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Opportunities and challenges in compiling long series: the BIS central bank statistics¹

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Opportunities and challenges in compiling long series: the BIS central bank statistics

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Abstract

Statistics on central banks' balance sheets play a pivotal role in understanding monetary policy implementation and, broadly, central bank policy actions. This paper introduces a new BIS data set featuring long series on the size of central banks' balance sheets, compiled in close cooperation with central banks and historians. Long run statistics are essential for placing current developments into a historical perspective, for instance to support a thorough analysis of past episodes of expansion and contraction. The construction of the data set overcame several challenges, including the absence of methodological frameworks, diverging accounting principles and scarcity of historical data.

Keywords: central bank balance sheet, historical financial and monetary statistics

JEL classification: E50, E58, N20, C82

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Introduction

As part of its mission to support the analysis of monetary and financial stability, the Bank for International Settlements (BIS) disseminates statistics on key macroeconomic and financial indicators spanning from credit, consumer and property prices to exchange rates and policy rates. A distinctive feature of these statistics is their extensive temporal coverage, with many going back to the mid-20th century or even further. Long series are in fact essential to cast light from the past on present policy debates and hold particular relevance in the context of macroeconomic analysis, which frequently encompasses several financial cycles.

Anchored in this well established tradition, this paper introduces a new data set featuring long series on central bank total assets. This statistical work fills an important data gap in multiple respects. First, the data set ensures comprehensive coverage, with long series starting from the year of establishment of most central banks and spanning over 50 countries. This is a major leap forward, as the series are spliced from multiple sources and average a length of one century per country, longer than any other BIS data set. Second, from an analytical perspective, these data help support the current debate on the evolution of central banks' balance sheets, offering a unique view over the long run. In this respect, taking a step back may be particularly useful for placing recent extraordinary episodes of balance sheet expansion and contraction, notably since the Great Financial Crisis, into a historical perspective. Finally, they complement the BIS's current existing statistical offering related to central banks, in particular the long series on policy rates.

This paper is organised into three sections. First, it highlights the importance of long series tracking the evolution of the size of central banks' balance sheets. The second section presents the novel data set, detailing its coverage, methodology and compilation challenges. Finally, the third section calls for an adaptive and multidisciplinary statistical practice for compiling long series.

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1. Why long series on central bank total assets matter

The size of central banks' balance sheets as a useful indicator for monetary and financial stability

Central banks' balance sheets have gained significant momentum in the public debate over the past few decades. Undoubtedly, this heightened attention has been primarily driven by major and extraordinary swings in their size, first marked by sharp expansions since the Great Financial Crisis, then followed by an unprecedented and globally synchronised contraction since 2022 (BIS (2024)).

It is the mandate of central banks that shapes their balance sheets. Like any organisation, central banks (or, as they were known originally, banks of issue) report what they own and owe – respectively, assets, liabilities and equity – in their financial statement or balance sheet. The size of the balance sheet, captured by the sum of assets, gives a useful snapshot of the organisation's finances.² Yet, unlike at other financial institutions, central banks' balance sheets also play a critical role in performing functions at the core of their mandates. Typically, in order to execute and assess their tasks, central banks have been required to disclose their balance sheet, generally in legally specified ways. The Bank Act of 1844, which specified the mode of disclosure of the Bank of England's balance sheet, is a characteristic example (Wood (1939)). More generally, as part of the toolkit for monetary policy implementation, central banks can actively use their balance sheet to set the policy stance, particularly when policy rates are at the effective lower bound. Similarly, balance sheets, for instance by means of foreign exchange reserves, can be an important tool for protecting the economy against unfavourable appreciation or depreciation of the currency (Filardo and Grenville (2012)). Central banks may also deploy their balance sheet to support the stability of the financial system, for example through emergency lending. Noteworthy examples are the Great Financial Crisis and the Covid-19 pandemic, during which central banks forcefully used balance sheets to contain market volatility and prevent real economy spillovers.

The size of the balance sheet reveals much about monetary policy and stability. First, in terms of monetary policy, data on total assets are especially useful as summary indicators of policy accommodation. For example, policies such as quantitative easing typically lead to increases in balance sheets through large-scale asset purchases and lending operations. Conversely, quantitative tightening shrinks the balance sheet. Further, the size of the balance sheet provides valuable insights into the monetary policy operational framework, with notable differences between central banks operating in scarce and abundant reserve systems (Bailey (2024), Borio (2023)). More importantly, balance sheets may ultimately affect price stability. In fact, any variation in assets and the corresponding liabilities may have an impact on the liquidity in the banking sector in the short run and affect prices in the medium run (Caruana (2011)).

Further, the central bank balance sheet can also influence financial stability and carry broader macroeconomic implications. In fact, balance sheets are the

² While the composition of the balance sheet is beyond the scope of this paper, it is important to note that the structure of assets and liabilities is a major factor influencing the central bank's financial results.

focal point of financial transmission. Admittedly, increases through large-scale asset purchases by central banks can contribute to inflating asset price bubbles and encourage excessive risk-taking among financial intermediaries (CGFS (2019)). The benefits of expanding or contracting the balance sheet (Box A) depend heavily on economic context and, when used effectively, expansions or contractions can help manage economic growth, control inflation and ensure a smooth implementation of monetary policy and financial stability. In this regard, central banks' balance sheets can have a macroprudential role, for instance by reallocating duration risk or by influencing how the economy responds to shocks through their long-run size (Eren et al (2024)). More broadly, data on the size of central banks' balance sheets may deliver wider policy insights. These can be fiscal – larger balance sheets may reflect fiscal dominance and high shares of government debt purchases by central banks and, arguably, carry implications for the government's position and funding (Orphanides (2016)).

Finally, the size of the balance sheet does matter for the central bank itself.

Like any other financial institution, central banks manage their risks, for instance in terms of liquidity and market exposure. Sound risk management is undeniably an important condition for central banks to perform their mandate effectively (Archer and Moser-Boehm (2013)). In practice, the size and composition of their balance sheets may signal their financial health. For instance, large balance sheets are typically associated with higher costs and risks, *ceteris paribus*. In fact, policies such as quantitative easing increase the leveraging of central banks and expose them to higher credit risks. Conversely, lean balance sheets may reduce risk-taking by central banks and give more space for them to increase in size and absorb risks in line with needs (BIS (2024)). Yet, unlike private financial entities, central banks are primarily institutions with policy mandates. In that, their financial exposures, including those materialised through losses and negative equity, do not hamper their capability to effectively conduct their policies (Bell et al (2024)).³ In this regard, large balance sheets, though possibly riskier, play a key role in both signalling and transmitting monetary policy by reinforcing the central bank's commitment.

Keeping sight on the long term: the need for historical data on central banks' total assets

While monitoring central banks' balance sheets size is critical for policy, analysing their long-term evolution provides deeper insights for a variety of purposes.

