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BlackRock

Generating sovereign wealth

FX reserve management and central bank profit models

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Summary[1]

- Central bank (CB) profit sharing regimes and their foreign exchange asset allocation policies both vary widely. This paper explores how one may influence the other. Some FX reserve asset allocation paradigms are very conservative, investing only in the safest and most liquid instruments. Others are more risk-seeking, including equities, corporate credit and alternatives, among other asset classes. What drives these differences?

- We examined two hypotheses, the first intuitive: CBs with more ample reserves may be more likely to seek out higher returns because of a higher tolerance for risk. The second is less intuitive: CBs that retain a higher share of their profits may be more incentivised to seek higher returns than those remitting the bulk of their profits to their government or shareholders. Our proprietary analysis confirms ***there is a correlation between reserve asset allocation policy and reserve adequacy.*** Our research further suggests that ***CBs that retain the most profits are also more likely to allocate to higher return-seeking asset classes.*** The implications of these findings are significant in that forgone returns by CBs with more risk-averse asset allocations imply a corresponding loss of social benefit.

- Most central banks do not have direct control over their revenue, profit sharing, and reserve allocation decisions. CB activities are often governed by statutes or constitutional constraints. It is fair to question the amount of endogenous decision-making central banks have over their profit sharing and reserve allocation practices. More study is required before one could definitively conclude that lower constraints on CB profit sharing leads to riskier asset allocation decisions. This said, ***we find central banks with greater latitude to retain or pay out earnings exercise greater latitude in accumulating and managing their reserves for profit.*** This observation alone merits reflection.

- We examined 84 central banks with approximately US$10 trillion in FX reserves, and split them into three groups based on the average amount of profit retained. We then feature case studies from the Czech National Bank, Bank of Namibia, and Banco De La República to illustrate the different approaches.

Our additional findings include:

- CBs that retain the most profits (76% and above) are least likely to have approved exposure to cash instruments, securitised debt and credit bonds.

- CBs that retain the least profits are most likely to own gold, based on the assets they are allowed to invest in.

- Developed market (DM) CBs tend to distribute most of their profits.

1 This paper is not intended to be an exhaustive study of CB finances, capital structure, independence or reserve adequacy. Neither does it cast any judgment on chosen relations between CBs, their fiscal counterparts and/or shareholders, or their respective profit-sharing regimes.

CB profit-sharing regimes

There is no standard practice among CBs for profit sharing. Some are effectively required to target specific pay-outs, including pre-defined sums and percentages of total earnings. Other profit pay-out regimes are functions of rules related to desired capital ratios. The rules themselves vary in nature and can be defined as fixed (i.e., pre-defined percentages of total profits) or floating (i.e., a function of capital ratio targets). In addition, accounting methodologies applied by CBs to calculate profits vary widely (with many CBs adhering to national standards). We illustrate different approaches with a series of brief case studies on Czech National Bank, Bank of Namibia, and Banco de la República. Unlike private commercial banks, CBs can exhaust their equity capital without having to interrupt or cease their operations. The growing phenomenon of negative CB equity capital has given rise to a large literature on whether CB losses matter. Some have argued CBs can still achieve their objectives despite worsening capital positions.[2] Others note a correlation between recurrent CB losses and poor policy outcomes, including high inflation.[3] Our analysis includes only those CBs for which profit-sharing and reserve asset allocation data is publicly available or otherwise known to us.

Our sample consists of 84 CBs with aggregate FX reserves of close to US$10tn. A summary is provided in Exhibit 1.

In our study group, around 80% of examined CBs retain 50% or less of their profits. On average, CBs retain around 36% of their annual profits with the remainder distributed most commonly to their respective governments and — in rarer instances — shareholders.

