

How do Central Banks Invest? Embracing Risk in Official Reserves

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This is an update to the 2017 SSGA study of central bank asset allocation.¹ In contrast to the last study which focused on the allocation of excess reserves (i.e. the investment tranche) exclusively, this study reviews the entire reserve portfolio. Two years on, the main findings are:

- Overall, there is greater diversity of asset classes and a broader use of risk assets, with roughly 15% (\$2tn out of total \$13tn) in unconventional reserve instruments.
- Based on official reserves, central banks are significant, frequently dominant, capital markets participants: they hold about a third of all supranational debt and nearly a fifth of high-grade sovereign debt (or nearly half if domestic QE holdings are added).
- Central banks hold around \$800bn (6% of portfolio) in equities and over one trillion (9% of portfolio) in return-enhancing² bonds (mainly investment-grade corporates and asset-backed securities) compared with close to zero at the beginning of the century.

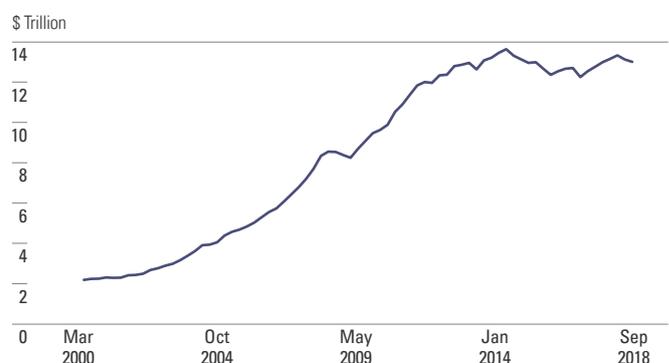
Central Banks as Asset Owners

After a decade of unconventional monetary policy, one could be forgiven for confusion around central bank investment patterns.³ This report is a reminder that the core investment assets of central banks stem from the official reserve portfolio. Assigning clear nominal and relative numbers will help dispel some of the obscurity around the reserves management practices of this traditionally non-transparent group of global public investors.

In this study we attempt to bridge existing data gaps by conducting a bottom-up estimate of the global reserve portfolio. We have studied the balance sheets of 30 large reserve holders⁴ at a detailed, granular level, using a mix of public and private information. Together, they manage \$10.7tn in reserve assets, i.e. over 80% of global central bank reserves. Based on the composition of their collective portfolio and some further data from the International Monetary Fund and the World Gold Council, we made some qualitative adjustments for the profile of the remaining central banks to estimate the total tally (see Methodology box on page 9 for more details).

In December 2017, total global central bank reserves⁵ stood at around \$13.3tn, recovering from their end-2015 trough but below the mid-2014 peak of over \$13.6tn (see Figure 1). This makes central banks one of the largest, if not the largest public investor group; for comparison, sovereign wealth funds (SWF) manage between \$6tn and \$8.2tn, depending on the definition, and public pension funds between \$6tn and \$15tn.⁶

Figure 1: Estimated Total Global Official Reserves, \$tn⁷



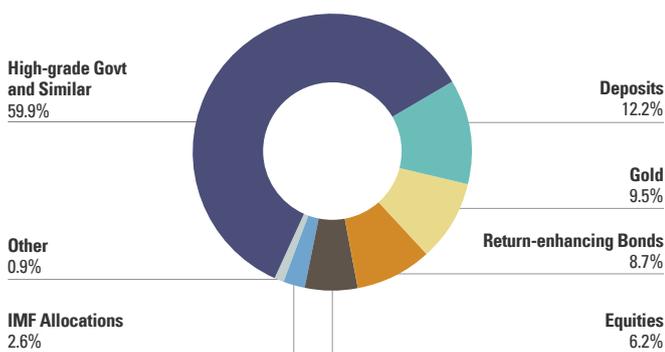
Sources: IMF COFER database, World Gold Council, Central Bank of the Republic of China (Taiwan), SSGA and OMFIF analysis.