One immediate goal is to document extraordinary events. Financial crises or other major social and political events are typically associated with large swings in the size of central banks' balance sheets. Telling examples are World Wars I and II or, more recently, the Great Financial Crisis and the Covid-19 pandemic, all of which saw large clusters of expansion-contraction cycles. In contrast, the size of central bank balance sheets shows little variation in normal times (Ferguson et al (2023)). Because extraordinary events are, by their very nature, tail events, *ie beyond* normal times, their analysis requires sufficiently broad and deep sets of data to produce meaningful insights.

³ However, continuous losses could hamper the financial independence of central banks, for instance when they have to be recapitalised by the government.

A second objective is to capture the evolution of central banks' balance sheet size across several financial cycles. Financial cycles form an essential component of the clockwork mechanics of the macroeconomy (Borio (2012)), with financial institutions' – including central banks' – balance sheets playing a critical role. Given that financial cycles span several years, access to historical data is a prerequisite to unveiling the full breadth of analytical and policy insights (Drehmann et al (2012)), including assessing the optimal size of long-run central bank balance sheets.

A third and broader aim is to document long-term trends in central banking. Central banks have assumed various roles throughout different monetary and institutional regimes and, at large, history. These roles evolved from ledger banks and banks of issue to government lenders, lenders of last resort and defenders of monetary – and, arguably – financial stability (Haldane and Qvigstad (2016)). Their use of balance sheets has been instrumental in both shaping and fulfilling those roles.

The ultimate goal is to derive lessons from the past in order to better assess the present and guide future decisions. In fact, historical statistics may play a critical role in addressing the preoccupations of policymakers in an increasingly uncertain and fragmented landscape (Borio (2023)). A noteworthy example is the Great Financial Crisis, which prompted a renewed interest in casting light from the past on central bank balance sheets. The critical issue back then was helping policymakers navigate uncharted waters and, arguably, drawing parallels with previous major financial and economic crises, not least the Great Depression. In practice, this search for historical data coincided with intense efforts to compile long-span time series on central bank balance sheets in several countries (Bordo et al (2016)). Taking historical data into account when drawing parallels with the present can be highly informative and rewarding. Yet it can also lead to misinterpretation if consumed without a thorough understanding of the underlying methodology and the broader historical context (Bignon et al (2022)).

Box A

Delving into the expansions and contractions of central banks' balance sheets: some stylised facts over the long run

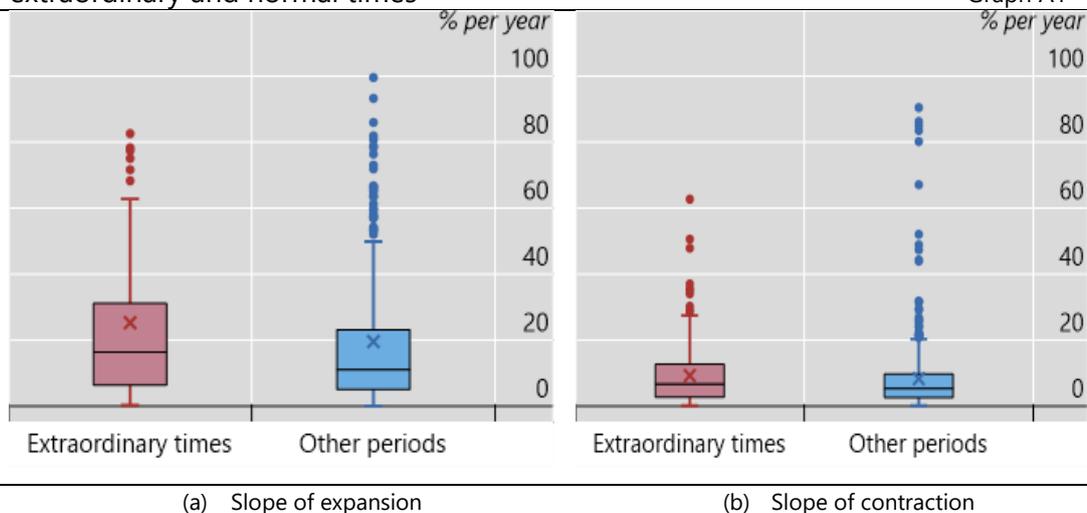
Tracking the size of central banks' balance sheets over the long run has several key analytical benefits, particularly in terms of policy. Among them, there are a number of simple yet powerful analytical questions, such as: are expansions more frequent than contractions? Are they bigger, and how do they relate to each other? Are they faster or do they span several years? This box presents some stylised facts to document those questions.

Over the long run, expansions have been more frequent than contractions.① In fact, on average, central banks' balance sheets have expanded two and a half times more frequently than they have decreased. This ratio tends to be higher for emerging market economies, averaging three times more compared with advanced economies' two. Expansions are concentrated around major crises, such as currency crises, wars and, broadly, financial turmoil. They are typically followed by few – but pronounced – contraction episodes. These notably occurred in the aftermath of the World Wars, in the 1990s with the Mexican and Asian crises and, more recently, during the Great Financial Crisis and the pandemic. Perhaps more importantly, the number of reductions in balance sheet size reached a record level in 2022 as central banks embarked on the most synchronised monetary tightening in a generation to respond to the inflation surge (BIS (2024)).

Expansions are bigger than contractions. On top of being more frequent, expansions in central banks' balance sheets are on average sizeable. Across the entire sample, the yearly growth rate is, in real terms, twice the contractionary one, with averages of 16% and 8%, respectively. In addition, expansions are highly skewed, with around 100 episodes with a growth rate of 50% or more since the early 19th century. Not surprisingly, these events were more frequent during the interwar period and, more recently, during the Covid-19 crisis. Conversely, contractionary episodes of the same order of magnitude are typically very rare: reductions of 50% or more year over year occurred only in a few cases, mostly in the 1980s. No doubt the vigorous monetary tightening in this period goes a long way towards explaining this finding, particularly in the aftermath of the oil crisis.

Expansions are fast; contractions are prolonged. This corroborates the idea that central banks deploy their balance sheet faster than they shrink it. Yet, and more interestingly, there is a difference between the speed of expansions (as measured by slope)^② during "extraordinary times", such as political, social and financial crises,^③ and in "other periods" (Graph A1). The average speed is always slower in normal periods than in extraordinary times, especially for expansions. A possible explanation of the faster and bigger expansions during crises is that central banks often opt to expand their balance sheets as they run out of options, particularly when their policy rates hit the effective lower bound. Extraordinary times are also associated with higher variability in expansion rates in comparison with contraction rates. Moreover, the gap between expansions and contractions is more pronounced for advanced economies than for emerging market economies.

