large international banking sector relative to a country's economy.
- instill confidence in the ability of the central bank to undertake effective monetary and exchange rate policy and meet future external obligations; and,
- provide a store of value that does not represent claims on the national government for periods of war, natural disasters or other unforeseeable crises.

While the sources of stress and the role of reserves, have evolved in tandem with the evolution of the global financial system, in most cases, investment guidelines have remained remarkably constant.

Today, foreign currency reserves continue to fulfill their traditional objectives as a financial bulwark against external stress. While the sources of stress and the role of reserves, have evolved in tandem with the evolution of the global financial system, in most cases, investment guidelines have remained remarkably constant. While central banks differ with respect to specific policy goals, their investment objectives are remarkably uniform and are nearly universally cited as capital preservation, liquidity and return, in that order.

*Capital preservation:* While most sovereign asset managers rank capital preservation as the primary investment objective, the interpretation of what constitutes capital preservation varies dramatically across and even within the same institution. To elaborate, the concept of capital preservation can be understood in accounting or in financial terms; over accounting cycles or over investment horizons; in nominal or in real terms; in local currency or in foreign currency; and, finally, at the single asset level or at the consolidated portfolio level. Each interpretation leads to vastly different perceptions of risk and, ultimately, the optimal strategic asset allocation. The lack of a common framework for understanding what constitutes capital preservation is often at the root of overly restrictive and sub-optimal investment guidelines, which ultimately may subvert policy objectives as discussed further below.

With respect to central bank policy objectives, the most relevant measurement of capital preservation would be at the portfolio level and over an investment horizon determined by an individual assessment of reserves adequacy. For reasons more related to "reputational risk", however, credit risk guidelines are often formulated so as to preserve capital at the single asset level rather than at portfolio level by restricting the universe of eligible asset classes to those with the highest credit quality-typically AA government or above. While this lowers the risk of credit impairment at the single asset level, it may imply lower total returns on average at the portfolio level and a higher risk of not achieving capital preservation in real terms. Moreover, the capital preservation objective tends to be measured over short-term accounting cycles rather than over the appropriate investment horizon, further constraining risk and returns.

These "reputational risk" constraints have driven reserves into a mix of cash equivalents and short to medium-duration, high-grade government bond portfolios. Given the low to negative yields, these positions not only have a substantial risk

of negative returns-thereby violating capital preservation objectives- but also represent a systemic concentration that could negatively affect liquidity if a preponderance of central banks were to sell. While such portfolios were compatible with policy and investment objectives over the past 25 years, the existing low and negative yields on government debt all but ensure capital losses in real and possibly also in nominal terms going forward.

*Liquidity* is a critical investment objective to enable central banks to intervene during economic downturns or crises to buffer destabilizing exchange rate volatility. For this purpose, investments should be of the highest credit quality and facility to transact without affecting price levels, particularly during crisis periods. US Treasuries and other "safe haven" government obligations are optimal for this purpose as they typically are well bid during periods of crisis-exactly the time when central banks may need to support the currency. Given the low risk and desirable liquidity characteristics, however, such securities are generally also the most expensive or, inversely, lowest yielding. The optimal level of liquidity should thus be calibrated to the level of potential outflows over various periods to prevent a drain on earnings. Looking back over the past 25 years, the level of liquidity required to meet draw-downs in the worst cases was only a fraction of total reserves for the large majority of central banks (see appendix).

*Investment return* has become increasingly important as negative yields on traditional reserve investments violate capital preservation objectives and impair earnings. Whilst often treated as a residual, investment return is an important factor in achieving multiple policy objectives, including: building countercyclical buffers during periods of economic strength to reduce financial vulnerability; providing a government "dividend" for budgetary purposes; reducing the cost of carry of reserves from sterilization; and, protecting central bank capital.

In assessing the potential of returns to enhance reserves levels, it is worth considering the cumulative returns of two USD denominated portfolios (gross of any investment fees) invested from 1 January 2000 to 31 December 2015, a period that included two major equity declines in 2000-01 and 2007-08.