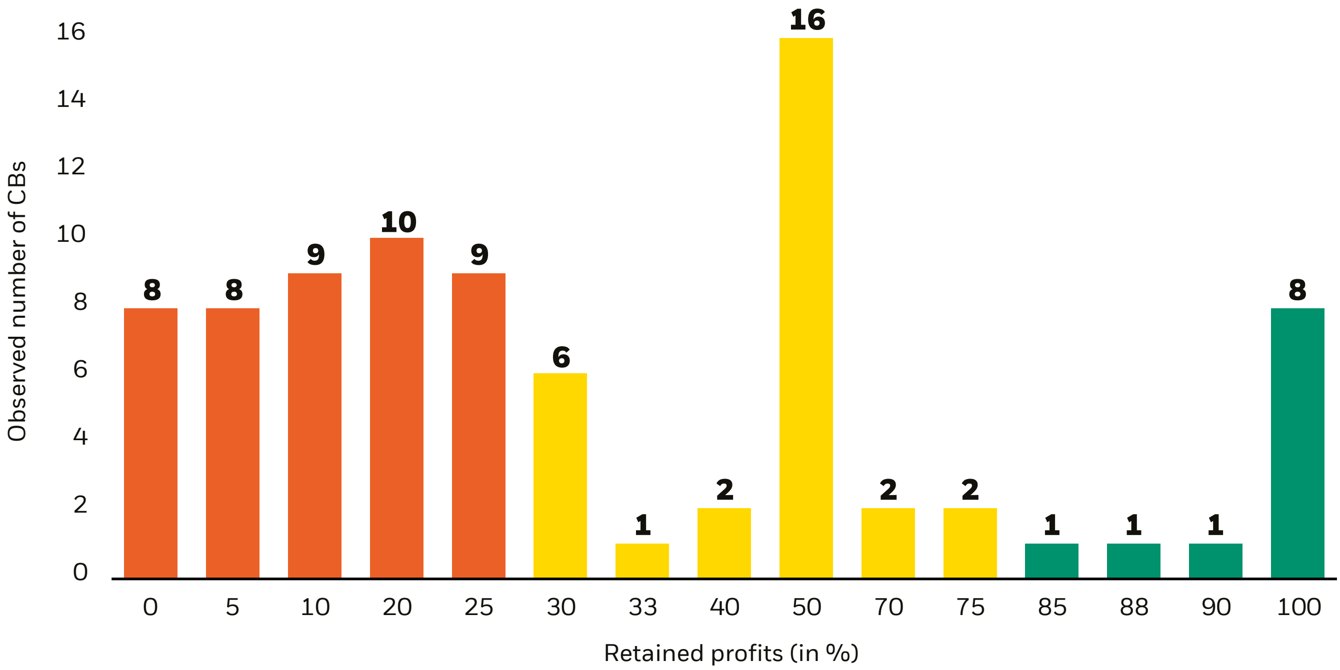
Exhibit 1: Summary of CB sample

	DM		EM			
Regions	**Number of observations**	**FX reserves (in US$bn)**	**Number of observations**	**FX reserves (in US$bn)**	**Total observations**	**Total FX reserves (in US$bn)**
Africa	–	–	9	75	9	75
Asia-Pacific	7	1,785	8	3,987	15	5,772
Europe and Central Asia	25	1,436	20	798	45	2,234
Latin America and Caribbean	–	–	11	726	11	726
Middle East	1	118	2	592	3	710
North America	1	128	–	–	1	128
Total	**34**	**3,467**	**50**	**6,179**	**84**	**9,646**

Source: Estimates of FX Reserves sourced through Bloomberg, IMF, WB (as of 31/3/2020).

2 "The role of central bank capital revisited" by Bindseil, Manzanares and Weller. *ECB Working Paper 392*. 2004.
3 "Central bank financial strength and macroeconomic policy performance," P. Stella in *The Capital Needs of Central Banks* by Milton and Sinclair. 2010.

Exhibit 2: Distribution of CBs by share of profits retained (average of estimates observed between 2016-2019)



Source: Annual reports, central bank statutes, news reports.

CBs historically earned the bulk of their income through two sources: seigniorage and foreign exchange reserves. FX reserves traditionally have been invested in the safest and most liquid assets, namely high-rated government bonds.[4] As global interest rates have fallen, income from the latter has declined. However, in many countries this income loss has been offset by a rise in the stock of FX reserves until the last few years.

In all countries, falling interest rates translated into hefty capital gains. In addition, those CBs with equity allocations in their FX reserves have generally seen positive impact on their bottom lines in recent years.

To fulfill their respective mandates during the Global Financial Crisis (GFC), several DM CBs massively expanded their balance sheets via quantitative easing (QE). These same CBs are doing so again to combat fallout from the COVID-19 pandemic. In addition, several EM CBs are also now following in their footsteps. In fact, as of this writing, more than a dozen EM CBs have been buying local government debt, local bank and/or local mortgage bonds, including Bank Indonesia, Banco de la República (Colombia), National Bank of Hungary, CB of the Republic of Turkey, and Banco Central de Chile.[5] Lessons from GFC show that QE programs may substantially boost seigniorage profits.

These activities may alter future CB revenue and equity capital outcomes. In some cases, they may dwarf the contributions from FX reserve management. As they do, profit retention regimes may also come under scrutiny.

4 "Understanding the Central Bank Balance Sheet," Garreth Rule. Centre for Central Banking Studies, Bank of England. 2015. **5** "Central Bank Bond Purchases in Emerging Market Economies," Yavuz Arslan, Mathias Drehmann and Boris Hoffman. *BIS Bulletin #20*. June 2020.

Profit-sharing regimes and reserve asset allocations

For stylised purposes, we divide CB profit-sharing regimes into three categories:[6]

1

Those that retain 0-25% on average (52% of our sample)