Distribution of slopes of expansions and contractions during extraordinary and normal times



Note: The box plots consider all of the panel data as indicated in Table 1 of the Annex. The outliers as detected by the box plot are higher for "other periods" and generally correspond to country-specific crises which may not be captured by the periods of extraordinary crises considered.

① Expansions (contractions) correspond to yearly positive (negative) growth rates in real terms.
 ② The peaks and troughs are identified using the local maxima and minima methodology (Harding and Pagan (1999), Bobasu et al (2019)). "Duration" refers to the number of years from a trough to the next peak in an expansion and from a peak to the next trough in contraction. "Amplitude" is defined as percentage change in break-adjusted total central bank assets (in real terms) from a trough to the next peak in an expansion (and from a peak to the next trough in a contraction). "Slope" is the ratio of amplitude (in absolute terms) to duration.
 ③ The major crises are: Crimean War (1853–56), Franco-Prussian War (1870–72), Panic of 1873 (1873–74), World War I (1914–20), Great Depression (1929–39), World War II (1939–45), Energy Crisis (1973–79), Crash of '87 (1987–88), Mexican peso crisis (1994–95), Asian financial crisis (1997–98), US war in Afghanistan (2001–02), Great Financial Crisis (2007–09), Covid-19 pandemic (2020–21) and Ukraine conflict (2022–23).

Source: BIS central bank total assets; authors' calculations.

2. A new BIS data set: long series on central bank total assets

Introducing a historically deep and geographically broad data set

The data set tracks the evolution of central banks' balance sheets over the long run in more than 50 countries.

The new BIS series on total assets ensure a uniquely deep temporal and geographical coverage, with data going back to the year of establishment of the predecessor institution of modern central banks whenever possible. The database covers 53 countries, of which 29 are advanced economies and 24 emerging market economies, with the geographical scope of the data set defined by current political borders. In practice, this means that the longest series in the data set start as early as in the 17th century, with the beginnings of note issue (Roberds and Velde (2016)). The two institutions with the longest time span are Sveriges Riksbank, regarded as the oldest central bank in the world since 1668 (Fregert (2014)), and the Bank of England, established in 1694 (Rieder et al (2023)).

This ambitious approach raises important methodological questions. Specifically, some form of institutional and policy continuity needs to be assumed in the first place, which is of course a demanding hypothesis (Bignon et al (2022)). In one conceivable scenario, one might limit the exercise to time spans when the bank of issue was granted a monopoly or quasi-monopoly of issue. This would have the Bank of England start in 1844 rather than 1694, the Bank of France in 1848 rather than 1800 to name a few. Conversely, one might try to extend the time span of the "central bank" into the past to create a synthetic measure of monetary issue by aggregating the money supply of individual banks of issue. This way, it would be possible, for instance, to begin the United States of America's monetary "historical times" with the Bank Act of 1863–4, which ensured homogeneous reporting of monetary data. Friedman and Schwartz (1963) essentially followed this approach, relying on the annual reports of the Comptroller of the Currency to generate a series for high-powered money. It aggregated the net banknote issues in the liability side of individual central banks' balance sheets.

As we move gradually into the 19th century, the number of countries where bank issue is entrusted to a single privileged bank increases, particularly in Europe.⁴ The BIS data set covers the entire lifespan of all those central banks. In the early 20th century, the tendency expands beyond Europe, especially in the Americas. Examples include the Federal Reserve System in the United States (1913), South Africa (1921), Peru (1922), Mexico and Chile (1925), Türkiye (1931), India and Canada (1934) and Argentina (1935), among others. Access to sovereignty contributed to the creation of modern central banks, leading to an increasing number of central banks entering the data set around 1960.⁵ On this point, complex splicing questions may arise because of political fragmentation episodes. Notable examples include the collapse of the Habsburg Empire and the resulting creation of central banks in central Europe during the interwar period, and the collapse of the Soviet Union and founding

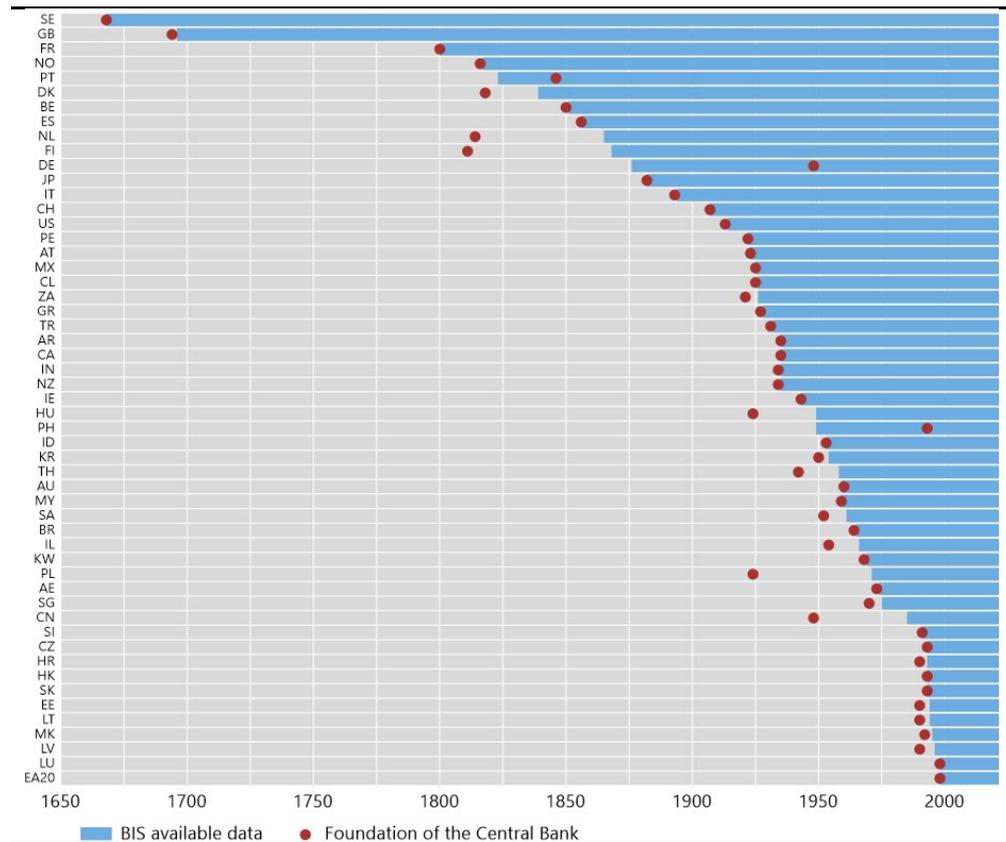
⁴ Bank of France was founded in 1800, followed by the Central Bank of Norway only a few years later in 1816 (Eitrheim et al (2022)). Other major central banks were also established in that century, with the Reichsbank in 1876, Bank of Japan in 1882, Bank of Italy in 1893 and Swiss National Bank in 1907.