- Portfolio A: the 3 month US Treasury Bill (3M US T-Bill), which represents the highest quality, most liquid asset class
- Portfolio B: a conservative, diversified portfolio based on the following fixed weights: 30% short-durations treasury bills/50% global bonds/20% global equities<sup>6</sup>

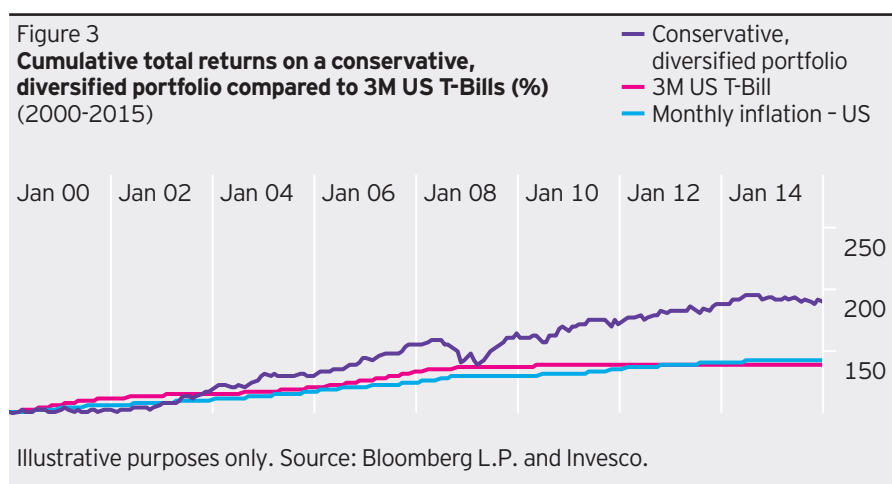
As can be seen in Figure 3, the higher cumulative return of the conservative, diversified portfolio, would have created a sufficient reserves buffer whereby its cumulative value would not have dropped below the market value of the 3M US T-Bill portfolio even after one of the sharpest market sell-offs of credit during the financial crisis of 2007-08. Moreover, by the end of the period, the conservative, diversified portfolio would have been worth nearly double its starting value while the 3M US T-Bill portfolio would have increased by about one-third, not even compensating for inflation. Reserves adequacy permitting, a central bank with the conservative, diversified portfolio would have entered the 2014-15 emerging market crisis with a stronger reserves position. Alternatively, part of the earnings would have been contributed to the national budget depending on the central's profit remittance rules and policy trade-offs.

If one compares the two portfolios from the objective of capital preservation in real terms, the conservative, diversified portfolio appears to have been less risky, even over short time horizons. As illustrated in Figure 4, the instances of not achieving capital preservation in real terms was higher for the 3M US T-Bill portfolio and the risk increased substantially over longer investment horizons as the return did not compensate for inflation. Conversely, the risk of not achieving capital preservation in real terms for the diversified portfolio decreased substantially over time due to higher investment return.

For countries with ample reserves, why is the investment return often treated as a residual? The answer lies in three complicating factors, which together often drive central bank policy makers into formulating highly restrictive investment guidelines. Firstly, central bankers seek stability and this view is all pervasive, affecting not only domestic monetary policy but also the construction of investment guidelines and strategy. In

particular, credit risk is highly constrained to avoid any "headline" or "reputational" risk from a credit impairment event. The second complicating factor relates to accounting standards and can be referred to as "presentation risk". Following the 1997-98 emerging market crisis, central banks were encouraged to report based on International Financial Reporting Standards (IFRS), which required that securities be reflected on the balance sheet at fair market value-or "marked to market". Broadly speaking, this standard contributed to greater conservatism and the risk profile for reserves driven more by short-term accounting constraints than reserves adequacy considerations. Finally, legal risks exist in some countries where sovereign asset managers do not enjoy a "safe harbor" or clear standards of care with respect to fiduciary investment decisions. Where such protections do not exist, it is inevitable that sovereign asset managers-whether central banks or sovereign wealth funds-- will likely behave conservatively regardless of the opportunity cost at the national level in terms of foregone income and reserves.

Reserves adequacy permitting, a central bank with the conservative, diversified portfolio would have entered the 2014-15 emerging market crisis with a stronger reserves position.



