

DEVELOPMENT
KNOWLEDGE AND
LEARNING

Central Bank Reserve Management Practices

Insights into Public Asset
Management from the
Second RAMP Survey

Reserve Advisory and Management Partnership (RAMP)



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RESERVE ADVISORY AND MANAGEMENT PARTNERSHIP (RAMP)

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Abbreviations

ESCB	European System of Central Banks
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
MBS	mortgage-backed securities
RAMP	Reserve Advisory and Management Partnership
SAA	strategic asset allocation
SSA	sovereigns, supranationals, and agencies
US\$	U.S. dollar

CURRENCIES

AUD	Australian dollar
BRL	Brazilian real
CAD	Canadian dollar
CHF	Swiss franc
CNY	Chinese yuan
DKK	Danish krone
EUR	euro
GBP	British pound sterling
HKD	Hong Kong SAR, China, dollar
INR	Indian rupee
JPY	Japanese yen
KRW	Korean (Republic of) won
MXN	Mexican peso
NOK	Norwegian krone
NZD	New Zealand dollar
RUB	Russian ruble
SEK	Swedish krona
SGD	Singapore dollar
TRY	Turkish lira
USD	U.S. dollar
ZAR	South African rand

1 Introduction

The World Bank Treasury's Reserve Advisory and Management Partnership (RAMP) launched its second survey on central banks' reserve management practices in the summer of 2019.¹ The goals were to improve the understanding of these institutions' reserve management policies and practices globally allowing for (1) further sharpening of the picture of reserve management activities across multiple regions, and (2) enhancing the opportunity of central banks to benchmark their actions and perspectives against peer institutions. Understanding reserve management practices is particularly important during the COVID-19 pandemic, as developing economies face unprecedented liquidity needs in foreign currency. Central banks may need to use their reserves in the face of capital outflows and sharp falls in exports, tourism, and remittances. Consequently, the growth of reserves over the past two decades was a positive development to confront the current crisis. (See European Central Bank [2006] for a discussion on drivers of reserve accumulation.)

The survey addressed key areas of public asset management. Its content covered (1) governance arrangements; (2) current strategic and tactical asset allocation; (3) risk management, including operational risks; and (4) the accounting framework. The survey posed 36 questions across these areas, some of which requested additional information depending on the participants' answers. Some queries gave a prescribed set of potential responses; others requested specific data.

The results reflect input from 105 central banks, with an overall response rate of approximately 85 percent.² Respondents represent countries of different sizes, with different income levels, and from multiple regions.³ Definitions of the categories are shown in table 1.1.⁴ The ranges of amounts of foreign exchange assets and levels of reserve adequacy vary quite significantly by category.⁵ Although most participants provided substantial amounts of information, some did not answer every question. When presenting data, this report identifies the number of institutions responding to the relevant question (or each section of a question, when necessary), either in the main text or in corresponding figures and tables.

Data are presented in an aggregate and unattributed format to maintain respondents' anonymity.⁶ Observations on this information arise from

TABLE 1.1 Survey participants' reserve levels and adequacy metrics

	NUMBER OF CENTRAL BANKS	MEDIAN GDP PER CAPITA (CURRENT US\$)	MEDIAN TOTAL RESERVES (US\$ MILLIONS) ^a	MEDIAN TOTAL RESERVES TO GDP	MEDIAN MONTHS OF IMPORT COVERAGE
<i>Geographic region</i>					
Americas and Caribbean	21	6,947	7,501	0.2	4.7
Europe and Central Asia	36	18,589	11,843	0.2	3.1
Middle East and Africa	28	2,376	5,611	0.1	4.3
South and East Asia and Pacific	20	5,283	42,207	0.3	7.2
<i>Country income group</i>					
High income	36	30,943	34,958	0.2	4.1
Upper middle income	34	6,315	7,451	0.2	5.1
Lower middle and low income	35	1,711	4,741	0.2	4.3
<i>Size (US\$)^b</i>					
Less than 3 billion	25	4,140	852	0.2	3.5
3 to 8 billion	27	5,871	5,050	0.1	4.0
8 to 60 billion	25	6,340	15,552	0.2	5.6
More than 60 billion	28	27,748	116,345	0.2	5.7
<i>Foreign exchange regime</i>					
Floating	53	12,301	30,068	0.1	4.1
Soft peg	46	4,499	6,002	0.2	4.7
Hard peg	6	7,612	3,366	0.3	7.0
Total	105	6,340	7,694	0.2	4.5

Sources: IMF's Annual Report on Exchange Arrangements and Exchange Restrictions database (2018); World Bank's World Development Indicators database (October 2018); and Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: GDP = gross domestic product.

a. Total reserves comprise holdings of monetary gold, special drawing rights, reserves of International Monetary Fund members held by the International Monetary Fund, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year-end (December 31) London prices. Data are in current U.S. dollars.

b. The respondent central banks' assets under management were categorized into four groups such that each group has a similar number of survey participants.

assessments through various lenses, including geographic region, country income group, reserves size and reserve adequacy levels, and monetary policy and exchange rate regimes. Where this analytical process identified patterns, the report shares these findings. The appendix shows detailed results for the most relevant questions.

To complement the understanding of reserve management practices, this year's survey questionnaire was changed to include more questions on governance and risk management. On strategic asset allocation, the survey inquired about the benchmark, the actual strategic asset and current asset allocation, and the scope of active management. Finally, the survey also introduced a new section on accounting.

This report is organized into three main parts. Chapter 2 highlights key findings. Chapter 3 describes the survey's findings in detail and offers observations on patterns in the data. Chapter 4 discusses potential policy implications arising from the responses and analysis.

NOTES

1. The inaugural survey on central banks' reserve management practices concluded in the spring of 2018. The results were published in the spring of 2019.
2. The percentages reported in this report are based on the number of respondents for each question, where 100 percent refers to the total number of respondents replying to a given question, this being either equal to or less than 105. The number of respondents to each question is reported in each of the figures and tables.
3. This report uses the World Bank's customized income group categories based on gross national income (GNI) per capita calculated using the World Bank Atlas Method. It separates countries into "low income" (GNI per capita of US\$1,025 or less in 2018), "lower middle income" (US\$1,026 to US\$3,995), "upper middle income" (US\$3,996 to US\$12,375), and "high income" groups (US\$12,376 or more) (World Bank Group 2019). For the purpose of this analysis, "lower-middle-income" and "low-income" countries have been grouped into the same category.
4. The definitions of the categories are set in such a way that an approximately similar number of institutions is represented in each category.
5. The adequacy of central banks' levels of foreign exchange reserves can be measured in various ways, including coverage of imports and short-term debt obligations. Unless otherwise specified, this report uses the term to reference a central bank's possession of enough levels of reserve assets to execute its mandate and achieve its objectives.
6. RAMP staff believed that confidentiality would facilitate central banks' participation and candid and comprehensive responses, given the sensitive nature of their operations.

2 Key Findings

The key findings on governance arrangements are as follows:

1. In most countries, the central bank manages foreign currency reserves independently. The participation of ministries of finance is limited.
2. Most respondents follow a three-tier governance structure. Boards typically approve the reserve management policy and the investment guidelines. The majority of central banks report having an investment committee that reviews proposals to the board and monitors implementation of reserve management policies but has limited decision-making power. Operational units play a critical role in the management of the portfolio and in policy and guideline proposals.
3. Survey results show diverse arrangements for the organizational structure of operational units. Over half of the respondents have the middle office in the same department as the front office, but a significant number also have an independent risk management department. A third of respondents have the front, middle, and back office in the same department.

The key findings on strategic asset allocation are as follows:

1. Tranching remains a prevalent practice among central banks. The investment tranche is typically the largest, followed by the liquidity tranche and the working capital. Investment tranches typically have longer investment horizons¹ than do liquidity tranches.
2. Reserve managers typically build portfolios with low sensitivity to changes in interest rates. The median duration of reserve portfolios is 18 months. Nonetheless, the survey finds that investment tranches, consistent with their longer investment horizons, have a longer duration.
3. The U.S. dollar retains its predominance in reserve portfolios. It is an eligible currency for all respondents, and it also represents the larger share of the reserve portfolios.
4. Central banks maintain their preference for highly liquid and low-risk asset classes. Although central banks have expanded their universe of eligible investments, reserve portfolios are still concentrated in traditional

reserve assets. Most respondents can invest in at least one of the nontraditional asset classes, such as corporate bonds, emerging market bonds, covered bonds, mortgage-backed securities, and equities. Notwithstanding this, the actual allocations to these asset classes remain limited.

5. Reserve managers tend to be close to their benchmarks, and most central banks use limited active risk in their investment management operations. On currencies, survey findings indicate that central banks slightly overweight the U.S. dollar and underweight the euro relative to their benchmarks. With regard to asset classes, reserve managers overweight sovereigns, supranationals, and agencies; bank deposits; and other spread products versus government bonds.
6. Compared with the previous survey, respondents' strategic asset allocations did not change significantly, but the participation of the U.S. dollar increased. On average, allocations to the renminbi and to the yen are also higher, albeit slightly. By contrast, the average participation of the British pound decreased, possibly due to the depreciation of the currency since the previous survey. For asset classes, the average allocation to bank deposits, money market instruments, emerging market bonds, mortgage-backed securities, and corporate bonds increased, versus a decrease in government bonds, showing a continuous appetite for diversification. However, the eligibility and participation of equities in foreign reserve portfolios remain almost unchanged.

The key findings on risk management are as follows:

1. Most reserve managers continue to be cautious regarding investment in lower-rated issuers and securities. Almost all respondents indicated that they could not invest in debt securities rated lower than investment grade. Compared with the previous survey, minimum credit ratings have not changed significantly. However, the number of tools used for credit risk analysis has increased.
2. A significant proportion of respondents do not use probabilistic metrics to measure market risk. Additionally, only half of the respondents use market risk models from third-party providers. Nonetheless, stress testing and scenario analysis are widely used.
3. Most respondents have a process to measure operational risk.

The key findings on accounting and distribution policies are as follows:

1. Almost two-thirds of respondents reported some degree of implementation of the International Financial Reporting Standards (IFRS). On one hand, recognition, transparency, credibility, and comparability explain the adoption of IFRS by central banks. On the other hand, national laws and regulations limit full IFRS adoption for some respondents, because local laws might define accounting standards for central banks that are not consistent with IFRS.
2. Central banks typically pay dividends to their governments. Most respondents do not distribute unrealized net income. This means that mark-to-market gains and losses tend to be distributed to the government only after instruments mature or are sold. Accounting and distribution policies are important for reserve management because critical decisions, for example, currency composition and strategic asset allocation, may be affected by

factors such as reducing net income volatility or managing the distribution of profits to the government.

3. The survey found that distribution and recapitalization policies of central banks are not symmetrical. Ministries of finance do not transfer funds or marketable government securities to cover negative equity or net income as often. Central banks are more likely to have positive equity when they receive support from ministries of finance.

NOTE

1. The investment horizon is defined as the length of time the institution expects to hold the portfolio.

3 Results and Observations

This chapter describes the survey's results and shares the authors' observations on the notable patterns identified. The subsections track the four main areas of public sector asset management that were the focus of the survey's questions: (1) governance arrangements; (2) strategic and current asset and currency allocation; (3) risk management, including operational risk; and (4) accounting and distribution frameworks.

GOVERNANCE

Governance arrangements

Governance in reserve management refers to the institutional arrangements and processes for policy development and investment of foreign exchange assets. According to de Abreau Faria and Ermes Streit (2016), an effective framework ensures clear delegation and separation of responsibilities and establishes the policy-making structure, pathways of accountability, and checks and balances associated with preserving and generating returns from reserves. It defines who makes decisions and who is responsible for them, as well as how they are made, and reflects country-specific institutional, social, and regulatory considerations. Holding and managing a country's official foreign reserves is one central bank function, that is, an area of activity conducted by a central bank to achieve its objectives (Bossu and Rossi 2019).

In most countries, the central bank manages foreign currency reserves independently from the government. About 97 percent of the respondents indicated that the ministry of finance does not have any active role in reserve management policy.

A few central banks (10 percent) also manage sovereign wealth funds. The expertise gained from managing foreign reserves, the public confidence in central banks, and the wish to avoid some duplication of functions at the country level may explain this arrangement.¹

Most respondents follow a three-tier structure in implementing their governance structure, and boards approve the reserve management policy. Of the institutions responding, 92 percent report that their respective boards approve

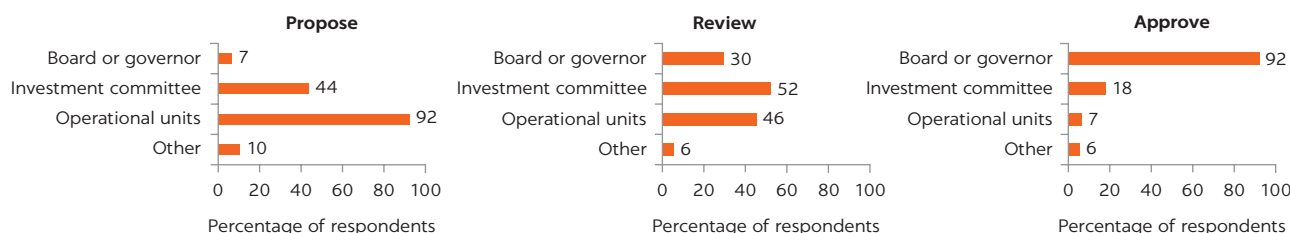
the reserve management policy, which includes such high-level decisions as reserve management objectives, risk tolerance, investment horizon, and strategic asset allocation (see figure 3.1).² Boards also tend to approve the investment management guidelines, that is, the specific investment rules for managing the portfolio (figure 3.2). To consider the complexities of governance arrangements in different countries, respondents could check more than one group or individual for each function. For example, some central banks require that the investment committee preapprove changes to the investment guidelines before they are presented to the board for final approval. That explains why results add up to more than 100 percent.

At the same time, investment committees have limited decision-making power in many central banks. Although more than 75 percent of respondents indicate the existence of an investment committee that reviews the proposals to the board and monitors implementation of reserve management policy, survey results indicate that this committee has limited decision-making power. About 74 percent of central banks indicate that their boards also approve the reserve management guidelines entailing the more detailed set of rules for risk taking. Boards also have responsibility for hiring external managers, a function sometimes delegated to the investment committee.³ By contrast, the *Revised Guidelines for Foreign Exchange Reserve Management* (International Monetary Fund 2014) suggest that central bank boards should focus on making decisions of a strategic nature and should delegate decisions concerning the implementation of strategies to the investment committees.

Operational units play a critical role in policy and guideline proposals. These units propose the reserve management policy (96 percent) and play a role in the

FIGURE 3.1

Role in the preparation and approval of reserve management policy



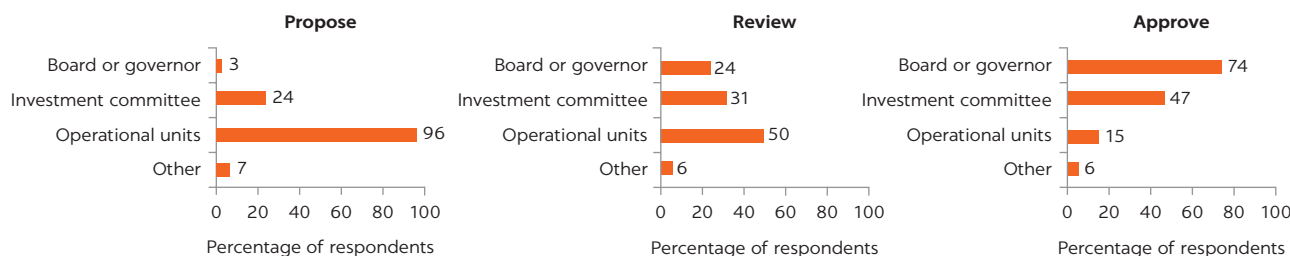
N = 105

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: Several respondents reported more than one group or body participating in the function. As a result, total responses are greater than 100 percent.

FIGURE 3.2

Role in the preparation and approval of the reserve management guidelines



N = 105

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: Several respondents reported more than one group or body participating in the function. As a result, total responses are greater than 100 percent.

preparation of the reserve management guidelines. For most central banks, they are also responsible for active management (99 percent) and trading decisions (97 percent).

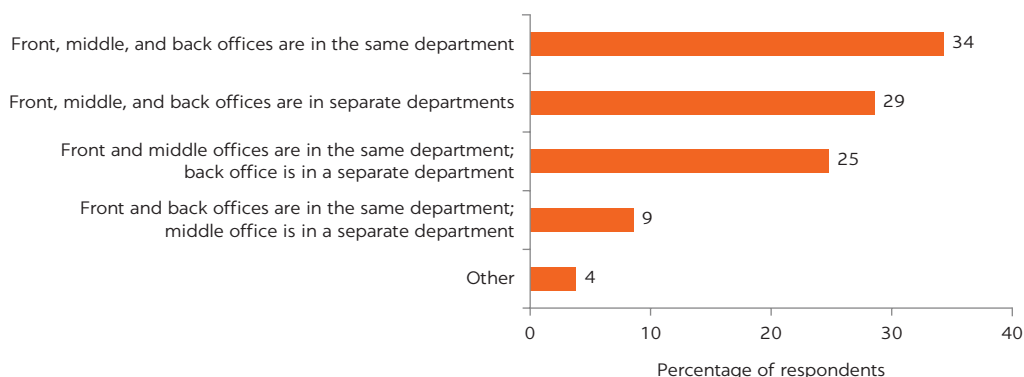
Organizational structure

Survey results show diverse arrangements for the organizational structure of operational units (figure 3.3). A third of central banks (34 percent) have the investment management (or front office), risk management (or middle office), and operations (or back office) in the same department. The front, middle, and back offices are in separate departments in 29 percent of respondents. Finally, 25 percent of the respondents have the front and middle offices in the same department, with the back office in a separate department. In most regions, respondents are evenly split between the different organizational categories, except for the Middle East and Africa, where most respondents (54 percent) have the three areas together in the same department. The analysis did not conclude that there is any association between the size and income level of a central bank and its organizational structure.