While the path and outlook for the value of reserves is influenced by numerous factors (not least fluctuations in currencies and gold prices), it is clear the era of rapid reserve growth is over. As reserve levels are stabilising, central banks are re-assessing the balance of different objectives of reserve management.

These objectives have been traditionally quite narrow and can be summarised as follows: (i) exchange rate management and backing domestic currency, if applicable, (ii) maintaining external liquidity and supporting market confidence therein, (iii) supporting the government in external debt management and (iv) maintaining an emergency reserve.⁸ This informs the traditional approach to reserve management, governed by objectives of, in order of priority, safety, liquidity and return.

While safety and liquidity remain the clear priorities, the focus on return has increased in recent years, contributing to the diversification of central bank reserve portfolios (see Figure 2). As we describe in the next section, 81.6% of assets are primarily held to address the first two objectives (deposits, high-grade bonds and, tentatively, gold). We will refer to those as *liquidity instruments*. On the other hand, 14.9% are *investment instruments* (equities and return-enhancing bonds), which are predominantly held to satisfy the return objective. A further 2.6% are IMF allocations⁹ which represent the countries' relationships with the IMF and the remaining 0.9% are chiefly derivatives.

Figure 2: Global Central Bank Reserve Portfolio, by Asset Class, % of \$13tn Total



Source: National central banks, IMF, SSGA & OMFIF analysis.

Liquidity Instruments: Safety Remains A Priority

In line with the liquidity and safety objectives, high-grade sovereign bonds issued in reserve currencies, gold and deposits have usually been the classic reserve instruments. They still constitute the bulk of the global reserve portfolio (almost 82%), and even among the group of the 30 largest security-holders our analysis focuses on, 16 invest nearly exclusively in these liquidity instruments.

Deposits

The most liquid instruments are deposits,¹⁰ which stand at \$1.6tn and make up 12.2% of the global reserve portfolio. This share has fluctuated in the past two decades but never exceeded 20% according to IMF data. Over 60% of deposits are held with other central banks and the Bank for International Settlements, a form of cash unavailable to other investors. Some of these arguably constitute indirect sovereign bond exposure as well, as the ultimate deposit-taking central bank has to have a corresponding asset which is likely to be a treasury bond. That leaves around \$600bn in commercial bank deposits, used by central banks which might be seeking higher deposit rates, using their deposits for custody and trading purposes, or may not have access to the full range of official deposits.

High Grade Sovereign Fixed Income

High grade sovereign and quasi-sovereign bonds are the key tool to meet the objectives around safety (given that they carry the lowest credit risk) and liquidity (as they are one of the most liquid markets), especially as they are available in all potentially desirable currencies. They make up 59.9% of the total portfolio (or 68.1% of reserves excluding gold and IMF allocations). In nominal terms, this amounts to approximately \$7.9tn (see Figure 3), underscoring the significant role central banks' ownership of sovereign bonds plays in global finance. While these assets

generally carry the lowest credit risk, the average credit rating has deteriorated over the past decade. This category of investments includes the highly-rated (usually AA and AAA, occasionally lower¹¹) government debt as well as debt of government agencies and supranational institutions.¹² We do not include US Agency Mortgage Backed Securities in this category as their cash flow profile is rather different (see next section).

Supranational bonds are popular with central banks and, based on our analysis using S&P data, we estimate that central banks may be holding as much as a third of all supranational issuance. For comparison, we estimate that they hold around 18% of pure sovereign bonds.¹³ Adding the \$6.9tn which (mostly EM) central banks hold in their reserve portfolios to over \$9tn on domestic monetary balance sheets (mostly DM through quantitative easing), central banks in aggregate hold almost 43% of all high-grade sovereign bonds as of 2017. If we add this to our estimates of holdings of other public investors,¹⁴ around half of all high-grade sovereign debt is recycled on a sovereign balance sheet elsewhere.