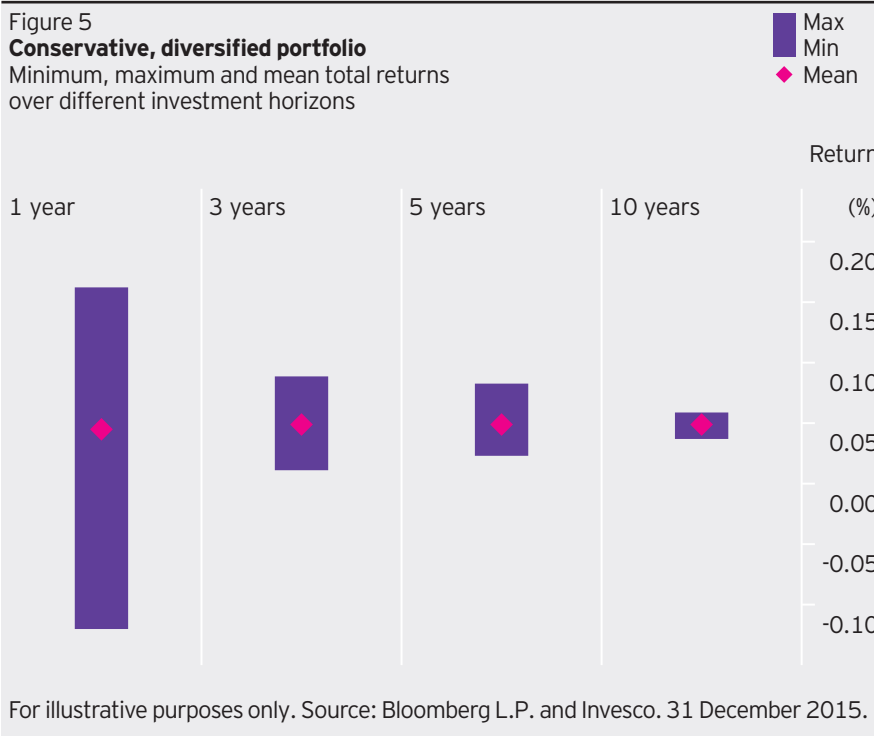
### III. Achieving greater degrees of freedom to meet policy objectives while seeking to enhance investment returns

Foreign currency reserves represent a substantial pool of capital, which can be invested profitably to the benefit of public finances or to further build reserves to help mitigate the risk of a financial crisis. While central banks are not profit-seeking institutions, the negligible returns on traditional reserve assets are putting central bank finances—both net income and capital—under pressure and forcing some central banks to seek government support. Lack of financial independence can beget lack of political independence. There is thus a considerable incentive for central banks to reconsider traditional constraints and explore options for potentially improving returns while still meeting policy objectives.

Central banks could seek to improve returns by: (a) Extending the investment horizon for the investment tranche; (b) optimising the level of the liquidity tranche and rebalancing the relative sizes of the investment and liquidity tranche to reflect changing economic conditions; (c) assessing the restrictions and limits in the investment guidelines in particular with respect to the universe of eligible assets and diversification; and, (d) mitigating constraints arising from reputational or presentation risk.

#### a. Extending the investment horizon for the investment tranche

For countries with ample reserves, an investment tranche with a longer investment horizon provides leeway to pursue potentially higher returns while still respecting capital preservation constraints. Figure 5 illustrates the mean return and risk (dispersion of returns) of the conservative, diversified portfolio when measured over one, three, five and ten year periods. As described earlier in Figure 3, this portfolio is diversified across US bills, bonds and equities. Over a short investment horizon of one year, the portfolio would have violated capital preservation constraints, as can be seen by the instances of negative total returns. When one extends the measurement period, the dispersion of returns would have diminished because of the positive impact of higher returns over time; and the portfolio would have conformed to central bank's capital preservation objective.



Moreover, reserve draw-downs appear to be attenuating as central bankers become more adverse to spending reserves to defend, often futilely, unrealistic exchange rates.

