Irving Fisher Committee on
Central Bank Statistics

BIS

12th biennial IFC Conference: "Statistics and beyond: new data for decision making in central banks"

22-23 August 2024

Using archival data at the Bank of England to understand the evolution of central bank balance sheets[1]

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[1] This contribution was prepared for the conference. The views expressed in this publication are those of the authors and do not necessarily represent the official views of the Committee, its members, or the BIS.

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Abstract

As central banks undertake Quantitative Tightening, there are important decisions to make on the ultimate size and composition of their balance sheets. For example, there is a debate about whether the ample reserves regimes, that largely emerged following the crisis of 2008, should be retained going forward, or whether should central banks return to a world where their balance sheets are as small and riskless as possible? The Bank of England has a long history of money market operations which might inform this debate. The recent BIS project to reconstruct historical balance sheet data for the Bank of England and other central banks (Bogdanova et al. (2024)) provides an important first step. But public disclosure of the Bank's operations was limited in official publications on which much of the historical balance sheet data relies. This paper considers the hidden insights that can be gleaned from archival evidence on the Bank's balance sheet. To map into the current debate, the liquidity draining operations employed by the Bank during World War 1 are used as a case study.

Keywords: Central bank balance sheets, liquidity, money market operations, historical monetary and financial statistics

JEL classification: E50, E58, N20, C82

1. Introduction

As central banks undertake Quantitative Tightening, there are important decisions to make on the ultimate size and composition of their balance sheets. Currently, there is a debate about whether central banks should continue with large balance sheets associated with the "ample reserves" regimes that emerged following the financial crisis of 2008, or whether central banks should return to a world where their balance sheets are as small and riskless as possible (Borio (2023)). This question is intimately related to how tightly central banks should control short-term money market rates though their operations.

The Bank of England has a long history of money market operations which might inform this debate. The recent BIS project (Bogdanova et al. (2024)) to reconstruct comparative historical balance sheet data for the Bank of England and other central banks provides an important first step in that process. However, public disclosure of the Bank's operations was limited in official publications and much of the historical data on the balance sheet had to be derived from archival evidence. Parallel work by the HMFS network of the IFC has explored the reasons behind limited disclosure and considered what additional insights might be gleaned from archival evidence at central banks.

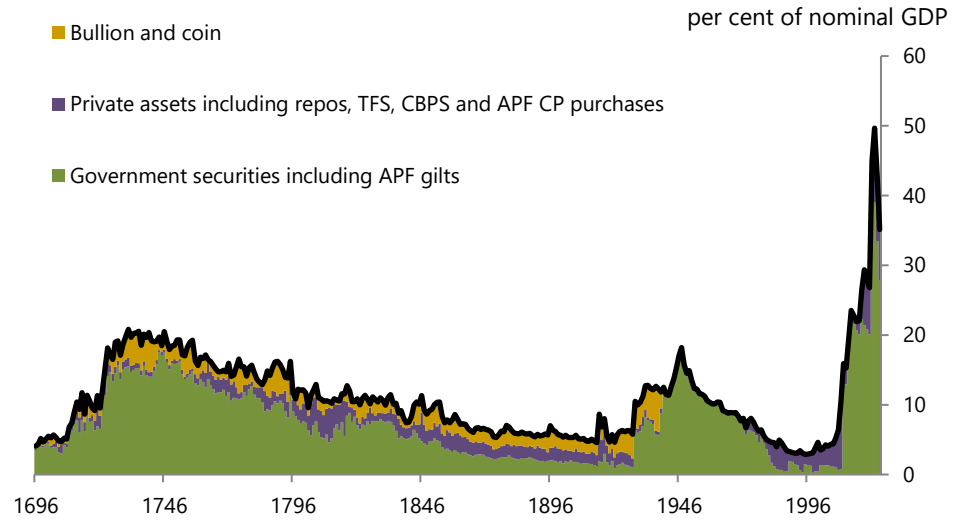
This paper considers the use of archival evidence to derive historical statistics on the Bank of England's balance sheet and how that can be used to understand its *modus operandi* over time. We focus on the hidden insights and operations that can be gleaned from the available archival evidence which can shed light on how the Bank dealt with issues similar to those experienced by central banks today. In particular, we show that analysing movements in the composition of the central bank balance sheet are often just as important as the overall size of the balance sheet, especially when accounting treatments differ across time. We use a case study of the Bank's operations during World War 1 to show that the *de facto* balance sheet was considerably larger than the disclosed statistics when compiled on a comparative basis and reveals the extent to which the government borrowed secured from the banking system, with the Bank of England in effect an intermediary.

