TECHNICAL

NOTES & MANUALS

Improving the Analytical Usefulness of the IMF's COFER Data

Glen Kwende and Erin Nephew

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Executive Summary

This technical note outlines a new methodology for the IMF's Currency Composition of Foreign Exchange Reserves (COFER) data, aimed at improving its analytical value and confidentiality. The IMF's Statistics Department conducts the COFER survey quarterly and publishes aggregated data at the end of each quarter.[1] Participation is voluntary except for Special Data Dissemination Standard Plus adherents, who are required to complete the survey and disclose their participation.

COFER tracks the currency breakdown of the world's foreign exchange reserves. At present, 149 entities report data, consisting of IMF member countries, nonmember countries or economies, and other foreign exchange reserve holding entities. The data are kept strictly confidential. The IMF does not publish country-level data or breakdowns below the global total. The names of COFER reporters also remain confidential unless the relevant authorities have granted the IMF explicit consent to disclose them.

COFER is widely used by central banks, other official institutions, and the private sector. The data plays a vital role in the IMF's work, enabling deeper analysis of trends in international financial markets. In today's fast-evolving global landscape, the accurate assessment of reserve data has become more crucial than ever—prompting growing analytical interest in the COFER dataset.

Under the new methodology, staff will impute the current "unallocated" portion of COFER to provide a complete currency composition—expressed in both dollars and shares—that accounts for 100 percent of the world's foreign exchange reserves. Until now, the IMF has compiled data from COFER reporters and published aggregate totals that included an "unallocated" category to account for gaps caused by nonreporting, incomplete submissions, or discrepancies with the IMF's International Liquidity database. While this approach helps preserve internal consistency, it can also produce irregularities or distortions that reduce the data's overall meaning and reliability. To address this shortcoming, staff use a multipronged statistical approach, leveraging the underlying currency composition in COFER to estimate each country's total foreign exchange reserves. As a result, the new COFER dataset will no longer include an "unallocated" component.

This new methodology aims to enhance both the analytical value of the COFER data and the confidentiality of reporters. By imputing missing values across the time series, underlying trends in the currency composition of foreign exchange reserves become clearer. Eliminating the "unallocated" portion removes the need for users to make assumptions—explicit or implicit—about these reserves, such as presuming that they reflect the average composition of the "allocated" portion. It also reduces distortions in aggregate trends that previously resulted from the mechanical inclusion or exclusion of countries over time. With missing data now estimated for every period, the resulting time series provides a more consistent and analytically robust view of global reserve composition. In addition, the new approach mitigates disclosure risks, particularly when countries join or leave the reporting sample, thereby strengthening the confidentiality of the dataset. COFER remains a strictly confidential data collection, and IMF staff remain fully committed to safeguarding the confidentiality of submissions by participating countries.

[1] See https://data.IMF.org/en/datasets/IMF.STA:COFER.

The new COFER series—including the imputations—will, for the first time, be published in December 2025, alongside the release of COFER data for the third quarter of 2025. The revised COFER series will include updates from the first quarter of 2000 through the second quarter of 2025, as well as new data for the third quarter of 2025. In this revised dataset, instead of an "unallocated" portion, all foreign exchange reserves will be allocated across currencies. Beginning with release of the third quarter of 2025, IMF staff will also publish the share of total imputed reserves.

Introduction

The Currency Composition of Foreign Exchange Reserves (COFER) dataset is widely used to track how much of the world's foreign exchange reserves are held in different currencies. COFER data facilitate analysis of developments in international financial markets and generate considerable analytical interest from users in central banks, other official institutions, and the private sector. In today's dynamic global landscape, accurately assessing reserve data is more critical than ever, and the COFER dataset has recently received increasing analytical attention.

However, technical aspects of the compilation of the COFER dataset can make it challenging for COFER users to draw accurate conclusions from the data. For example, IMF staff recently published a Chart of the Week (Kwende, Nephew, and Sánchez-Muñoz 2025) to explain the effect of exchange rate movements on the COFER dataset, as reserves are reported in US dollars. This means that if a country holds reserves in euros or yen, the value of those holdings is first converted into dollars before being added to the global totals in COFER. When exchange rates shift—even if no central bank buys or sells anything—the reported shares can change, and this valuation effect can obscure the direction of change of the underlying movement in the currencies.

One other such technical aspect of the COFER dataset is that, historically, the COFER data asset has shown total foreign exchange reserves broken down into "allocated" and "unallocated" components. "Allocated" foreign exchange reserves are those whose currency composition is known. The IMF publishes the breakdown of "allocated" foreign exchange reserves into eight named currencies and an "other currencies" category. At present, the IMF does not have a formal list of reserve currencies, but currencies separately identified in the COFER survey are widely regarded as reserve currencies. This breakdown shows allocated foreign exchange reserves, at a global level, attributable to claims in US dollars, euro, Chinese renminbi, Japanese yen, British pounds sterling, Australian dollars, Canadian dollars, Swiss francs, and "other currencies." The IMF collects data on the currency composition of foreign exchange reserves from individual country COFER reporters. In a few cases where COFER reporters experienced delays or temporarily suspended data reporting, IMF staff estimated their figures based on their most recent data submission for a limited period of time. Otherwise, any missing data—resulting from nonreporting, incomplete reporting, or discrepancies between total reserves in COFER and the International Liquidity database—were included in COFER as "unallocated." The International Liquidity database consists of all the resources that are available to the monetary authorities of countries for the purpose of meeting balance of payments financing needs. Among other data, it includes nearly 100 percent of the world's foreign exchange reserves.

The seemingly technical nature of an unallocated share in COFER could obscure or even exaggerate underlying trends in the aggregate currency composition of foreign exchange reserves.

This could happen, for example, if data users ignored or discounted the "unallocated" portion of the dataset—explicitly or implicitly—by assuming that it mirrored the average composition of the "allocated" portion. If the reserve holdings of nonreporting countries—reflected in the "unallocated" portion of the dataset—differed significantly from the published average, this could obscure or exaggerate trends and lead to inaccurate analytical conclusions.

This could also happen because countries within the "allocated" and "unallocated" portions of the dataset were not constant, complicating interpretations across time periods. Countries moved in and out of the "allocated" and "unallocated" portions of the dataset by starting to report when they did not previously report, stopping reporting when they had previously reported, or by providing incomplete reports, or reports with differences between their reported foreign exchange reserves between COFER and the International Liquidity dataset.

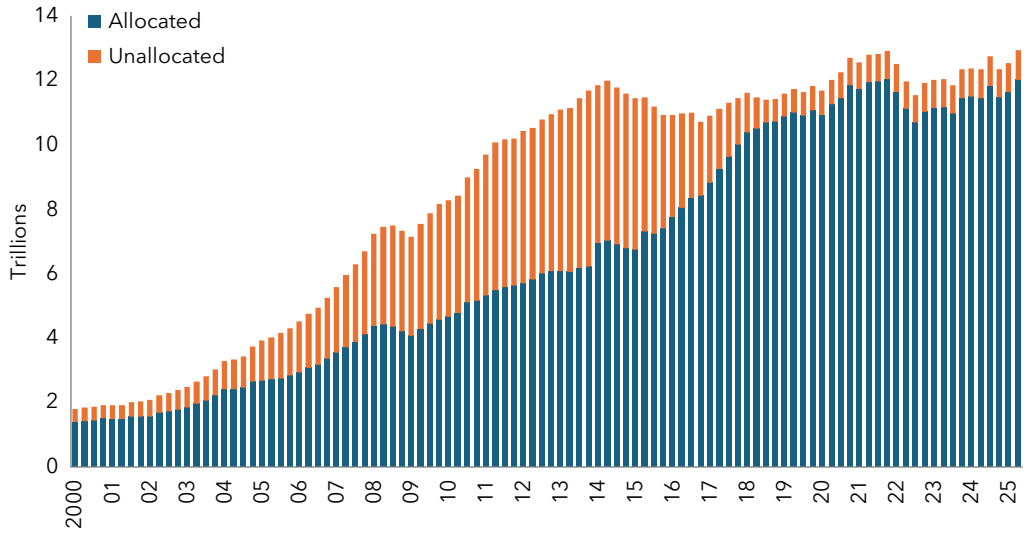
This could also happen because, when countries moved from being nonreporters to reporters, or vice versa, particularly if their holdings of foreign exchange reserves were large or skewed relative to the global average, IMF staff used statistical methods to smooth these entries and exits to prevent residual disclosure of individual country data. Although necessary to safeguard the strict confidentiality of the underlying country-specific information, doing so could obscure analytically useful underlying patterns in currency composition or exaggerate trends where there would otherwise be none. Inaccurate analytical conclusions were a particular risk when a large reserve holder, or a holder with an unusual skew to its reserve allocation relative to the global average, had been mechanically smoothed in or out of the dataset.