**b. Optimising the size of the liquidity tranche to minimize its cost.**

Tranching reserves into liquidity and investment tranches can help reconcile multiple policy objectives for reserves. Assets exhibiting the highest liquidity and best credit are generally the most expensive or, inversely, would have the lowest return. An analysis of the optimal level of liquidity required to meet potential draw-downs can be based on historical analysis and balance of payments simulation. Core reserves, which are typically able to absorb short-term market fluctuations, can thus be invested in more diversified strategies with a potential for higher expected return. The relative size of the tranches can be rebalanced as economic conditions change.

Central bank's precautionary liquidity requirements are driven by the level of expected potential draw-downs during periods of crisis, when central banks may be required to intervene to support the level of the currency. Reserve draw-downs have become less accentuated as reserve levels have increased and countries have shifted from pegged to managed exchange rate regimes. Adverse balance of payments dynamics, which also negatively impact the level of reserves, occur more

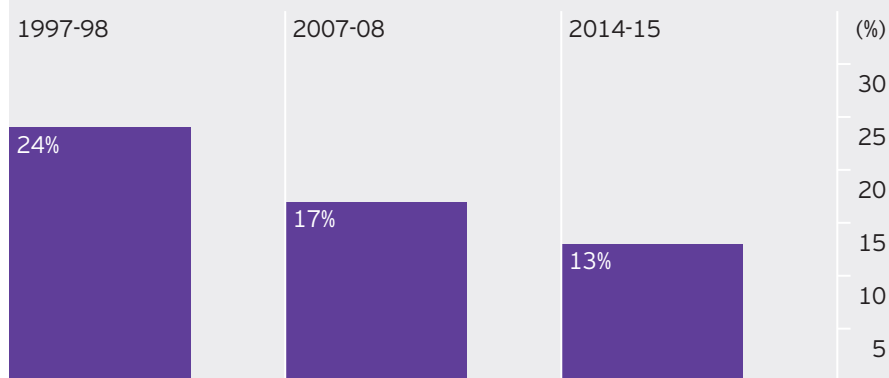
slowly giving central bank policy makes an opportunity to "de-risk" or rebalance the relative size of the investment and liquidity tranches. As illustrated in Figure 6, most countries did not lose more than 30% of reserves during the worst crisis period—as measured the by peak-to-trough intra-period declines. Moreover, reserve draw-downs appear to be attenuating as central bankers become more adverse to spending reserves to defend, often futilely, unrealistic exchange rates.

Credit, equity markets and emerging market currencies typically all fare poorly during global crises as investors de-risk and seek "safe haven" assets. In other words, central bank may need to sell part of the reserves at the same time as credit markets are under pressure. It is thus illustrative to examine the performance of the conservative, diversified portfolio during crises (see Figure 7) to answer the question: would interim capital losses have impeded central bank's policy objectives in intervening to support the currency? For the majority of central banks, the worst case interim capital loss of 11% would have been manageable as the bulk (70% or higher) of reserves would have been available for currency intervention purposes without a "fire sale" of risk assets.

Figure 6

**Severity of reserves draw-downs during crisis periods has lessened**

Countries with a peak to trough decline in reserves >30% during crisis periods



Data Source: IMF International Financial Statistics: central bank reserves excluding gold and SDRs ; Universe comprising central banks with reserves >\$250MM and excluding the five countries that joined the EUR during these periods.

Figure 7

**Conservative, diversified portfolio (Annualised returns)**

Total return and maximum draw-down during crisis periods

	1997-98	2007-08	2014-15
Total return	+9.86	+1.37	+0.27
Worst draw-down	-1.48	-11.18	-3.86

Source: Bloomberg L.P. For illustrative purposes only.



**c. Diversifying for risk/return benefits**

Diversifying across historically uncorrelated assets can improve expected risk-adjusted returns and lessen the liquidity risk associated with systemic concentration amongst central banks to a single market sector. Diversification of central bank reserves has many facets: at a macroeconomic level, diversifying the precautionary portfolio away from a country's "business risk" or macro-economic exposures; at a currency level, across a basket of currencies to protect the country's purchasing power; and, at the portfolio level, across assets with a historically low correlation or covariance to potentially achieve better risk-adjusted returns.