2. Historical Bank of England balance sheet data

A near-complete record of the Bank's annual balance sheet is available back to its inception in 1694. This has been digitised and put into spreadsheet form on the Bank's website (see **Figure 1** for an asset breakdown). A weekly public record of the balance sheet was also published from 1844 onwards as part of the provisions of the Bank Charter Act of that year. This higher frequency data has also been digitised and made available in a spreadsheet up to 2006, when there was a change in the presentation and disclosure of the reported balance sheet items. These historical data form the basis of the BIS historical series by Bogdanova et al. (2024).

Figure 1

The Bank of England Consolidated Balance Sheet 1696-2024



These data show the unprecedented expansions of the Bank of England balance sheet in the period after the Great Financial Crisis and the Covid pandemic, even when compared with the expansions in the World War periods. However, focusing simply on the reported aggregate balance sheet movements does not always tell the whole story.

Sometimes monetary policy operations were carried out which were not visible or not reported on-balance sheet. For example, the Special Liquidity Scheme (SLS) and Funding for Lending Schemes (FLS) introduced in the financial crisis were carried out as collateral swaps and so do not appear on the published balance sheet. In addition, supplementary accounts and balance sheets were often used to cover certain operations that were not treated as part of the main balance sheet, in part because they were viewed as temporary or were operated on behalf of the fiscal authority. In the UK, the Currency Note Redemption Account (CNRA) was established at the outset of the World War 1 to manage an emergency issue of Treasury notes. These notes were only amalgamated with the Bank's note issue much later in 1928 causing a jump in the reported balance sheet between 1928 and 1929. A casual observer of the headline balance sheet data might mistake this that jump as a response to the 1929 stock market crash. Similarly, after 1931 foreign exchange intervention has been carried out via the separate Exchange Equalisation Account which the Bank manages on behalf of the government. So, it is important to make users of the data aware of such supplementary information by reporting them alongside the balance sheet.

Changes in the composition of the balance sheet can be as important as the size in understanding how central banks have used their balance sheets to promote monetary and financial stability. For example, during the classical Gold Standard outflows of gold would typically reduce central bank balance liabilities other things equal. The central bank might then actively attempt to sterilise those movements by purchasing assets or lending to the financial system for monetary

policy or financial stability purposes. As a result, there might be little obvious change in the overall size of the balance sheet. But shifts in the composition of assets would reveal the stabilisation activity of the central bank.

Moreover, accounting and disclosure procedures have changed over time which may hamper direct comparisons of the balance sheet over time. Some operations that we would account for today as a switch between different types of liabilities - for example when a central bank borrows secured from a commercial bank via a repo transaction - was often accounted for as a contraction in the balance sheet in earlier times given how the collateral underlying the operation was treated. This means that digging beneath the aggregated categories in the disclosed data is often important for understanding what was happening in particular historical episodes.

Archival data is often vital in uncovering and elucidating these issues. The Historical Monetary and Financial Statistics (HMFS) network of the IFC has explored the reasons behind limited disclosure by central banks and considered what additional insights might be gleaned from archival evidence at central banks. The historical Bank of England data, both disclosed at the time and published retrospectively, were drawn from various underlying ledgers used internally at the Bank and which are still accessible at the Bank of England Archive. The next part of the paper looks at the data pipeline from these published records back to the original ledgers. This allows the published information to be unpacked at a more granular level to reveal more detail about the Bank's operations and balance sheet composition. We then look at case study examining the liquidity draining operations by the Bank during the First World War and how they relate to the facilities operated by central banks today.