To improve the analytical usefulness of the COFER aggregates and to strengthen the confidentiality of underlying country-specific information, the COFER dataset will no longer include an "unallocated" component. Instead, IMF staff will impute the "unallocated" portion of COFER to provide a currency composition, in dollars and shares, that covers 100 percent of the world's foreign exchange reserves. By eliminating the "unallocated" portion of the dataset, IMF staff intend to simplify the interpretation of the published currency shares and limit the residual disclosure risks that arise when countries drop in and out of a reporting status.

Methodology: Imputing the Unallocated Share of COFER

The unallocated share of the COFER dataset has declined substantially over time. In the second quarter of 2025, the latest quarter for which data are available, the "unallocated" portion of the COFER dataset was $919.3 billion (that is, 7.1 percent of the $12.9 trillion in foreign exchange reserves held globally in that quarter), an amount that has been roughly unchanged since 2018 (see Figure 1). The unallocated portion is down considerably from the pre-2018 period, when reported data from countries accumulating large foreign exchange reserve holdings was either not provided or still being phased into the COFER dataset to protect individual country data from residual disclosure. With the unallocated portion of the COFER dataset down to only 7 percent, IMF staff can impute the currency composition of the remaining country holdings to improve the analytical usefulness of the global aggregates presented in the COFER dataset. IMF staff have also done so for the historical series back to the first quarter of 2000, though estimates for earlier periods necessarily involved imputing a larger portion of the dataset and thus should be interpreted with care.

Figure 1. World Official Foreign Exchange Reserves, by Allocation, 2000:Q1–2025:Q2, Trillions of US Dollars



Source: COFER; and IMF staff calculations.

IMF staff are well placed to implement this imputation exercise and to both maximize the analytical usefulness of the COFER data and strengthen the confidentiality of reporters and reported data, as they are in a unique position to leverage the underlying country coverage of the dataset. Leveraging the rich, underlying, country-specific data within COFER, the imputation methods applied by IMF staff to impute the unallocated portion of the COFER dataset include applying currency shares—derived through stratified mean

imputation,[2] carry-forward imputation,[3] and a mixed method that is a combination of the two—to the total foreign exchange reserves of nonreporting countries. IMF staff have used the currency shares of a subgroup with economic characteristics similar to the nonreporting country to impute its currency shares.

As a first step, IMF staff estimate a country's total foreign exchange reserves. For a country that reports to COFER, there can be discrepancies between the total foreign exchange reserves reported to COFER and the total foreign exchange reserves reported to the International Liquidity database. Such discrepancies can arise as a result of differences in source data, timing, definition, or late/missing reports to one database or the other. The practice to date has been to include any difference between the International Liquidity database and COFER in "unallocated" as part of COFER.[4] This practice has now been ended, as IMF staff, as part of the methodological changes discussed in this technical note, will use the information reported to COFER as the total reserves for reporting countries. For a country that does not report to COFER, IMF staff will use information reported in the International Liquidity database to estimate total foreign exchange reserves. For a country that does not report to either COFER or the International Liquidity database, IMF staff will use an external official source, such as a central bank's website. If that is unavailable, IMF staff will use their judgement to carry forward the best available, last known estimate of a country's foreign exchange reserves.

Stratified Mean Imputation

As a second step, IMF staff place reporting countries into stratified subgroups based on their reported currency composition of foreign reserves. Based on the reports from these countries, it is possible to place them definitionally and algorithmically into stratified subgroups to facilitate stratified mean imputation. The first subgroup is definitional and splits subgroups between countries that are issuers of currencies in the reserve currency basket[5] ("Reservia") and countries that are not (non-Reservia).

The Reservia subgroup consists of 27 countries whose reserve assets show an unusual skew, as they, by definition, do not hold their own currencies as foreign currency reserves. For example, the United States does not hold US dollars; Germany does not hold euros; Japan does not hold yen; and so on. As a result, the

[2] A missing value is imputed with a value observed from the mean of a stratified subgroup. For the COFER dataset, the average currency shares of the group to which the nonreporting country is assigned are used.

[3] The value at time t–1 replaces the missing value at time t. For nonreporting countries that were previous COFER reporters, the imputation of the currency composition of their reserves is based on their most recently reported shares for the first four periods after they stop reporting.

[4] COFER adjusts its totals for each country to align with the International Liquidity database. It is not possible to adjust the other way around—to use COFER totals to adjust the International Liquidity database for individual countries—because of the strictly confidential nature of COFER reporting. If total foreign exchange reserves, as reported to COFER, are $90 million, and total foreign exchange reserves, as reported in the International Liquidity database, are $100 million, then IMF staff include $10 million in "unallocated" as part of COFER. This makes sense, in theory, and eliminates a discrepancy between the COFER and the International Liquidity datasets. In several cases, it gives nonsensical results at the country level. For example, if the total allocated reserves reported to COFER exceed the total foreign exchange reserves reported to the International Liquidity database, IMF staff would include a "negative unallocated" amount to account for the difference. In the aforementioned example, if the amount reported to COFER had been $100 million, and the amount reported to the International Liquidity database had been $90 million, IMF staff would include negative $10 million in "unallocated" as part of COFER. This happens surprisingly often because the International Liquidity database carries forward total reserves for late reporters (sometimes for many months or even years), while the COFER team may (1) receive more up-to-date reporting from those same reporters, (2) those reporters may release updated figures on their central bank websites or other country publications, or (3) both. Aggregated across many countries, this results in a significant (but economically meaningless) "negative unallocated" amount included in the COFER dataset, resulting in lower-quality figures to users.

[5] The countries in the reserve currency basket are Australia, Canada, China, Japan, Switzerland, United Kingdom, United States, and the countries of the euro area are Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Portugal, Slovak Republic, Slovenia, and Spain.

reserve allocations of these countries differ systematically from those of other countries and should not be used to impute the allocations of non-Reservia countries. Combined, the countries of Reservia account for approximately 50 percent of global foreign exchange reserve holdings.

The non-Reservia subgroup is made up of 164 countries or entities, which together account for the other 50 percent of global foreign exchange reserves. For the non-Reservia countries that report to COFER, IMF staff have identified six distinct and relevant patterns in their reserve holdings. An algorithm is used to stratify these countries into six subgroups based on these patterns:

- Subgroup 1: Skewed toward the euro; away from both the US dollar and a combination of all other currencies.
- Subgroup 2: Skewed toward the US dollar; away from both the euro and a combination of all other currencies.
- Subgroup 3: Skewed toward the US dollar and a combination of all other currencies; away from the euro.
- Subgroup 4: Skewed toward a combination of all other currencies; away from both the US dollar and euro.
- Subgroup 5: Skewed toward the euro and a combination of all other currencies; away from the US dollar.
- Subgroup 6: Skewed toward both the US dollar and the euro; away from a combination of all other currencies.

These patterns are defined relative to the reported global average currency allocation. So, if the reported global average allocations are 56 percent to US dollars, 21 percent to euros, and 23 percent to a combination of all other currencies (as it was in the most recent quarter, the second quarter of 2025), then a reporting country would be placed algorithmically in subgroup 1 by having a euro allocation greater than 21 percent, a US dollar allocation less than 56 percent, and an allocation to all other currencies of less than 23 percent. Similarly, a reporting country is placed algorithmically in subgroup 2 by having a euro allocation less than 21 percent, a US dollar allocation greater than 56 percent, and an allocation to all other currencies of less than 23 percent. This exercise is repeated for each aforementioned subgroup, with reference, in each case, to the reported global average.