2

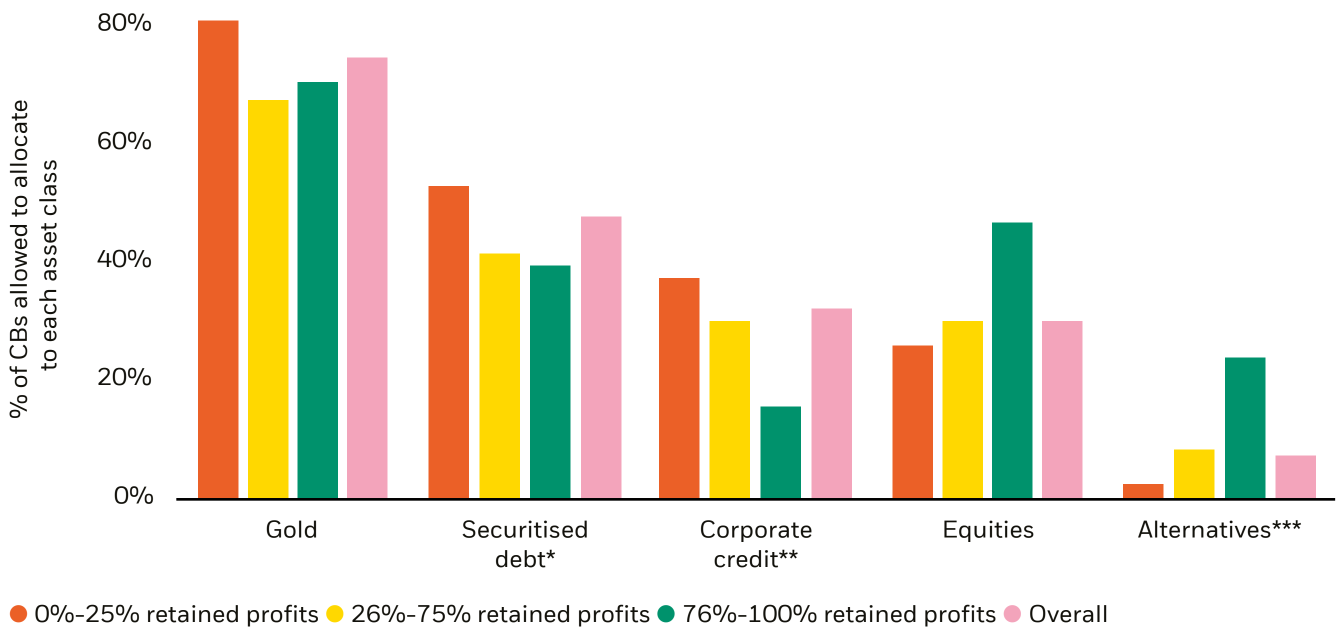
Those that retain 26-75% on average (35% of our sample)

3

Those that retain 76-100% on average (13% of our sample).

Results of our asset allocation analysis by profit retention regimes can be found in Exhibit 3. For further clarity, the graph indicates percentages of examined CBs that allocate reserves to each of the asset classes per profit retention scheme. This does not equate to the actual allocation of reserve funds to each of the asset classes. Exhibit 4 further expands on the findings by presenting the total FX Reserves of CBs which can allocate to each of the approved asset classes. It is important to note, however, that the data does not equate to actual allocations to those asset classes.

Exhibit 3: CB approved asset classes according to profit retention per percentage of allowed CBs



Source: Approved asset classes were determined by information contained in most recent CB annual reports and were supplemented by information gathered by BlackRock relationship managers (May 2020). ***Securitised debt** represents reserves allocated to primarily mortgage-backed securities (MBS) and other securitised debt instruments. ****Corporate credit** represents corporate bonds (and does not include government debt). *****Alternatives** include private equity, hedge funds, real estate, infrastructure, and other alternative strategies. We follow these definitions consistently throughout the paper.

6 The profit regimes listed above are comprised of approximate values only and should be treated as such. Categorisations were made based on the average of observed profit-retention ratios from 2016-2019.

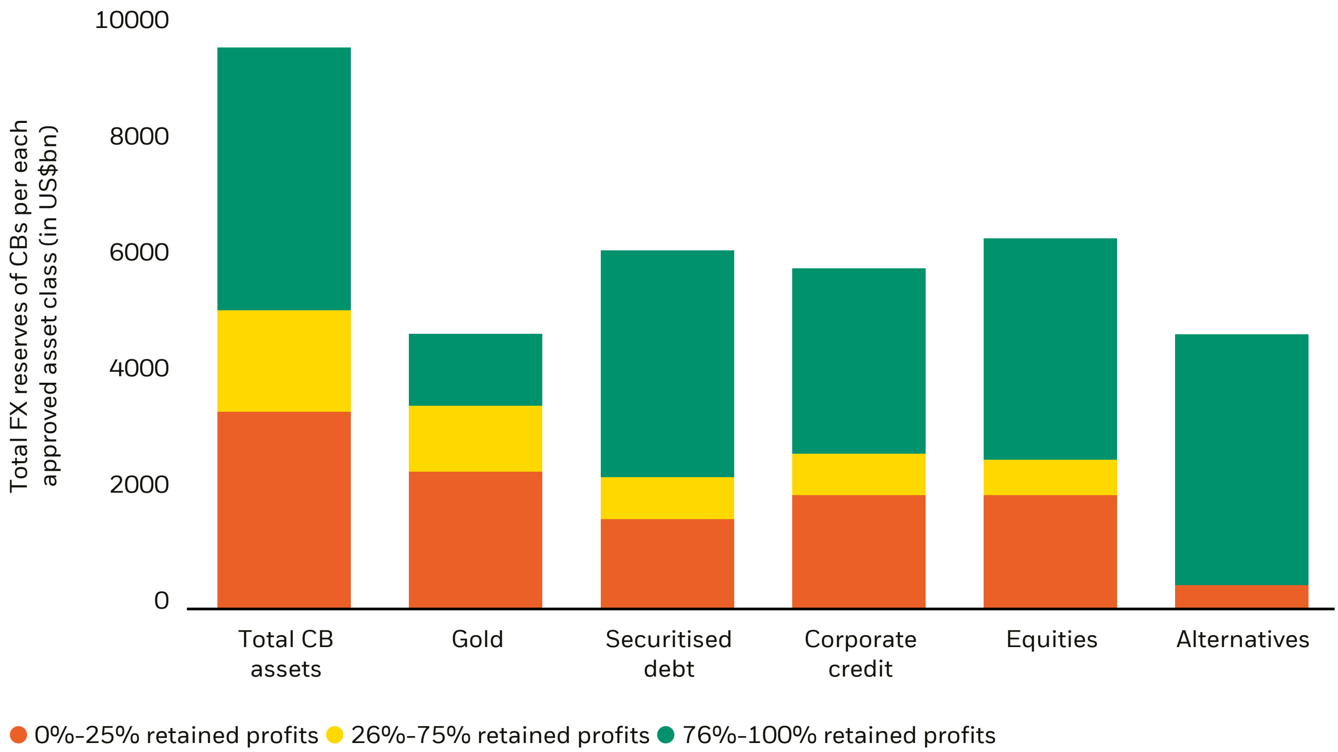
CBs which retain the most profits (76% and above) are more likely to allocate to equity and other higher return-seeking asset classes (including alternatives).