Although the International Monetary Fund (2014) recommends that investment and risks functions be properly separated, this survey found that most central banks (59 percent⁴) have the middle office in the same department as the front office. Even though an independent risk management function improves identification, monitoring, and management of risks, full organizational separation of functions may not be possible in many cases. Under the arrangement in which the front office and the middle office are in the same department, the institution requires detailed policies for the use of information and to resolve possible conflicts of interest (International Monetary Fund 2014). One critical function of the middle office is producing relevant reserve management reports for authorities and senior management. The technical expertise required to produce these reports and the scarcity of these skills in the institution may explain why these functions are housed in the same department (see figure 3.4). However, no relationship was found between the organizational structure of risk management and the frequency of the reports produced for the first level of the organization, its board and governor.⁵

FIGURE 3.3

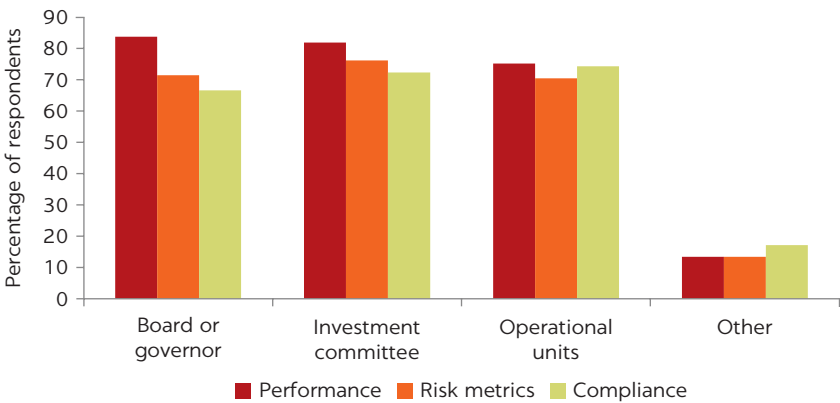
Organizational structure of reserve management



N = 105

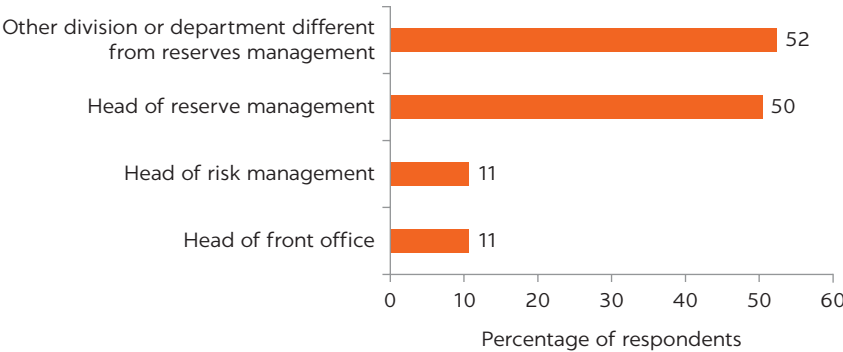
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

FIGURE 3.4
Position or group to which the middle office reports reserve management information



N = 105
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

FIGURE 3.5
Position or group to which the reserve management back office reports



N = 103
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.
Note: In several central banks, the head of the front office is different from the head of reserves. The latter often oversees not only trading but also other functions such as strategic asset allocation or risk management. The sum is greater than 100 percent because respondents were able to check several alternatives depending on the complexity of their governance structure.

In the case of the back office, two types of reporting arrangements are common (figure 3.5). The operations and settlement function either reports to a different department outside of reserves management (52 percent of the respondents) or is within the reserve management department (50 percent). Most central banks that responded “other” have the back office as a separate department but within the same reporting structure as the reserve department.

STRATEGIC ASSET ALLOCATION

Current strategic asset allocation

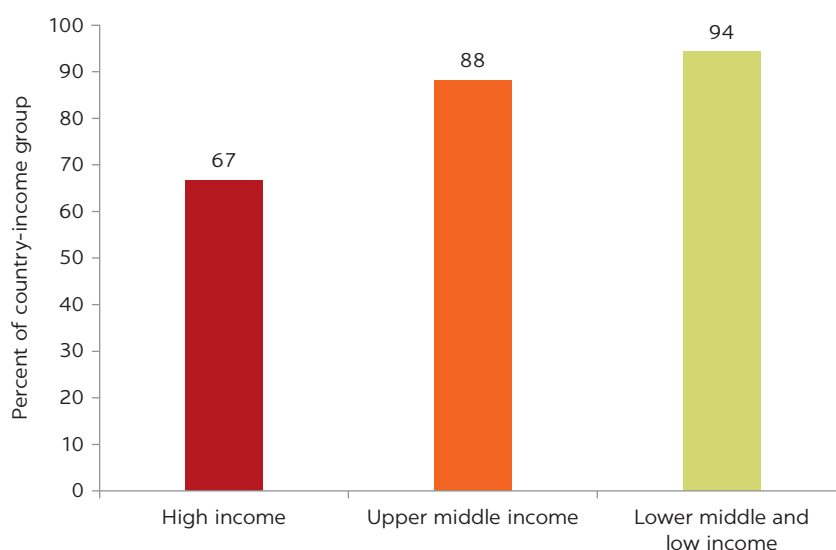
Empirical evidence shows that strategic asset allocation (SAA) is a key driver of investment performance (Brinson, Hood, and Beebower 1986; Ibbotson 2010).⁶

Building an SAA involves multiple steps that aim to translate investment policy into an asset allocation that achieves a central bank's investment objectives over the applicable investment horizon. As a first step, an institution decides whether to use tranching as a tool to build its SAA. Next, it identifies eligible currencies and asset classes. Only investments denominated in these currencies and that match these financial instruments may be included in the reserve portfolio.

Tranching is a common tool for constructing an SAA. In this approach, a central bank segregates foreign exchange reserves into discrete subportfolios. The structure and relative size of each of these tranches is based on an assessment of liquidity needs across various time horizons and reserve adequacy scenarios. The most prevalent tranches are the working capital tranche, the liquidity tranche, and the investment tranche. The working capital tranche covers daily cash flow needs and typically has an investment horizon of 90 days or less. The liquidity tranche is used to meet transaction needs and to intervene in the foreign exchange market to replenish the working capital tranche or to satisfy larger drawdown requirements. Its investment horizon is typically one year or less. The investment tranche puts greater focus on earning returns and provides liquidity only in the event of major emergencies or severe crises. The investment horizon of the investment tranche is typically greater than one year.

Tranching remains a prevalent practice among central banks. About 83 percent of the respondents use it, a slightly higher number than in the previous survey (80 percent). Low- and middle-income countries are more likely to tranche their reserves than are high-income countries (figure 3.6). In addition, countries with high reserve levels use tranching comparatively less frequently. Whereas 91 percent of central banks with total reserves of less than US\$60 billion use tranching, only 61 percent of those with reserves greater than US\$60 billion do so. Although tranching may help some central banks lengthen the investment horizon and increase diversification for a portion of the portfolio, other central banks may achieve the same objectives without it. For example, Garcia-Pulgarin, Gomez-Restrepo, and Vela-Baron (2015) propose an asset allocation framework

FIGURE 3.6
Tranching by income group



N = 105

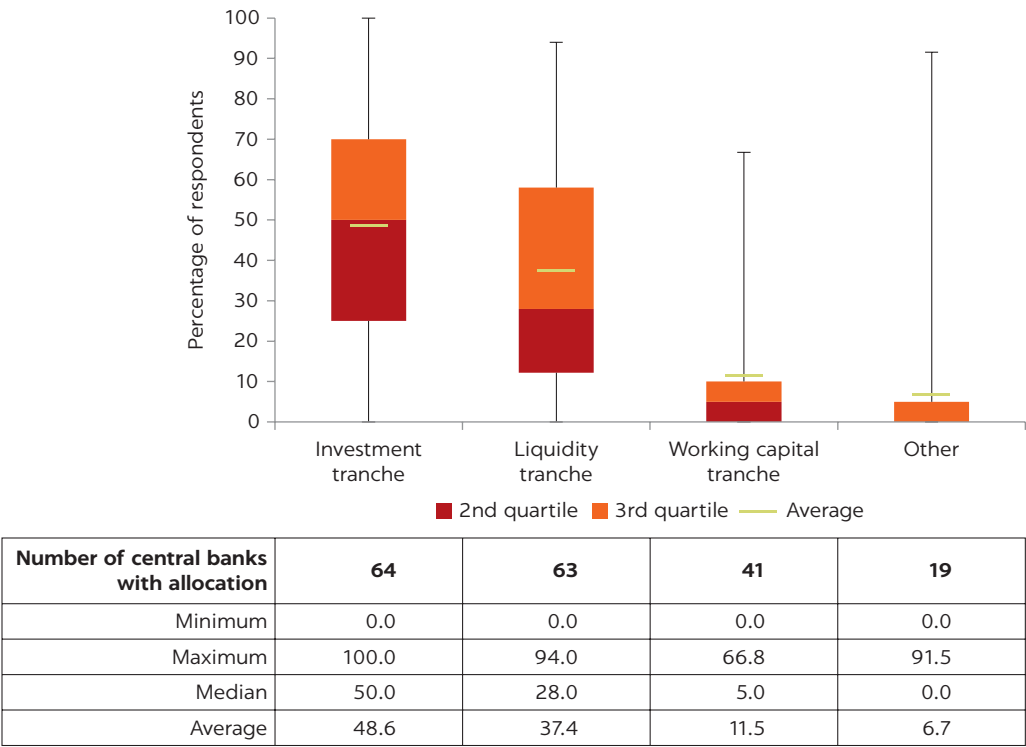
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

that incorporates tranching and compare the results to that of a single tranche. They find that tranching results in a small loss of efficiency but argue that it facilitates the institutional process of defining liquidity and financial goals to stakeholders.

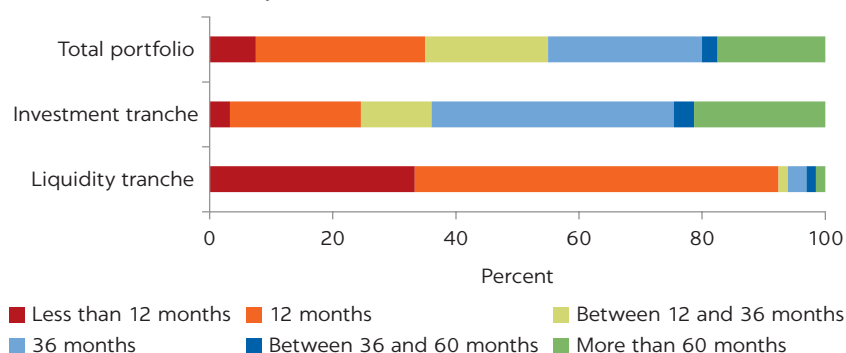
The survey finds that the investment tranche is typically the largest tranche in relative terms, followed by the liquidity and the working capital tranches. Figure 3.7 displays the distribution of tranche sizes. For each tranche, it identifies the minimum, the second quartile group, the median, the third quartile group, and the maximum. Empirical evidence suggests that central banks size the investment tranche according to reserves adequacy.² The relatively larger size of the investment tranche for central banks in the survey suggests that many respondents may have allocated more than enough reserves to cover short- and medium-term liquidity needs and are able to allocate a proportion of the portfolio to a tranche with a typically longer investment horizon.

Survey results confirm that investment tranches have longer investment horizons⁸ than do liquidity tranches. The most common investment horizon for the liquidity tranche is 12 months (60 percent of respondents), but the average investment horizon of the investment tranche is closer to three years (figure 3.8). Most respondents (64 percent) have investment horizons of three years or more

FIGURE 3.7
Participation of tranches in reserve portfolios



N = 68
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.
Note: The distribution for each tranche is based on the total number responding to the question (N=68). The data are divided into four equal-sized quartiles made up of 25 percent of the data. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively.

FIGURE 3.8**Investment horizon by tranches**

N = 75

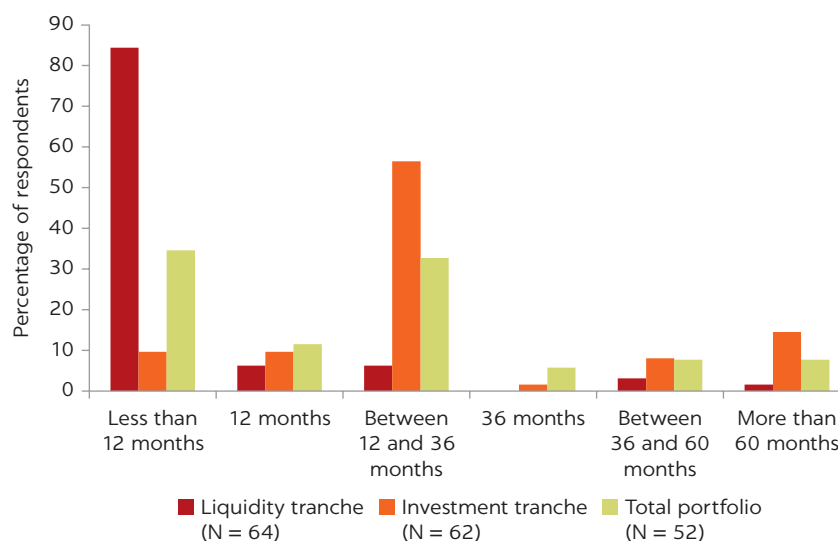
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

for the investment tranche. In total, 65 percent of the respondents have an investment horizon longer than one year for their total reserves portfolio.² Longer investment horizons are consistent with an increasing ability to take risk and generate additional returns (Siegel 2008).

Survey data indicate that central banks in high-income countries or holding larger reserves tend to have longer investment horizons in their reserve operations. Institutions in high-income countries reported having investment horizons of 60 months on average, compared with their lower-income counterparts, which had a 40-month investment horizon on average. Similarly, the investment horizon is longer for countries with larger reserves (greater than US\$60 billion). This result is in line with recent empirical findings that suggest that central banks adjust the levels of reserves to the level of volatility of their macro environment (RAMP et al. 2020). Therefore, once central banks have accumulated enough reserves to meet their immediate liquidity needs, they can lengthen the investment horizon.

Despite having different tranches, central banks surveyed report having only one SAA for the whole portfolio. Of the respondents, 75 percent indicate they have one SAA for their reserves portfolio, while only 17 percent have more than one. One possible explanation for having one SAA, even under a tranching framework, is that the approach considers the correlation between the assets in all of the tranches and therefore ensures a more efficient portfolio. A central bank can meet its liquidity objectives with a single SAA if proper constraints are included in the optimization.

Reserve managers typically build portfolios with low sensitivity to changes in interest rates, and therefore duration exposure is limited in reserves portfolios. Figure 3.9 shows the distribution of duration exposure for the liquidity tranche, the investment tranche, and the total portfolio. The median duration of the liquidity tranche is three months. In contrast, the median duration of the investment tranche is 22 months, indicating that interest rate risk is usually larger in the investment tranche. For the total reserves portfolio, the median duration amounts to 18 months. Only 21 percent of the respondents have a total duration greater than three years in their combined reserves portfolio. This result indicates that central banks continue to deploy a cautious approach to interest rate exposure to achieve the capital preservation objective of reserves management.¹⁰

FIGURE 3.9**Distribution of duration for total portfolio and by tranche**

N = 78

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

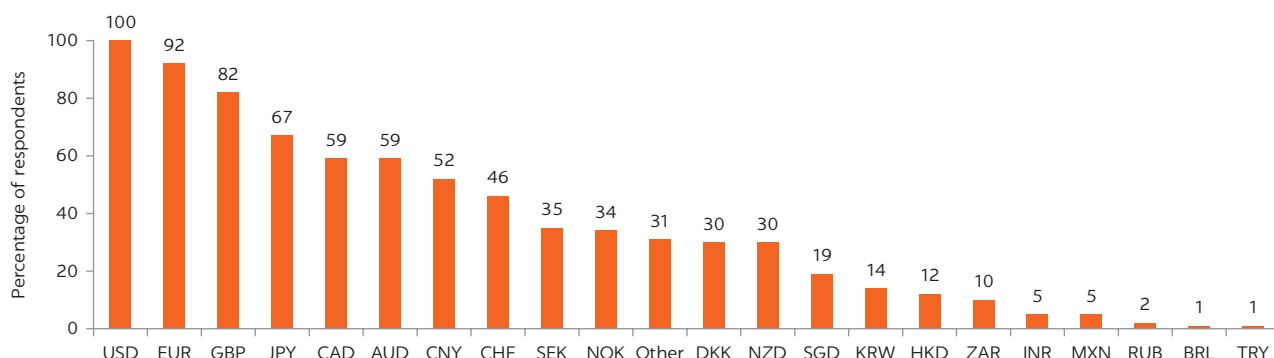
Note: The percentages for the tranches are based on the number of respondents per tranche (that is, those reporting the duration of a given tranche). Respectively, 82, 79, and 67 percent of respondents reported the duration for the liquidity tranche, the investment tranche, and the total portfolio.

Eligible currencies and actual currency composition of reserves

Balance of payments considerations and portfolio management concerns drive the actual currency composition of reserve portfolios (Wang 2019). Balance of payments considerations comprise the structure and denomination of external debt, intervention needs, and asset and liability management. Portfolio management concerns consist of the diversification of currency risk and the returns, availability, and liquidity of assets denominated in different currencies. Intervention requirements and payment of external debt claims tend to be more relevant to a liquidity tranche. Meanwhile, diversification of currency risk and pursuit of higher returns play a more important role in shaping the investment tranche (RAMP et al. 2019).

Survey results show that the U.S. dollar retains its predominance in reserve portfolios. It was the only currency that all respondents indicated as eligible. Eligibility means that a central bank is allowed to invest in the currency, but it may choose not to. The other currencies that make up the special drawing rights basket are also eligible for most respondents: 92 percent can invest in the euro, 82 percent in the British pound, 67 percent in the Japanese yen, and 52 percent in the Chinese renminbi (figure 3.10).