As a third step, IMF staff calculate the unweighted average (or mean) currency allocation of each subgroup and apply that mean to a nonreporting country's total foreign exchange reserves. With all the reporting countries assigned to the stratified groups, the mean currency allocation for each subgroup is calculated for each quarter. The mean is then applied to nonreporting countries' total foreign exchange reserves to impute values for any nonreporting countries in that quarter.

Countries that report to COFER are placed into subgroups algorithmically; whereas countries that have never reported to COFER are placed by IMF staff into the relevant stratified subgroups using publicly available data on trade and financial linkages, geopolitical relationships, and qualitative factors and judgment. For example, consider the case of country X, a country with $1 billion in foreign exchange reserves, who is a nonreporter to COFER. Assume that country X has extensive economic, financial, historical, geographic, and political and geopolitical linkages to the euro area. IMF staff examine this country's data, compare it with data on the countries comprising the various subgroups, and find that it most closely aligns, quantitatively and qualitatively, with the countries comprising subgroup 1. IMF staff then use the mean allocation of subgroup 1 to impute the currency allocation of country X's $1 billion in foreign exchange reserves. Country X would be assumed to have an allocation that, like the countries of subgroup 1, skews toward the euro and away from the dollar and other currencies, relative to the global average.

The largest part of the unallocated total is attributable to countries that have never reported to COFER at all. For these countries, the entire amount of their reserves was included in COFER as "unallocated," and will, under this new method, instead be allocated using the stratified mean imputation method.

However, to safeguard the strict confidentiality of individual country data, IMF staff have taken particular care with countries that have changed their COFER reporting (starting or stopping) at some stage. The entry and exit of such countries can create noticeable changes in the aggregates, which could lead to residual disclosure of those countries' underlying currency allocations. To prevent this, IMF staff divide countries into large reserve holders and small reserve holders, with small holders being those whose foreign exchange reserve holdings are less than 2 percent of global foreign exchange reserves. Changes in the foreign exchange reserves of small holders are unlikely to cause movements in the aggregates that exceed the usual quarter-to-quarter fluctuations and therefore do not give rise to the same residual disclosure risks as large holders in COFER. Depending on the size of the holder and the skew of its reserve holdings, either a carry-forward imputation or a mixed method will be used if needed to maintain confidentiality.

Carry-Forward and Mixed Method Imputation

Carry-forward imputation—where a country's most recent report is used to impute a subsequent missing value—is initially applied to countries that previously reported to COFER but stopped at some stage. For nonreporting countries who were previous COFER reporters, the currency composition of their reserves is imputed based on their most recently reported shares for the first four periods after reporting stopped. This approach gives IMF staff time to work with the country to reestablish regular reporting, as most instances of nonreporting last only a quarter or two and are typically due to late submissions.

Small reserve holders: For the first four quarters after a previous reporter stops reporting, their unallocated reserves will be allocated based on their most recently reported shares (carry-forward imputation). At the fifth quarter of nonreporting, the unallocated reserves of nonreporters holding less than 2 percent of global reserves are allocated based on the average allocation of the subgroup to which they are assigned (stratified mean imputation). The subgroup mean applied here is computed without including the nonreporter's most recently reported shares in the calculation. Because the reserve holdings are small, this should not have a significant effect on the global aggregates.

Large reserve holders: For the first four quarters after a large holder stops reporting, their unallocated reserves will be allocated using carry-forward imputation. At the fifth quarter of nonreporting, stratified mean imputation will be used, with the most recently reported shares of the nonreporting country included in the group average computation.[6] By gradually phasing in imputed shares and recalibrating group averages each quarter, the methodology minimizes abrupt shifts and supports the continuity and analytical integrity of the global aggregates.

Large reserve holders with an unusual skew to their reserves: To safeguard the strict confidentiality of individual country data, IMF staff have also taken particular care with large holders who have an unusual previously reported skew to their reserves, relative to the global average. In such a case, the residual

[6] For example, assume country A—a large holder in group 2—most recently reported in the fourth quarter of 2024, with its reserve allocation at 50 percent US dollars, 25 percent euro, and 25 percent other currencies. For the first quarter of 2025 to the fourth quarter of 2025, the currency composition of country A's unallocated reserves will be imputed using the same 50/25/25 shares. In the first quarter of 2026, country A's reserves with those 50/25/25 shares are added to the reserves of group 2 to compute the group 2 average. Assume the resulting group 2 average is 51 percent US dollars, 25 percent euros, and 24 percent other currencies. This new average is then applied to country A's unallocated reserves to determine its final allocation for the first quarter of 2026. The same process is repeated in the second quarter of 2026: country A's reserves are first provisionally allocated using the 51/25/24 shares, which are then used to update the group 2 average. The updated average is subsequently applied to country A to determine its final allocation. This iterative approach ensures a smooth transition from reported to imputed data.

disclosure risk is high, so IMF staff will use a mixed method of carry-forward and stratified mean imputation over a period longer than four quarters.[7]

These new methods require IMF staff to impute—rather than aggregate and redisseminate—reported data on the currency composition of foreign exchange reserves. To this end, IMF staff will continuously incorporate external quantitative and qualitative data that may provide information on the currency composition of foreign exchange reserves of nonreporters,[8] even if it is not received through official submissions to the IMF through COFER or the International Liquidity database. Doing so will improve the analytical usefulness of the COFER aggregates while enhancing the confidentiality of the underlying country-specific data.

[7] IMF staff use the country's most recently reported shares to compute for the next four quarters. From the fifth quarter, IMF staff use a mixed method to smooth the exit of the country from the dataset so that the residual disclosure risk is managed. First, IMF staff computes the average shares of the subgroup to which it belongs (without it). IMF staff then apply a weighted average of the group allocation (20 percent) and the allocation of the large holder in the previous period (80 percent) to get the average share that is applied to the large reporter for the current period. The same weights are applied moving forward based on the (imputed) shares of the previous quarter (80 percent) and the group shares (20 percent). This allows for a smooth path as the imputed value for the large reporter converges over time to the subgroup's average and limits the risk of residual disclosure in the published aggregates.

[8] For example, national data publications or other external information available to COFER compilers. This would entail adjusting the imputed values to better reflect all available information.

Results

IMF staff used the aforementioned methods to impute currency allocations for every country, for every quarter from the first quarter of 2000 to the second quarter of 2025. The application of these methods leads to changes in total reserves, allocated reserves, unallocated reserves, and currency-specific claims and shares across the full timespan. In general, total reserves decrease slightly, allocated reserves now equal total reserves, and unallocated reserves are eliminated. Claims in each currency increase, as previously unallocated amounts are distributed across the currencies and added to the allocated totals. In share terms, the changes are modest and vary by currency and over time. Table 1 shows a summary of these changes for the most recent quarter, the second quarter of 2025, and the following sections present detailed results.

Table 1. Currency Composition of Foreign Exchange Reserves, 2025:Q2

	As Published (millions)	New Method (millions)	Difference (millions)	Difference (%)
Total foreign exchange reserves	12,944,765	12,893,887	–50,878	–0.39%
Allocated reserves	12,025,455	12,893,887	868,432	7.22%
Claims in US dollars	6,773,338	7,364,681	591,343	8.73%
Claims in euros	2,540,427	2,593,936	53,509	2.11%
Claims in Chinese renminbi	255,371	255,323	–47	–0.02%
Claims in Japanese yen	670,074	742,440	72,365	10.80%
Claims in pounds sterling	580,230	606,711	26,481	4.56%
Claims in Australian dollars	250,935	263,808	12,873	5.13%
Claims in Canadian dollars	313,828	335,563	21,734	6.93%
Claims in Swiss francs	19,544	22,137	2,593	13.27%
Claims in other currencies	621,708	709,289	87,581	14.09%
Unallocated reserves	919,310	0	–919,310	–100.00%

	As Published (%)	New Method (%)	Difference (ppt)	Difference (%)
Total foreign exchange reserves	100.00	100.00	0.00	0.00%
Shares of allocated reserves	92.90	100.00	7.10	7.64%
Shares of US dollars	56.32	57.12	0.79	1.41%
Shares of euros	21.13	20.12	–1.01	–4.77%
Shares of Chinese renminbi	2.12	1.98	–0.14	–6.75%
Shares of Japanese yen	5.57	5.76	0.19	3.34%
Shares of pounds sterling	4.83	4.71	–0.12	–2.48%
Shares of Australian dollars	2.09	2.05	–0.04	–1.95%
Shares of Canadian dollars	2.61	2.60	–0.01	–0.28%
Shares of Swiss francs	0.16	0.17	0.01	5.64%
Shares of other currencies	5.17	5.50	0.33	6.40%
Shares of unallocated reserves	7.10	0.00	–7.10	–100.00%

Sources: COFER; and IMF staff calculations.