⁵ The BIS long series on total assets of the South African Reserve Bank starts in 1926, five years after its establishment.

of countries in central and eastern Europe after the dissolution of Czechoslovakia and of Yugoslavia. One implication of the current methodological choices is that, unavoidably, the countries previously forming Czechoslovakia, the Soviet Union or Yugoslavia show considerably shorter time series. All in all, the data set covers the full time span since the central bank's establishment for most of the countries, with the median start year being 1942.

Temporal coverage since the establishment of the central bank

Chart 1



Source: BIS central bank total assets; authors' calculations.

Enlarging the family: the central bank total assets data set as part of the BIS's macroeconomic statistics

The BIS has a long-standing tradition of producing key financial and macroeconomic statistics. As the oldest international financial institution, its role in statistics emerged shortly after its establishment in 1930, primarily driven by the need to read “the obscure premonitory signs of financial weather” (BIS (1935)). As interest in macroeconomic aggregates sharpened after World War II and, more significantly, the collapse of Bretton Woods, the BIS began to systematically collect, exchange and release international financial statistics and macroeconomic indicators (Clement (2004)).

Over the years, and particularly since the Great Financial Crisis, the BIS's offering of macroeconomic statistics to the public has grown significantly. In the 2010s, the BIS expanded its statistics on property prices (2010 and 2014), credit to the non-financial sector (2013) and to the government (2015), consumer prices (2016), and nominal exchange rates and central bank policy rates (2017).

The compilation of BIS statistics has three major objectives. The first one is to ensure the highest degree of comparability of data across countries. Achieving comparability is a challenging task, particularly when methodologies differ across countries or, even more importantly, data sources are disparate. Typical cases are commercial property prices, for which there is no single best source for the compilation (Deryol et al (2019)), or credit to the general government, for which valuation and consolidation rules may show significant variation across countries (Erik (2015)). The second objective is completeness of the data. Completeness entails broad coverage of countries, for both advanced and emerging market economies. It also implies deep temporal coverage. Here, the compilation of long series is the third key objective. In fact, many policy questions require the analysis of long spans of data, particularly to grasp the interaction with macroeconomic and financial variables across financial cycles (Borio (2012)). In response, BIS statistics offer long series for key macro and financial statistics, including property prices, credit and policy rates (BIS (2017)).

With the new series on central bank total assets, the BIS statistics family expands once again, with no exception to these three objectives: the data set aims to ensure cross-country comparability, offers broad geographical coverage and features long time series. More distinctively, the central bank total assets data set shows the longest BIS-spliced series, with an average of a century of data per country. Data sets such as policy rates and credit go back to the late 1940s, covering the period since Bretton Woods for the former and the compilation of national accounts for many countries for the latter. In contrast, the central bank total assets series further delve into history and, whenever possible, backdate the data until the very year of establishment of the central bank.

Such broad and deep coverage, spanning several countries and long periods of time, ensures a harmonious integration of the long series on central bank total assets into the other BIS macroeconomic data sets. Primarily, these series form a natural family with the data on policy rates. Setting the (short-term) interest rate is one facet of monetary policy implementation. Long data on total assets bring the deployment of balance sheets by central banks into focus, further enriching the overall picture. Beyond that, central bank total assets also interconnect with other key BIS data sets to enable the analysis of interactions with key macroeconomic and financial variables, not least consumer prices and credit.

Building the long composite series: methodological principles and challenges

Data on central bank total assets originate from two main sources. On the one hand, central banks disclose their accounts through financial statements. Also known as accounting balance sheets, these are typically regarded as the main official source of data. On the other hand, and more recently, central banks have started to compile their balance sheet following monetary statistics. The monetary presentation, also called a statistical balance sheet, is particularly relevant to analyse the relationship between financial corporations, including central banks, and other institutional sectors, for instance through monetary aggregates (Cartas and Harutyunyan (2017)). The monetary presentation of central banks' balance sheets follows the monetary and financial statistics methodology. In that, it may feature differences with the accounting framework, not least due to different valuation rules as well as different recording, aggregation and consolidation practices.

The BIS-spliced series use financial statements as the primary reference. Accounting data are typically disclosed at least once per financial year for auditing purposes. This choice entails two fundamental advantages for the compilation of long series. First, it facilitates the backdating of the series, since accounting statements usually have been published since the establishment of the central bank. Secondly, and perhaps more importantly, it also ensures consistency across time in terms of sources, minimising the number of breaks caused by changes in methodologies. Nonetheless, other sources may have been used as a last resort to ensure the availability of higher-frequency (monthly and quarterly) data. In some jurisdictions, financial statements are only available annually, typically through annual reports. In such cases, the BIS constructed the long series by splicing the higher-frequency data from monetary statistics or other sources with longer but only annual financial statements.

Yet financial statements reflect specific institutional arrangements resulting in significant variations across countries and over time. More specifically, central bank balance sheets are based on accounting documents, raising a number of challenges. Firstly, accounting or financial statements are compiled by accountants whose primary purpose is bookkeeping for audit. As a result, the data differ from other statistics whose primary goal is to ensure cross-country comparability and consistency across data sets. Secondly, and perhaps more importantly, central banks' financial statements typically follow national accounting rules. In practice, only about one quarter of central banks around the world effectively apply international standards for financial reporting such as IFRS (Beja et al (2021)). Noteworthy examples are the Federal Reserve System, which uses the Financial Accounting Manual for Federal Reserve Banks (FAM), and the European System of Central Banks (ESCB), whose accounting framework also departs from IFRS (Archer and Moser-Boehm (2013) and Schwarz et al (2014)). Typical deviations range from the presentation of the items, valuation and provisioning methods to financial year and reporting lags. For example, although most central banks align their financial year with the calendar year (end of December), some opt to close their official accounts in other periods, for example February, March or June. Similarly, balance sheet data reporting lags can greatly vary across jurisdictions, from a few weeks to several quarters.

Beyond accounting frameworks, balance sheets fundamentally reflect a diverse array of institutional arrangements, as they are intrinsically linked to the

central bank's mandate. In fact, data on central bank balance sheets not only feature differences among countries because of specific national accounting frameworks; they also – perhaps more significantly – greatly vary across time. Undoubtedly, there is an important reason for this: central bank balance sheets fundamentally reflect major monetary policy interventions and, in general, historical monetary and financial developments. Indeed, as policy regimes change over time, so do fiscal and monetary policies. Those changes are, in turn, captured in the central bank's balance sheet, monetary policy framework and instruments and, ultimately, in the way they are recorded and reported in the statements. In this context, financial statements carry important policy implications based on the information they disclose and, for this reason, are inherently linked to the policy objectives of *each* central bank (Bholat and Darbyshire (2016)). Taken from this angle, achieving the compilation of fully standardised statistics on central bank balance sheets may well be a pious wish.