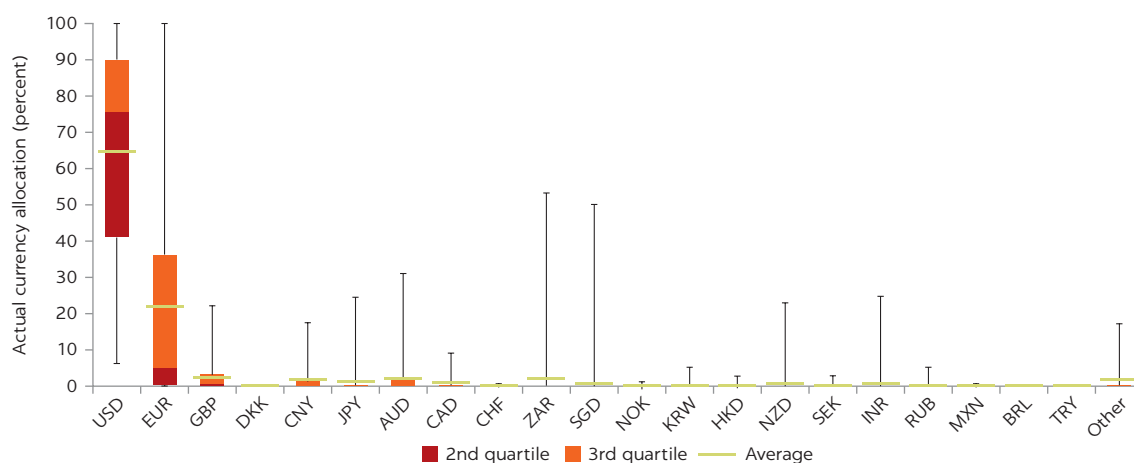
The U.S. dollar also maintains its position as the currency with the largest allocation. Figure 3.11 shows the distribution range of the currency composition of all respondents' foreign exchange holdings, including those that reported no allocation to the respective currency. For each currency, figure 3.11 displays the range of institutions' reported shares and quartiles, as well as the median and average. The U.S. dollar is the most important currency in reserve portfolios, followed by the euro. The data also indicate that a few central banks have large allocations to the euro, but the majority have large dollar exposures and small or nonexistent exposures to the euro.¹¹ By contrast, the allocation to each of the

FIGURE 3.10**Number of respondents that may hold each currency as part of their foreign exchange reserves**

N = 100

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: See abbreviations section for expansion of currency abbreviations.

FIGURE 3.11**Distribution of allocations to individual currencies**

Number of central banks with no allocation	1	15	30	50	51	55	55	60	75	80	81	81	82	82	82	83	83	86	86	87	87	59
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	100.0	100.0	22.0	0.2	17.3	24.5	31.0	9.1	1.0	53.1	50.0	2.0	5.0	5.0	23.0	2.7	24.7	5.2	1.0	0.0	0.0	17.0
Median	75.8	5.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	64.4	21.9	2.5	0.0	1.5	1.1	1.7	0.8	0.0	1.7	0.6	0.0	0.1	0.1	0.6	0.0	0.6	0.1	0.0	0.0	0.0	1.5

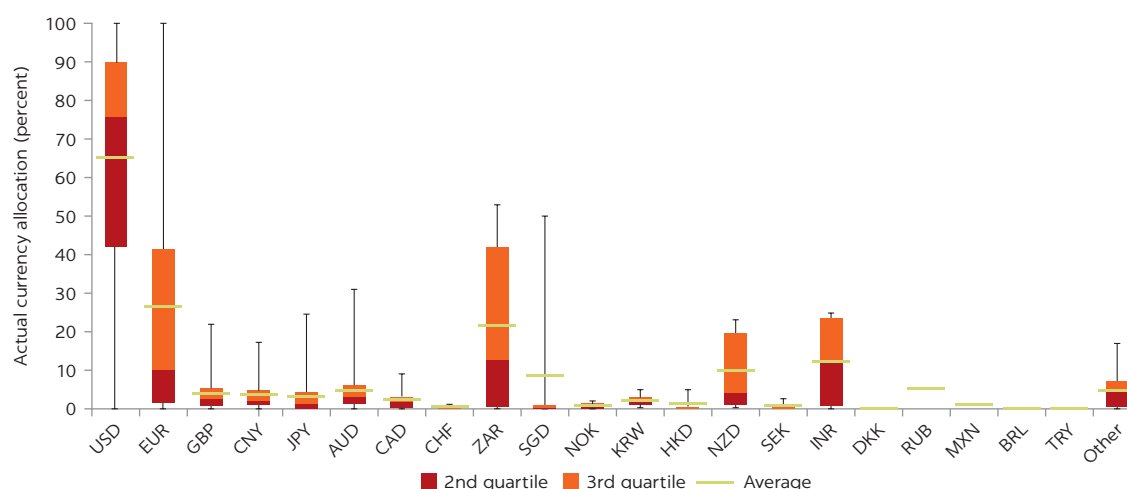
N = 87

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: This figure displays the distribution of the actual allocations to the different currencies. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum for the 87 respondents to the question. The data are divided into four equal-sized quartiles. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data is either greater than or equal to this value, while the remaining 50 percent is smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively. See abbreviations section for expansion of currency abbreviations.

other reserve currencies is not material. Figure 3.12 shows that, in most cases, allocations to currencies different from the dollar and the euro are small, even among countries that have exposure.

Despite recent changes in the relative sizes of large economies, the currency composition results are consistent with historical data showing U.S.

FIGURE 3.12**Distribution of the allocations to individual currencies for respondents with exposure**

Number of central banks with exposure	86	72	57	36	32	32	27	12	7	6	6	5	5	5	4	4	2	1	1	0	0	28
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.0	5.2	1.0	0.0	0.0	0.0
Maximum	100.0	100.0	22.0	17.3	24.5	31.0	9.1	1.0	53.1	50.0	2.0	5.0	5.0	23.0	2.7	24.7	0.2	5.2	1.0	0.0	0.0	17.0
Median	75.9	10.0	2.4	1.7	1.4	3.1	1.7	0.1	12.8	0.3	0.4	2.0	0.1	4.3	0.2	12.0	0.1	5.2	1.0	0.0	0.0	4.7
Average	65.2	26.4	3.8	3.5	3.1	4.7	2.4	0.3	21.5	8.7	0.7	2.2	1.1	9.6	0.8	12.2	0.1	5.2	1.0	0.0	0.0	4.8

N = 87

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: This figure displays the distribution of the actual allocations to the different currencies. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum for the 87 respondents to the question. The data are divided into four equal-sized quartiles. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively. See abbreviations section for expansion of currency abbreviations.

dollar-denominated assets' decades-long dominance of reserve portfolios (Wang 2019). Most trade and capital flows still take place using the U.S. dollar or the euro, which may explain their predominance in reserve portfolios even though, over the long term, the U.S. and euro area economies' shares of global gross domestic product have been in decline (BIS 2019).

Some currencies that are frequently eligible for investment tend to have small allocations in reserve portfolios. The divergence between eligible currencies and actual holdings is most visible for the Australian dollar, the Canadian dollar, the British pound sterling, the Japanese yen, and the Chinese renminbi. All have eligibility frequencies of between 52 percent and 81 percent. However, none has a median exposure greater than 3 percent. These results suggest that any shift away from the U.S. dollar or the euro as dominant reserve currencies is, at present, not substantial.

The analysis of the currency allocation by reserve level, region, and income group yields interesting findings and reconfirms the importance of balance of payments considerations (table 3.1).¹² As noted, the median central bank in the survey holds 76 percent in U.S. dollars and 5 percent in euros. However, countries with smaller reserve levels (less than US\$3 billion) tend to have higher allocations to the U.S. dollar (88 percent) compared with countries with larger reserve levels (63 percent for countries with reserves larger than US\$60 billion). Similarly, the allocation to the euro is larger in countries with larger reserve

TABLE 3.1 Median of the allocations to individual currencies by geographic region, country income group, and size*Percent*

	USD	EUR	GBP	CNY	JPY
Geographic region					
Americas and Caribbean	96.0	0.1	0.0	0.0	0.0
Europe and Central Asia	30.5	42.0	0.0	1.3	0.0
Middle East and Africa	83.1	3.2	0.0	1.0	0.7
South and East Asia and Pacific	74.5	1.4	0.1	1.0	0.0
Country income group					
High income	53.0	29.2	0.0	1.6	0.0
Upper middle income	80.7	5.0	0.0	0.1	0.0
Lower middle and low income	83.1	0.9	0.0	0.8	0.0
Size (US\$)					
Less than 3 billion	87.5	0.7	0.0	0.0	0.0
3 to 8 billion	79.0	5.6	0.0	1.1	0.0
8 to 60 billion	72.0	9.1	0.0	1.0	0.6
More than 60 billion	63.0	29.2	0.0	2.5	0.3
Total	75.8	5.0	0.0	0.5	0.0

N = 87

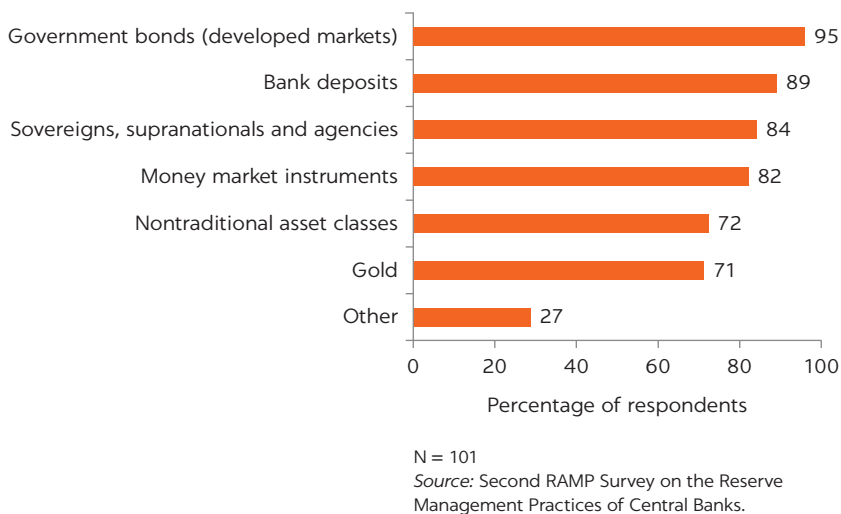
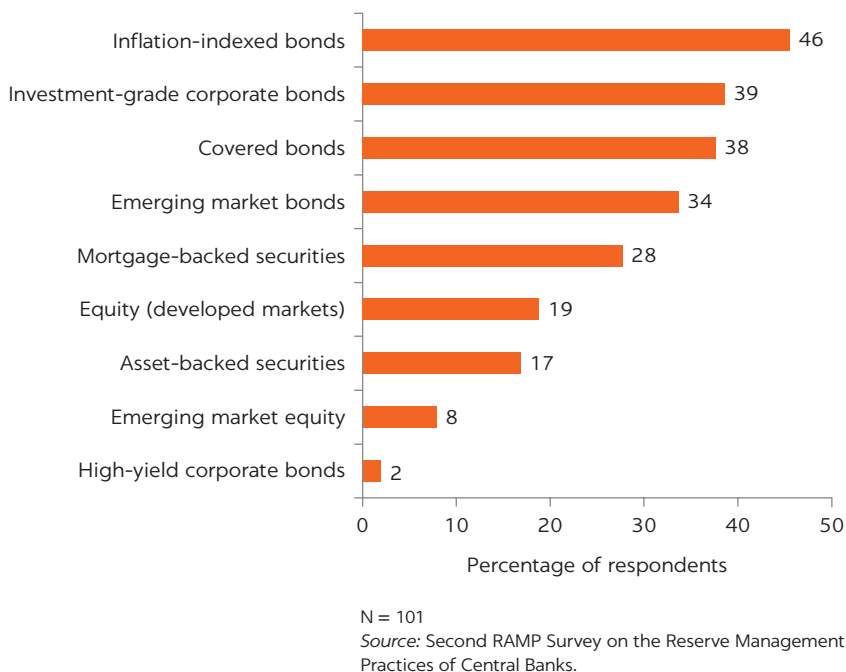
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: The order of the currencies is based on figure 3.12, that is, by number of respondents with exposure to the currency. See abbreviations section for expansion of currency abbreviations.

levels (29 percent) than in countries with lower reserve levels (1 percent). By income level, low-income countries are predominantly invested in U.S. dollars (the median is 83 percent), but high-income countries have a lower-than-median allocation (53 percent). This suggests that countries with lower reserve and income levels concentrate in the U.S. dollar because the currency's predominance in trade and financial markets is even more important for them than it is for other countries. Another possible explanation for this observation is that reserve levels in those countries are not high enough to diversify into other currencies. By region, survey results also indicate that trade and investment flows are important in the currency allocation decision. The Americas and Caribbean is the region with the largest median allocation to the U.S. dollar (96 percent), followed by the Middle East and Africa (83 percent). For both regions, the U.S. dollar is the most important currency in external transactions. By contrast, the largest median allocation to the euro is in Europe and Central Asia (42 percent).

Eligible asset classes and asset class composition of reserves

Central banks maintain their preference for highly liquid and low-risk asset classes. An overwhelming majority of central banks cited the following as eligible instruments: government bonds (95 percent); bank deposits (89 percent); sovereign, supranational, and agency (SSA) securities (84 percent);¹³ and money market instruments (82 percent) (see figure 3.13). This finding is consistent with the investment aim of capital preservation and liquidity.¹⁴ About 71 percent of the

FIGURE 3.13**Eligible asset classes****FIGURE 3.14****Higher-risk financial instruments that are eligible asset classes**

respondents also indicated that gold is an eligible asset class. Bank deposits, although they are considered safe and liquid in the very short term, entail counterparty risk exposure and are less liquid than government bonds when held with commercial banks for longer terms than overnight.

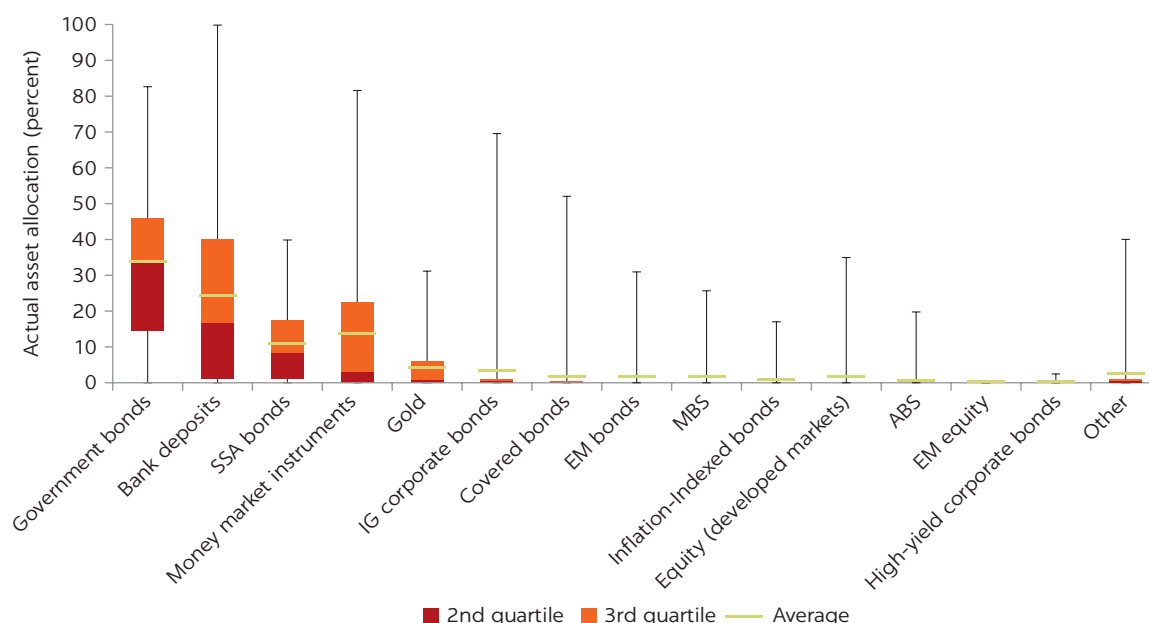
Most respondents (72 percent) can invest in nontraditional asset classes with higher risk, such as corporate bonds, emerging market bonds, covered bonds, mortgage-backed securities (MBS), and equities (nontraditional asset classes are listed in figure 3.14). Central banks invest in nontraditional asset classes to increase returns and diversification (Hentov et al. 2019). Low or negative interest rates in developed markets may have accelerated the transition to riskier

asset classes. Figure 3.14 shows the eligibility of each of those asset classes. The preferred nontraditional asset class is inflation-indexed bonds (46 percent of respondents), followed by investment-grade corporate bonds (39 percent), covered bonds (38 percent), emerging market bonds (34 percent), and MBS (28 percent). An interesting observation is that the eligibility of MBS is lower than that of other nontraditional asset classes, even though these securities tend to be more liquid and to have lower credit risk than corporate, covered, and emerging market bonds. This finding could be explained by the higher operational complexity of managing an MBS portfolio. Finally, equity investment is still not common among central banks: only 19 percent of institutions can invest in developed market equity and 8 percent in emerging market equity.