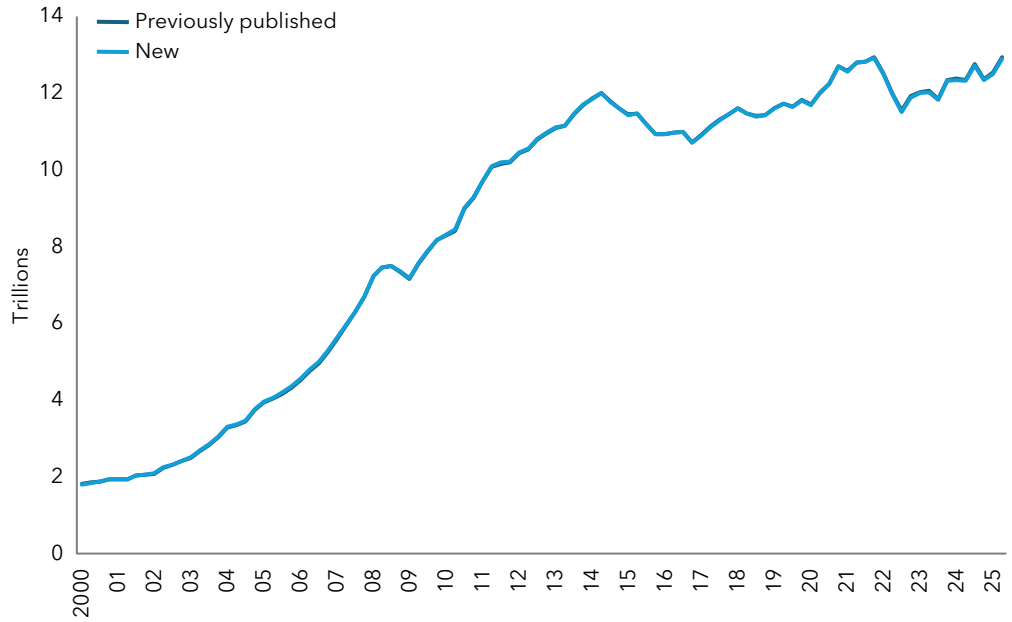
Changes to Total Reserves

Compared with the published series, the new Total Foreign Exchange Reserves series is virtually unchanged. To date, the IMF collected data from COFER reporters, aggregated them, and published the resulting

aggregations. Any missing data (resulting from nonreporting, incomplete reporting, or to a difference between total reserves in COFER and the International Liquidity database), was included in COFER as "unallocated" so that the COFER and IL databases were aligned. As part of the new estimates, IMF staff have discontinued the automatic linking of the COFER and the International Liquidity databases. Instead, they now use a combination of COFER, the International Liquidity database, and external official source data—such as central bank websites—to estimate total foreign exchange reserves for each COFER country, selecting the most reliable data source available in each case.

Across the series, the average quarterly value of total foreign exchange reserves for the world is approximately 0.1 percent lower than previously published. Because these amounts were previously classified as "unallocated," their recalculation does not affect the underlying currency composition. In other words, because currency shares are calculated excluding the unallocated portion, they remain unchanged when total reserves are adjusted. The previously published and revised series for total foreign exchange reserves from the first quarter of 2000 to the second quarter of 2025 illustrated in Figure 2 show that the changes are minimal and do not alter any observable trends in the data.

Figure 2. Total Official Foreign Exchange Reserves 2000:Q1–2025:Q2, Trillions of US Dollars

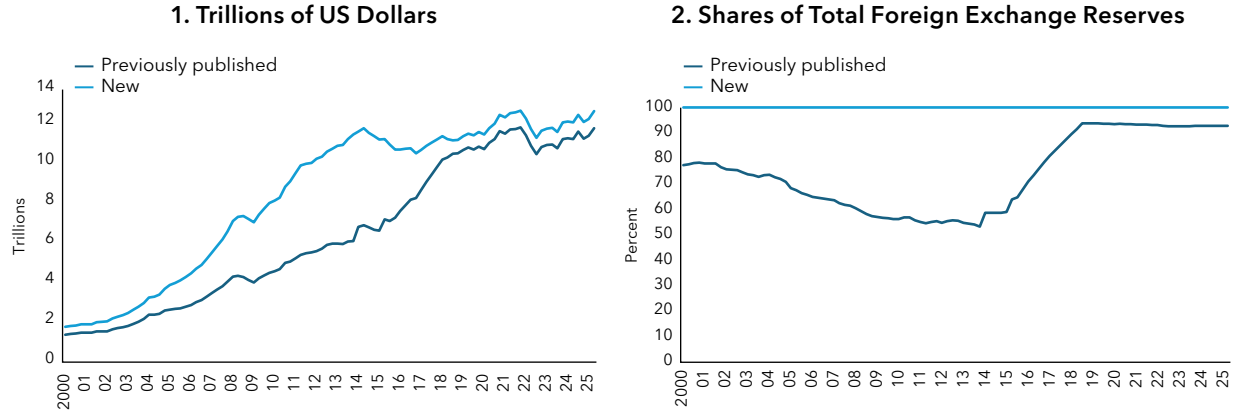


Source: COFER; and IMF staff calculations.

Changes to Allocated Reserves

Measured in US dollars, the level of foreign exchange reserves allocated to each currency has increased substantially, as previously unallocated amounts have been distributed and added to the allocated totals. In the new series, "allocated" foreign exchange reserves are equal to "total" foreign exchange reserves given that all reserves are allocated. However, a component in "allocated" foreign exchange reserves has been imputed by IMF staff using the methods discussed in this technical note. Beginning with COFER data for the third quarter of 2025, IMF staff will start publishing the share of total reserves that has been imputed. Figure 3 shows the previously published and new series for allocated foreign exchange reserves.

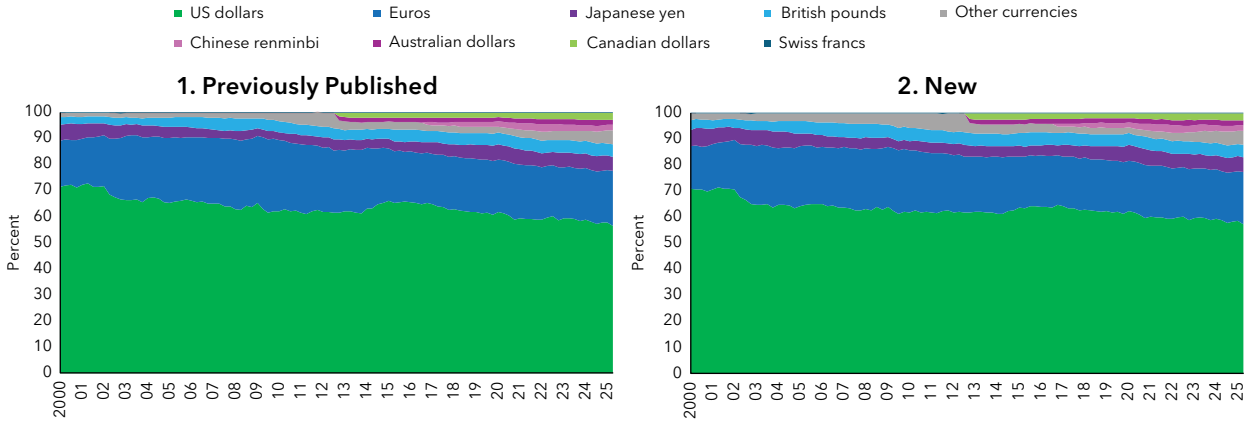
Figure 3. Allocated Foreign Exchange Reserves, 2000:Q1–2025:Q2



Source: COFER; and IMF staff calculations.