Overcoming challenges: how to compare without standardising

On a conceptual level, imperfect standardisation does not necessarily prevent comparability. Standardisation involves achieving complete alignment in terms of concepts, while comparison focuses instead on identifying similarities and differences based on *existing* characteristics. These may not necessarily conform to a common standard as long as there is a useful level playing field for comparing. In the case of central bank balance sheets, the common basis is the fact that, despite their differences, central banks primarily function as monetary authorities and, as such, they have similar statements at the highest level of aggregation. In this sense, producing statistics on total assets or balance sheet size – the highest aggregation possible – may already ensure meaningful, empirically driven comparability even when more granular items on the balance sheets may present differences across central banks. Statistical methods, such as splicing, break adjustment and other techniques to align, whenever possible, fiscal and financial years are also key to improving comparability.

On a practical and methodological level, the BIS ensured consistency within and across series by following two principles. First, whenever monthly data are available, the annual series always corresponds to the December observation in order to enhance comparability across countries (Box C). Since financial statements follow the financial year, the annual BIS-spliced series may differ from the figures reported by those central banks whose fiscal year does not match the calendar year. Second, annual series are always converted from monthly data. Therefore, if monthly monetary statistics are sourced in the absence of monthly financial statements, the annual series deviate from the annual financial statements. Finally, on a practical level, the data set also includes series adjusted for breaks, expressed in US dollars and as a percentage of GDP to facilitate better analysis and comparison across countries. The break-adjustment calculations follow the methodological framework specified in the *BIS Quarterly Review* published in March 2013.⁶

⁶ See Bank for International Settlements, *BIS Quarterly Review*, March 2013, p. 71.

Splicing long series on central bank total assets: from theory to practice

Constructing long series on central banks' balance sheet size is a complex task. It requires a number of methodological and practical considerations in order to properly collate, or splice, multiple series across time. The purpose of this box is to outline the splicing logic by translating the methodology outlined in Section 2 into a practical example.

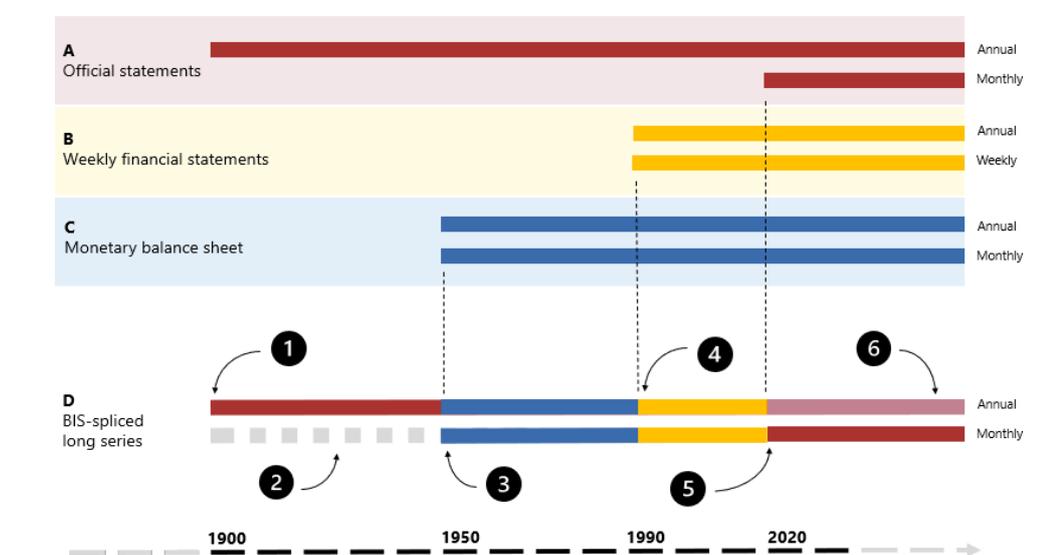
As a starting point, we take the case of a central bank for which data on the total assets are available under three different methodologies (Picture 1): official accounts (**A**), weekly financial statements (**B**) and monetary balance sheet (**C**). For each methodology, the top horizontal line indicates the annual coverage of the available series, while the bottom one represents the availability of higher-frequency data, for example weekly or monthly data. The BIS-spliced long series (**D**), shown at the bottom, represent the result of the splicing.

To start, annual data from official accounts are available from the central bank's establishment, as shown by the red line at the top (**1**). The official annual data are aligned with the central bank's financial year, which we assume starts in April of year y and ends in March of $y + 1$. As a result, the BIS-spliced series features only annual data for the early periods of the central bank (**2**).

Yet, since 1950, the central bank has disclosed its monthly balance sheet compiled for the purpose of monetary statistics (**3**). Because higher-frequency data are available from this period onwards, the BIS-spliced series splices the monthly monetary data. From 1990 onwards, data sourced from weekly financial statements become available. These are closer to but not fully consistent with the official accounts; the BIS-spliced series introduces a new break (**4**). Starting in 2020, the monthly statements aligned with the annual official statements are released; consistent with the target methodology, the BIS-spliced series chains with the corresponding series (**5**). However, since monthly data are available, the annual series is derived as end-of-December value to improve cross-country consistency. Hence, it deviates from the annual figure reported in the official accounts, which follows the financial year (end of March) (**6**).

Splicing of long series on central bank total assets: an example

Picture 1



Source: authors.

3. Towards an adaptive and multidisciplinary statistical practice for compiling long series

The apparent simplicity yet intricate nature of compiling long series calls for a solid, integrated and comprehensive methodological and compilation framework.

At a conceptual level, extensive efforts have been undertaken to offer an integrated approach to the construction of historical macro-financial statistics.

One key initiative is the historical monetary and financial statistics (HMFS) project, established under the aegis of the Bank for International Settlements (BIS) and Irving Fisher Committee on Central Bank Statistics (IFC), which has recently achieved a significant milestone by producing a unified framework for historical monetary and financial statistics (Bignon et al (2022)). In practice, this framework addresses two critical considerations. First, it offers a way forward to overcome the major limitations of existing measures in macro-financial historical statistics, in particular to ensure cross-time and cross-country comparable long series (Borio (2023)). Second, it underscores the importance of integrating statistical and historical expertise into the compilation process, notably in order to mitigate a “recency bias”, which involves constructing and analysing historical data solely through the lens of the present. Embracing the role of “statistorian”, an expert fluent in the languages of both history and statistics, is essential for measuring the past to better understand the present.

This unified approach translates into a number of practical considerations.