Although central banks have expanded their universe of eligible investments, reserve portfolios are concentrated in traditional reserve assets. The median allocation to government bonds and to bank deposits is 34 percent and 17 percent, respectively. In contrast, the median allocation to riskier asset classes, such as corporate bonds, emerging market bonds, and equity, is zero percent, indicating that the majority of respondents do not hold them in their portfolios (Figure 3.15).¹⁵

FIGURE 3.15

Distribution of allocations to individual asset classes



Number of central banks with no allocation	7	16	16	23	33	51	52	57	58	59	60	68	69	70	49
Minimum	0.0	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	82.7	100.0	40.0	81.6	31.0	70.0	52.0	31.0	25.5	17.1	35.0	19.9	0.4	2.4	40.0
Median	34.0	16.8	8.5	3.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	33.8	24.3	10.8	14.0	4.2	3.5	1.5	1.3	1.3	0.6	1.3	0.6	0.0	0.0	2.7

N = 71

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

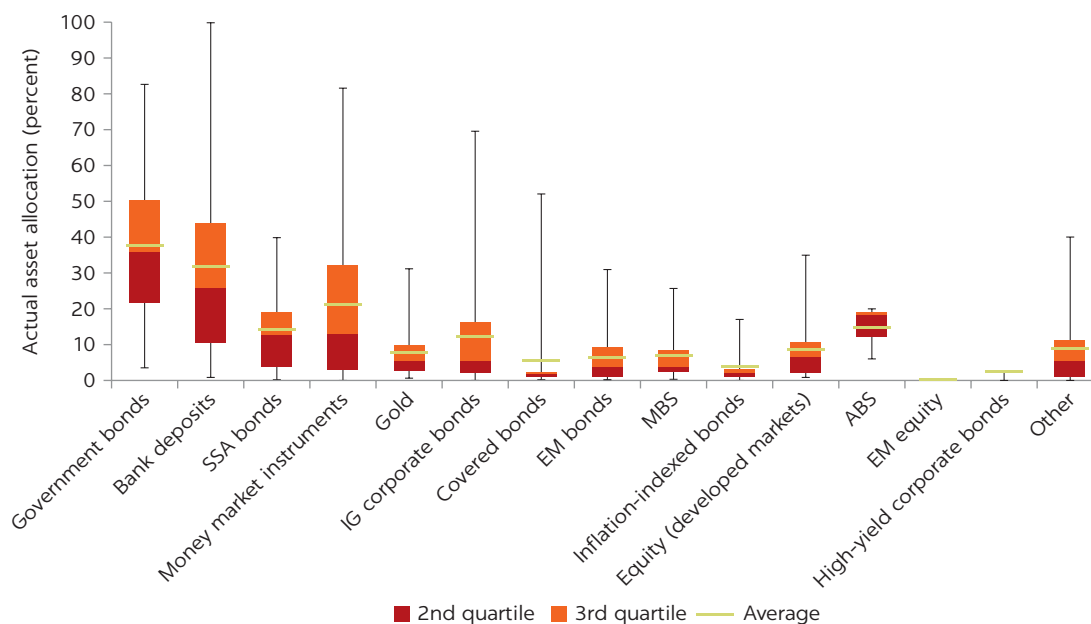
Notes: ABS = asset-backed securities; EM = emerging market; IG = investment grade; MBS = mortgage-backed securities; SSA = supranational, sovereign, and agency. This figure displays the distribution of the actual allocations to the different asset classes. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum. The data are divided into four equal-sized quartiles. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively.

The allocation to riskier asset classes is small, even for central banks that have diversified into those instruments. Figure 3.16 shows information obtained from the reported asset allocations of respondents' foreign exchange reserves and shows only data for the institutions that indicated exposure to a specific asset class. (The figure therefore does not reflect the impact of central banks who did not report an allocation.) For each financial instrument, the figure displays the range of institutions' reported shares and quartiles, as well as the median and average. The median allocation to nontraditional asset classes is less than 10 percent in most cases, showing that diversification of reserve portfolios is a gradual process.

Across central banks, the analysis of the asset allocation by reserve level, region, and income group reveals several notable differences across classifications (see table 3.2). The median central bank holds 34 percent in government bonds; 17 percent in bank deposits; 9 percent in SSA bonds; 3 percent in money market instruments; and 0.7 percent in nontraditional assets. Countries with smaller reserve levels (less than US\$3 billion) have the largest allocation to bank deposits relative to government bonds, with a median allocation of 15 percent in government bonds and 33 percent in bank deposits. By contrast, central banks with larger

FIGURE 3.16

Distribution of the allocation to individual asset classes for respondents with exposure



Number of central banks with exposure	64	55	55	48	38	20	19	14	13	12	11	3	2	1	22
Minimum	4.0	1.0	0.5	-1.0	0.7	0.1	0.2	0.4	0.3	0.0	1.0	6.0	0.1	2.4	0.0
Maximum	82.7	100.0	40.0	81.6	31.0	70.0	52.0	31.0	25.5	17.1	35	19.9	0.4	2.4	40.0
Median	36.0	26.0	13.0	13.1	5.5	5.5	2.0	4.0	4.0	2.0	6.3	18.5	0.3	2.4	5.7
Average	37.5	31.4	14.0	21.1	7.8	12.4	5.5	6.4	7.0	3.6	8.7	14.8	0.3	2.4	8.7

N = 71

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Notes: ABS = asset-backed securities; EM = emerging market; IG = investment grade; MBS = mortgage-backed securities; SSA = supranational, sovereign, and agency. This figure displays the distribution of the actual allocations to the different asset classes. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum. The data are divided into four equal-sized quartiles. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively.

TABLE 3.2 Median of the allocations to individual asset classes by geographic region, country income group, and reserve size

Percent

	GOVERNMENT BONDS	BANK DEPOSITS	SSA BONDS	MONEY MARKET INSTRUMENTS	GOLD	NONTRADITIONAL ASSETS ^a
Geographic region						
Americas and Caribbean	31.7	7.4	15.9	5.0	0.7	2.4
Europe and Central Asia	40.1	12.5	12.0	2.0	5.5	5.0
Middle East and Africa	32.0	20.5	3.3	11.4	0.0	0.2
South and East Asia and Pacific	9.5	35.1	1.6	17.0	0.0	0.2
Country income group						
High income	48.0	6.2	10.5	0.8	1.3	11.0
Upper middle income	28.9	20.0	14.4	10.0	0.7	0.7
Lower middle and low income	30.5	22.1	1.0	13.9	1.4	0.0
Size (US\$)						
Less than 3 billion	14.7	33.0	0.0	1.0	0.0	0.0
3 to 8 billion	30.3	15.0	11.5	6.5	1.8	0.1
8 to 60 billion	34.0	17.0	15.0	6.0	4.0	6.0
More than 60 billion	51.0	1.0	8.5	2.2	3.0	1.2
Total	34.0	16.8	8.5	3.0	1.0	0.7

N = 71

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: SSA = sovereigns, supranationals, and agencies. The sum of the median allocations does not add up to 100 percent because the median asset allocation for several asset classes is zero percent.

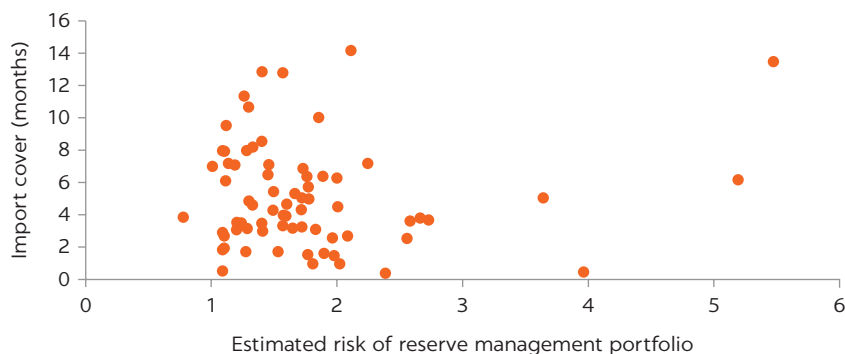
a. Median of the total allocation to nontraditional assets: investment grade corporate bonds, high-yield corporate bonds, covered bonds, emerging market bonds, mortgage-backed securities, asset-backed securities, inflation-indexed bonds, developed market equity, and emerging market equity.

reserves (US\$60 billion and greater) allocate a median of 51 percent to government bonds and only 1 percent to bank deposits. By income level, low-income countries predominantly invest in bank deposits (the median is 22 percent) and money market instruments (14 percent), whereas high-income countries have a lower-than-median allocation (6 percent and 1 percent, respectively). High-income countries hold government bonds with a median allocation of 48 percent and 11 percent for SSA bonds. The bulk of the allocation to nontraditional assets resides with high-income countries, with a median allocation of 11 percent. Analyzing the data by region may provide useful information, because some countries in the same region share similar reserve management objectives or may use their regional peers as benchmarks. Central banks in Europe and Central Asia have the largest median allocation to government bonds (40 percent), whereas those in South and East Asia and Pacific hold the lowest median allocation (10 percent). This relationship is inverse, however, for bank deposits—central banks in Europe and Central Asia have one of the lowest allocations, with 13 percent, as opposed to those in South and East Asia and Pacific, with the highest allocation (35 percent). The institutions in the Americas and the Caribbean invest a median of 16 percent in SSA bonds, the highest allocation across all regions.

The relationship between the level of risk that central banks take in their reserves operations and measures of reserve adequacy was not material (see figures 3.17 and 3.18.) This result is similar to that in the previous survey. It may suggest that some central banks with high reserve adequacy are taking less risk than the average but also that some central banks with low reserve

FIGURE 3.17

Comparison of the estimated risk of the reserve management portfolio and months of import coverage of foreign exchange reserves of all respondents



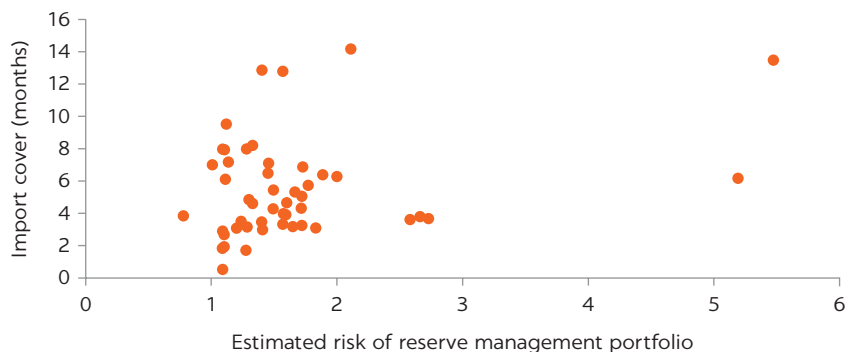
N = 70

Sources: World Bank World Development Indicators and Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: Estimated risk was calculated as part of the report on risk aversion and background risk for central banks (RAMP et al. 2020) and refers to the volatility of the returns of the reserve management portfolio. The measure is calculated using the survey results and standard market indices. It excludes currency volatility.

FIGURE 3.18

Comparison of the estimated risk of the reserve management portfolio and months of import coverage of foreign exchange reserves of emerging market respondents



N = 48

Sources: World Bank World Development Indicators and Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: Estimated risk was calculated as part of the report on risk aversion and background risk for central banks (RAMP et al. 2020) and refers to the volatility of the returns of the reserve management portfolio. The measure is calculated using the survey results and standard market indices. It excludes currency volatility.

adequacy construct portfolios that carry high risks. However, recent empirical findings suggest that in determining the risk tolerance for their reserves activities, central banks consider not just current macroeconomic variables but also their volatility. On average, central banks adjust the level of risk of their reserve management operations to the volatility of their macroeconomic environment (RAMP et al. 2020).

Active management

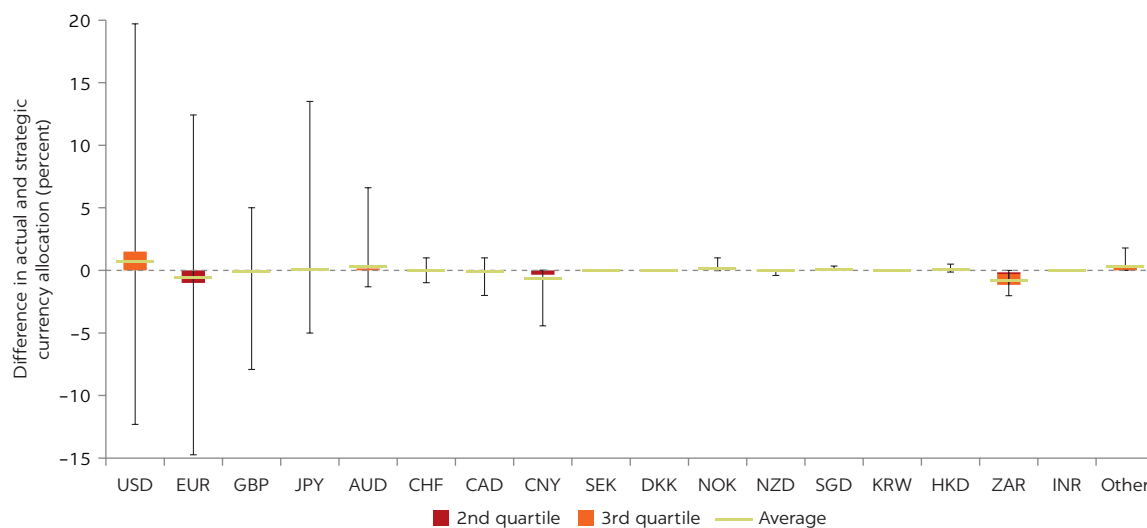
The survey found that most reserve managers do not take significant active risk.¹⁶ The current survey aimed to identify the scope of active risk in central

banks, and the questionnaire included questions on the strategic and current asset allocation of reserve portfolios. With respect to currency exposure, as figure 3.19 illustrates, most central banks tend to deviate only slightly from their strategic currency benchmark, suggesting that they take limited active currency risk. Survey responses also show that many institutions are willing to deviate significantly from their strategic asset allocation by overweighting high-quality spread products relative to their benchmarks. This may reflect efforts to improve returns in the current global low-yield environment. This substitution does not entail as much active risk as deviations from the strategic currency allocation or from duration because prices of these different asset classes tend to move in tandem. The main risk arising from this strategy is spread widening, particularly during periods of market stress.

On currencies, central banks slightly overweight the U.S. dollar and underweight the euro relative to their benchmarks. The interest rate differential between the United States and Europe may explain the slight underweight in euros. Survey findings suggest though that the overweight in U.S. dollars versus euros is small, given that median currency deviations of respondents are zero, indicating that most central banks do not take much active currency risk. This finding is also confirmed when calculating how much risk central banks take on relative to their respective benchmarks (tracking error). Only 28 percent of respondents have a currency tracking error different from zero. On average,

FIGURE 3.19

Currency deviations from the benchmark



Number of observations	44	40	34	27	23	22	22	19	18	17	17	15	7	5	5	3	2	10
Minimum	-12.3	-14.7	-8.0	-5.0	-1.3	-1.0	-2.0	-4.8	0.0	0.0	0.0	-0.4	0.0	0.0	-0.1	-2.0	0.0	0.0
Maximum	19.7	12.4	5.0	13.5	6.6	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.4	0.0	0.5	0.0	0.0	1.8
Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.0
Average	0.7	-0.6	-0.1	0.1	0.3	0.0	-0.1	-0.6	0.0	0.0	0.1	0.0	0.1	0.0	0.1	-0.8	0.0	0.3

N = 44

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

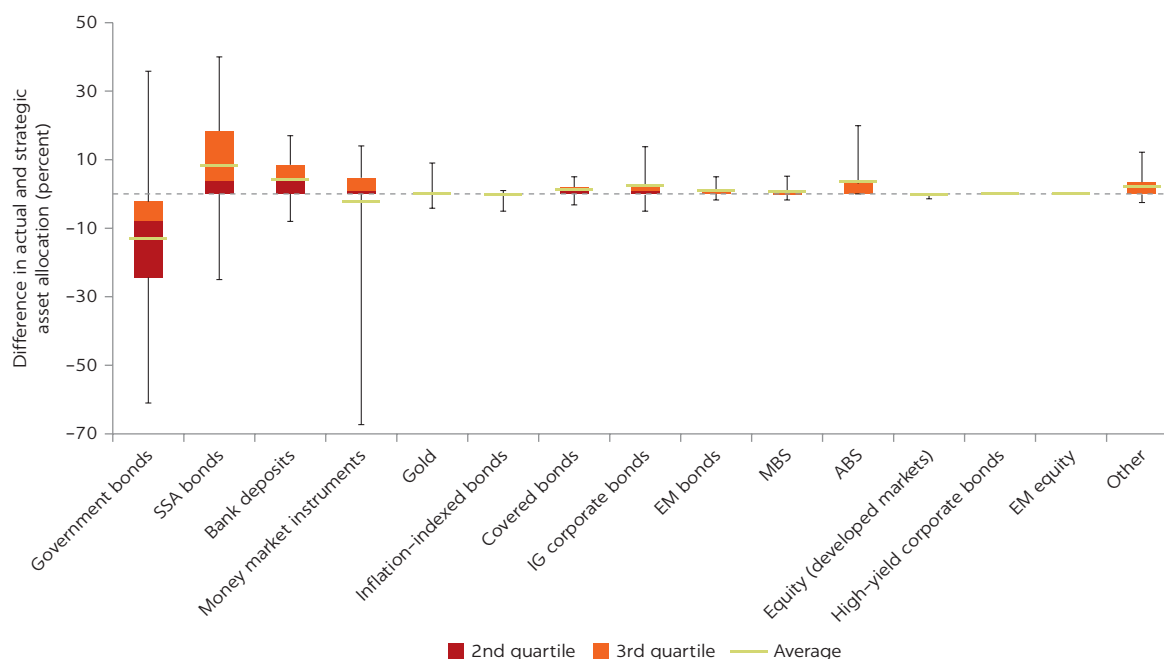
Note: This figure displays the distribution of the deviations of each currency. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum. The data are divided into four equal-sized quartiles for the 44 respondents for which data were available. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively.

these central banks take moderate active risk in currencies (0.28 percent tracking error). However, five central banks do take significant currency risks in their reserves management operations versus their strategic currency exposure. Their calculated tracking error amounted to more than 0.5 percent, with one central bank recording active risk of 1.2 percent.