Measured in shares, the allocation of foreign exchange reserves across currencies varies slightly given that previously unallocated amounts have been distributed in a way that increases the share for some currencies and decreases it for others relative to the previously published data. However, overall changes are modest. Figure 4 shows the previously published and new allocations across the time series in relative terms.

Figure 4. Shares of Allocated Foreign Exchange Reserves, 2000:Q1–2025:Q2



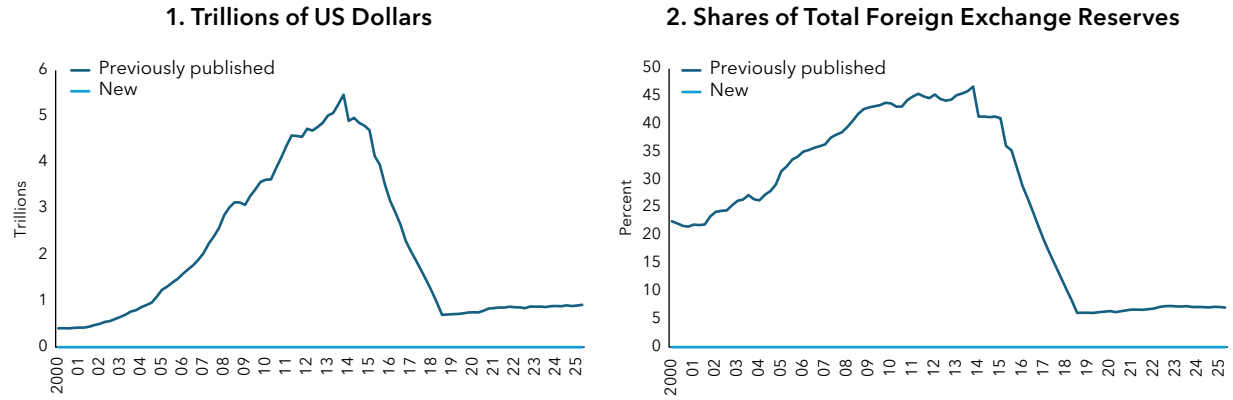
Source: COFER; and IMF staff calculations.

In terms of broad trends, the revised series closely mirrors the previously published version because the countries for which data were imputed represent a small share of the total over most of the period. Although their share peaked at 46.8 percent of total foreign exchange reserves in the fourth quarter of 2013, it declined to as low as 6.13 percent by the second quarter of 2019. The shares shown in Figure 4 are the aggregate allocations of countries in the COFER dataset. Aggregate results are essential for identifying broad trends but can obscure the heterogeneity of individual country allocations. In practice, few countries exhibit a currency composition that closely resembles the global aggregates shown in Figure 4. The stratified method was specifically designed to account for systematic differences in reserve allocation behavior across countries.

Changes to Unallocated Reserves

Unallocated reserves, which grew steadily until 2018 and then began to decline, are now eliminated as part of the COFER dataset. Instead, the unallocated amount falls to zero across the time series, as measured in US dollars and as a share of total foreign exchange reserves. Figure 5 shows the previously published and new series for unallocated foreign exchange reserves.

Figure 5. Unallocated Foreign Exchange Reserves, 2000:Q1–2025:Q2



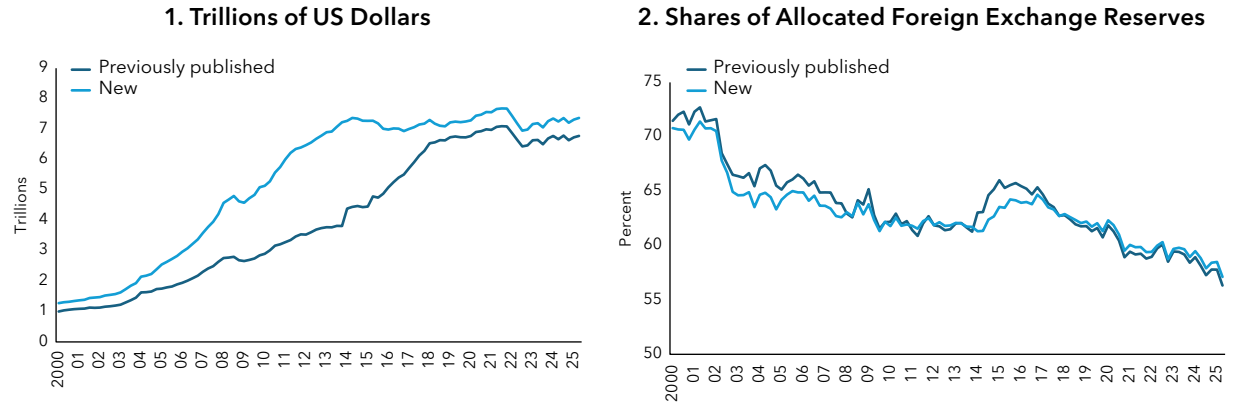
Source: COFER; and IMF staff calculations.

Changes, by Currency

Changes to Claims in US Dollars

Compared with the published series, the new US dollar shares are slightly lower than previously published from 2000 to 2017 and slightly higher than previously published from 2018 onward. This reflects the allocation of previously unallocated foreign exchange reserves for those periods, by countries whose imputed shares of dollar holdings are lower than the global average before 2018 and higher than the global average from 2018 onward. The group of countries whose foreign exchange reserves are being imputed is not a static group. Countries move into and out of groups of reporters and nonreporters whose allocations are being imputed, while the foreign exchange reserve allocations of their stratified subgroups also evolve. Figure 6 shows the previously published and new series for the US dollar from the first quarter of 2000 to the second quarter of 2025.

Figure 6. Claims in US Dollars, 2000:Q1–2025:Q2

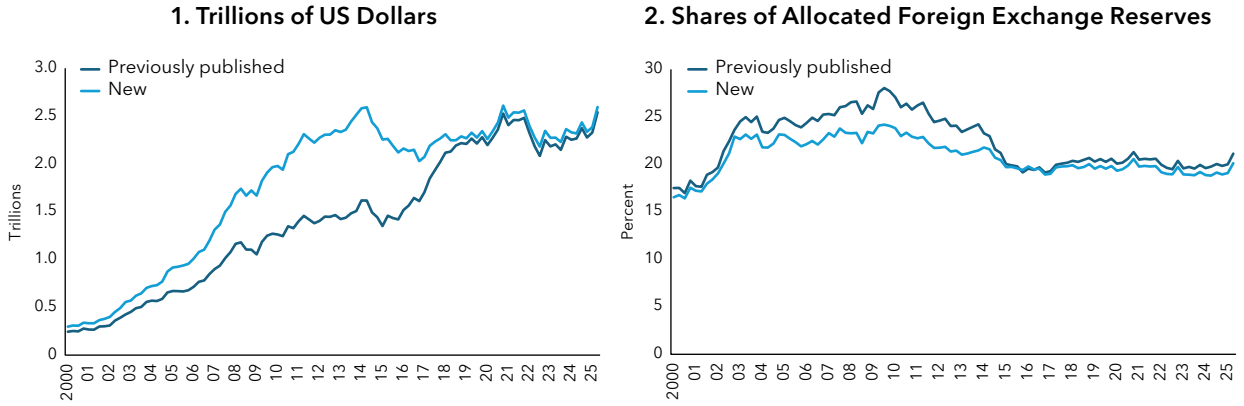


Source: COFER; and IMF staff calculations.

Changes to Claims in Euro

Compared with the published series, the new euro shares are slightly lower than previously published across most of the time series. This reflects the allocation of previously unallocated foreign exchange reserves for countries whose imputed shares of euro holdings are lower than the global average. Figure 7 shows the previously published and new series for the euro from the first quarter of 2000 to the second quarter of 2025.