3. The data pipeline from published data to archival records

I Reporting and disclosure of the Bank's balance sheet both before and after 1844

It is useful to begin by reviewing how and when the Bank began to disclose details of its balance sheet. Before the early C19th, the Bank had not been required to produce a regular account of its balance sheet. Indeed, it was not until four years into that the accounts had settled to a regular pattern. In 1696, however, the Bank did furnish some figures to Parliament from which a balance sheet, dated 10th November 1696, was produced. It was following various financial crisis and the inflation that occurred during the "Restriction period" of 1797-1821 (when the Bank suspended convertibility of its notes into gold) that more information was supplied following various Parliamentary enquiries at which the Bank gave evidence. That evidence including details on its balance sheet. These appeared in the Appendices of those reports and which are available in digital form in the Hathitrust digital library (links are provided to the relevant pages of the reports below).

Some tables giving particulars of the note circulation were published in 1819, in connection with the "Secret Committee on the Expediency of the Bank resuming Cash Payments". No further figures were then published, so far as is known, until 1832. In that year a Parliamentary Committee, which sat " ... to inquire into the Expediency of renewing the Charter of the Bank ... ", were supplied with figures extracted from the Bank's general ledgers by William Smee, then Chief Accountant. These figures were later extended in scope and time, and published in Report from Select Committee on banks of issue 1840**,** as an appendix to the Report of the Committee on Commercial Distress 1848, and, later, to that of the Committee on the Bank Acts 1857.

The annual data comprised notes in circulation, rest (i.e. the balance on profit and loss account), deposits, securities, and the Bank's holdings of coin and bullion, for each half year from February 1778 to August 1847. Weekly data from 1832 were also made available, with a breakdown of some categories of assets and liabilities that were not made available after 1848.

The Bank Act 1833 required an account of notes in circulation, deposits, securities, and coin and bullion to be supplied weekly to the Chancellor of the Exchequer, and the average of the preceding three months to be published monthly in The London Gazette (see, for example here). This "Average State of the Bank Accounts" was not published after 16th August 1844 when regular weekly publication of figures commenced on 7th September 1844 in the form that would be known as "The Bank Return", in accordance with the Bank Charter Act of that year (see example here). The Charter Act split the Bank into separate Issue and Banking Departments each with its own balance sheet presentation. That Bank Return continued relatively unchanged until 2006 when reforms to the money market led to a different presentation which provided more granular information on the Bank's operations under the new arrangements.

In 2012, the Plenderleith Review of the Bank's provision of emergency liquidity assistance (ELA) recommended that the Bank should consider ceasing full publication of its balance sheet weekly in order to improve its ability to provide covert liquidity assistance in the future. In response the Bank switched from October 2014 to producing a Weekly Report that provided data only on assets and liabilities generated through the Bank's monetary policy operations, typically disclosing over 90% of the balance sheet by value. The full balance sheet was to be published only quarterly with a 5 quarter lag supplemented by an end February observation in the Bank's Annual Report typically published in June or July of the relevant year. That means the high frequency time series estimates of the Bank's balance sheet at a monthly or weekly frequency only cover disclosed assets from 2014 onwards and understate the true balance sheet. Although benchmarking to the lagged quarterly data and Annual Report estimates of the full balance sheet is possible using Chow Lin or other methods, the high frequency Weekly Report data refer to Wednesday observations and typically do not synchronise with the end quarter or financial year data observations. This considerably reduces the value of making benchmarking adjustments.

II Published Secondary Sources

In addition to the public disclosures from the Bank, various financial historians and Bank staff built on these estimates in various books articles, many of which were drawn from additional material in the Bank's archive. Sir John Clapham, in The Bank of England: A History, Volume I, Appendix C (Cambridge, 1944), republished William Smee's figures for notes in circulation, rest, and coin and bullion, and added drawing accounts (private customer deposits) which he obtained from the Bank's ledgers. He also carried the figures back to 1720.
In 1953 Gayer, Rostow and Schwartz published their volume on *The Growth and Fluctuation of the British Economy 1790-1850*. Underlying this work was the data annex (available here) compiled by Anna Schwartz and contained a number of monthly time series on various components of the Bank of England balance sheet, such as bills and notes discounted on the asset side and note circulation on the liability side. This drew on earlier unpublished work by Norman Silberling, who had obtained these various series from the Bank's archive[1] which formed the basis of Silberling (1923). A later paper by Fetter (1967) criticised these monthly figures given that they were a subset of the data published in earlier Parliamentary reports (and in the 1967 QB article) and showed quite a different pattern from the more aggregated totals.