Conversely, CBs which retain the least profits are more likely to own gold and securitised debt. They are also the least likely group of CBs to own equities; instead they are somewhat more likely to own corporate credit. Further examination of the data indicates that ***a substantial number of CBs are not allowed to invest in higher return-seeking asset classes.***

Approximately 70% of CBs in our sample are not allowed to invest in corporate credit and equities. In addition, over 90% of CBs are not allowed to invest in alternatives.

Analysis of the data through regional lenses suggests that ***gold is commonly owned across regions, except Latin America and the Caribbean. Equities and alternatives are owned mostly by CBs located in Asia-Pacific, Europe and Central Asia and the Middle East. Furthermore, securitised debt is popular across all regions apart from Africa. We also observed a clear tendency for DM CBs to distribute most of their profits.***

Exhibit 4: Total FX reserves of CBs per approved asset classes according to profit retention (in US$bn)



Source: Approved asset classes were determined by information contained in most recent CB annual reports and were supplemented by information gathered by BlackRock relationship managers (May 2020). Estimates of FX Reserves sourced through Bloomberg, IMF, WB (as of 31/3/2020). The data does not equate to actual allocations to each asset class.

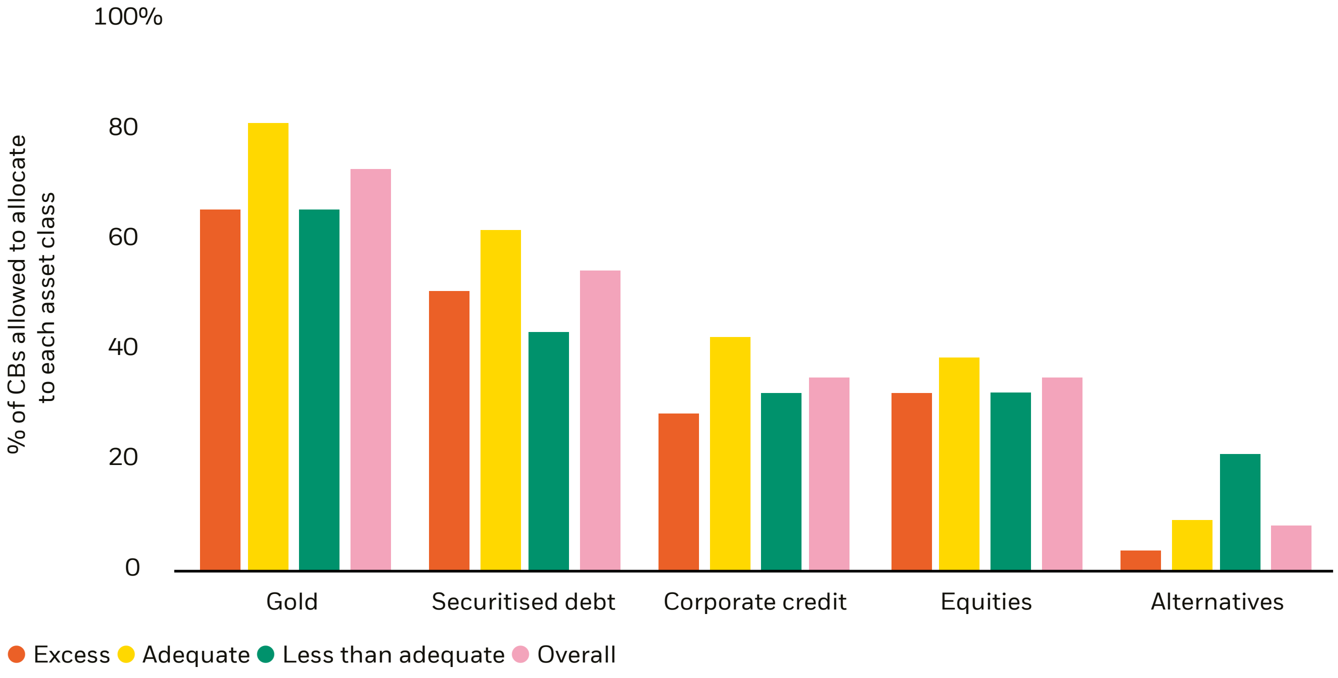
CB approved asset classes and reserve adequacy

Additionally, we looked at reserve adequacy in relation to CB approved asset classes. We used the latest IMF Reserve Adequacy data (as of 2019 year-end) to measure the level of EM CB reserves.