Portfolio diversification across assets has the potential to generate higher expected returns at the same level of risk. Or conversely, lower risk at a given level of expected return. The ability to construct a portfolio with a diverse set of assets is therefore an important degree of freedom in seeking to achieve both central banks' investment and policy objectives. In considering diversification away from government bonds, the minimum level of liquidity should be established to maintain precautionary balances for crisis periods. Stable reserves, however, can be invested in more diversified strategies in an investment tranche. Figure 8 shows the impact on return of adding different asset classes to 3M US T-Bills in equal risk weights. As can be seen, the greatest impact on return come from diversification across asset classes rather than by expanding fixed income.

Given the concentration of the \$8.3 tn in global reserves to short duration US government securities, diversification can

also contribute to liquidity were there to be a systemic crisis in the US government debt markets. The US Treasury debt crisis of 2013, which resulted in a ratings downgrade, foreshadowed what could occur in the face of continued negative fiscal dynamics and political paralysis.

**d. Mitigating reputational and "presentation" risk**

Accounting considerations should reflect the central bank's risk tolerance, as defined by its assessment of reserves adequacy, not drive it. For central banks required to carry fixed income investments at market or "fair value", however, this relationship can be inverted when investment strategies are designed to avoid short term accounting losses rather than generate sustainable income. The International Accounting Board recently changed its rules for accounting for financial assets (IFRS<sup>9</sup>), giving more leeway to account for debt securities at historical, amortized cost rather than on a mark to market basis (fair value). This should alleviate some of the concerns with long duration debt securities due to their short-term market volatility. During normal market conditions, when prices are not distorted by quantitative easing, long duration bonds can be ideal assets for foreign currency reserves. From a balance sheet perspective, they more closely match long duration liabilities (money supply and commercial bank deposits). And, such assets have tended to do well during periods of crisis as yields on reserve currencies have tended to decline during periods of "risk-off" and flight to quality. The average return has tended to be higher over time due to the term structure of interest rates, thus better preserving capital in real terms. And,

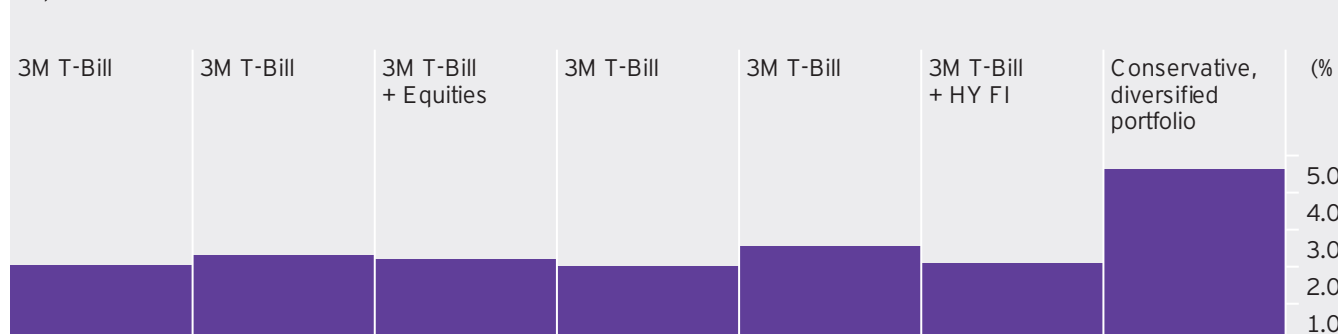
finally, investments that are spread along the yield curve, rather than concentrated in the short to medium end, may mitigate systemic liquidity risk in the case where official institutions acted simultaneously to sell reserve assets.

Investment guidelines are typically constructed to minimize credit risk at the single asset level, independent of considerations relating to risk-adjusted returns and the impact on the portfolio as whole. This bias reflects a concern that a credit impairment event could become headline risk. If capital preservation measures are applied at the portfolio level, the behaviour of individual assets should be irrelevant as long as the total capital value is maintained over the appropriate horizon.

Over the past decade, the universe of investment products has expanded to provide central bankers with a greater range of alternatives in seeking asset class returns without the reputational or headline risk associated with an individual credit event. The development of the market in exchange-traded funds (ETFs) offers access to exposure to the major asset classes. Managed funds, which are carried at net asset value, are another alternative.