First, in order to enhance comparability, statisticians shall ensure full transparency on the compilation through metadata. This involves giving an extensive account of the raw source used, the compilation methods applied and the statistical techniques employed, for example break adjustment. It also entails explaining the steps involved in the construction of the series, as well as the strengths and limitations, and enabling users to retrace the splicing logic. Second, compiling long series also requires a bottom-up, empirically driven approach. In practice, a statistical concept such as total assets is defined by looking at the evolving presentation of the balance sheet across time and countries. The series needs to pragmatically track subsequent variations in the concept across time, rather than inferring an ideal one from the present. The use of archival resources may bring considerable added value in this regard, as it can help reveal the evolution of statistical concepts in conjunction with historical changes, such as shifts in how central banks disclose their balance sheet (Thomas (2024)). Finally, collating series to derive long ones involves various statistical techniques, including treating discontinued series, monetary conversions and legacy currencies and, last but not least, adjusting for breaks. For example, the BIS data set also offers series adjusted for breaks as part of central bank total assets, following a unified approach also employed in other long BIS series (BIS (2013)).

More fundamentally, constructing long series calls for a multidisciplinary and adaptive statistical practice. Producers and users of long series are unavoidably confronted with a simple yet critical requirement: to deeply understand the context of the data. From the practitioner perspective, the compilation of historical series requires appreciating their background, requirements and peculiarities. It also entails critically questioning what can and cannot be compared, as well as the appropriateness of measurement tools. In the case of the long series on central bank balance sheets, statisticians often find themselves in situations where historical expertise is required, for example, to balance the idiosyncrasies born out of national arrangements with the desire for intertemporal and interspatial consistency.

Additionally, accounting knowledge is also required, not least to grasp nuances in valuation methods. On the other hand, users shall also be aware that any historical statistics – not to say *any* statistics – are always the result of many decisions, assumptions and trade-offs. Understanding what the underlying choices are and how those statistics are manufactured is critical to avoid misuse and misinformation. All in all, both producing and using long series call for an adaptive statistical mindset and practice (Damouras et al (2021)), mixing qualitative approaches to capture the peculiarities of time and geography with quantitative methods for comparing and ensuring consistency. This adaptive practice is proven to be challenging yet very rewarding.

Annex

Characteristics of the series included in the data set

Summary of attributes

Table 1

Country	Establishment of the central bank	Start of the BIS-spliced series		Number of spliced series ⁷	Spliced sources		
		Annual ⁸	Monthly		Financial statements		Monetary
					Annual reports	Other ⁹	
Sweden	1668	1668	Sep 1999	2	✓	✓	
United Kingdom	1694	1696	Sep 1844	4	✓	✓	
France	1800	1800	Jun 1840	6	✓	✓	✓
Norway	1816	1817	Jan 1950	4	✓	✓	
Portugal	1846	1823	Dec 1979	5	✓	✓	✓
Denmark	1818	1839	Jan 1987	2	✓	✓	
Belgium	1850	1851	Jan 1999	7	✓	✓	
Spain	1856	1856	Jan 1962	4	✓	✓	✓
Netherlands	1814	1865	Dec 1982	4	✓	✓	✓
Finland	1811	1868	Jan 1868	3	✓	✓	
Germany	1948	1876	Sep 1948	4	✓	✓	
Japan	1882	1882	Jan 1953	2		✓	
Italy	1893	1894	Jun 1936	6	✓	✓	✓
Switzerland	1907	1907	Jan 1948	2	✓	✓	
United States	1913	1914	Nov 1914	2		✓	
Peru	1922	1922	Jan 2006	2	✓	✓	
Austria	1923	1923	Sep 1955	4	✓	✓	
Mexico	1925	1925	Jan 1977	2	✓	✓	
Chile	1925	1926	Jan 2011	3		✓	✓
South Africa	1921	1926	Jan 1964	2	✓	✓	
Greece	1927	1928	Mar 1998	2	✓		
Türkiye	1931	1932	Jan 1986	3	✓	✓	
Argentina	1935	1935	Jan 1998	2	✓	✓	
Canada	1934	1935	Mar 1935	1		✓	
India	1934	1935	Oct 1945	4	✓	✓	
New Zealand	1934	1935	Oct 1993	3	✓	✓	

⁷ Primary series may also include discontinued series.

⁸ Highlighted if the BIS-spliced series starts with the establishment of the central bank or earlier than 1900.

⁹ For example, it may include weekly or monthly financial statements that are not fully aligned with the statements of financial position published in the annual report of the central bank.

Characteristics of the series included in the data set

Summary of attributes

Table 1

Country	Establishment of the central bank	Start of the BIS-spliced series		Number of spliced series ⁷	Spliced sources		
		Annual ⁸	Monthly		Financial statements		Monetary
					Annual reports	Other ⁹	
Ireland	1943	1943	Sep 1997	4	✓	✓	✓
Hungary	1924	1949	Jan 1998	3			✓
Philippines	1993	1950 ¹⁰	Jul 1993	2	✓		
Indonesia	1953	1953	Dec 2001	2	✓		✓
Korea	1950	1954	Jan 1970	2	✓		
Thailand	1942	1958	Dec 1975	4	✓	✓	✓
Australia	1960	1959	Jul 1969	3	✓	✓	
Malaysia	1959	1959	Jan 1998	2	✓	✓	
Saudi Arabia	1952	1961	Jan 2000	2	✓	✓	
Brazil	1964	1965	Jul 1994	2	✓	✓	
Israel	1954	1966	Jan 2001	2	✓		
Kuwait	1968	1969	Apr 1969	2		✓	
Poland	1924	1971	Dec 1996	2	✓		✓
United Arab Emirates	1973 ¹¹	1974	Dec 1974	1	✓		
Singapore	1970	1975	Jan 1991	2		✓	
China	1948	1985	Dec 1999	4	✓		✓
Slovenia	1991 ¹²	1991	Dec 1991	3	✓	✓	✓
Czechia	1993 ⁵	1993	Jan 1993	1		✓	
Hong Kong SAR	1993	1993	Dec 1998	2	✓		
Slovakia	1993 ⁵	1993	Jan 2006	3	✓	✓	✓
Estonia	1990 ⁵	1994	Jan 1994	3		✓	
Lithuania	1990 ⁵	1994	Jun 2004	3	✓	✓	✓
North Macedonia	1992 ⁵	1995	Dec 1995	3	✓		✓
Latvia	1990 ⁵	1996	Jan 1996	3		✓	✓
Luxembourg	1998	1998	Jun 1998	1		✓	
Euro area	1998	1998	Dec 1998	1		✓	
Croatia	1990 ⁵	1999	Dec 2010	3	✓	✓	

¹⁰ The Bangko Sentral ng Pilipinas (BSP), the central bank of the Republic of the Philippines, was established on 3 July 1993. The BSP took over from Central Bank of Philippines, which was established on 3 January 1949, as the country's central monetary authority. The BSP enjoys fiscal and administrative autonomy from the national government in the pursuit of its mandated responsibilities.