For asset classes, survey results show that the median differences between the actual allocations and the benchmarks are positive for SSA, bank deposits, and other spread products, and negative for government bonds (figure 3.20). SSA benchmarks are not easy to replicate, compared with government benchmarks, because individual SSA securities are not as liquid as government bonds. As a result, central banks tend to use government benchmarks, even if they diversify into other high-quality bonds. Survey data also show that the median central bank has an overweight position in bank deposits and an underweight position in money market instruments. This positioning may reflect central banks' efforts to diversify into different short-term spread products to improve yields. Looking at income groups, respondents from low- and lower-middle-income countries did not deviate much from their strategic asset allocation weight to government

FIGURE 3.20

Asset class deviations from the benchmark



Number of observations	31	28	27	26	22	17	16	12	12	11	7	7	2	2	8
Minimum	-61.0	-25.0	-8.0	-67.3	-4.2	-5.0	-3.2	-5.0	-1.8	-1.4	0.0	-1.4	-0.1	0.0	-2.5
Maximum	35.8	40.0	17.0	14.0	9.0	1.0	5.0	13.8	5.0	5.2	19.9	0.0	0.0	0.0	12.0
Median	-8.0	4.0	4.0	1.0	0.0	0.0	1.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	-13.0	8.3	4.2	-2.2	0.2	-0.3	1.1	2.4	1.0	0.7	3.7	-0.2	0.0	0.0	2.2

N = 31

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Notes: ABS = asset-backed securities; EM = emerging market; IG = investment-grade; MBS = mortgage-backed securities; SSA = sovereigns, supranationals, and agencies. This figure displays the distribution of the deviations for each asset class. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum. The data are divided into four equal-sized quartiles for the 31 respondents for which data were available. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively. See abbreviations section for expansion of currency abbreviations.

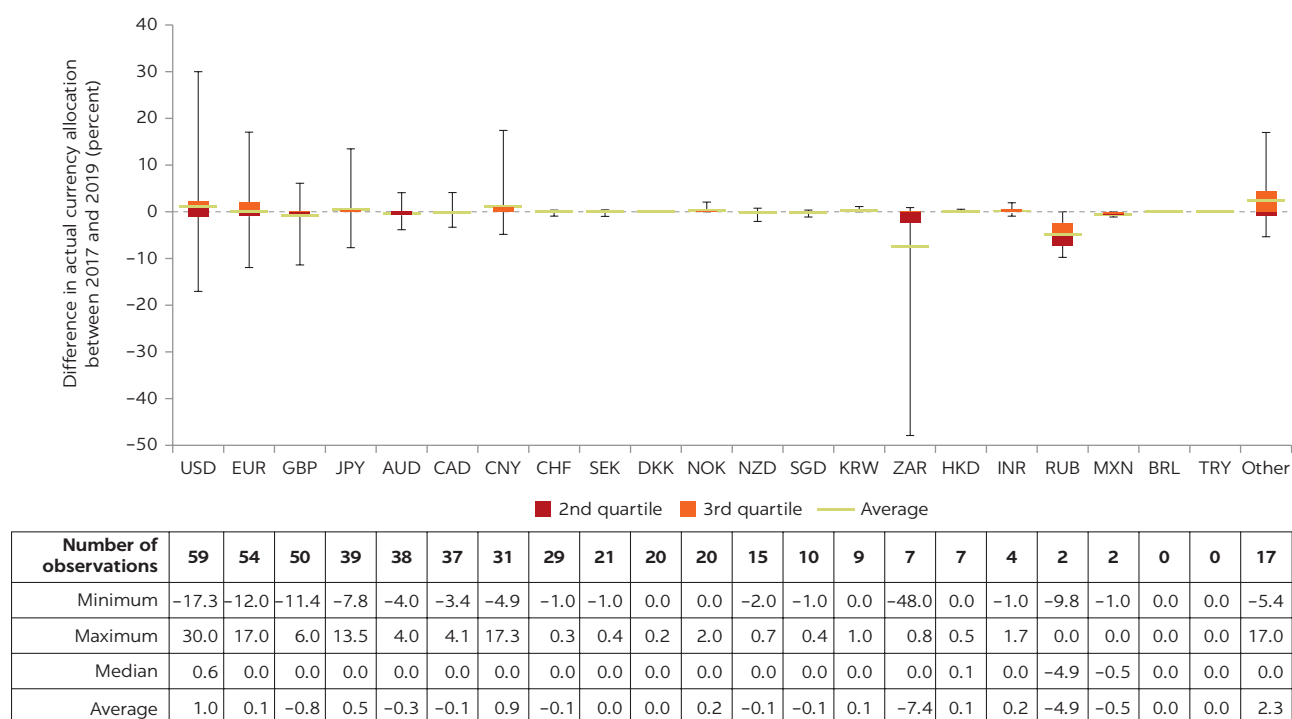
bonds, whereas upper-middle-income countries recorded a median deviation of -2.5 percent and high-income countries show a median underweight of -7.5 percent. By size, the largest deviations from the strategic allocation can be observed in central banks with reserves greater than US\$60 billion, which record a median underweight of 32 percent for government bonds against an overweight of 26 percent for SSA products.

Changes from the last survey

Compared with the previous survey, most respondents did not change their actual currency and asset class allocations significantly—median changes to these allocations were close to zero.¹⁷ On average, however, the actual allocations to the U.S. dollar, the renminbi, and the yen increased, whereas the average participation of the British pound and the South African rand decreased (figure 3.21). This result is explained by a few central banks, because the median change was close to zero.

For asset classes, the average actual allocation to emerging market bonds, MBS, and corporate bonds increased moderately (figure 3.22). The increase was small, but it reflects central banks' continuing appetite for diversifying further into other fixed-income products. By contrast, the median allocation to equity remained unchanged. The increase in the share of money market instruments

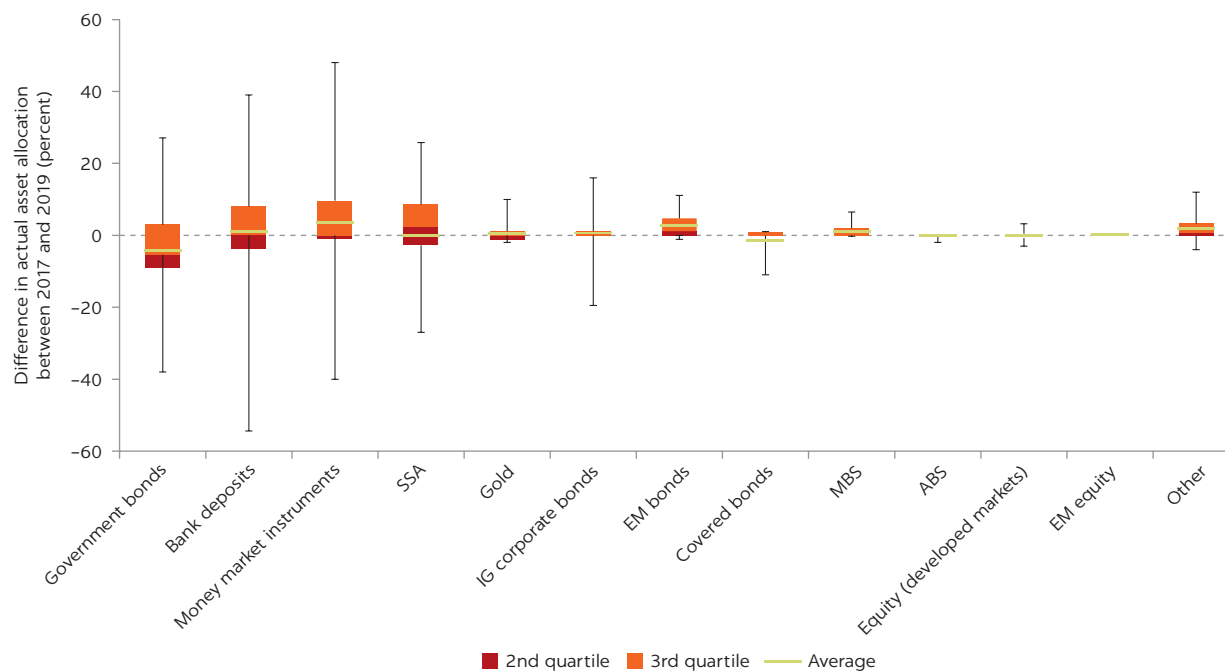
FIGURE 3.21
Changes in currency actual allocation from previous survey



N = 59

Source: First RAMP Survey on the Reserve Management Practices of Central Banks; Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: This figure displays the distribution of the deviations for each asset class. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum. The data are divided into four equal-sized quartiles for the 57 respondents for which data were available. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively. See abbreviations section for expansion of currency abbreviations.

FIGURE 3.22**Changes in asset allocation from previous survey**

Number of observations	34	33	32	30	24	15	15	11	11	8	7	3	12
Minimum	-38.0	-54.4	-40.0	-27.0	-2.0	-19.5	-1.0	-11.0	-0.3	-2.0	-3.0	0.0	-4.0
Maximum	27.1	39.0	48.0	23.0	10.0	16.0	11.0	1.0	6.5	0.0	3.6	0.4	12.0
Median	-3.6	0.0	0.0	-0.4	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.5
Average	-4.3	1.2	3.6	0.3	0.5	0.9	2.6	-1.5	1.3	-0.3	0.0	0.1	1.8

N = 35

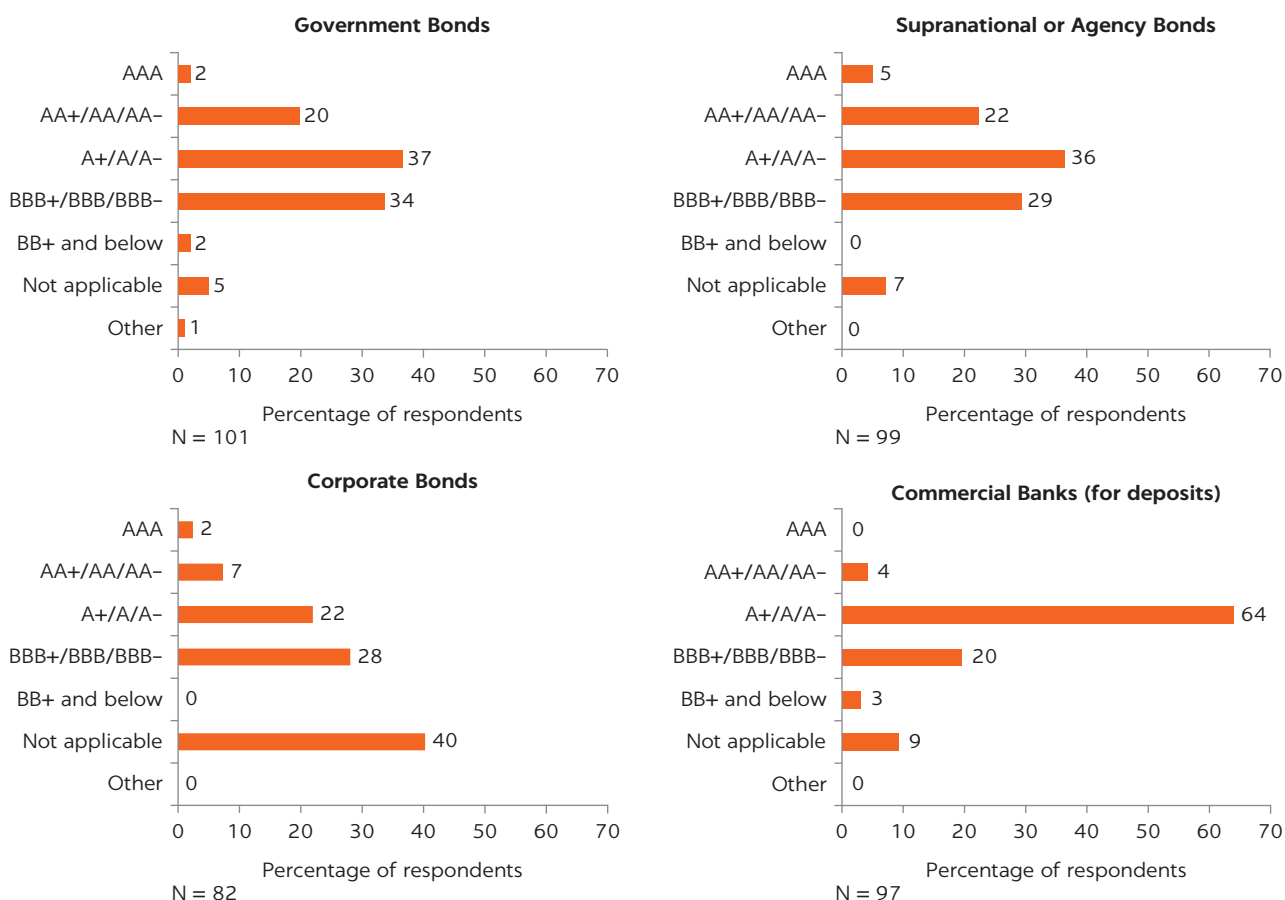
Source: First RAMP Survey on the Reserve Management Practices of Central Banks; Second RAMP Survey on the Reserve Management Practices of Central Banks.

Notes: ABS = asset-backed securities; EM = emerging market; IG = investment-grade; MBS = mortgage-backed securities; MM = money market; SSA = sovereigns, supranationals, and agencies. This figure displays the distribution of the changes in asset allocations. It shows the minimum, the second quartile group, the median, the third quartile group, and the maximum. The data are divided into four equal-sized quartiles for the 35 respondents for which data were available. The lines dividing the groups (2nd and 3rd) are the quartiles. The median marks the midpoint of the data and is displayed as the line between the 2nd and the 3rd quartile groups. Some 50 percent of the data are either greater than or equal to this value, while the remaining 50 percent are smaller than this value. The upper and bottom whiskers represent the maximum (highest point) and minimum (lowest point), respectively.

and the decrease in bank deposits may show increased interest in marketable short-term securities, such as commercial paper, which offer better liquidity than do bank deposits.

RISK MANAGEMENT

A central bank faces a variety of risks in its reserve management operations. Two of the most important are credit-related hazards and market-related issues. The former arise from the possibility of loss due to an obligor's deteriorating credit quality, most often in the form of a rating downgrade or default. This risk is especially relevant to corporate bond investors and holders of term deposits with commercial banks. Risks associated with market-related issues stem from the possibility that the price of an asset will decline due to market factors. A comprehensive risk management framework helps institutions identify and assess the magnitude of these threats and maintain them within limits consistent with their tolerance (International Monetary Fund 2014).

FIGURE 3.23**Minimum credit ratings by asset class (distribution over respondents by asset class)**

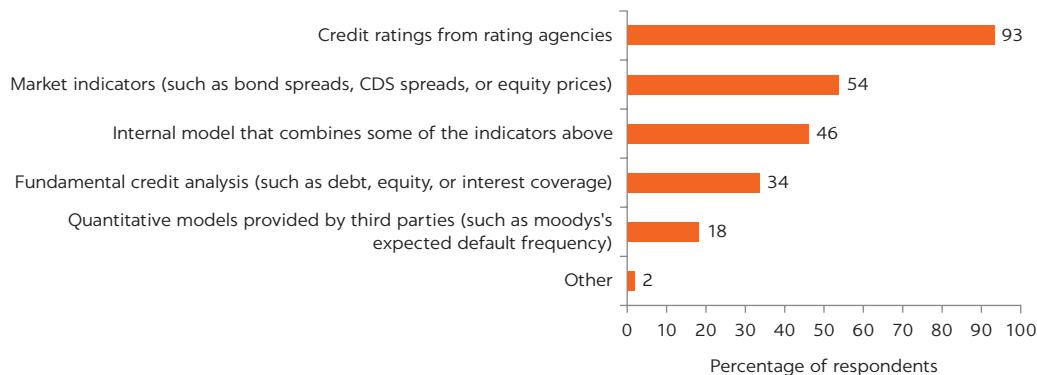
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Credit risk management

Determining the appropriate level of credit risk is important for central banks. Given central banks' focus on liquidity and capital preservation and concerns that credit defaults may adversely affect their reputation, central banks tend to take on credit risk conservatively. At the same time, credit products offer a spread relative to treasuries and can enhance portfolio return. Therefore, central banks need to determine the appropriate level of credit risk given their risk tolerance. The current low or negative yields in developed markets and higher reserve levels might increase central banks' appetite for credit risk.

Survey results show that most reserve managers continue to be conservative with respect to their exposure to credit risk (figure 3.23). Almost all respondents indicated that they could not invest in debt securities rated lower than investment grade. Only 2 percent of institutions reported that they can invest in government bonds rated BB+/BB/BB-. Investment in SSA or corporate bonds with speculative ratings is not allowed in any respondent central bank.

Compared with the previous survey, the tolerance for credit risk has not changed significantly.¹⁸ Minimum ratings are relatively stable for governments and corporations. About 22 percent of the respondents decreased their minimum ratings for supranationals and agencies, but all remained within investment grade.

FIGURE 3.24**Credit assessment methodologies**

N = 104

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

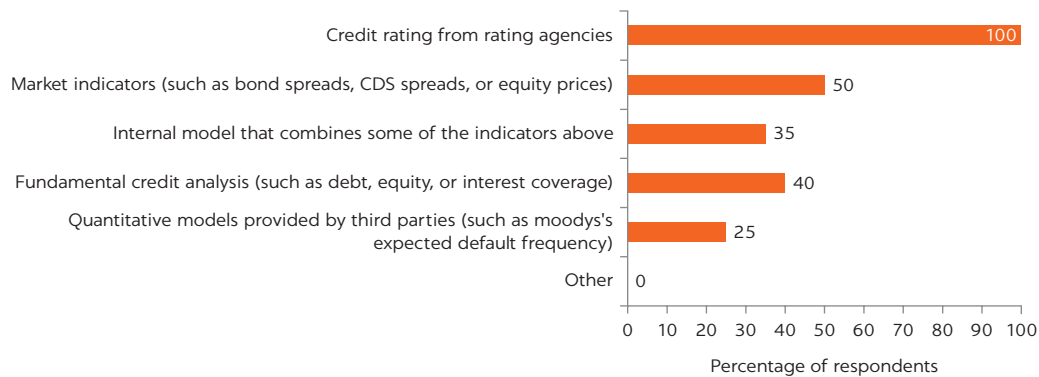
Note: CDS = credit default swap.

Credit ratings remain the basic mechanism for monitoring credit risk (figure 3.24), with 93 percent of the respondents using them. However, the majority (72 percent) use other methodologies to complement credit risk analysis. For example, 54 percent of institutions use market indicators, and 46 percent have developed internal models to assess credit risk.