On top of increased credit risk, the ultra-low or negative yields on vast swaths of the sovereign universe have proved a major challenge. Many EM central banks set domestic policy rates at levels which exceed high-grade bond yields, creating negative carry. The traditional approach to reserves is to manage the high-grade bond portfolio to an internal benchmark with a fixed targeted duration achieved through diversified holdings across the relevant segment of the yield curve. Some central banks manage duration more actively and deviate from the target more frequently, but the main source of volatility is usually the currency risk which they take on by managing the currency composition of their portfolios. Quite often, however, neither currency nor duration management prove sufficient to offset the cost of negative carry.

Gold

To a lesser extent, gold is also liquid and safe. The extent of their gold holdings distinguishes central banks from both public and private asset owners. Gold is a commodity with a volatile price and no

Figure 3: Global Central Bank Reserve Portfolio, by Asset Class \$bn and % of Total

	Holdings, \$bn	% of Total
Total Official Reserves	13,261	100.0
IMF Reserve Positions + SDRs	347	2.6
Gold	1,265	9.5
Securities, Deposits and Other Investments	11,649	87.8
Deposits	1,618	12.2
Securities	9,914	74.8
High-grade Govt and Similar	7,943	59.9
Government	6,875	51.8
Supra	364	2.7
Agency/Guaranteed	704	5.3
Return-enhancing Bonds	1,152	8.7
Asset-backed	459	3.5
IG Corp Bonds	670	5.0
HY Bonds	—	0.0
EM Debt	24	0.2
Equities	819	6.2
DM Equities	781	5.9
EM Equities	38	0.3
Other	117	0.9

Source: National central banks, IMF, SSGA & OMFIF analysis.

associated income stream;¹⁵ normally, such assets are popular with investors with higher risk budgets and more diversified portfolios.

Even there, commodities usually merely form a small sliver of the alternatives portfolio. For example, public pension funds had 0.5% of their assets in commodities, including gold, as of year-end 2016. In contrast, 9.5% of official reserves are held in gold (on market prices) as of year-end 2017; in fact, the World Gold Council estimates that official holders are in possession of over 17% of all gold above ground.¹⁶ To understand and interpret this number, we delve deeper into the underlying factors.

The allocation to gold has profound historical reasons behind it, with many countries having adopted a gold standard in some shape or form before World War II. Following the end of the war, gold continued to play an important role within the Bretton Woods international monetary system. It is only after 1971 that gold lost the last of its quasi-monetary features and became a pure commodity.

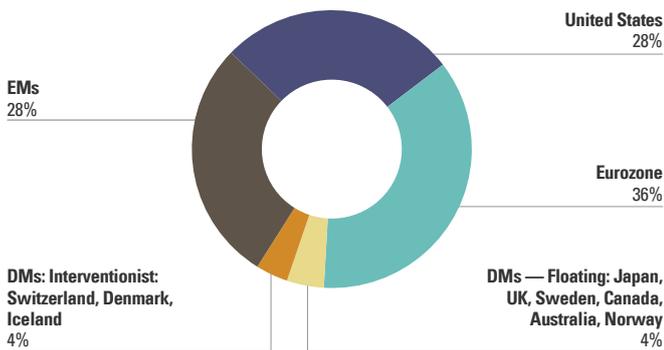
The countries which used to hold gold for policy purposes hold most of it now. Specifically, developed economies with now-floating exchange rates constitute 53%¹⁷ of the global economy but only hold 14% of global reserves; their share in official gold, however, is a staggering 68% (Figure 4). If we exclude these central banks from estimations altogether, the share of gold in global reserves drops to 3.9%, which is much more in line with a conventional multi-asset portfolio of a general institutional investor. The legacy status of gold is further confirmed by the fact that most of these countries have not touched their gold holdings in years. Looking at gold on a tonnage basis, 57 out of 188 central banks surveyed by the WGC have not changed their gold allocation by a single ounce in the past 10 years — including US, Italy, Switzerland,

Japan and Netherlands which together hold 44% of all central bank gold. The Banque de France and Germany’s Bundesbank have used the benign gold price environment to lock in the gains and reallocate.