¹¹ The United Arab Emirates Currency Board was established in May 1973, followed by the establishment of the Central Bank of the United Arab Emirates in December 1980.

¹² The establishment date corresponds to the date of re-establishment.

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Irving Fisher Committee on
Central Bank Statistics



Opportunities and challenges in compiling long series: the BIS central bank statistics

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XII Biennial of the Irving Fisher Committee on Central Bank Statistics

Basel, 23 August 2024

The size of central banks' balance sheets: a key indicator

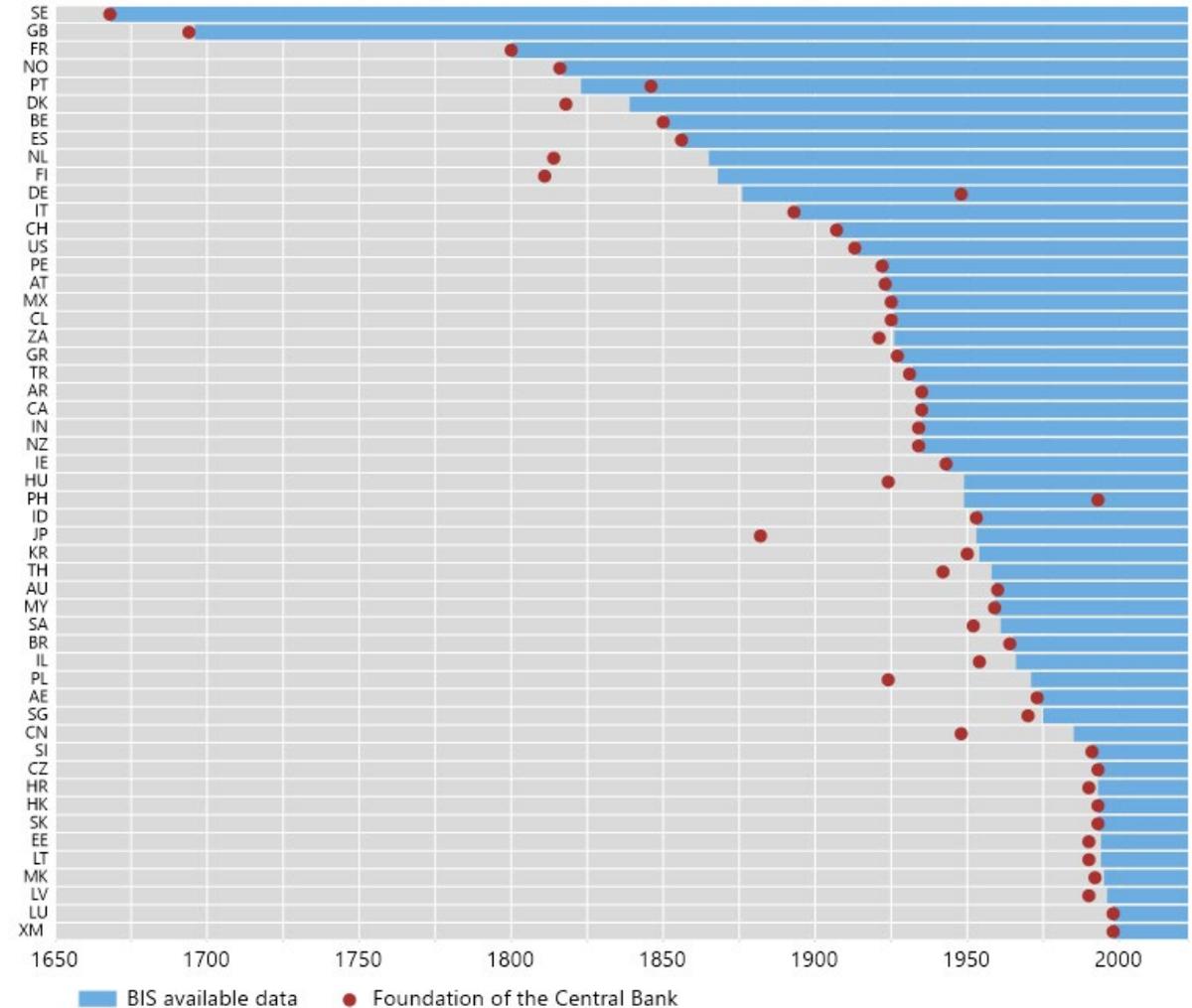
- **Central bank balance sheets** have gained **significant momentum** in the public debate over the past few decades
 - Global financial crisis, the pandemic and, more recently, unprecedented globally-synchronised contraction in central banks' balance sheets
 - They reveal much about monetary policy, financial stability and, broadly, the economy
- Yet, what is needed is **keeping sight on the long run**
 - Documenting extraordinary events and locating periods with large swings
 - Evolution of balance sheets across financial cycles
 - Secular trends in central banking
 - Derive lessons from the past to better assess the present and guide decisions in the future

Outline

- I. A new BIS data set on central bank total assets
 - I. A historically deep and geographically broad data set
 - II. Building the long composite series: methodological principles
- II. Delving into the expansions and contractions of central banks' balance sheets: some stylised facts over the long run
- III. Going beyond compilation challenges: empowering data with metadata

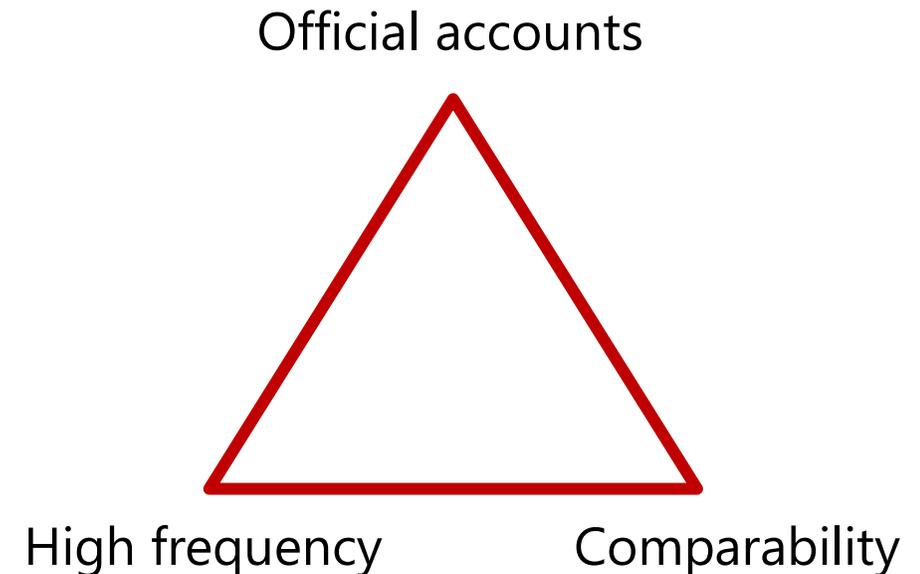
The new BIS data set on central bank total assets