Figure 7. Claims in Euro, 2000:Q1–2025:Q2

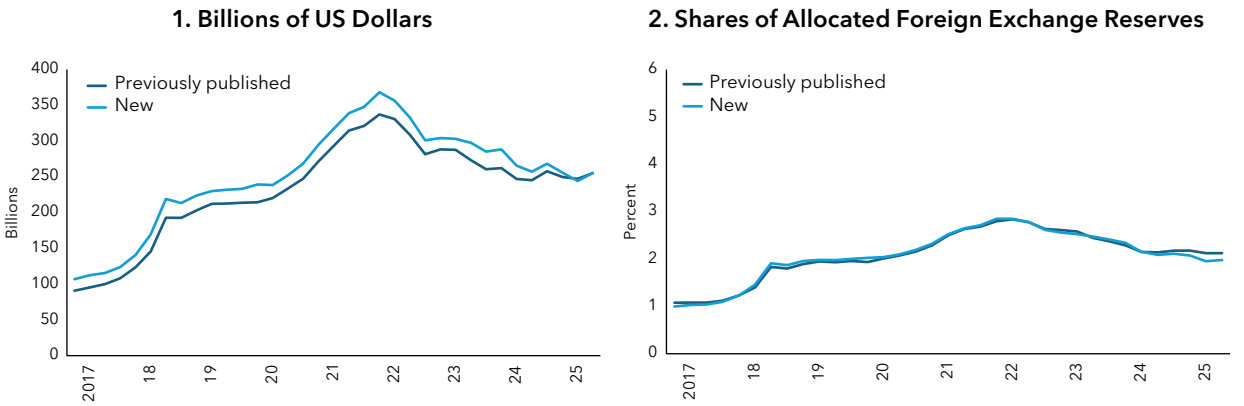


Source: COFER; and IMF staff calculations.

Changes to Claims in Chinese Renminbi

The new Chinese renminbi shares, which begin only in the fourth quarter of 2016,[9] are largely unchanged. However, the shares in the most recent quarters are lower than previously published. This reflects the allocation of previously unallocated foreign exchange reserves for countries whose imputed shares of renminbi holdings are lower than the global average. Figure 8 shows the previously published and new series for the Chinese renminbi from the fourth quarter of 2016 to the second quarter of 2025.

Figure 8. Claims in Chinese Renminbi, 2016:Q4–2025:Q2
(included in "other currencies" before 2016:Q4)



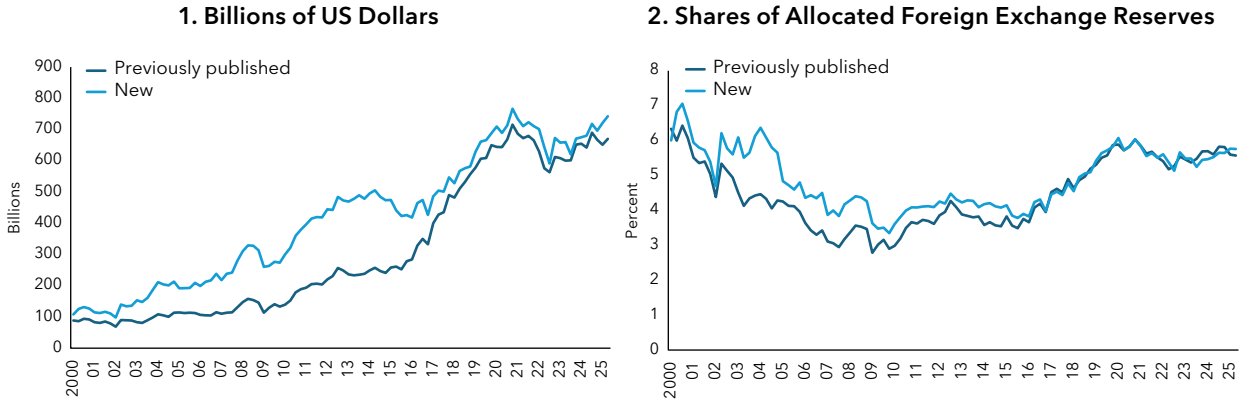
Source: COFER; and IMF staff calculations.

[9] The IMF separately identified the Chinese renminbi in its official foreign exchange reserves database starting October 1, 2016.

Changes to Claims in Japanese Yen

Compared with the published series, the new Japanese yen shares are higher in the early years of the series and less changed in the more recent period. This reflects the allocation of previously unallocated foreign exchange reserves for countries whose imputed shares of yen holdings are higher than the global average in the earlier part of the series. Figure 9 shows the previously published and new series for the Japanese yen from the first quarter of 2000 to the second quarter of 2025.

Figure 9. Claims in Japanese Yen, 2000:Q1–2025:Q2

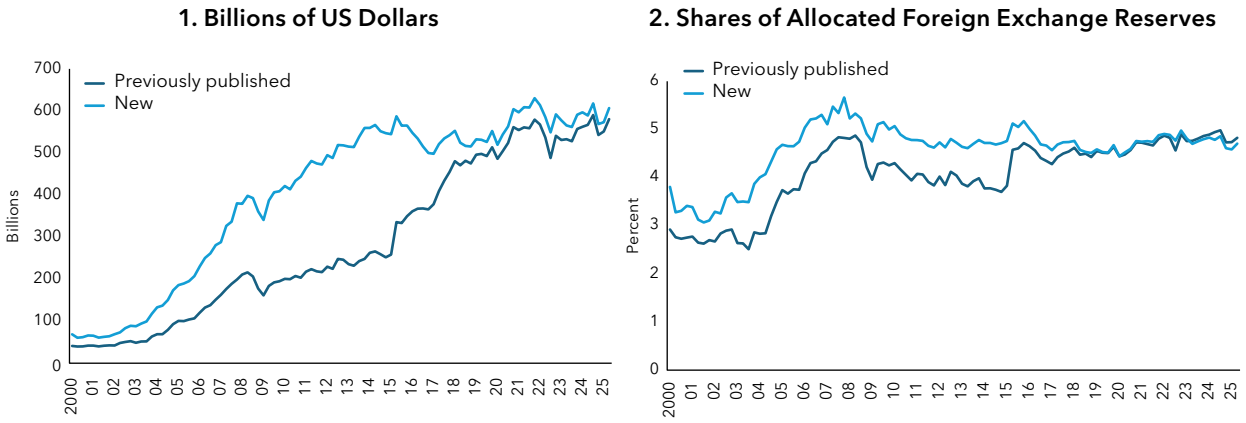


Source: COFER; and IMF staff calculations.

Changes to Claims in Pounds Sterling

The new pounds sterling shares are similar to the Japanese yen shares, in that they are higher in the early years of the series and less changed in the more recent period; the shares are also opposite of the US dollar shares, in that they are higher than previously published for the early part of the series and then lower than previously published more recently. Again, this reflects the allocation of previously unallocated foreign exchange reserves for countries whose imputed shares of pounds sterling holdings are higher than the global average in the earlier part of the series. Figure 10 shows the previously published and new series for the pounds sterling from the first quarter of 2000 to the second quarter of 2025.

Figure 10. Claims in Pounds Sterling, 2000:Q1–2025:Q2

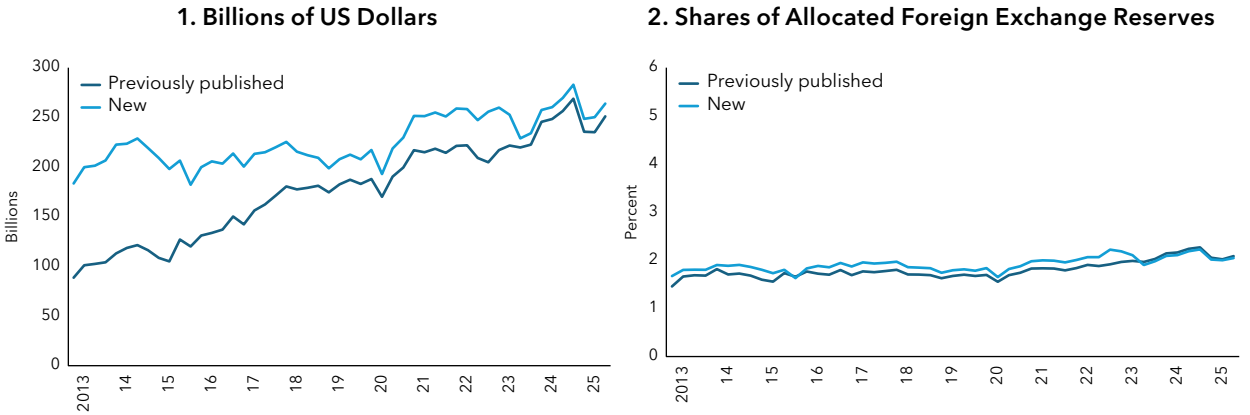


Source: COFER; and IMF staff calculations.