In 1962, the Archives Section of the Bank started a re-examination of the Bank's earlier ledgers known as "The Bank Return Exercise". The reason for this interest was sparked by two studies in the early 1960s. The first was an essay by R.D. Richards essay on the Bank of England that would appear in Van Dillen's *History of the Principal Public Banks*. Later Horsefield and Yamey produced an unpublished paper on the Bank's balance sheet figures prior to 1720, which they had extracted from the Archive. Stimulated by this the Bank's archivists spent several years extending the work to cover the period 1698-1939. The year 1698 was chosen, as the Bank's accounts had not until then settled to regular pattern. The post-1844 period was based on the Bank Return figures but consolidated the Banking and Issue Department accounts to be consistent with earlier years. Finally, this was extended back to 1696 and forward to 1966 and the final result was published in a Quarterly Bulletin Article in 1967 with a Data Appendix. The project involved going back to the original ledgers from which the published figures originated and required a detailed reconciliation of the figures produced by Smee and others. A record of this journey was carefully documented and stored away in the Bank's archive. This record provides an invaluable guide to the "data pipeline" between published estimates and the ledgers and shows what further detail can be extracted from those ledgers.

III From published estimates to the ledgers

This section contains a preliminary investigation of how published estimates discussed above link back to the Bank's underlying ledgers available in the archive,

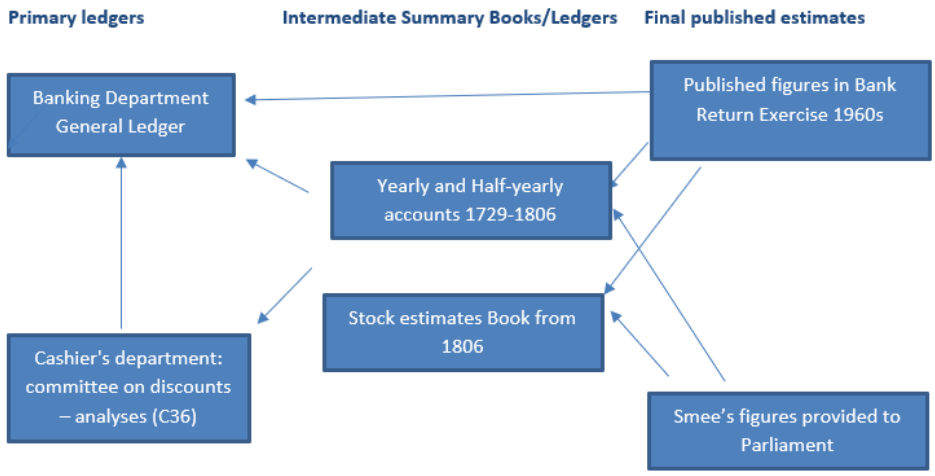
[1] In 1920 the Bank of England furnished Silberling semi-monthly figures from its records for the years 1794-1830. Initial investigations by the author suggest these figures were "low lying fruit" drawn from the Bank's General Ledger (see below).

and what extra information those ledgers might contain. It is useful to split the data pipeline between the period before and after the 1844 Charter Act.

a) 1696-1844

For the pre-1844 period, the Bank Return Exercise in the 1960s drew heavily from a set of Annual and Half-Yearly Accounts from 1729 and then, from 1806, what are known as the Stock Estimates Books. These in turn were summary ledgers derived from the Banking Department General Ledger and possibly, later on, from the Discount Office ledger summaries in the early C19th. For the figures in the very earliest years (before the figures in the 1729 yearly accounts), the Bank Return exercise drew directly on the Bank's General Ledger, where balance sheet summaries were written in at the end of the year. **Figure 2** summarises the data pipeline from ledgers to published estimates. The Bank Return exercise also attempted to retrace Smee's steps through these ledgers in the figures he produced for Parliament in the C19th. A description of the key ledgers (with links to the online catalogue) are given in Appendix 1.