We also incorporated DM CBs by making a broad assumption that they have a moderate to excess level of reserves (we assigned randomised scores to reflect this assumption in the data through IMF's Reserve Adequacy ratios).

The data in Exhibit 5 indicates that those ***CBs with adequate and excess reserve levels are more likely to diversify into other asset classes than the CBs with insufficient reserves (with a notable exception of alternatives).***

Exhibit 5: CB approved asset classes in relation to reserve adequacy



Source: For EM CBs, we have utilised the IMF's Adequacy Ratios as of 2019 year-end, further dividing them into three categories: **Excess** = >150%; **Adequate** = 100-150%; and **Less than adequate** = <100%. For DM CBs, we made a broad assumption that their level of reserves can be defined as moderate to excess and we assigned random scores of 100 and above (in terms of IMF's Adequacy Ratios) to reflect this assumption for illustrative purposes only. Sample consists of 66 CBs (18 CBs were excluded from the original sample due to lack of data regarding reserve adequacy).

Social welfare implications of FX reserve allocation policies

Asset class diversification has significant impact on both the levels and volatility of income generated by reserve assets. As riskier asset classes have higher returns over longer time horizons, more conservative asset allocation choices axiomatically result in social opportunity costs over time. On a risk-adjusted basis, 70% of CBs with ample FX reserves that are not allowed to invest in corporate credit, and 67% that are not allowed to invest in equities are leaving returns on the table over time. Since 70% of these CBs predominantly remit the bulk of their profits, social welfare loss may be inferred. A group of EM CBs keep the bulk of their reserves solely in bank deposits and gold. These institutions may also suffer from sub-optimal returns.

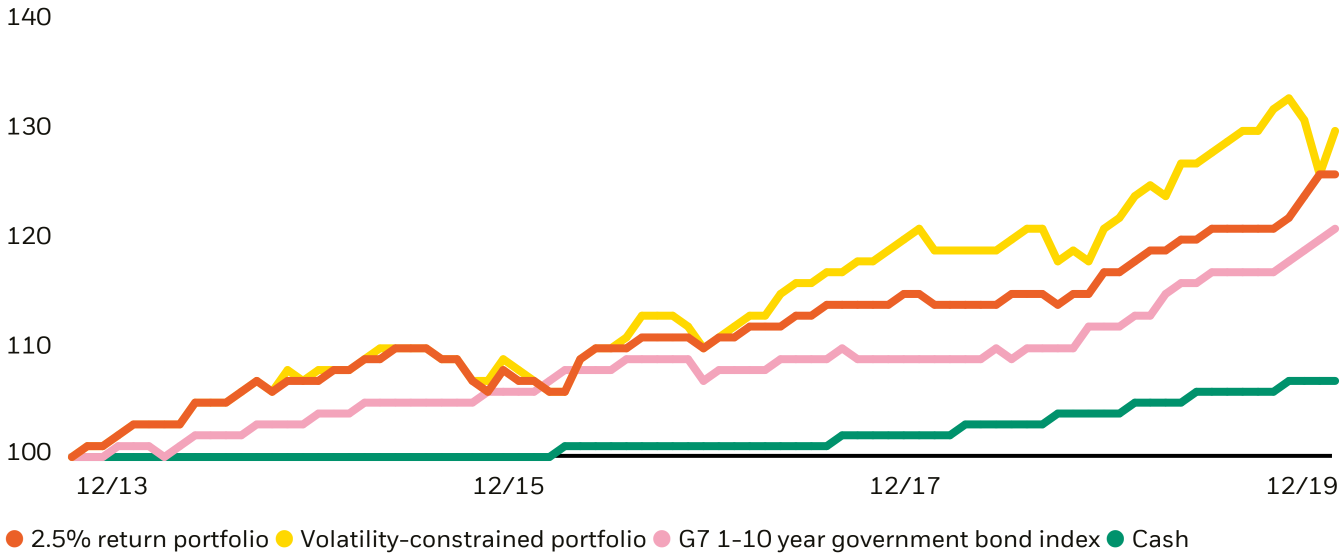
Optimal reserve management practices have been a constant focus at BlackRock since 2013. We have shown in multiple studies how resilient portfolios that consciously and deliberately balance volatility and liquidity constraints against realistic income objectives are likely to produce more favourable social outcomes over time.[7] In our latest publication, *Rising to the challenge — Reserve management in an uncertain world,* we highlight the evolution of our model portfolio with insights into how it has performed against a high-grade government bond reference portfolio. We also highlight the importance of incorporating sustainability into the portfolio construction framework as we believe we are now at the start of a long, tectonic shift involving 'sustainability premia' across asset classes. Our research confirms more volatile asset classes such as equities, emerging markets, real assets and credit offer diversification benefits as well as higher potential returns over the long term. We also explain why we believe they deserve a place in central banks' reserve portfolios.