That said, some central banks continue to buy net new amounts of gold. The total holdings of gold in tonnage are at the highest level since the 1990s, meaning that some central banks continue to actively buy it. The present trend specifically took off after the global financial crisis, as central banks increased their gold holdings by 14%. Given appreciation in the gold dollar value, this amounted to a 67% increase in dollar terms. This helped keep the share of gold in global reserves quite stable, at roughly 10%.¹⁸

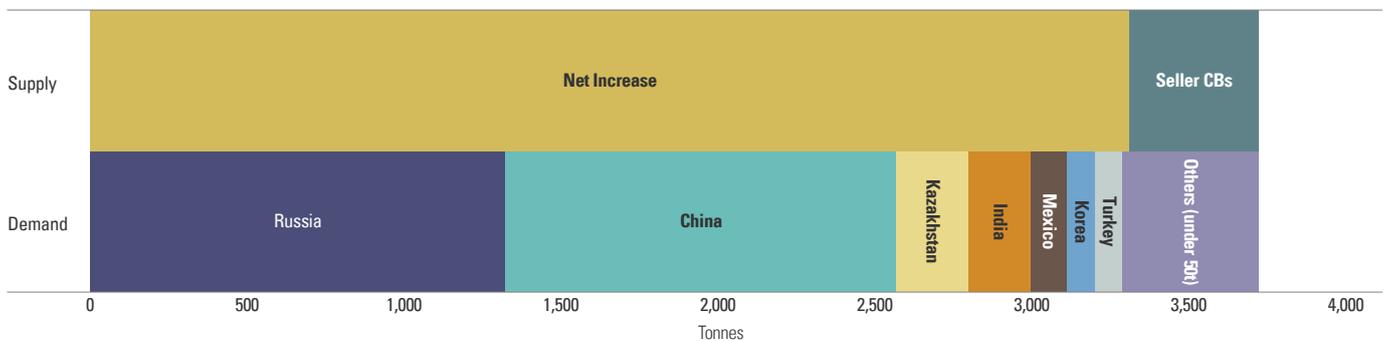
The net purchases, however, are dominated by a few key players. Collectively, central banks bought 3,712 tons of gold and sold 409 tons in 2008–17; Russia and China together accounted for more than two-thirds of purchases on a gross basis and more than three-quarters on a net basis (see Figure 5). This pattern, supported in part by idiosyncratic geopolitical factors, is supportive of gold’s role as a reserve asset.

Figure 4: Official Gold Holdings by Country and Country Groups, December 2017



Source: World Gold Council, SSGA & OMFIF analysis.

Figure 5: Central Bank Net Purchases of Gold, 2008–17, Tons



Source: World Gold Council, SSGA & OMFIF analysis.

Investment Instruments: Increased Focus on Return

The 1998 Asian Financial Crisis led many emerging markets to intentionally accumulate official reserves to guard against potential balance of payments crises; such accumulation ultimately created reserves above the reserve adequacy threshold, or excess reserves. For example, among 55 emerging market economies for which the IMF conducts its reserve adequacy analysis,¹⁹ 30 had excess reserves as of year-end 2017, by 58% on average.

The ‘adequate’ reserves are considered to be sufficient to meet the worst-case scenario requirement for reserves in a balance of payments crisis. For excess reserves, central banks can therefore refocus on return – the third reserve management objective. While different central banks have different risk tolerance, this portion can be managed on a *risk-return basis*, rather than just complying with safety and liquidity requirements. As a result, we observe a fairly widespread embrace of riskier asset classes.