Figure 2: Data Pipeline for 1696-1844

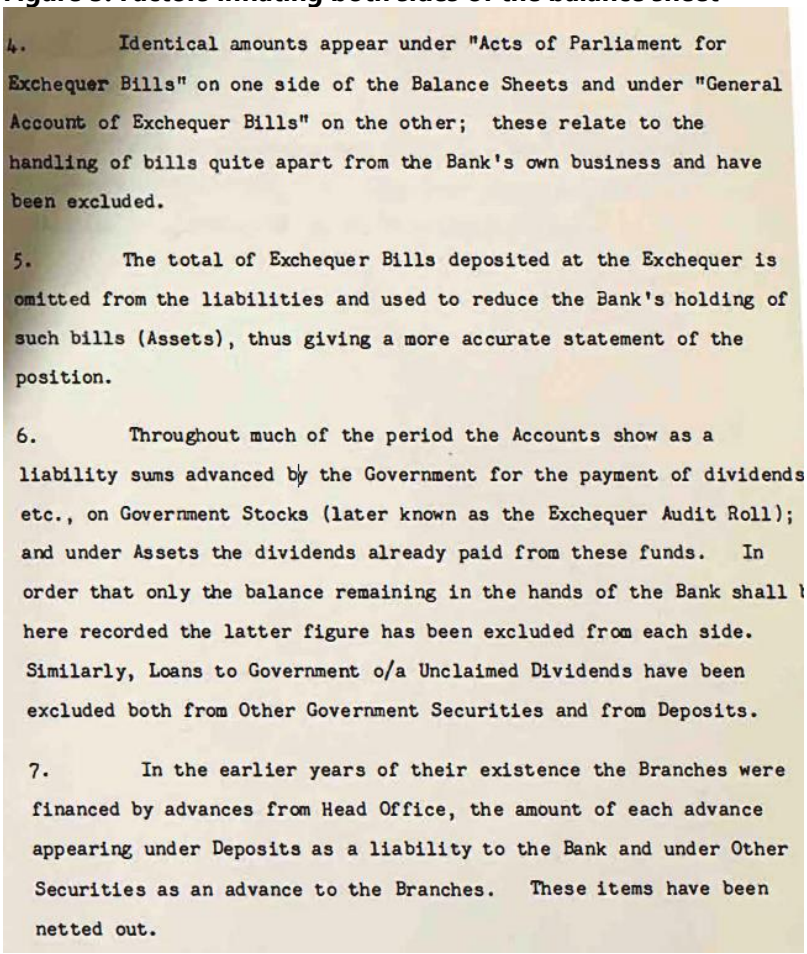


Initial investigations suggest that the semi-monthly figures supplied to Silberling in the 1920s also come from the Banking Department General Ledger. The General Ledger provided running accounts of the Bank's incomings and outgoings on bills, notes and gold, throughout the year but not in a simple balance sheet form (other than at the end of the year). In providing Silberling with bi-monthly figures, it looks as though the 1920s archivists took the "low lying fruit" (i.e. those entries in the Ledger that stock positions could be drawn from easily) see Figure 5 below for the running account on Bills and Notes.

The Bank Return exercise revealed a number of issues with extracting balance sheet figures from the underlying ledgers. A particular issue was that the balance sheet data presented in the Stock Estimates often involved both sides being inflated by various factors, that both Smee and the Bank Return Exercise authors felt the need to adjust for. This suggests that careful examination of the components of the balance sheet is often important in determining the size of the overall balance

sheet. A couple of examples related to the Bank's management of Exchequer bills and Head Office advances to the Bank's branches are shown in **Figure 3** below.

Figure 3: Factors inflating both sides of the balance sheet



4. Identical amounts appear under "Acts of Parliament for Exchequer Bills" on one side of the Balance Sheets and under "General Account of Exchequer Bills" on the other; these relate to the handling of bills quite apart from the Bank's own business and have been excluded.

5. The total of Exchequer Bills deposited at the Exchequer is omitted from the liabilities and used to reduce the Bank's holding of such bills (Assets), thus giving a more accurate statement of the position.

6. Throughout much of the period the Accounts show as a liability sums advanced by the Government for the payment of dividends etc., on Government Stocks (later known as the Exchequer Audit Roll); and under Assets the dividends already paid from these funds. In order that only the balance remaining in the hands of the Bank shall b here recorded the latter figure has been excluded from each side. Similarly, Loans to Government o/a Unclaimed Dividends have been excluded both from Other Government Securities and from Deposits.