Consistent with our studies undertaken since 2013, this year we modelled two portfolios with a 50% liquidity floor. The first targets a 2.5% return while minimising risk (return targeting portfolio), while the other looks to maximise return in adverse scenarios with a volatility ceiling of 4.6% (aka, our risk-constrained portfolio).[8]

Our research again suggests that incorporating definable risks in a diversified fashion results in more optimal portfolio outcomes. This is also evident in the longer-term returns of the portfolios as shown in Exhibit 6. Over a multi-year horizon — from 30 November 2013 to 30 April 2020 — our hypothetical, volatility-constrained portfolio has beaten the G7 benchmark by 110 basis points per annum, while our hypothetical 2.5% return target portfolio has beaten its G7 benchmark by 70 basis points per annum.

7 See our annual series of reserve optimisation studies, beginning with "In Search of a New Official Reserve Paradigm: Rethinking Safety, Liquidity and Return" by P. Fischer and T. Keeley, BlackRock 2013. **8** The 2.5% target return portfolio includes 50% allocation to short-duration government bonds, 16% to corporate bonds, 14% to equity, 8% to other government bonds, 4% to Chinese bonds, 3% to inflation-linked bonds, 3% to mortgage-backed securities, and 2% to emerging markets debt. The 4.6% risk-constraint portfolio includes 50% allocation to short-duration government bonds, 18% to developed equity, 9% to other government bonds, 7% to investment-grade credit, 6% to real assets, 5% to sub-investment-grade credit, 3% to mortgage-backed securities, and 2% to inflation-linked bonds.

Exhibit 6: Historic returns of BlackRock's CB model portfolios



Source: **The figures shown relate to simulated past performance (gross). Simulated past performance is not a reliable indicator of current or future results.** For illustrative purposes only. The chart shows the simulated hypothetical performance of two illustrative portfolios and two indices. The evolution of the composition of the two portfolios and their proxies are shown in the appendix. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index. Results do not reflect the deduction of management/advisory fees and other expenses; management/advisory fees and other expenses will reduce a client's return. Source: Refinitiv Datastream; monthly data in USD from 31 December 2013 to 31 March 2020, BlackRock.

Hypothetical performance

The "2.5% return portfolio" and "Volatility constrained portfolio" referred to in this presentation are intended to provide only an example of the potential of the investment strategy to be employed and do not take into consideration actual trading conditions and transaction costs. The figures are for illustrative purposes only and results cannot be guaranteed.

	2.5% Return target portfolio	Volatility-constrained portfolio	G7 1-10 year bonds (hedged)	US Cash
2015	-2.1%	-1.5%	0.2%	0.2%
2016	4.5%	4.7%	0.8%	0.4%
2017	3.1%	6.6%	1.6%	1.0%
2018	0.3%	-2.5%	2.8%	1.9%
2019	4.0%	8.6%	4.1%	2.1%
2020	6.2%	3.7%	2.4%	0.5%

Conclusion

Our analysis suggests that CBs that tend to retain most of their profits are more likely to have equities and other higher-return seeking asset classes approved in their respective reserve management programs. The analysis further suggests CBs with adequate-to-excess reserve levels are more likely to diversify into other asset classes.

Given idiosyncratic economic and historic circumstances unique to each country, we do not believe there is one optimal profit-sharing regime or capital ratio that all CBs should pursue. This said, we believe all central banks should retain adequate reserves. We further believe the assignation of profit-sharing regimes should not retard optimal asset allocation decision-making; asset allocation and profit-sharing considerations should be segmented. FX reserve asset allocation should be optimised to the benefit of all stakeholders, regardless of how returns are distributed. Finally, theory and practice both suggest there are substantial benefits to be derived from FX reserve allocation policies that allow diversification beyond G7 government bonds, given adequate risk frameworks.

Case study I

Czech National Bank

CNB CZECH NATIONAL BANK

Profit rule

According to the Czech National Bank (CNB) Act, Article 47 (No. 6/1993 Coll.), the Bank is obligated to deliver all profits to the central government's budget after the Bank has covered in full losses from previous years and fills its reserve funds. It is mandatory that the profits are used first to cover any losses from previous years. The law further stipulates that CNB is allowed to create reserve funds in its own discretion with the use of its profits. This effectively provides CNB with flexibility to decide how much of its profits it wishes to retain for its reserve funds along with how those reserve funds are managed. This said, the Board of the Bank has the ultimate discretion to decide whether the profits are used for building reserve funds or are distributed to the central government. It is also important to note that CNB takes into account FX translations into its profit/ loss statements each year.

Profit-sharing regime 3

CBs that retain 76-100% of annual profits on average

Given that CNB has recorded losses for decades, it has retained 100% of its profits.[9] The historical losses recorded by CNB stem from the Bank's involvement in the stabilisation of the Czech banking system during the period of economic transformation in the 1990s and from the appreciation of CZK. During that period, CNB accumulated significant losses (exceeding US$10bn) as the funds were used to capitalise local banks and finance the liabilities of failing banks. During 2013-2017 CNB increased its FX reserves four times due to the implementation of unconventional monetary policy (lifting and fixing the EUR/CZK exchange rate above 27). After leaving this regime, CZK appreciated and left the bank with total loss of CZK250bn (approx. US$11.75bn) for 2017 — the most extreme recorded figure ever. In 2019, CNB recorded a profit of CZK57.9bn (US$2.6bn) which was driven by returns on international reserves management which totalled CZK115.1bn (US$5.1bn). The returns were supported by rising stock markets and dividend income which contributed CZK68.7bn (US$3.0bn) and, to a lesser extent, capital appreciation of the bond portfolios (stemming from deceasing yields) which contributed CZK52bn (approx. US$2.3bn). The gains were partially offset by movements of the koruna exchange rate, and rising costs of monetary policy operations. Even after profitable 2019, the bank's own capital remained deeply negative at about CZK130bn (US$5.7bn).