Since the previous survey, methodologies that central banks use for credit risk analysis have improved. A complementary methodology was implemented by 14 central banks that previously only relied on credit ratings. Additionally, now 46 percent of the respondents have their own internal models, versus 37 percent of the respondents in the previous survey. More specifically, 47 percent of central banks that invest in either bank deposits or corporations, use an internal model, as opposed to only 31 percent of the respondents in the previous survey.

Despite the changes noted above, there may be scope for some institutions that invest in corporate credit to improve their credit risk management framework. Some 28 percent of the respondents still rely on credit ratings only. Central banks that invest in corporate bonds could consider complementing this methodology because default and rating downgrade probabilities are higher, even for highly rated issuers. The survey also found that institutions with exposure to credit risk seem not to have better tools for analyzing credit risk (figures 3.25 and 3.26) than those without exposure. For instance, central banks that invest in corporate bonds use almost the same number of methodologies for analyzing credit as do central banks that do not invest in corporate credit (2.3 methodologies versus 2.4 for those not investing in corporate credit). Moreover, only 35 percent of central banks that may invest in BBB-rated corporate debt (BBB+/BBB/BBB-) or below have an internal credit assessment model, versus 45 percent of central banks without any investments in corporate bonds.

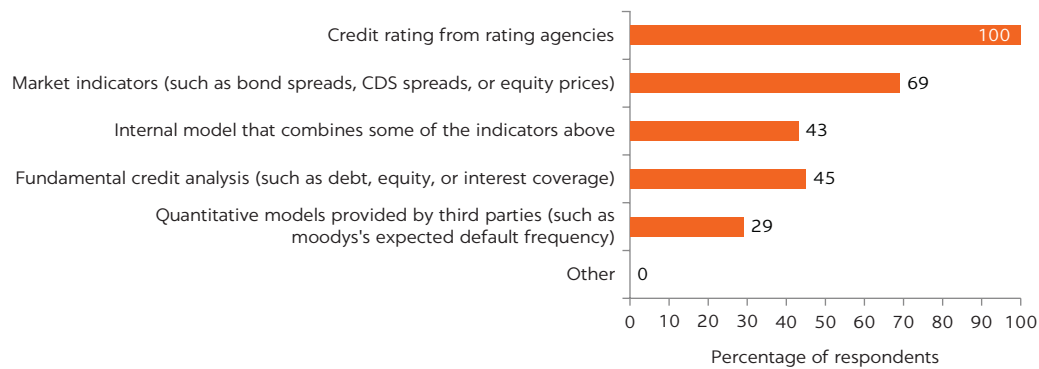
Finally, many central banks could still improve their measurement of aggregate credit risk at the portfolio level. Most respondents (57 percent) do not use a model to produce measures such as expected and unexpected loss, credit value at risk, and expected shortfall (figure 3.27). The respondents that do produce these metrics prefer an in-house model (24 percent of the respondents), followed by vendor credit risk models and Basel models. However, the trend

FIGURE 3.25**Credit assessment methodologies for respondents with corporate credit exposure**

N = 20

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

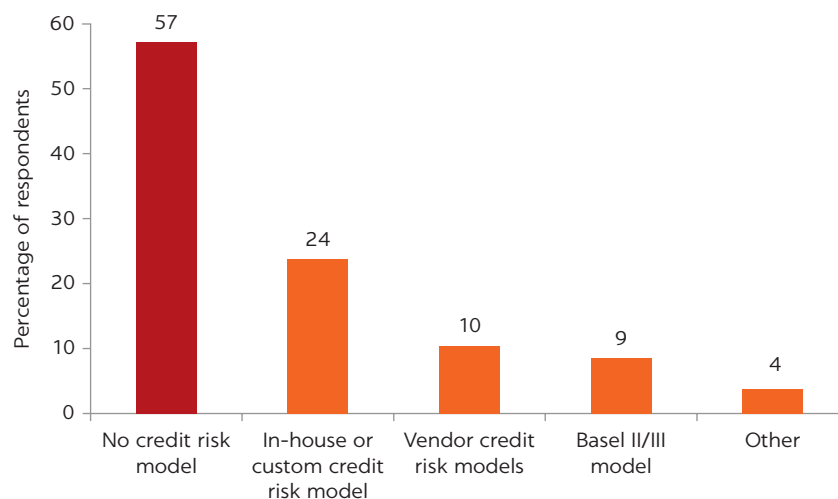
Note: CDS = credit default swap.

FIGURE 3.26**Credit assessment methodologies for respondents with minimum credit ratings of BBB- for at least one asset class**

N = 42

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: CDS = credit default swap.

FIGURE 3.27**Use of models to measure portfolio credit risk**

N = 105

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

is positive; since the previous survey, 15 additional institutions have begun measuring aggregate credit risk. Aggregate credit risk measures, using either internal or external methodologies, are useful for monitoring credit risk, especially for institutions with more credit exposure, for example, those that invest in deposits with commercial banks and corporate bonds.¹⁹

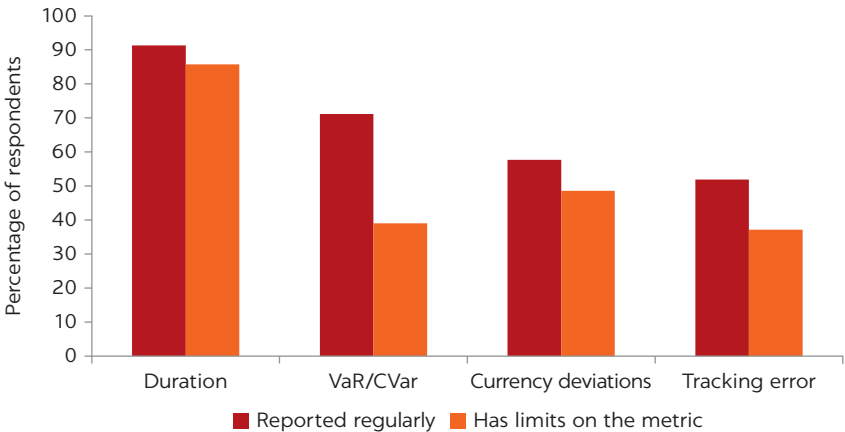
Market risk management

A reserve manager can use numerous methodologies to develop an understanding of the market risk in the portfolio. For fixed-income portfolios, duration and currency deviations indicate the sensitivity of the portfolio to changes in interest rates and exchange rates. In this context, probabilistic risk measures are more robust because they allow a comparison to be made of risk across different portfolios and asset classes. They are particularly well suited for central banks that have diversified into nontraditional asset classes. In this category, value-at-risk, conditional value-at-risk, and tracking error are frequently used metrics.²⁰

A significant proportion of respondents do not use probabilistic metrics to measure market risk. Although more than 80 percent of the respondents measure and limit duration in their portfolios, the use of other metrics is still relatively limited (figure 3.28). Fewer than half of respondents have restrictions on probabilistic risk measures. Those measures are particularly useful for central banks with exposure to nontraditional asset classes such as corporate bonds and equities in their reserve portfolios and central banks that deviate substantially from their strategic asset allocation.

Only half of the respondents use market risk models from third-party providers. Producing increasingly sophisticated probabilistic measures usually requires a third-party risk model because the quantitative and data resources tend to be more limited in central banks. On average, central banks that have implemented third-party risk models have 5.7 asset classes in their portfolio, versus 4.8 asset classes for those that do not. Additionally, 76 percent of the respondents that have a third-party risk model are in the high-income or upper-middle-income category. Central banks with larger reserves are

FIGURE 3.28
Use of market risk measures



N = 105
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.
Note: CVaR = conditional value-at-risk; VaR = value-at-risk.

more likely to use external risk models. About 68 percent of the banks with reserves greater than US\$60 billion reported the implementation of a third-party risk model, as opposed to only 24 percent of the banks with reserves of less than US\$3 billion.

Most respondents have implemented stress tests or scenario analysis. Survey results reveal that 78 percent of central banks use stress tests and scenario analysis to address issues that cannot be captured by traditional risk models and metrics. Some 56 percent of the respondents indicated that they use stress tests and 70 percent reported using scenario analysis. Only 22 percent do not use either methodology.

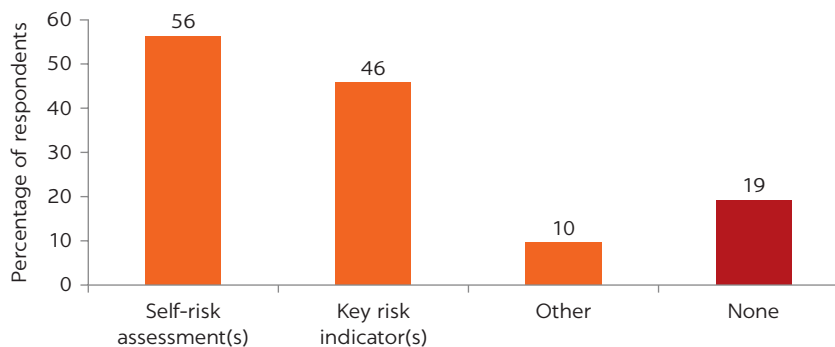
Neither the absolute size of reserves nor the degree of diversification explains the number of market risk measurement methodologies. In all cases, the correlation coefficients are less than 30 percent. Upper-middle-income countries use the largest number of metrics (1.5), followed by respondents from high-income (1.4) and lower-middle and low-income (0.83) countries. Similarly, banks with more reserves (greater than US\$60 billion) use on average 1.7 metrics compared with 0.6 metrics for banks with smaller reserves (less than US\$3 billion). However, further analysis reveals that the governance structure in which these central banks operate may have an impact. Respondents with independent risk management departments use, on average, a greater number of methodologies than those in which the risk management function is within the reserves department.

Operational risk management

Managing operational risk is critical for the financial sector overall, according to the Basel committee (BIS 2011), and, by extension, for reserves management. Operational events, such as technological failures or human error, can result in significant losses for the institution and damage its reputation. Unlike credit or market risk, for which additional risk may be compensated for by higher expected returns, operational risk is simply a part of doing business. In recent years, and in line with developments in the financial industry, the appropriate management of operational risk has received far greater attention from financial institutions and regulators (see its inclusion in Basel II and III, for example). As these frameworks suggest, when central banks increase the complexity of their reserve portfolios (for example, investing in additional asset classes), they should also upgrade their operational risk frameworks.

Central banks can use various methodologies and arrangements to assess and manage the corresponding operational risk of their operations. Self-risk assessment is a process for identifying risks and controls for all relevant operations. This process requires that management and staff self-evaluate the controls for critical business processes. Meanwhile, key risk indicators quantify the risk of an activity based on the probability of occurrence and its impact. Both approaches can be implemented in an organization and can be used to improve processes, include additional controls, and enhance the technological infrastructure.

Most respondents reported having a process for measuring operational risk (81 percent). Self-risk assessment is used by 56 percent of respondents, while 46 percent use key risk indicators (figure 3.29). About 10 percent report the use of other operational risk measurement methodologies. However, 20 respondents (19 percent) do not use any methodology for measuring operational risk in their reserve management operations. Some 45 percent of these banks were in the group with lower reserve levels (less than US\$3 billion).

FIGURE 3.29**Measures of operational risk**

N = 105

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

ACCOUNTING AND DISTRIBUTION FRAMEWORKS

Accounting policies matter because they might affect the behavior and financial strength of central banks (Archer and Moser-Boehm 2013). A wide spectrum of standards apply in the central bank accounting framework. Typically, central banks adopt three types of framework: the International Financial Reporting Standards (IFRS), the European System of Central Banks (ESCB), and national accounting frameworks in the central bank laws or regulations.

Survey results reveal that two-thirds of the respondents use IFRS, either fully or partially. Next most frequently used are the ESCB (15 percent) and national Generally Accepted Accounting Principles (3 percent) (see figure 3.30). This distribution is in line with other survey results (Archer and Moser-Boehm 2013; Bunea et al. 2016) and confirms that, globally, central banks apply multiple accounting frameworks rather than a single one. Survey results reveal that IFRS is the dominant accounting standard for central banks in the Middle East and Africa (82 percent) as well as for smaller central banks (with 84 percent of banks with less than US\$3 billion reporting use of IFRS).

Respondents indicated that their primary reasons for adopting IFRS, partially or in full, were (1) to enhance transparency, credibility, and comparability; and (2) to recognize international accounting standards. Only 39 percent of the respondents indicated having adopted IFRS because of a legal requirement, and 23 percent reported using the standard to fulfill the International Monetary Fund Safeguard Assessments (figure 3.31).

Meanwhile, national laws and regulations limit full IFRS adoption. About 70 percent of the respondents that have not implemented IFRS follow different accounting regimes determined by central bank laws or regulations. When asked about their plans to adopt IFRS by December 31, 2021, only 24 percent of central banks responded positively.

Respondents use various practices when reporting unrealized foreign exchange gains and losses. Participants indicated using three different practices to report unrealized foreign exchange gains and losses, either through (1) the income statement, (2) the revaluation of equity in the balance sheet, or (3) not reflecting any unrealized gains and losses and valuing assets and liabilities at historical costs (see figure 3.32). Of all respondents, 41 percent include revaluations in the income statement, while 37 percent report it as equity and 19 percent

FIGURE 3.30
Reporting framework

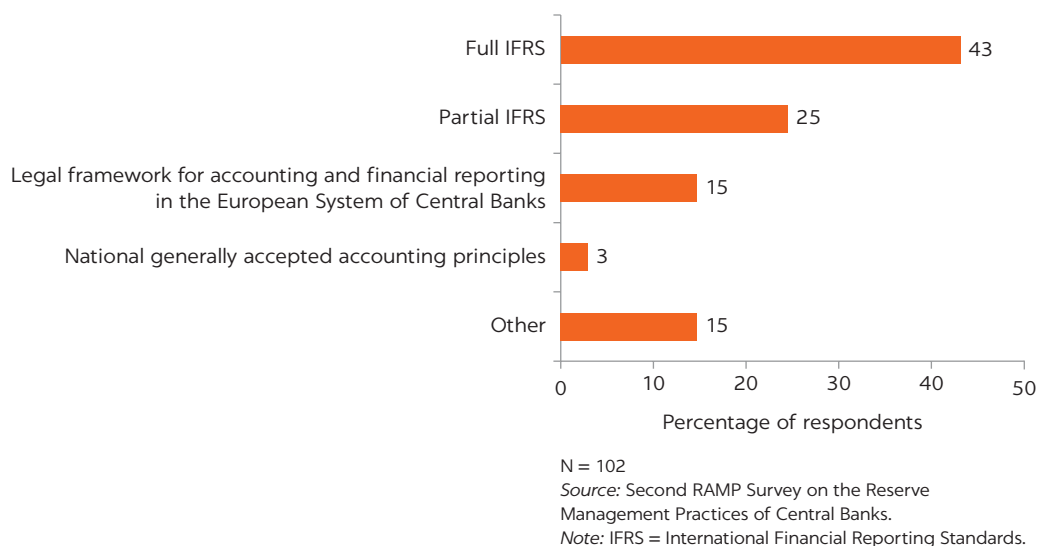


FIGURE 3.31
Reasons for adopting International Financial Reporting Standards

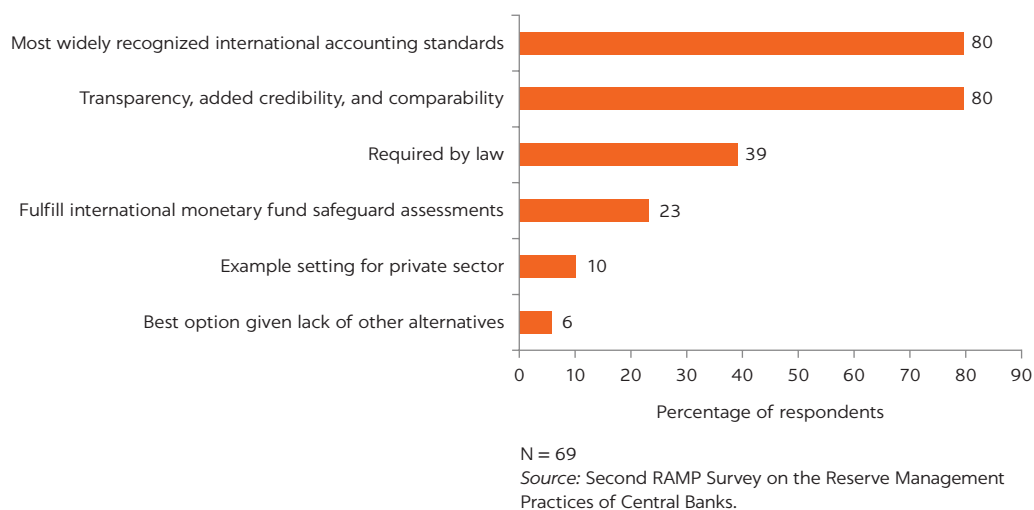
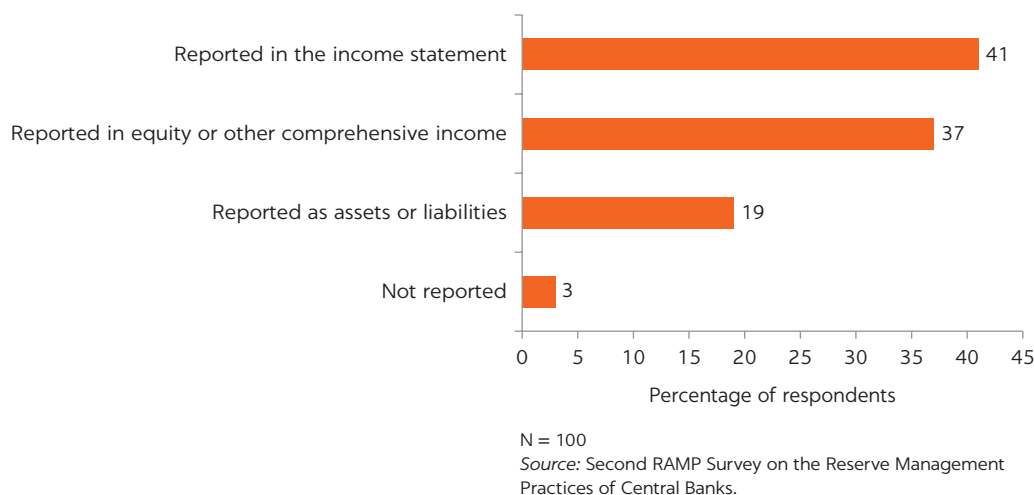


FIGURE 3.32
Reporting methodology for unrealized foreign exchange gains and losses



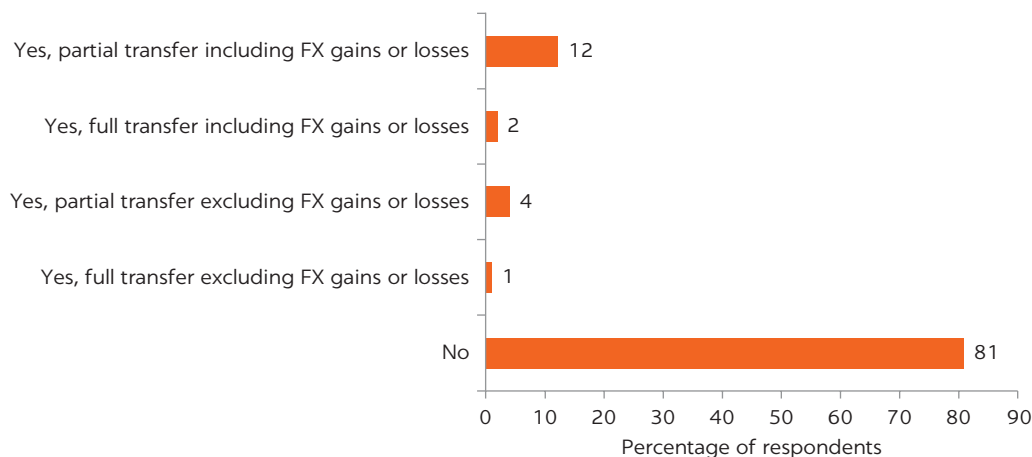
do not capture unrealized gains and losses at all. Notably, almost all upper-middle-income countries (92 percent) report unrealized foreign exchange gains and losses through the income statement. Reporting unrealized gains and losses through the income statement can create volatility in net income (Archer and Moser-Boehm 2013) and may affect a central bank's strategic asset allocation decisions. For instance, a central bank that reports all foreign exchange gains and losses in the income statement may change its currency mix or choose a suboptimal asset allocation with low duration to reduce net income volatility.