7. In the earlier years of their existence the Branches were financed by advances from Head Office, the amount of each advance appearing under Deposits as a liability to the Bank and under Other Securities as an advance to the Branches. These items have been netted out.

A similar issue relates to Bank of England notes "held in the Bank". These were notes the Bank had issued but were retained or held internally and not in actual circulation. Some of these were notes that had been returned to the Bank either in exchange for gold or in settlement for a bill of exchange or deposited in a drawing account. Rather than destroying these notes, the Bank typically retained them in storage ("store notes") for potential re-issue rather than have to print new notes at additional cost. These retained notes were accounted for as both and asset and a liability of the Bank and this was the treatment followed in the 1967 QB article. The modern treatment would typically suggest that only notes "in circulation" outside the Bank should be treated as a true liability to other sectors and so notes retained internally needed to be netted out of total issuance to obtain the consolidated balance sheet of the Bank. This consolidated approach to notes is the approach taken in Bogdonova et al. (2024).

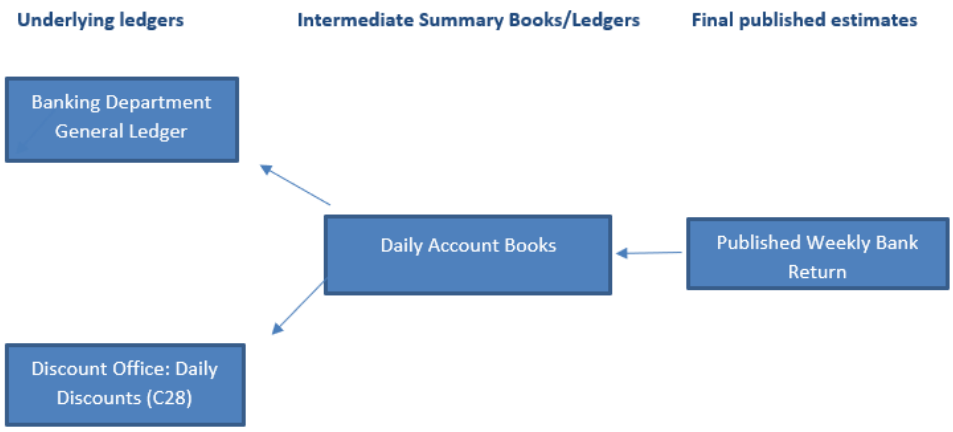
However, it is still important to record what happens to notes in the Bank. After the Bank Charter Act of 1844 these notes had increased operational significance as they formed the reserve of the Banking Department, which under the constraints of the

Bank Charter Act[2] gave it limited and - as subsequent financial crises would demonstrate - insufficient discretion to expand notes in circulation when required. Following the establishment of the Issue Department on 31st August 1844 all notes at Head Office and the branches were transferred to a special account. From this account notes to the value of £6,813,660 were transferred to the Banking Department in payment for securities, coin and bullion transferred to the Issue Department; this formed the Banking Department's reserve; the remaining notes were excluded from the Bank Return. As a result, the reported amount of notes held by the Bank dropped from over £31 million in February 1844 to under £9 million in February 1845. From this point movements in the Banking Department's holdings of notes became an important fulcrum of the Bank's operations (Anson et al. (2017)).

b) The pipeline from 1844 onwards

After 1844, the Bank Return Exercise relied on the figures published in the weekly Bank Return rather than those that appeared in the Stock Estimates that, as discussed, were used in the pre-1844 estimates. The Weekly Bank Return itself was compiled from a new series called the Daily Account Books which are available from the early 1850s and were presented to the Governors and signed off at the weekly "Books meeting" as shown in **Figure 4** below.