Changes to Claims in Australian Dollars

The Australian dollar shares, which are shown separately from "other currencies" starting in the fourth quarter of 2012,[10] are slightly higher than previously published from 2012 to 2022 and little changed thereafter. Figure 11 shows the previously published and new series for the Australian dollar from the first quarter of 2000 to the second quarter of 2025.

Figure 11. Claims in Australian Dollars, 2012:Q4–2025:Q2
(included in "other currencies" before 2012:Q4)

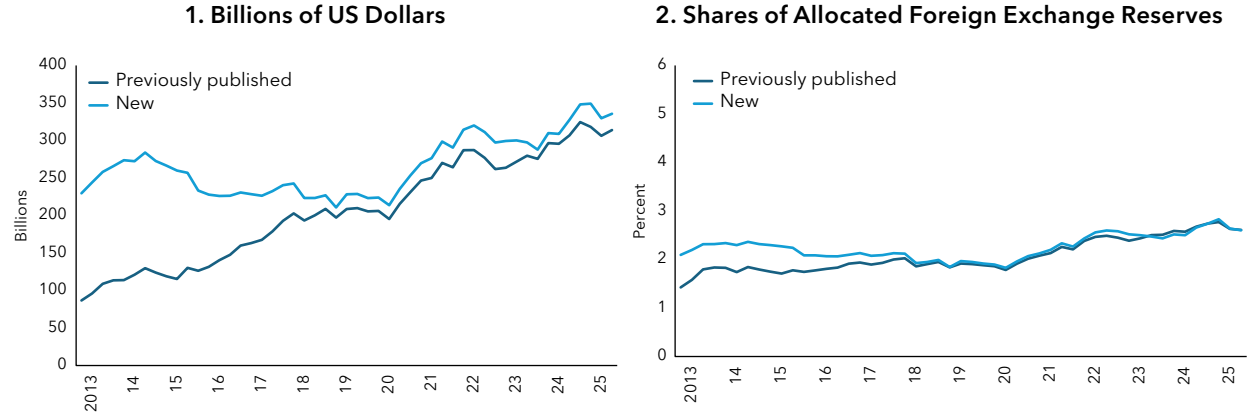


Source: COFER, and IMF staff calculations.

Changes to Claims in Canadian Dollars

The Canadian dollar shares, which, like the Australian dollar, are shown separately from "other currencies" starting in the fourth quarter of 2012, are higher than previously published from 2012 to 2022, and little changed thereafter. Figure 12 shows the previously published and new series for the Australian dollar from the fourth quarter of 2012 to the second quarter of 2025.

Figure 12. Claims in Canadian Dollars, 2012:Q4–2025:Q2
(included in "other currencies" before 2012:Q4)



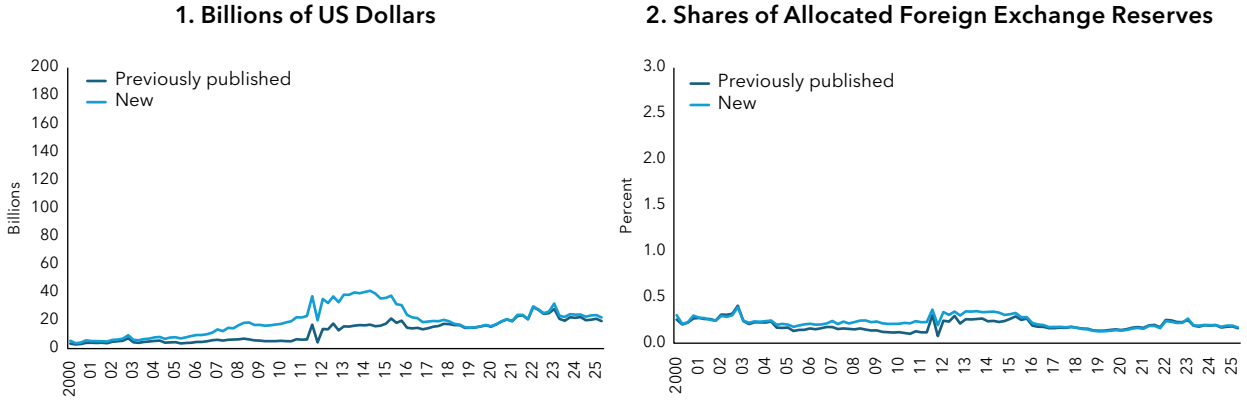
Source: COFER, and IMF staff calculations.

[10] On June 28, 2013, the IMF published on its website the quarterly data on the COFER with an expanded currency range, separately identifying two additional currencies: the Australian dollar and the Canadian dollar.

Changes to Claims in Swiss Francs

Compared with the published shares, the new Swiss franc shares are similar to the pounds sterling and the yen; they are slightly higher in the early years of the series and less changed in the more recent period. Figure 13 shows the previously published and new series for the Swiss franc from the first quarter of 2000 to the second quarter of 2025.

Figure 13. Claims in Swiss Francs, 2000:Q1–2025:Q2

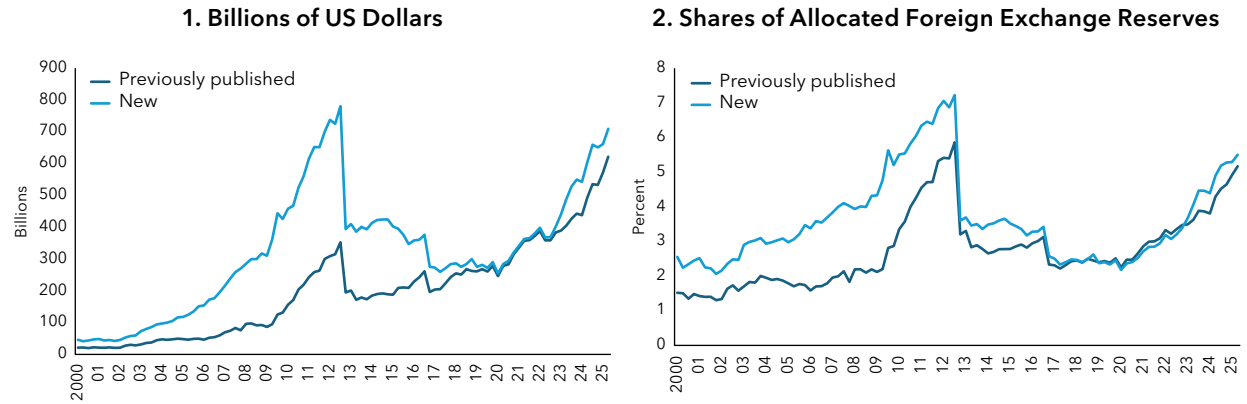


Source: COFER, and IMF staff calculations.

Changes to Claims in Other Currencies

Compared with the published shares, the new "other currencies" shares are generally higher than previously published across the series. This reflects the allocation of previously unallocated foreign exchange reserves of countries whose imputed shares of other currency holdings are higher than the global average. Figure 14 shows the previously published and new series for "other currencies" from the first quarter of 2000 to the second quarter of 2025.

Figure 14. Claims in Other Currencies, 2000:Q1–2025:Q2
(includes Canadian and Australian dollars until 2012:Q4; Chinese renminbi until 2016:Q4)



Source: COFER, and IMF staff calculations.

Improving Analytical Usefulness and Strengthening Confidentiality

This new imputation method improves the analytical usefulness of the COFER dataset. Underlying trends in the currency composition of foreign exchange reserves should become clearer now that missing values are imputed across the time series. Eliminating the "unallocated" portion of the dataset removes the need for users to make assumptions about these reserves—whether explicitly or implicitly—by assuming that they mirror the average composition of the "allocated" portion. This change also reduces the extent to which aggregate trends are distorted by mechanically smoothing reporting countries into and out of the dataset over time. Since missing data are now fully imputed in every period, the resulting time series offers a more consistent and analytically robust view of global reserve composition.