How far does the embrace go? There are two ways to look at it. The first way is to try to estimate implicitly what share of reserves is managed on a risk-return basis. To obtain such an estimate, we need to look at levels of excess reserves and at central banks’ governance frameworks. Such an approach was undertaken in SSGA’s previous study which estimated that such return-seeking ‘investment tranches’ form about 15% of global reserves as of year-end 2016. The 15% merely indicates the capacity for risky investments, as not all such capacity is used and some central banks keep some or all of those reserves in traditional instruments. The second approach, used in the current study, is to bypass such governance considerations and look at the factual share of risky assets in reserve portfolios which we estimate at 15% at year-end 2017. That either means that central banks have utilised their risk budgets in full, or, much more likely, that the scope for such investments has actually grown.

Anecdotal evidence suggests that prior to the 2008 crisis, only a handful (likely five or six) of central banks held such instruments. Even in 2017, only six central banks comprising 43% of global reserves actually held 80% of total *investment instruments*. The breadth of adoption, however, has increased significantly: in our sample of the 30 large reserve holders, 17 held return-enhancing bonds and 11 invested in equities. In other words, central banks *as investors* have responded to the policy signals of other central banks and have sought out higher-yielding assets in the era of quantitative easing.

Even if reserve adequacy allows for more flexibility, many central banks are still subject to a very restricted choice of reserve instruments for legacy or governance reasons. For instance, the 1934 Reserve Bank of India Act stipulates that the RBI may invest in debt instruments representing sovereign/sovereign-guaranteed liability, per article 17.12 of the Act, but also prohibits investment in riskier assets such as equities. Thus, investment into new asset classes often requires governance changes at the central bank level, particularly if an external manager is needed.

Despite all these limitations, this study finds that there has been a substantial evolution, if not revolution, in reserve management. The balance between the three classic reserve management objectives has decisively shifted, and many central banks have embraced diversification into new asset classes. While the data only provides a snapshot of global reserves at one point in time, we nonetheless observe significant, rapid changes among reserve managers.

Investment instruments are tilted towards bonds, with return-enhancing bonds constituting 8.7% and equities 6.2% (see Figure 3). While further breakdown is only available for a more limited sample, our tentative conclusion is that in both fixed income and equity, the allocation is overwhelmingly skewed towards developed markets. We found no evidence of any central bank investing in high-yield debt and only a marginal figure for emerging markets debt

(see below). The bulk of the risky fixed income allocation is in investment-grade corporate debt (5.0% of total) or asset-backed securities (3.5%). Similarly, the equity portion is also nearly all in developed markets (5.9% of total), with only a residual in emerging markets stocks (0.3% of total).

This near-exclusive focus on developed markets is presumably explained by the desired currency composition of the foreign reserves portfolio. According to IMF Currency Composition of Official Foreign Exchange Reserves (COFER) data, nearly all foreign reserves are in developed market currencies. Even excluding the People's Bank of China — the world's largest reserve holder and an institution unable to hold Renminbi assets — the total share of DM currencies in remaining central bank reserve portfolios approaches 95%.²⁰

Turning to asset-backed securities, we estimate that central banks hold about \$460bn in total. This is a very wide asset universe and few central banks disclose their holdings in full, though we estimate the share of dollar-denominated bonds is fairly high, in line with currency composition of reserves. It is also likely that a substantial chunk of those are US Agency mortgage-backed securities. These are very close to treasuries in credit risk but have a different duration risk due to their complex cash-flow profile.

We estimate that the number of central banks holding investment-grade corporate debt is roughly the same as for Asset Backed Securities but that the amount is higher at around \$670bn, or just over 3% of the global market. Some of the most diversified central banks hold them alongside other asset classes in a full multi-asset portfolio; in other cases, we see central banks which are prohibited from or have decided against

equity investments using Investment Grade credit instead to gain some degree of private sector exposure. Similarly to equities, however, there are governance and reputational risks involved in those investments: a single default, even if negligible in balance sheet terms, may set back the public case for diversification of reserves.