- Broad coverage with 52 countries
 - 23 emerging market economies
 - 29 advanced economies
- Deep coverage with longest BIS series:
 - Average length (years): 93
 - Median start date: 1942
 - Earliest start date: 1668
- Data available since the foundation of the Central Bank for most of the countries



I. Building the long composite series: methodological principles (1/2)

- Alignment with the **official accounts** of the Central Banks
 - Usually available since the establishment
 - Annual audited reports
- High available frequencies: **monthly**, quarterly, annual
- **Comparability** across countries
 - Harmonise financial years from monthly series
 - Break-adjustment (eg BIS Quarterly Review (2013))



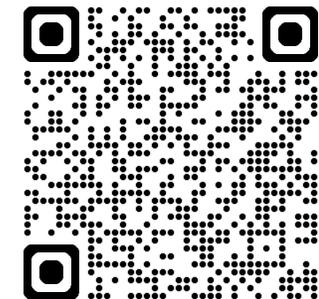
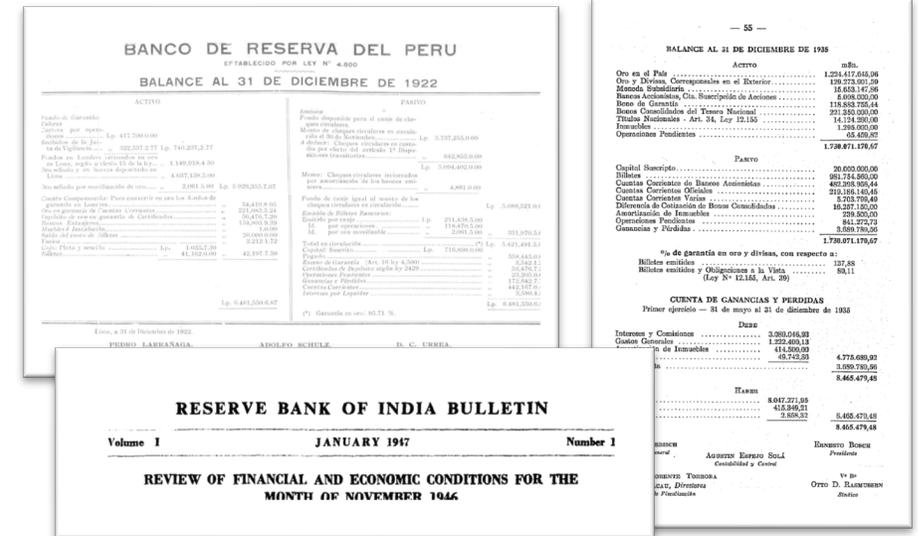
I. Building the long composite series: methodological principles (2/2)

- Diverse **array of sources**

- Central banks
- Digitised repositories
- Historical work and archives

- The data set is **live since August 20** on the BIS Data Portal

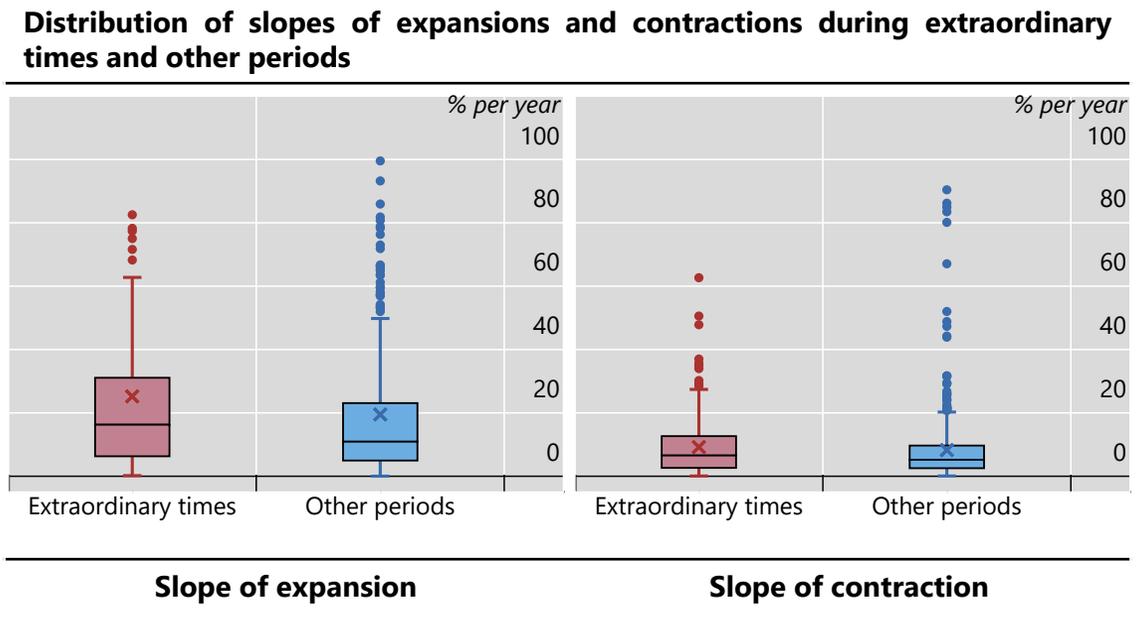
- Monthly, quarterly and annual
- USD, ratio to GDP and domestic currency
- Break-adjusted and unadjusted for breaks



II. Delving into the expansions and contractions of central banks' balance sheets

- **Three key stylised facts**, at a glance:

- Over the long run, **expansions have been more frequent than contractions**
 - Central banks expand their balance sheet two and half times more frequently than they decrease it
- **Expansions are bigger than contractions**
 - In terms of magnitude, expansions are twice as much as contractions
- **Expansions are fast, contractions are prolonged**, particularly when crises hit.



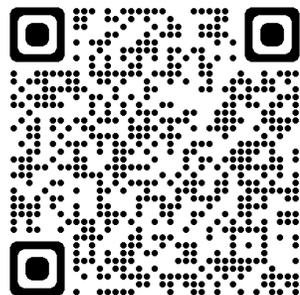
III. Overcoming compilation challenges: looking forward

- **Comparability without standardisation is hard yet attainable**
 - Data on central banks' balance sheets are from **accounting documents, not statistical ones**
 - Balance sheets reflect a **diverse array of institutional arrangements** which are born out of each central bank's specificities
 - **Transparency is key:**
 - Enriching and **augmenting the data with metadata**
 - **Fostering the understanding of the data:**
 - For producers, this implies **critically questioning** what is comparable and what is not
 - For users, it entails **understanding how data are manufactured**
 - **All in all, long series call an adaptive and multidisciplinary statistical practice**

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Thank you !

Annex

Splicing of long series on central bank total assets: an example