Finally, communication strategies with external stakeholders (government, civil society and academia) can be an effective and, in fact, essential factor in aiming to mitigate reputational risk. Central banks that have successfully diversified into credit have done so only with ex ante communication with external stakeholders regarding the investment strategy-its basis, rationale and risk profile- to mitigate the reputational or headline risk of any surprises from a credit impairment event.

Figure 8  
**Risk parity portfolios**  
Impact of diversification on total return (annualised)<sup>8</sup>



<sup>8</sup> For illustrative purposes only.  
Source: Bloomberg L.P. and Invesco. 2000 to 2015. Weights are adjusted that both asset classes have the same risk contribution, based on historical volatility. Government: BofA Merrill Lynch 0-3 Year US Treasury Index, Bloomberg Ticker: G1QA Index. Equities: MSCI World Net Return USD Index, Bloomberg Ticker: M1WO Index. IG FI: Bloomberg US Corporate Bond Index, Bloomberg Ticker: BUSC Index EM FI: JP Morgan EMBI Global Core, Bloomberg Ticker: JPEICORE Index HYFI: Bloomberg USD High Yield Corporate Bond Index, Bloomberg Ticker: BUHY Index.

In order to improve investment return potential, central banks require both the ability and the willingness to assume risk. Over the past 15 years, the ability to take on more risk has improved with the increase in the level of reserves, reserves adequacy and development of the requisite governance structure and staff skills. The willingness to take risk to potentially improve returns, however, has lagged given both individual and institutional asymmetric incentives. With today's traditional reserve assets eroding central bank's financial and, potentially, political strength, the investment return objective has taken on greater importance and offers the possibility of better long term returns on pools of capital that are substantial relative to the size of a country's economy.

Market conditions are currently volatile and many emerging market countries are under pressure. Adding risk to a portfolio during a time when a country's own risk profile has increased may not be advisable. For those countries, who did follow more diversified longer-term strategies, however, they are going into this period of global financial weakness with higher bulwarks and more resiliency. Linking a central bank's investment horizon to its reserves adequacy position is a strategic not a tactical decision and takes time. But, over time, such a strategy can be rewarded.

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**Aiming to mitigate headline risk from issuer-specific events**

There are several ways in which official institutions can gain access to broad asset class exposure (beta) without incurring headline risk from issuer-specific events. Pooled fund structures offer central banks the ability to gain diversified exposure to an asset class without incurring potential reputational risk from issuer-specific events. Exchange-Traded Funds (ETFs), often passively managed, can provide a cost-effective<sup>10</sup>, transparent and liquid<sup>11</sup> means to gain exposure to a wide range of asset classes, markets or risk factors. ETFs based on market capitalization weighted indices provide investors with the risk and return of the broad index. In addition to indexed products, ETFs are also offered with specific tilts, sometimes known as "smart beta"<sup>12</sup>, which provide the risk and return of a diversified basket of shares with desired characteristics, such as high dividends or low volatility. For Central Banks seeking diversified market exposures with intra-day liquidity, ETFs can offer an efficient and transparent solution potentially mitigating the risk associated with holding individual "names".

For central banks with more customized requirements, we have observed the use of private, wholly-owned, closed-end funds as an innovative solution. Set up in-line with relevant local regulations, a private, wholly owned closed-end fund can offer a central bank many benefits, including total control of investment parameters, the ability to receive a daily single valuation, full transparency of underlying holdings and clear attribution of risks and returns. This is similar to a dedicated segregated portfolio but results are reported on a consolidated net asset value basis, again mitigating the potential headline risk from exposures at the single issuer level. Using private wholly owned, closed-end funds for external reserve management additionally provides clear separation between the central bank's own reserve management activities and those of its third party reserve managers.