FX reserve asset allocation

As of 2019 year-end, CNB's reserves stood at US$149.9bn. The objective of the reserve management is to maximise the return within the pre-defined risk constrains on all types of risk. The reserve portfolio is divided into two tranches which differ in investment horizon, risk parameters and expected returns.

- **Liquidity tranche,** which accounted for 47% of the reserves at the end of 2019. This portfolio contains fixed-income investment instruments with a residual maturity of up to one year, denominated in euros and US dollars;
- **Investment tranche,** which accounted for 53% of the reserves during the same time period. It consists of higher return-seeking asset classes. These include bonds with longer maturities, covered bonds of German and Canadian banks, and equities. In 2019, CNB added mortgage-backed securities (MBS) guaranteed by selected US agencies. It also approved the creation of a relatively small "starter" portfolio of Chinese government bonds.

9 Profit-sharing regime categorisations were made based on the average of observed profit-retention ratios. Given that CNB has historically retained 100% of its profits, it was assigned to category 3, even though the Bank is obligated to deliver all profits to the central government (after covering for losses and filling its reserve fund).

Source: Czech National Bank, Annual Reports (2017,2018, 2019).

This case study was selected to illustrate the Profit-sharing Regime 3 (CBs that retain 76-100% of annual profits on average). The information above is not a prediction of future performance or any assurance that comparable investment opportunities will be available.

Case study II

Bank of Namibia

Bank of Namibia

Profit rule

According to the Bank of Namibia Act (No. 1 of 2020), Chapter 12 (Determination of Net Profits, Appropriation of Net Profits and Reserve Accounts), Section 71 stipulates that before distributing the net profit, the Bank must first transfer unrealised gains (losses remain a charge against the income) to the Investment Revaluation Reserve account, followed by transferring exchange rate gains (losses) to the Revaluation Reserve account and providing allowance for credit losses. The Bank is then obligated to distribute the remaining net profits based on the following order: 1) if the funds in the General Reserve account are less than 50% of the paid-up capital of the Bank, the Bank must transfer at least 30% of the net profits to the General Reserve account and at least 25% of the net profits to the State Revenue Fund and it may transfer the remaining net profits to the General Reserve Fund/other reserve accounts and the State Revenue Fund; 2) if the funds in the General Reserve account are more than 50% of the paid-up capital of the Bank, the Bank must transfer at least 25% of the net profits to the General Reserve account and at least 30% of the net profits to the State Revenue Fund. The Board of the Bank has the right not to distribute any of the profits if it believes that the assets of the Bank are or will be less than the sum of its liabilities and paid-up capital after the distribution.

Profit-sharing regime 2

CBs that retain 26-75% of annual profits on average

The Bank recorded a net profit of N$849.6m (approx. US$59.5m) for the year 2019 which is 35% higher than in 2018. The increase in net profits was mainly attributable to improved earnings on the Bank's Rand investments, further supported by higher average reserves balances (partly as a result of an increase in Southern African Customs Union receipts). Appreciation of foreign investments in fixed income also contributed to the profits. As a result, the Bank transferred a record high dividend of N$399.9m (US$28m) to the Government which was allocated to the State Revenue Fund implying a pay-out ratio of 47%. Furthermore, 42% of the net profits were allocated to the General Reserve account (designed for increasing the paid-up capital of the Bank, offsetting losses incurred, funding a Development Reserve and redeeming any securities issued by the Bank) with the rest appropriated across Development Fund Reserve (with the main purpose of promoting/financing economic development in Namibia), Building Fund Reserve (set aside for the Bank's future projects) and Training Fund (designed to up-skill human capacity of the Bank). In 2018 and 2017, when the Bank recorded N$627.1m (US$43.3m) and N$439.3m (US$39.5m) in net profits, respectively, the appropriation of profits was similar; with the bulk of those being allocated to State Revenue Fund (47%, 49%) and General Reserve account (42%, 44%).

FX reserve asset allocation

As of 2019 year-end, Bank of Namibia's reserves stood at N$28.9 billion (US$2bn). The foreign exchange reserves are denominated in the United States Dollar (54% as of 2019 year-end), South African Rand (40%; existing peg with Namibian Dollar) with the remainder allocated across Special Drawing Rights basket of currencies. The reserves are segregated into three tranches and are managed by both internal and external managers:

- **Working capital tranche** has an objective to meet estimated daily liquidity requirements or the expected payments and outflows.
- **Liquidity tranche** is designed to meet short-term external debt obligations and import coverage payable within 12 months.
- **Investment tranche** covers medium and long-term payment needs of the country. This portfolio is comprised of funds in excess of both the working capital and liquidity tranches and aims to seek long-term returns.

The primary objective of managing foreign reserves at the Bank is to have safe and easily convertible assets which produce risk-adjusted returns in accordance to the approved strategic benchmarks. The assets are managed in a conservative manner comprised primarily of global government bonds and money market funds.