This strengthens the confidentiality of the COFER dataset: imputing the unallocated portion of the dataset helps mitigate residual disclosure risks, particularly when countries enter or exit the reporting sample. COFER is a strictly confidential dataset, and IMF staff remain fully committed to safeguarding the confidentiality of individual data submitted by participating economies.[11]

Next Steps

The new COFER series—including the imputations—will, for the first time, be published in December 2025, alongside the release of COFER data for the third quarter of 2025. The revised COFER series will include updates from the first quarter of 2000 through the second quarter of 2025 as well as new data for the third quarter of 2025. There will be no "unallocated" portion in any of the revised data because 100 percent of foreign exchange reserves will be allocated across currencies using the methods described in this technical note. IMF staff will also publish the share of total reserves that have been imputed beginning with data from the third quarter of 2025.

[11] The IMF used to publish a breakdown of the COFER dataset for "advanced economies" and "emerging and developing economies" until 2015. However, starting with the second quarter of 2015, to avoid possible residual disclosure of individual country data, with the release of a list of COFER participants, the IMF has decided to terminate publication of this breakdown. In the context of this work on imputing the unallocated portion of the COFER dataset, IMF staff have revisited this decision but decided to continue not publishing this breakdown to preserve the confidentiality of individual country data.

ANNEX I. Technical Background and History of the COFER Dataset

The IMF's Statistics Department conducts the Currency Composition of Foreign Exchange Reserves (COFER) survey quarterly and disseminates the aggregated data to the public at the end of each quarter for a reference date of the end of the previous quarter.[12] Participation by countries in this survey is voluntary; however, Special Data Dissemination Standard Plus adherents are required to participate in the COFER database and to disclose their participation.

At present, 149 reporters—consisting of member countries of the IMF, nonmember countries or economies, and other foreign exchange reserve holding entities—share data with the IMF to be aggregated in the COFER dataset. Participation in COFER is voluntary, and economy-specific data are strictly confidential, given their sensitive nature. The names of COFER reporters are also confidential unless the authorities have given the IMF consent to disclose their names. To avoid residual disclosure and to maintain the strict confidentiality of the underlying country-specific data, the IMF publishes neither individual country data nor any breakdowns below the "world" total level.

The concept of reserves covered in the survey is in accord with the IMF's *Balance of Payments and International Investment Position Manual, Sixth Edition* (BPM6) and is unchanged in BPM7. BPM6 defines reserves as "those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy, and serving as a basis for foreign borrowing)" (BPM6, paragraph 6.64). Foreign exchange reserves reported through COFER consist of the monetary authorities' claims on nonresidents in the form of foreign banknotes, bank deposits, treasury bills, short- and long-term government securities, and other claims usable in the event of balance of payments needs. COFER data do not include monetary gold, special drawing rights holdings, or reserve position in the IMF. Data are reported in millions of US dollars.

The COFER dataset includes annual data from 1995 to 1998 and quarterly data from 1999 onward. To date, the IMF had broken down COFER data into "allocated" and "unallocated" components. The COFER dataset was compiled from two sources: the quarterly COFER survey and the International Liquidity dataset. The International Liquidity dataset was used to determine the total foreign exchange reserves for all countries, whereas the COFER survey provided data on the currency composition of foreign exchange reserves of reporters. For countries that do not fill out the COFER survey, their total foreign exchange reserves from the International Liquidity dataset were reported as unallocated in the COFER dataset. For countries that report, their reported shares were listed as allocated in the dataset. Any discrepancies between the total foreign exchange reserves from the International Liquidity dataset and the total from the COFER survey for reporting countries were reported as unallocated in the COFER dataset.

The COFER database has been changed and updated several times before. Each time, the change or update aimed to improve the analytical usefulness of the aggregates, to strengthen the confidentiality of the underlying country-specific data, or both. The following is an overview of some key changes in the COFER dataset since its inception:

[12] See https://data.IMF.org/en/datasets/IMF.STA:COFER.

Quarterly data became available. Annual data are available from 1995 to 1998, but quarterly data became available starting from the first quarter of 1999.

The Australian dollar and the Canadian dollar were separately identified. After consultation with the IMF's Executive Board, the IMF developed an action plan in 2011 to expand COFER reporting. One main component of this initiative was to expand the currency range to capture developments in reserve assets denominated in "other currencies." For this purpose, the IMF's Statistics Department conducted a survey of all COFER reporters. Based on the survey outcomes, the Australian dollar and the Canadian dollar were considered for separate identification in COFER data. On June 28, 2013, the IMF released on its website the quarterly data on the COFER with an expanded currency range, separately identifying two additional currencies—the Australian dollar and the Canadian dollar.

The IMF identified COFER reporters. On September 30, 2015, the IMF published the list of COFER reporters for the first time.

The IMF stopped providing a breakdown for advanced and emerging market economies in the COFER dataset. COFER originally included a breakdown for advanced economies and emerging market economies but stopped in 2015 to prevent residual disclosure of country-specific data.

The Chinese renminbi was separately identified. The IMF separately identified the renminbi in its official foreign exchange reserves database starting October 1, 2016. The change was reflected in the survey for the fourth quarter of 2016 that was published at the end of March 2017. On November 30, 2015, the IMF's Executive Board determined the renminbi to be a freely usable currency, effective October 1, 2016, and decided to include the renminbi in the special drawing rights basket as of that date. On February 26, 2016, the IMF's Executive Board agreed to make the change in COFER effective October 1, 2016, thus providing the lead time necessary for COFER survey respondents to adjust to the change.

ANNEX II. Analytical Usefulness of the COFER Dataset

Central banks' foreign exchange reserves provide insurance against external shocks and facilitate monetary and exchange rate policy. Their currency composition—how much is held in US dollars, euros, yen, sterling, renminbi, and a growing set of "other" currencies—matters for global financial stability and for the international roles of currencies. The IMF's Currency Composition of Official Foreign Exchange Reserves (COFER) survey is the standard dataset for tracking these patterns.

Classic and modern studies converge on a set of determinants for a country's currency composition of foreign exchange reserves. Transaction and invoicing links, currency pegs, and financial integration strongly correlate with the currencies a country holds as reserves (Eichengreen and Mathieson 2000; Eichengreen, Chițu, and Mehl 2016; Gopinath and Stein 2018, 2021; Ito and McCauley 2020). Safety, liquidity, and market depth are important because reserve managers require markets that can absorb large flows with minimal price impact and minimal legal and operational risk (Bertaut, von Beschwitz, and Curcuru 2025). Network effects are a powerful determinant of persistent currency dominance, although they do not preclude meaningful diversification across several leading currencies (Eichengreen, Mehl, and Chițu 2018). In addition, active diversification and valuation effects play a key role in the currency composition of reserves (Arslanalp, Eichengreen, and Simpson-Bell 2022, 2024).

The COFER dataset has facilitated a range of empirical inquiries, particularly around reserve diversification, currency dominance, and market intervention strategies. Lim's (2007) landmark study investigated whether reserve portfolios respond to exchange rate fluctuations through rebalancing behaviors. Wong (2007) extended the analysis by examining international reserve diversification using quantity shares derived from COFER data. The euro's challenge to the dollar and the historical context of reserve currency compositions have been explored (Eichengreen and Mathieson 2000; Lim 2006). Arslanalp and Simpson-Bell (2021) investigated the decline of the dollar share of currency reserves over a 25-year period, while maintaining its dominance. Goldberg and Hannaoui (2024) argued that changes in dynamic portfolio allocations by a small handful of countries—rather than a systematic retreat from the dollar in official reserve portfolios—explain the declining dollar share in the overall COFER. The COFER dataset has also been used to study the role active diversification in relation to valuation effects plays in the currency composition of foreign exchange reserves (Arslanalp, Eichengreen, and Simpson-Bell 2022, 2024).

While COFER provides rich aggregate insights, its limitation lies in confidentiality: individual country data remains restricted, accessible to only four IMF staff in charge of compiling the COFER aggregates. Recognizing this, researchers have sought alternative datasets. For example, Ito and McCauley (2021) developed a new disaggregated dataset of individual central bank reserve compositions for a subset of countries (covering 63–73 countries depending on dataset), allowing more nuanced, country-level analysis.

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