Profit distribution is one important factor that shapes central banks' financial buffers (Archer and Moser-Boehm 2013). Profit distribution may be relevant to their operational independence and policy-making capability in some circumstances. For example, central banks that make large profit distributions may try to reduce the volatility of the reserve portfolio to smooth those distributions. A central bank's net income can either be passed through to the government budget or to private sector shareholders (in cases in which the central bank has private shareholders), or it may be added to its balance sheet as reserves. The design and effectiveness of these distribution rules can significantly affect a central bank's financial soundness. For example, distribution rules that are asymmetric in the sense that surpluses are paid out while losses remain on the central bank's balance sheet, may result in negative equity for the central bank, damaging its credibility and policy effectiveness. The negative effect of an asymmetric distribution policy can be ameliorated if a central bank is allowed to build up retained reserves, thereby holding on to a certain portion of realized gains to build up a buffer (Archer and Moser-Boehm 2013). International accounting standards further recommend excluding unrealized gains from the revaluation of foreign exchange reserves as well as from distribution schemes. Unrealized gains can reverse in the future and, therefore, adversely affect central banks' balance sheets if they are paid out.

In practice, most respondents do not distribute unrealized gains to shareholders (81 percent) (figure 3.33). These gains are only distributed to the government after the instruments mature or are sold and gains and losses are realized.

FIGURE 3.33

Distribution policy of unrealized net income to the government



N = 99

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: FX = foreign exchange.

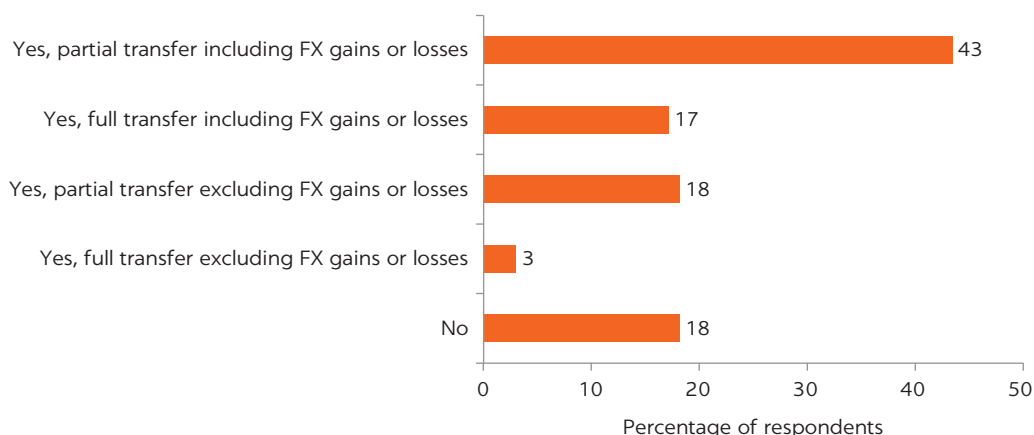
Distributing unrealized gains may be inconvenient for central banks because some of these gains may be the temporary result of mark-to-market variations but do not materialize when instruments mature or are sold.

Realized net income is certainly part of most central banks' distribution schemes, however. About 82 percent of the respondents distribute realized net income (figure 3.34), which is mostly partial distributions (61 percent of the respondents). It is also common to include foreign exchange gains and losses in the distribution. Some 43 percent make partial transfers and 17 percent make full transfers.

The survey found, consistent with previous empirical analysis, that central banks' distribution and recapitalization policies are not symmetrical (see Archer and Moser-Boehm 2013). Although more than 80 percent of the respondents distribute gains to their governments, only 59 percent report having a legal obligation for the ministry of finance to transfer funds or marketable government securities to cover negative equity or net income. In countries with higher income levels, ministries of finance are less likely to recapitalize or cover negative equity in their central banks (figure 3.35). Additionally, the survey found that the absolute size of reserves and the type of exchange rate regime matter. Analysis indicates that countries with an absolute lower level of reserves are more likely to receive support than countries with higher levels of reserves (figure 3.36). And although all respondents with a hard peg receive support from their respective ministries of finance, respondents with soft pegs and floating exchange rate regimes, in that order, are less likely to receive support from their ministries (figure 3.37).

Survey results indicate that central banks are more likely to have positive equity when they receive financial support from their ministries of finance. About 62 percent of institutions with positive equity receive transfers to cover negative income or negative equity (figure 3.38). By contrast, only 43 percent of central banks with negative equity do. Unlike commercial banks, central banks do not go out of business when they have negative equity. However, a large level of negative equity might interfere with the central bank's mission. A central bank's financial strength may affect its independence and credibility (Stella and Lonnberg 2008). Negative capital may also cause deviations from the "optimal"

FIGURE 3.34
Distribution policy of realized net income

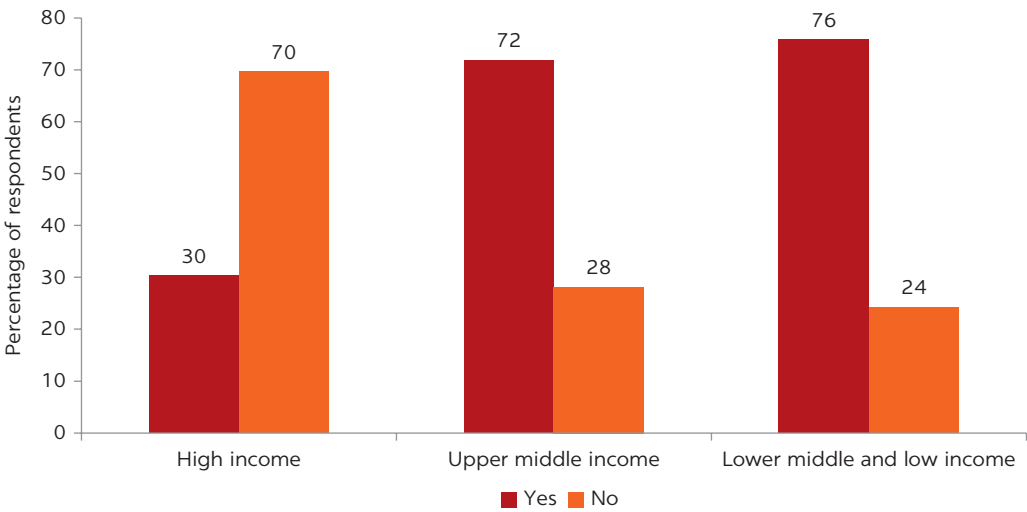


N = 99

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

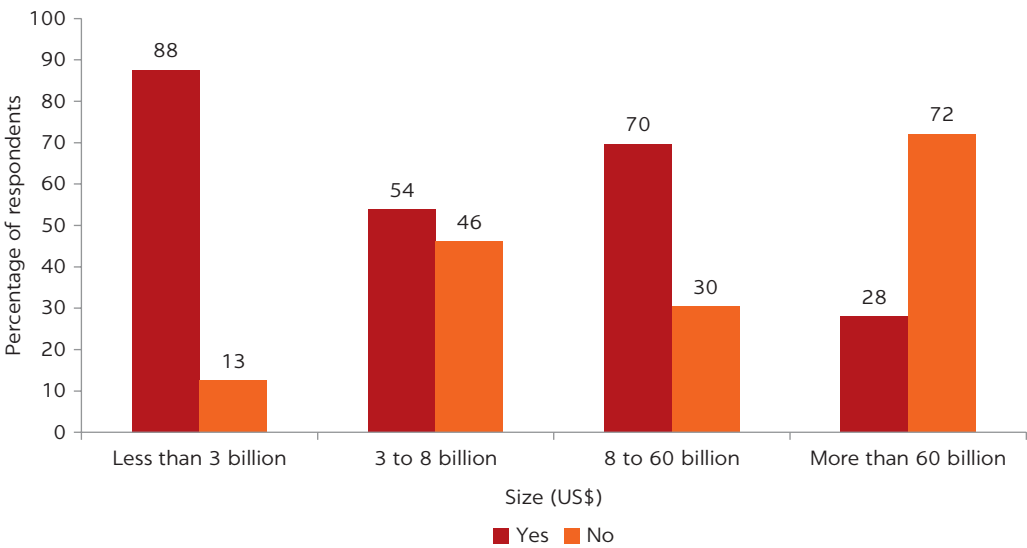
Note: FX = foreign exchange.

FIGURE 3.35
Countries with legal obligation to transfer funds or marketable government securities to cover negative equity or the negative net income of the central bank, by income level



N = 98
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

FIGURE 3.36
Countries with legal obligation to transfer funds or marketable government securities to cover negative equity or the negative net income of the central bank, by size of reserves



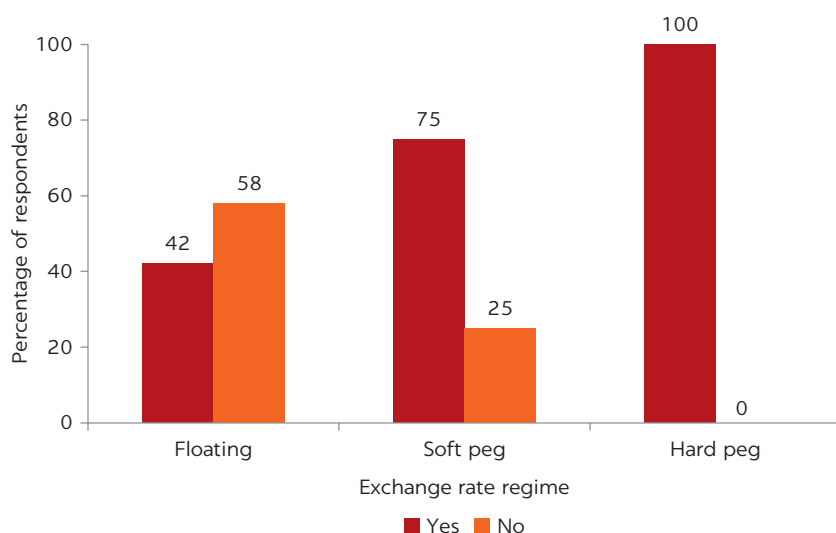
N = 98
Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

monetary policy interest rate (Adler, Castro, and Tovar 2012). Moreover, Pinter (2017) finds that countries where central banks do not receive fiscal support are more likely to have higher inflation.

Academic literature also indicates that a proper policy for distribution of foreign exchange gains has proven to be important for keeping domestic inflation under control (Alvarez-Parra, Arreaza, and Zambrano 2018; Ize 2007;

FIGURE 3.37

Countries with legal obligation to transfer funds or marketable government securities to cover negative equity or the negative net income of the central bank, by exchange rate regime

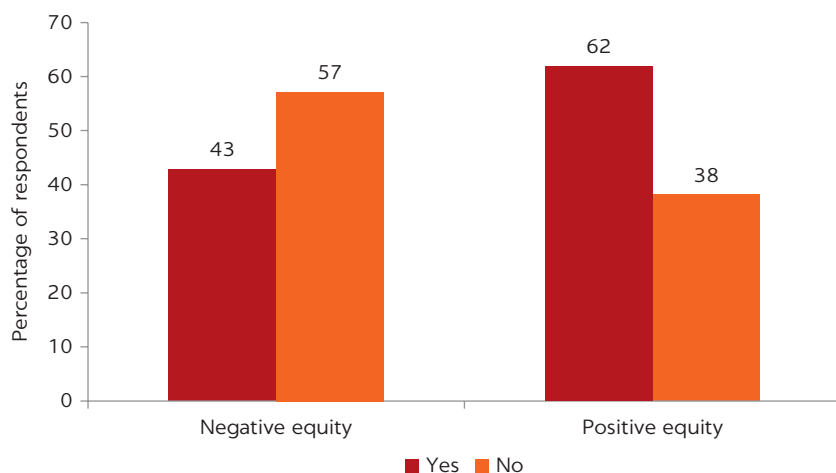


N = 98

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

FIGURE 3.38

Recapitalization policies and probability of positive or negative equity



N = 98

Source: IMF Monetary and Financial Statistics; Second RAMP Survey on the Reserve Management Practices of Central Banks.

Stella and Klueh 2008). When the domestic currency depreciates, central banks that include foreign exchange gains in their income statements may register accounting profits. Accounting profits that are distributed to the ministry of finance may result in expanded domestic monetary aggregates and further induce increased inflation, resulting in further domestic currency depreciation. Therefore, distributing accounting gains related to domestic currency depreciation may create incentives for the government to encourage further currency depreciation. Alvarez-Parra, Arreaza, and Zambrano (2018) find evidence of this dynamic.

NOTES

1. Governance arrangements of sovereign wealth funds are different from those of central bank reserves because governments typically have more active participation. The analysis of these governance arrangements is beyond the scope of this report.
2. See Bossu and Rossi (2019), who discuss legal issues in the design of board oversight in central banks.
3. This survey did not include questions on external management. See RAMP et al. (2019) for external management practices of central banks.
4. This number results from adding the respondents with all functions in the same department (34 percent) and those with the front and middle offices in the same department but the back office in a separate department (25 percent).
5. Analysis of the responses shows that having the front office and risk management functions in the same department results in more frequent reports to the board or governor (44 percent). Only 38 percent of respondents with a separate risk management department produce reports to the board or the governor.
6. This survey did not include questions on the numeraire used for reserve management. Data on this topic can be found in the inaugural survey (RAMP et al. 2019).
7. According to Heller (1966), there are three motives for holding international reserves: transactional, speculative, or precautionary. Empirical results (see, for example, Aizenman 2007) support precautionary (versus mercantilist) motives. In this case, reserves play the role of self-insurance against sudden stops in capital flows. Jeanne and Rancière (2011) develop a model of the optimal level of international reserves for a small open economy. The model focuses on the benefits of holding reserves for crisis mitigation and the reduction of the probability of sudden stops and is consistent with the average level of reserves in emerging market economies since 1980, with the exception of Asia since 1998.
8. The investment horizon is defined as the length of time the institution expects to hold the portfolio.
9. Respondents reported the investment horizon of the liquidity tranche, the investment tranche, and the total portfolio separately.
10. Additionally, survey results show that central banks with longer investment horizons also have longer portfolio duration.
11. The median allocation to the U.S. dollar is 76 percent, and the average is 64 percent. In the case of the euro, the median allocation is 5 percent and the average is 22 percent. Given the skewness of the distribution, the medians may provide a better indication of central bank preferences.
12. Ito and McCauley (2019) also show that the currency composition of reserves relates strongly to the co-movement of the domestic currency with the key currency and the currency invoicing of trade.
13. The sovereign securities in the SSA category are typically in foreign currency. When governments issue in their own currency, it is considered a government bond.
14. Habib, Stracca, and Venditti (2020) explore the factors that make government bonds safe assets. They find that government bonds with inertia (whether the asset behaved as safe in the past), issued by countries with good institutions, and with large market sizes have positive performance during periods of global risk (increases in the Chicago Board Options Exchange's Volatility Index [VIX]). The findings are consistent with the importance of U.S. Treasury bonds in reserve portfolios.
15. The data in figure 3.15 should not be compared with the inaugural RAMP survey. Whereas the first survey asked whether the respondent had exposure to the asset class, the second survey asked about eligibility.
16. The inaugural survey did not ask about the composition of the benchmark; it is therefore not possible to see changes in active risk since the previous survey.
17. The sample used for this analysis consisted of data for respondents for which data were available from both surveys. In the case of actual currency allocation, the sample consisted of 57 respondents. In the case of actual asset allocation, a sample of 35 respondents was available.
18. The sample used for this analysis consisted of data for respondents with data available from both surveys. This methodology was used for both minimum credit ratings and risk methodologies.
19. See Lütkebohmert (2009) for an explanation of various portfolio credit risk models.
20. See Emmer, Kratz, and Tasche (2015) for a comparison of risk measures in practice.