Source: Bank of Namibia, Annual Reports (2017,2018, 2019).

This case study was selected to illustrate the Profit-sharing Regime 2 (CBs that retain 26-75% of annual profits on average). The information above is not a prediction of future performance or any assurance that comparable investment opportunities will be available.

Case study III

Banco de la República

Profit rule

According to the legal framework as described in the Constitution, Act 31 of 1992, and the Bylaws of Banco De La República, the Bank is obligated to first discount net investments in goods for cultural activity and appropriate funds to the statutory reserves (which are designed to absorb losses) from the profits, the remainder of which is then transferred to the National Government. If the Bank has losses from previous years and they cannot be covered by the statutory reserves, the profits cannot be distributed. The profits of the Bank are projected on an annual basis which are then incorporated into the annual Budget law (similarly, projected losses/deficit are also taken into account).

Profit-sharing regime 1

CBs that retain 0-25% of annual profits on average

Over the past few years, Banco De La República has been consistently recording higher profits primarily driven by income generated on international reserves. In 2019, the Bank recorded profits of COP$7,149bn (approx. US$1.9bn) which represented an increase of 219% as compared with the previous year. After discounting for net investments in cultural activities and providing a provision for the statutory reserves, the Bank transferred COP$6,998bn (US$1.8bn) to the National Government implying a pay-out ratio of approximately 98%. In 2018 and 2017, when the Bank recorded COP$2,241bn (US$670m) and COP$804bn (US$270m) in profits, respectively, the appropriation of profits was similar; the bulk of which was transferred to the National Government resulting in pay-out ratios of 90% and 95%.

FX reserve asset allocation

As of 2019 year-end, Banco De La República's reserves stood at US$53.1bn and had an IMF Adequacy Ratio of 138. The Bank holds what it deems to be an adequate amount of foreign reserves to intervene in the foreign exchange market and to facilitate access by the government and the private sector to international capital markets. According to the comprehensive report on Foreign Reserve Management published by the Bank in 2019, the reserves are structured as follows:

- **Investment portfolio,** which accounts for approximately 95% of the total reserves. The portfolio is managed by both internal and external managers and is comprised primarily of a short-term passive portfolio tranche and a smaller medium-term tranche (with an additional active portfolio component) along with relatively small holdings in gold. Most of the portfolio is invested in securities issued by governments and government-related entities (including quasi-government and mortgage agencies) and, to a much smaller extent, corporates.
- **Other** allocations account for the remaining 5% and are spread across IMF quota and Special Drawing Rights, Latin American Fund and others.

Source: Banco De La República, Annual Reports (2017,2018, 2019).

This case study was selected to illustrate the Profit-sharing regime 1 (CBs that retain 0-25% of annual profits on average). The information above is not a prediction of future performance or any assurance that comparable investment opportunities will be available.

Index disclosures

Index returns are for illustrative purposes only and do not represent any actual fund performance. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.

Asset	Benchmark
DM equities	MSCI World
DM equities ex US	MSCI World ex USA
EM equities	MSCI Emerging Markets
G7 1-10y bonds (hedged)	ICE BofA 1-10 Year G7 Government Index (hedged)
Global ILB	ICE BofA Global Inflation-Linked Government Index (hedged)
1-5y US Treasuries	ICE BofA 1-5 Year US Treasury Index
US MBS	ICE BofA US Mortgage Backed Securities Index
$-EMD	JP Morgan EMBI Global Index
US equities	S&P 500 Index
Gold	Gold Bullion LBM
Global corporate bonds (hedged)	ICE BofA Global Corporate Index (hedged)
ABS/CMBS	ICE BofA US ABS & CMBS Index
Global real estate	FTSE EPRA Nareit Global Index
Bank loans	S&P Leveraged Loan Index
Global high yield (hedged)	ICE BofA Global High Yield Index (hedged)
US cash	JP Morgan Cash US 1 Month Index
US corporate bonds	Bloomberg Barclays US Corporate Investment Grade Bond Index
Chinese bonds	Bloomberg Barclays China Aggregate Index (hedged)
Global Treasuries (hedged)	Bloomberg Barclays Global Treasury Index (hedged)
Infrastructure equities	MSCI World Infrastructure Index
L-EMD	JP Morgan GBI-EM Composite Index

Historical correlation chart indices: HFRI Global Hedge Fund Index aggregates managers across hedge fund strategies. The Barclays US Aggregate Index is a broad-based flagship benchmark that measures the investment grade, US dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency). The CTA Index calculates the daily rate of return for a pool of CTAs selected from the larger managers that are open to new investment. Index returns are for illustrative purposes only. You cannot invest in an index. Long treasuries are 30+ year US government treasury bonds. *Diversification does not guarantee a profit or eliminate the potential for loss.

Risks

Capital at risk. The value of investments and the income from them can fall as well as rise and are not guaranteed. Investors may not get back the amount originally invested.

Past performance is not a reliable indicator of current or future results and should not be the sole factor of consideration when selecting a product or strategy.

Changes in the rates of exchange between currencies may cause the value of investments to diminish or increase. Fluctuation may be particularly marked in the case of a higher volatility fund and the value of an investment may fall suddenly and substantially. Levels and basis of taxation may change from time to time.

Important information

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