Figure 4: Post-1844 data pipeline



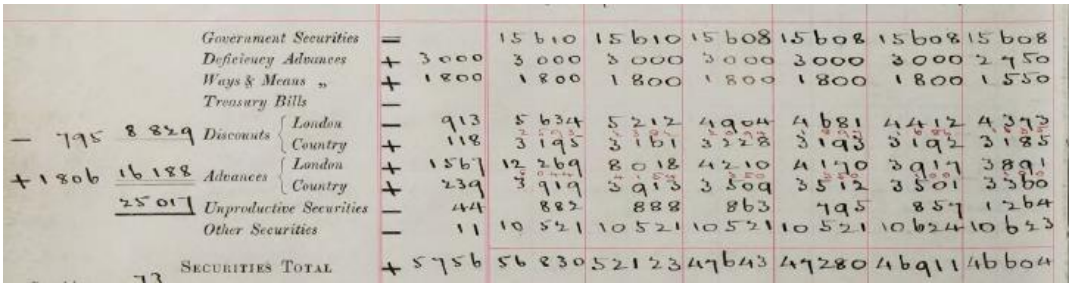
The Daily Books themselves were drawn from both the General Ledger but also from the increasingly more sophisticated ledgers on the Bank's discount and advances business, in particular the daily discount ledgers. Both the Daily Account Books and the Daily Discount Ledgers contain time series data on balance sheet

[2] Under the Bank Charter Act of 1844 the total stock of issued notes was linked to the bullion holdings of the Bank save for a fixed "fiduciary issue" which could be backed by securities. This was institutionalised by setting up separate a "Issue Department" of the Bank which held gold and securities against the notes issued by the Bank. The remaining "Banking Department" of the Bank held some of the Issue Department's notes as a reserve which it could use to purchase securities should it feel the need to bolster the notes in circulation even if the total stock of notes was pinned down by the Bank's gold reserve. The Banking Department reserve of notes was often known as the "unused" part of the Bank's overall gold reserves.

items at a much more granular level. Below we discuss the extra information and show the linkage between the Daily Account Books and the Discount Ledgers.

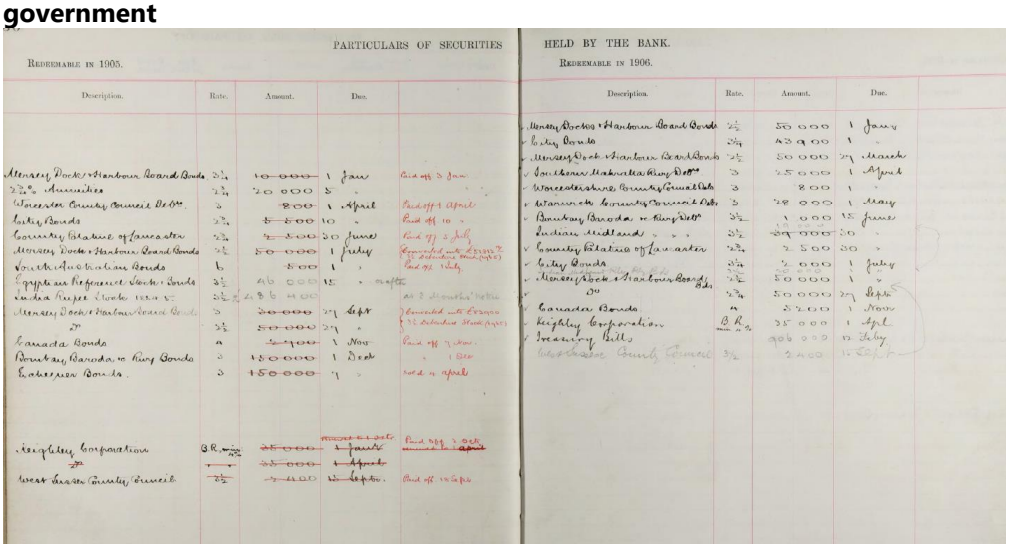
The Daily Books contain a more granular breakdown of assets not contained in the published weekly Bank Return. It shows a breakdown of discounts and advances as well as the split between Head Office and the Bank's branches in the country. It also has entries for unproductive securities and a breakdown of government securities. The Daily books also have a lot of information on the type of investments held by the Bank. On the liability side, there is also breakdown of "other private deposits" i.e. those other than the government and bankers. These are shown in **Figures 5 to 7** below.