4 Concluding Observations

Reserve accumulation and conservative investment policies have helped central banks to prepare for crises such as the current coronavirus pandemic. Traditional asset classes that make up the majority of reserve portfolios have appreciated, just as those resources are needed the most. Developing countries, in particular, are experiencing capital outflows and decreases in export revenues, tourism, and remittances. Reserves are an essential buffer to mitigate the impact of these events. Results from the Second RAMP Survey also show that central banks have improved their risk management practices. Therefore, the objective of the following recommendations is to build on those positive practices and encourage further progress.

The survey results indicate scope for improving governance in some central banks. Most respondents have a three-tier decision-making structure: the board, the investment committee, and the operational units. However, most of the relevant decisions, such as defining reserve management policy and guidelines, remain in the purview of the board. Investment committees mostly oversee the process and review proposals to the board for institutions with significant reserves and complex operations, suggesting an opportunity for delegating more decisions to investment committees. According to the *Revised Guidelines for Foreign Exchange Reserve Management* (International Monetary Fund 2014), boards should indeed make the strategic decisions. Notwithstanding this recommendation, the investment committees in central banks with large and complex operations can take on more operational decisions, such as defining and implementing the investment guidelines. Delegating explicit investment authority to investment committees can also lead to more efficient decision making, because operational decisions would not need to be subject to the formalities of board proposals.

With respect to asset allocation, the survey's key findings suggest that central banks remain mostly invested in high-quality, fixed-income assets, while continuing gradual diversification into nontraditional asset classes.

Additionally, survey data highlight opportunities to improve risk management practices at central banks. A material number of central banks' risk management functions do not produce performance, compliance, or risk reports

for boards and governors, hampering their ability to monitor reserves management activities appropriately. Also, a significant proportion of respondents, especially respondents that have exposure to credit risk, still rely only on credit ratings. Moreover, the use of probabilistic risk metrics, such as value-at-risk, remains relatively low. Adopting more sophisticated measures of credit and market risk management becomes even more crucial for those institutions that have expanded into corporate or emerging market bonds or even equities. Further portfolio diversification should go hand in hand with better risk management.

In addition, the survey results indicate that some institutions could also improve their accounting frameworks. About a third of central banks have not implemented International Financial Reporting Standards. Although local laws and regulations may limit this process, central banks should strive to adopt widely accepted frameworks to make their financial reporting more comparable to that of other central banks. With regard to distribution policies, central banks may want to remain conservative in the amount they distribute to their governments, particularly avoiding the distribution of unrealized gains, because some of these gains may be the result of temporary mark-to-market variations. Central banks should carefully consider how to distribute foreign exchange gains to avoid seeing domestic currency depreciations increase domestic inflation.

Finally, ministries of finance could support their central banks when they have negative income or equity to minimize the risk of interfering with monetary policy. Adjusting accounting and distribution policies often requires support from governments, particularly from ministries of finance, because these laws and regulations are typically not in the purview of central banks.

Appendix A

TABLE A.1 Organizational structure for reserve management

Percentage of respondents within group

	FRONT, MIDDLE, AND BACK OFFICES ARE IN THE SAME DEPARTMENT	FRONT, MIDDLE AND BACK OFFICES ARE IN SEPARATE DEPARTMENTS	FRONT AND MIDDLE OFFICES ARE IN THE SAME DEPARTMENT; BACK OFFICE IS IN A SEPARATE DEPARTMENT	FRONT AND BACK OFFICES ARE IN THE SAME DEPARTMENT; MIDDLE OFFICE IS IN A SEPARATE DEPARTMENT	OTHER
<i>Geographic region</i>					
Americas and Caribbean	28.57	38.10	14.29	9.52	9.52
Europe and Central Asia	25.00	25.00	27.78	16.67	5.56
Middle East and Africa	53.57	17.86	28.57	0.00	0.00
South and East Asia and Pacific	30.00	40.00	25.00	5.00	0.00
<i>Country income group</i>					
High income	30.56	30.56	19.44	11.11	8.33
Upper middle income	26.47	32.35	29.41	11.76	0.00
Lower middle and low income	45.71	22.86	25.71	2.86	2.86
<i>Size (US\$)</i>					
Up to 3 billion	40.00	20.00	32.00	0.00	8.00
3 to 8 billion	25.93	22.22	40.74	7.41	3.70
8 to 60 billion	44.00	32.00	16.00	8.00	0.00
More than 60 billion	28.57	39.29	10.71	17.86	3.57
<i>Foreign exchange regime</i>					
Floating	26.42	33.96	24.53	13.21	1.89
Soft peg	45.65	23.91	23.91	0.00	6.52
Hard peg	16.67	16.67	33.33	33.33	0.00
Total	34.29	28.57	24.76	8.57	3.81

N = 105

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

TABLE A.2 Use of tranching*Percentage of respondents within group*

	TRANCHING	NO TRANCHING
Geographic region		
Americas and Caribbean	85.7	14.29
Europe and Central Asia	72.2	27.78
Middle East and Africa	89.3	10.71
South and East Asia and Pacific	90.0	10.00
Country income group		
High income	66.7	33.33
Upper middle income	88.2	11.76
Lower middle and low income	94.3	5.71
Size (US\$)		
Up to 3 billion	88.0	12.0
3 to 8 billion	92.6	7.4
8 to 60 billion	92.0	8.0
More than 60 billion	60.7	39.3
Foreign exchange regime		
Floating	75.5	24.5
Soft peg	89.1	10.9
Hard peg	100.0	0.0
Total	82.9	17.1

N = 105

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

TABLE A.3 Average investment horizon of the tranches*Months*

	LIQUIDITY TRANCHE	INVESTMENT TRANCHE	TOTAL PORTFOLIO (INCLUDING RESPONDENTS WITHOUT TRANCHES)
Geographic region			
Americas and Caribbean	11.8	44.8	42.6
Europe and Central Asia	11.4	33.7	38.6
Middle East and Africa	11.8	35.2	23.3
South and East Asia and Pacific	7.6	40.8	33.6
Country income group			
High income	13.9	29.9	44.7
Upper middle income	10.5	36.5	29.2
Lower middle and low income	10.1	44.2	27.3
Size (US\$)			
Up to 3 billion	12.7	30.6	22.9
3 to 8 billion	10.4	36.8	23.2
8 to 60 billion	16.4	41.3	55.3
More than 60 billion	7.9	44.4	36.3
Foreign exchange regime			
Floating	13.0	35.9	40.6
Soft peg	10.0	40.0	29.2
Hard peg	7.0	33.0	28.0
Total	11.0	37.7	35.3

N = 75

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

TABLE A.4 Average duration of the tranches*Months*

	LIQUIDITY TRANCHE	INVESTMENT TRANCHE	TOTAL PORTFOLIO
Geographic region			
Americas and Caribbean	9.2	32.5	25.3
Europe and Central Asia	8.8	29.0	23.2
Middle East and Africa	6.5	34.4	16.5
South and East Asia and Pacific	3.5	33.6	27.4
Country income group			
High income	13.7	32.8	35.8
Upper middle income	6.7	33.7	22.5
Lower middle and low income	5.0	29.9	14.8
Size (US\$)			
Up to 3 billion	4.9	33.7	27.9
3 to 8 billion	5.3	24.6	13.7
8 to 60 billion	9.1	36.6	21.3
More than 60 billion	21.4	43.3	39.6
Foreign exchange regime			
Floating	12.0	26.0	23.8
Soft peg	1.8	26.3	21.0
Hard peg	5.2	39.4	21.0
Total	7.6	32.1	22.4

N = 78

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

TABLE A.5 Eligibility by currency*Percentage of respondents within group*

	USD	EUR	JPY	GBP	CNY	SEK	DKK	RUB	KRW	SGD	HKD
Geographic region											
Americas and Caribbean	100.0	81.0	57.1	71.4	28.6	38.1	28.6	0.0	14.3	23.8	14.3
Europe and Central Asia	100.0	91.4	68.6	80.0	45.7	34.3	34.3	2.9	5.7	8.6	5.7
Middle East and Africa	100.0	96.3	63.0	85.2	66.7	40.7	29.6	3.7	18.5	11.1	11.1
South and East Asia and Pacific	100.0	100.0	82.4	94.1	70.6	23.5	23.5	0.0	23.5	47.1	23.5
Country income group											
High income	100.0	91.7	77.8	83.3	52.8	41.7	38.9	0.0	13.9	22.2	13.9
Upper middle income	100.0	90.6	62.5	81.3	43.8	40.6	37.5	6.3	18.8	25.0	18.8
Lower middle and low income	100.0	93.8	59.4	81.3	59.4	21.9	12.5	0.0	9.4	9.4	3.1
Size (US\$)											
Up to 3 billion	100.0	95.8	41.7	62.5	29.2	8.3	8.3	0.0	0.0	4.2	0.0
3 to 8 billion	100.0	92.6	70.4	88.9	51.9	48.1	40.7	7.4	14.8	25.9	18.5
8 to 60 billion	100.0	95.8	79.2	91.7	58.3	41.7	33.3	0.0	12.5	8.3	4.2
More than 60 billion	100.0	84.0	76.0	84.0	68.0	40.0	36.0	0.0	28.0	36.0	24.0
Foreign exchange regime											
Floating	100.0	90.2	72.5	84.3	60.8	41.2	35.3	2.0	23.5	25.5	17.6
Soft peg	100.0	95.3	62.8	81.4	46.5	27.9	23.3	2.3	2.3	11.6	4.7
Hard peg	100.0	83.3	50.0	66.7	16.7	33.3	33.3	0.0	16.7	16.7	16.7
Total	95.2	87.6	63.8	78.1	49.5	33.3	28.6	1.9	13.3	18.1	11.4

continued

TABLE A.5, continued

	INR	ZAR	BRL	MXN	TRY	CHF	CAD	AUD	NZD	NOK	OTHER
<i>Geographic region</i>											
Americas and Caribbean	0.0	0.0	0.0	0.0	0.0	42.9	71.4	42.9	38.1	38.1	28.6
Europe and Central Asia	0.0	2.9	0.0	2.9	2.9	40.0	57.1	65.7	22.9	34.3	25.7
Middle East and Africa	7.4	29.6	0.0	3.7	0.0	59.3	63.0	59.3	33.3	40.7	37.0
South and East Asia and Pacific	17.6	5.9	5.9	17.6	0.0	41.2	41.2	64.7	29.4	17.6	35.3
<i>Country income group</i>											
High income	0.0	2.8	0.0	5.6	2.8	44.4	61.1	63.9	36.1	38.9	16.7
Upper middle income	6.3	6.3	0.0	6.3	0.0	43.8	65.6	71.9	40.6	43.8	46.9
Lower middle and low income	9.4	21.9	3.1	3.1	0.0	50.0	50.0	40.6	12.5	18.8	31.3
<i>Size (US\$)</i>											
Up to 3 billion	4.2	16.7	0.0	0.0	0.0	33.3	50.0	37.5	20.8	8.3	37.5
3 to 8 billion	11.1	11.1	0.0	3.7	0.0	55.6	55.6	63.0	33.3	48.1	44.4
8 to 60 billion	4.2	4.2	0.0	0.0	0.0	62.5	66.7	58.3	29.2	45.8	20.8
More than 60 billion	0.0	8.0	4.0	16.0	4.0	32.0	64.0	76.0	36.0	32.0	20.0
<i>Foreign exchange regime</i>											
Floating	2.0	9.8	2.0	9.8	2.0	47.1	62.7	66.7	35.3	41.2	23.5
Soft peg	9.3	11.6	0.0	0.0	0.0	44.2	60.5	51.2	25.6	25.6	37.2
Hard peg	0.0	0.0	0.0	0.0	0.0	50.0	16.7	50.0	16.7	33.3	50.0
Total	4.8	9.5	1.0	4.8	1.0	43.8	56.2	56.2	28.6	32.4	29.5

N = 100

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: See Abbreviations section for expansion of currency abbreviations.

TABLE A.6 Eligibility by asset class*Percentage of respondents within group*

	BANK DEPOSITS	MONEY MARKET INSTRUMENTS	GOVERNMENT BONDS	INFLATION- INDEXED BONDS	SSA	COVERED BONDS	MBS	ABS	IG CORPORATE BONDS	HY CORPORATE BONDS	EQUITY (DEVELOPED MARKETS)	EM BONDS	EM EQUITY	GOLD	OTHER
<i>Geographic region</i>															
Americas and Caribbean	90.00	85.00	95.00	60.00	95.00	20.00	45.00	30.00	25.00	0.00	10.00	21.05	5.00	75.00	30.00
Europe and Central Asia	80.56	86.11	100.00	41.67	88.89	55.56	16.67	2.78	41.67	0.00	27.78	30.56	2.78	86.11	25.00
Middle East and Africa	91.67	83.33	95.83	45.83	75.00	37.50	33.33	33.33	41.67	4.17	12.50	37.50	8.33	58.33	29.17
South and East Asia and Pacific	100.00	70.59	88.24	47.06	76.47	29.41	29.41	11.76	41.18	0.00	23.53	47.06	23.53	58.82	23.53
<i>Country income group</i>															
High income	75.00	77.78	100.00	55.56	91.67	50.00	38.89	19.44	47.22	0.00	38.89	33.33	13.89	83.33	19.44
Upper middle income	100.00	90.00	93.33	46.67	90.00	33.33	26.67	13.33	33.33	3.33	13.33	37.93	10.00	63.33	40.00
Lower middle and low income	93.55	80.65	93.55	38.71	70.97	32.26	19.35	19.35	32.26	0.00	3.23	29.03	0.00	67.74	22.58
<i>Size (US\$)</i>															
Up to 3 billion	91.30	78.26	86.96	17.39	69.57	13.04	13.04	13.04	21.74	0.00	13.04	17.39	4.35	47.83	13.04
3 to 8 billion	92.59	88.89	96.30	55.56	85.19	37.04	25.93	25.93	44.44	3.70	18.52	37.04	11.11	62.96	40.74
8 to 60 billion	91.30	82.61	100.00	56.52	91.30	69.57	34.78	13.04	39.13	0.00	8.70	36.36	0.00	91.30	26.09
More than 60 billion	79.17	79.17	100.00	58.33	91.67	37.50	41.67	16.67	45.83	0.00	37.50	41.67	16.67	87.50	25.00
<i>Foreign exchange regime</i>															
Floating	84.3	82.4	100.0	54.9	86.3	47.1	39.2	19.6	47.1	0.0	25.5	35.3	11.8	80.4	28.00
Soft peg	92.5	80.0	90.0	37.5	82.5	32.5	20.0	17.5	30.0	2.5	12.5	32.5	2.5	62.5	22.50
Hard peg	100.0	100.0	100.0	50.0	83.3	16.7	0.0	0.0	16.7	0.0	16.7	16.7	16.7	66.7	50.00
Total	88.66	82.47	95.88	47.42	84.54	39.18	28.87	17.53	38.14	1.03	19.59	33.33	8.25	72.16	26.80

N = 101

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

Note: ABS = asset-backed securities; EM = emerging market; HY = high yield; IG = investment grade; MBS = mortgage-backed securities; SSA = sovereigns, supranationals, and agencies.

TABLE A.7 Legal obligation for the ministry of finance to transfer funds to cover the central bank's negative equity or negative net income*Percentage of respondents within group*

	LEGAL OBLIGATION	NO LEGAL OBLIGATION
<i>Geographic region</i>		
Americas and Caribbean	61.9	38.1
Europe and Central Asia	36.4	63.6
Middle East and Africa	76.9	23.1
South and East Asia and Pacific	72.2	27.8
<i>Country income group</i>		
High income	30.3	69.7
Upper middle income	71.9	28.1
Lower middle and low income	75.8	24.2
<i>Size (US\$)</i>		
Up to 3 billion	87.5	12.5
3 to 8 billion	53.8	46.2
8 to 60 billion	69.6	30.4
More than 60 billion	28.0	72.0
<i>Foreign exchange regime</i>		
Floating	42.0	58.0
Soft peg	75.0	25.0
Hard peg	100.0	0.0
Total	59.18	40.82

N = 98

Source: Second RAMP Survey on the Reserve Management Practices of Central Banks.

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ECO-AUDIT

Environmental Benefits Statement

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We follow the recommended standards for paper use set by the Green Press Initiative. The majority of our books are printed on Forest Stewardship Council (FSC)–certified paper, with nearly all containing 50–100 percent recycled content. The recycled fiber in our book paper is either unbleached or bleached using totally chlorine-free (TCF), processed chlorine-free (PCF), or enhanced elemental chlorine-free (EECF) processes.

More information about the Bank’s environmental philosophy can be found at <http://www.worldbank.org/corporateresponsibility>.



In the summer of 2019, the World Bank Treasury's Reserve Advisory and Management Partnership (RAMP) conducted its second survey on central banks' reserve management practices, with a particular focus on governance, accounting, and other operational practices. Understanding these practices is particularly relevant during the COVID-19 crisis, as central banks use their foreign currency reserves to help their countries deal with capital outflows and sharp decreases in exports, tourism, and remittances. On governance, the survey finds that the most common practice is that boards set the investment policy and guidelines, investment committees review the proposals to the board and monitor implementation, and operational units make day-to-day decisions and develop proposals for the board. Central banks have different organizational arrangements for their operational units. The survey results also show that most central banks are well-positioned to provide foreign currency liquidity during the coronavirus pandemic, as they continue to invest their reserves in high-quality fixed-income assets. At the same time, the gradual diversification to non-traditional asset classes continues. The allocation to emerging market bonds, corporate bonds, and mortgage-backed securities of central banks reserves increased slightly since the previous survey. The data show considerable cross-country differences in the way central banks manage their reserves, and in some circumstances, the analysis suggests these differences correlate with respondents' country income groups and levels of reserve adequacy. Regarding accounting practices, two-thirds of central banks report some degree of implementation of International Financial Reporting Standards (IFRS). The survey also reveals multiple practices to distribute central bank net income to governments. However, data suggest that the transfers of profits between central banks and ministries of finance are not symmetrical—central banks are more likely to distribute profits than to receive financial support in case of losses.