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**Aiming to avoid undesirable outcomes**

Forward-looking risk measurement tools provide a significantly different perspective than models based on historical returns, particularly when yields approach zero following a 25 year bull market and may turn up. Forward-looking measures of investment risk can greatly help the iterative process between the central bank and its third party investment manager to define appropriate investment parameters. With reputational risk often equated to downside risks or the risk of an absolute loss, a combination of simulation and Value-at-Risk (VaR) based methods can have an important role in seeking to ensure risks are in-line with the central bank's risk tolerance.

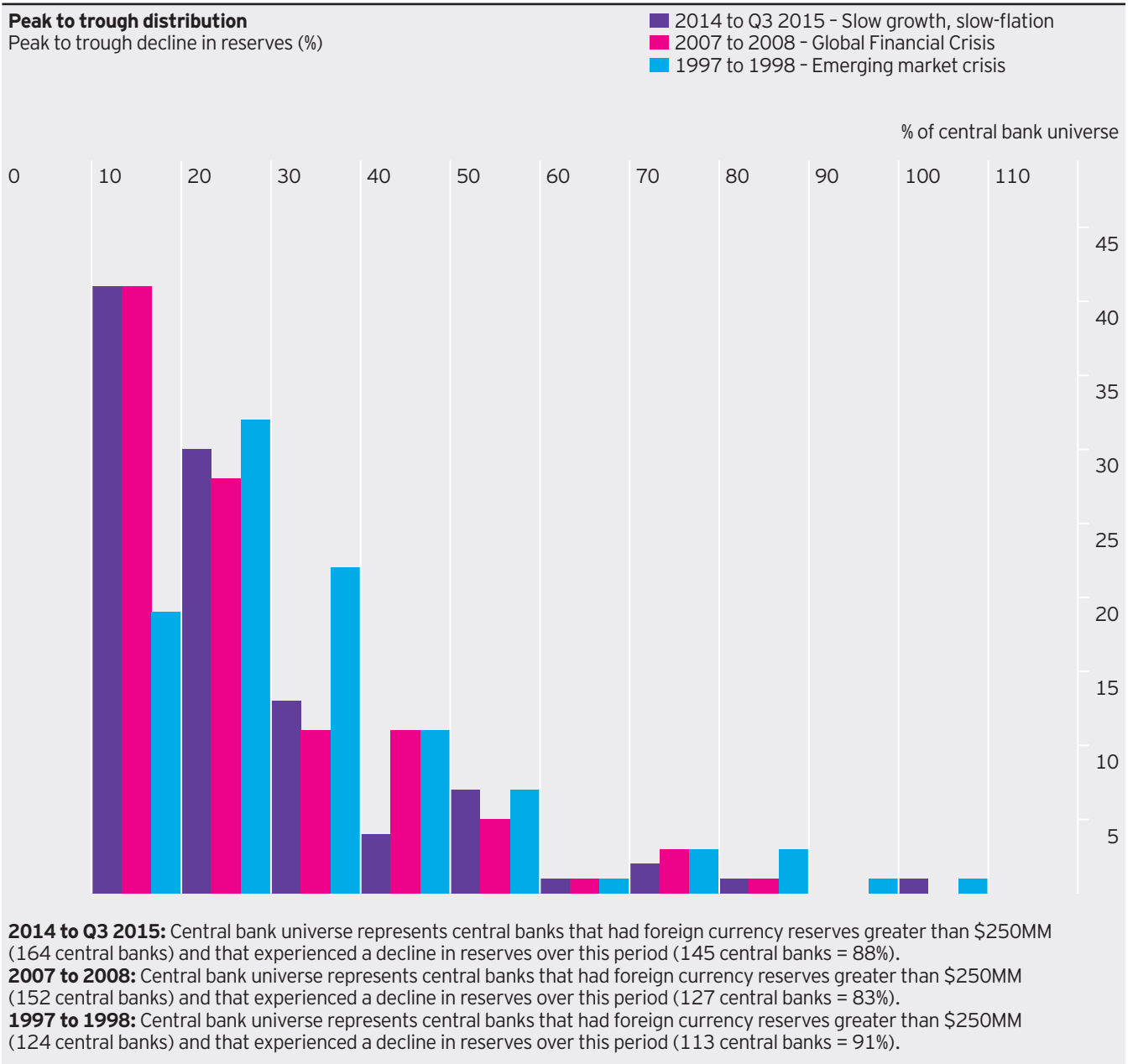
Forward looking scenario and sensitivity analysis can illuminate the potential downside exposure to particular risk factors for a given portfolio specification. The output from sensitivity analysis offers a recognizable format to central banks' own forecasting/signalling techniques by providing a range of possible outcomes across different probabilities. In the case of fixed income mandates, sensitivity analysis enables adjustments to permitted duration and credit spread exposures to be evaluated in terms of their impact on downside risk. Such analysis can be tied in to absolute loss tolerances and describe for the Central Bank the potential circumstances under which a maximum loss limit might be crossed.