Holdings of emerging market debt are very small. Most of them are made up of central bank stakes in the Pan Asia Bond Index Fund (PAIF) that invests in local currency government and quasi-government bonds in eight Asian markets.²¹ The rest are a mix of hard-currency and local-currency emerging market debt which are negligible in global terms.

While the \$820bn-odd in equity holdings is small and constitutes a far smaller presence in global markets (below 2%), its significance in the reserve management revolution cannot be overstated. Equities expose central banks to the risk of much more significant capital losses than other asset classes. Further, equities require an active decision on exit as they cannot be run off passively. Finally, they set up even more complex governance issues than bonds as central banks become shareholders with voting power — whether they use it or not is a different matter. The previous SSGA study estimated that as of 2016, 90% of central bank equities were indexed. This number is unlikely to have changed materially as the indexed approach to holdings is one way to mitigate governance risks.

We expect illiquid private market assets to remain a rarity in central bank portfolios.²² Governments wishing to build exposure to such asset classes normally do so through sovereign wealth funds, and we expect central banks to stick to liquid, if risky, assets in their official reserves.

Conclusion

Central banking has undergone many changes over the past decade. While central bankers have been in the news mostly due to innovations in monetary policy, reserve management has quietly changed in dramatic ways as well. As this report illustrates, the diversification of reserve assets is fully underway and the official reserves portfolio is becoming increasingly complex. The embrace of risk assets, particularly equities, stands in great contrast to the usual timidity of classic reserve management. The past decade has been favourable to risk assets, so this strategic shift has not been tested in periods of prolonged equity drawdowns or multiple defaults in bond markets.

This report also highlights how central banks have become significant capital markets participants in their own right. While risk assets have risen as a share of reserves, central banks remain small players in the overall market. This is not the case with high-grade sovereign bonds, where the large nominal holdings of central banks make them a critically important investor group. Roughly 43% of all high-grade sovereign paper sits on a central bank balance sheet. This not only raises questions for future research about bond market liquidity (given that QE holdings are buy-to-hold), but also about future fiscal financing capacity. If central banks have been a major source of deficit funding in the past, what circumstances would enable them to do so in the future?

Furthermore, the total size of global foreign reserves has been largely stagnant since 2011–12, so it is unlikely to constitute a major source of future demand. This implies a greater reliance on unconventional monetary policy and other unorthodox tools in the event of rising fiscal deficits in developed markets. And that, in turn, may require reserve managers to innovate even further in the future.

¹ SSGA (2017): Hentov, Elliot 'How do Central Banks Invest'.

² The overall stagnation is not universal and reflects several underlying trends: several large reserve holders such as the central banks of China, Saudi Arabia and Russia have lost some reserves since 2013, but it was compensated by rapid reserve accumulation by Switzerland as well as several mid-sized emerging market central banks.

³ We use this term hereafter to denote all fixed income holdings other than high-grade sovereign, agency and supranational bonds.

⁴ We surveyed 30 reserve holders with the largest estimated securities portfolios, which differs slightly from 30 largest reserve holders outright. Please see the Methodology box on page 9 for more information.

⁵ Japan manages most of its official reserves through the Ministry of Finance rather than the Bank of Japan; some of US gold holdings are also managed at the Treasury level; such reserves are fully included in this report.

⁶ The lower estimates refer to SSGA studies (Hentov, Elliot & Petrov, Alexander, 'How Do SWFs Invest?' (2018) and Hentov, Elliot & Petrov, Alexander & Odedra, Sejal, 'How Do Public Pension Funds Invest' (2018)) while the upper estimates are sourced from the 2018 OMFIF Global Public Investor report.

⁷ The figure has a slightly lower number for year-end 2017 as all years in the chart had to be estimated on a consistent methodology which is slightly simplified compared to our in-depth study.