Clearly though, the objective for both the central bank and its third party investment manager is to avoid reaching a point where unpalatable loss outcomes are reached. Developing loss management protocols, which set progressive levels of interaction and eventually intervention between both sides, can be usefully informed by such scenario analysis. Following implementation, the loss management protocol becomes one component of an overall risk management framework that is informed by realized loss measures (ex post) and estimates of potential downside risk such as scenario analysis (hypothetical and historic) and VaR.

### Central bank reserves

Level of peak to trough declines, during crisis periods, for central banks experiencing decline in reserves

2014 to Q3 2015 Slow growth, slow-flation	2007 to 2008 Global Financial Crisis	1997 to 1998 Emerging market crisis
>30% drop (%)	>30% drop (%)	>30% drop (%)
South Sudan 75	Pakistan 67	Gabon 96
Ukraine 68	United Arab Emirates 59	Zimbabwe 87
Burkina Faso 67	Mongolia 46	Angola 78
Tajikistan 67	Montenegro 46	Ukraine 74
Timor-Leste, Dem. Rep. of 65	Ethiopia 45	Pakistan 72
Equatorial Guinea 56	Kuwait 44	Papua New Guinea 68
Zimbabwe 53	Bahamas, The 40	Moldova 65
Mongolia 50	Georgia 39	Seychelles 64
Ecuador 49	Sudan 39	Russian Federation 63
Chad 49	Sri Lanka 38	Ethiopia 50
Suriname 49	Fiji 38	Ghana 49
Congo, Republic of 47	Ecuador 36	Panama 49
Azerbaijan, Republic of 47	Belarus 35	Italy 49
Mali 46	France 34	Brazil 48
Burundi 46	Qatar 33	Sweden 44
Greece 44	Norway 32	Mauritius 42
Armenia, Republic of 35	Senegal 31	Norway 41
Benin 35	Burkina Faso 30	Cote d'Ivoire 41
Gabon 34	Kazakhstan 30	Romania 39
Belarus 34	Bahrain, Kingdom of 30	Kenya 38
Gambia, The 32		Finland 38
Moldova 32		Denmark 37
Denmark 31		Venezuela, Republica Bolivariana de 35
		Bolivia 34
		Kazakhstan 34
		Thailand 33
		Ecuador 31
		Costa Rica 31
		Bahrain, Kingdom of 31
		Turkey 30





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- <sup>1</sup> IMF and World Bank data 22.3.16.
- <sup>2</sup> IMF: International Financial Statistics (IFS): Foreign currency reserves ex-SDR and gold in USD.
- <sup>3</sup> Source: Barclay's UST Fixed Income Indices. Total return in USD.
- <sup>4</sup> IMF: IFS Central Bank Reserves ex SDR, ex gold in USD and excluding China.
- <sup>5</sup> IMF as at 4 February 2016.
- <sup>6</sup> Bonds: JP Morgan Global Aggregate Bond Index Total Return Unhedged USD, Bloomberg Ticker: JGAGUSD Index. Equities: MSCI World Net Return USD Index, Bloomberg Ticker: M1WO Index. Cash: US TBILL 3-6M Total Return, Bloomberg Ticker: SPBDUB6T.
- <sup>9</sup> IMF International Financial Statistics: Central Bank Reserves in USD ex-gold and SDR; Universe of central banks with peak reserves > \$250 MM.
- <sup>10</sup> Cost effective - Since ordinary brokerage commissions apply for each buy and sell transaction, frequent trading activity may increase the cost of the ETFs.
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