⁸ IMF (2001): Guidelines for Foreign Exchange Reserve Management; for a more detailed discussion of central bank policy objectives see <https://omfif.org/media/4098534/the-omfif-conversations-foreign-reserves-in-a-volatile-world.pdf>, <https://omfif.org/media/5355062/changing-importance-of-reserves.pdf>.

⁹ We have grouped IMF reserve position and SDR allocation together as they are determined by a country's IMF membership conditions and are not an active portfolio choice.

¹⁰ The available data suggests that the use of term deposits by central banks is negligible and the bulk of the figure is overnight deposits.

¹¹ Emerging market government debt is a risk asset class and is considered in the relevant section. There are a number of economies which are considered 'developed markets' but whose debt has a credit rating below A- (for example, Italy and Portugal). We included those into the calculation for 'high-grade' bonds but to our knowledge, the holdings are very small and only one central bank on our sample of 30 had any.

¹² By agencies, we consider government-owned institutions issuing debt under a government guarantee (such as KfW in Germany or Coface in France); by supranationals, we consider international development institutions established under a treaty, issuing debt under an implicit cross-government guarantee in the form of callable equity, such as the European Investment Bank or International Bank for Reconstruction and Development.

¹³ The number of 18% is obtained by two independent ways — by dividing all the central bank holdings by the total debt issued by Developed Markets as defined by MSCI, or by total sovereign debt rated A- or above.

¹⁴ The lower estimates refer to SSGA studies (Hentov, Elliot & Petrov, Alexander, 'How Do SWFs Invest?' (2018) and Hentov, Elliot & Petrov, Alexander & Odedra, Sejal, 'How Do Public Pension Funds Invest' (2018)) while the upper estimates are sourced from 2018 OMFIF Global Public Investor report.

¹⁵ Some central banks engage in gold lending and are able to achieve a return this way, but this return is associated with the lending operations rather than with gold itself.

¹⁶ <https://gold.org/about-gold/gold-supply/gold-mining/how-much-gold>.

¹⁷ As of year-end 2017; IMF World Economic Outlook data.

¹⁸ This number differs slightly from our 9.5% estimates quoted in Figure 3 as it is based entirely on World Gold Council's data.

¹⁹ IMF ARA Framework — Assessing Reserve Adequacy.

²⁰ IMF COFER as per Q4 2017.

²¹ The markets are China, Hong Kong, Indonesia, Malaysia, Philippines, South Korea, Singapore and Thailand. The purpose of those holdings is also to develop local capital markets.

²² The few cases we are aware of are central banks which de-facto run a sovereign wealth fund on their balance sheet.

METHODOLOGY

The asset allocation of the global reserve portfolio was estimated using the following steps:

- The overall universe of central bank reserves — \$13.3tn — was defined by using OMFIF Global Public Investor data on 164 central banks.
 - Of those, 86 central banks (holding 96.3% of global reserves) have data on their IMF allocations; we extrapolated this data to estimate the remaining 78 central banks that collectively hold 3.7% of reserves.
 - To obtain gold holdings estimates, we created estimates using the IMF data on the same 86 central banks where appropriate and with World Gold Council data if a central bank did not value gold on a mark-to-market basis. We extrapolated World Gold Council data to the remaining 3.7% of reserves.
 - The remaining parts of the global reserve portfolio — securities, deposits and other instruments — were extrapolated from the 30 large reserve holders which hold 81% of reserves and 87% of reserves when excluding gold and IMF allocations. These 30 holders were chosen as they hold the highest level of foreign currency reserves when excluding gold and IMF allocations, and thus differ from top 30 reserve holders overall.
- For the 30 central banks surveyed in detail, we built their balance sheets line-by-line as per Figure 3. We used the following sources:
 - IMF and World Gold Council data for high-level parameters
 - Central bank annual reports, which provided varying level of detail depending on specific case
 - Internal SSGA data
 - Data and anecdotal information obtained from conversations with central bank representatives
 - All the numbers in the report refer to year-end 2017 unless otherwise stated.

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