Figure 5: Breakdown of Discounts and Advances and between Head office and Branches



Government Securities	=	15 610	15 610	15 608	15 608	15 608	15 608	
Deficiency Advances	+ 3 000	3 000	3 000	3 000	3 000	3 000	2 750	
Ways & Means "	+ 1 800	1 800	1 800	1 800	1 800	1 800	1 550	
Treasury Bills	—							
— 795 8 829 Discounts London	— 913	5 634	5 212	4 904	4 681	4 412	4 393	
Country	+ 118	3 195	3 161	3 228	3 193	3 192	3 185	
+ 1806 16 188 Advances London	+ 1567	12 269	8 018	4 210	4 170	3 917	3 891	
Country	+ 239	3 919	3 913	3 509	3 512	3 501	3 560	
25 017 Unproductive Securities	— 44	883	888	863	795	857	1 264	
Other Securities	— 11	10 521	10 521	10 521	10 521	10 624	10 623	
SECURITIES TOTAL	+ 5756	56 830	52 123	47 843	47 280	46 911	46 804	

Figure 6: A snapshot of the Bank's investments in securities other than government



PARTICULARS OF SECURITIES HELD BY THE BANK.

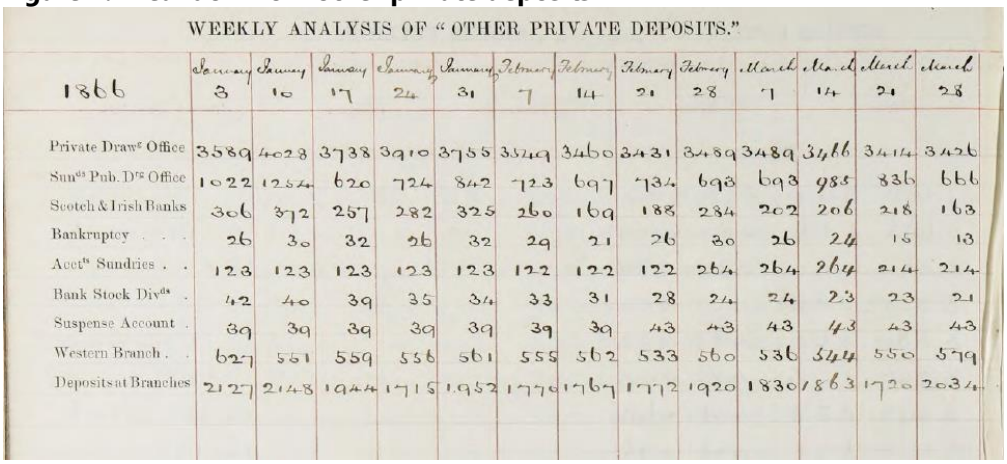
REDEEMABLE IN 1905.

Description.	Rate.	Amount.	Due.
Mersey Docks & Harbour Board Bonds	2½	10 000	1 Jan
2½% Annuities	2½	20 000	5 "
Worcestershire County Council Debt.	3	800	1 April
Derby Bonds	2½	5 200	10 "
Guernsey Estates of Lancaster	2½	4 500	30 June
Mersey Docks & Harbour Board Bonds	2½	50 000	1 July
South Australian Bonds	5	500	1 "
Egyptian Preference Stock & Bonds	3½	46 000	15 "
India Rupee Stock 1874	5	2 96 400	
Mersey Dock & Harbour Board Bonds	3	30 000	27 Sept
"	2½	50 000	27 "
Canada Bonds	4	4 400	1 Nov
Bombay Baroda & Cent. Ry Bonds	5	150 000	1 Dec
Lancaster Bonds	3	150 000	1 "
Keighley Corporation	B.R.	35 000	1 January
"	"	35 000	1 April
West Riding County Council	2½	4 400	1 Sept

REDEEMABLE IN 1906.

Description.	Rate.	Amount.	Due.
Mersey Docks & Harbour Board Bonds	2½	50 000	1 Jan
Derby Bonds	2½	43 900	1 "
Mersey Dock & Harbour Board Bonds	2½	50 000	27 March
Southern Nahratta Ry Debt	3	25 000	1 April
Worcestershire County Council Debt	3	800	1 "
Staffordshire County Council Debt	3	28 000	1 May
Bombay Baroda & Cent. Ry Debt	3½	1 000	15 June
Indian Midlands " "	3½	200 000	30 "
Guernsey Estates of Lancaster	2½	2 500	30 "
Derby Bonds	2½	2 000	1 July
Mersey Dock & Harbour Board Bds.	2½	50 000	1 "
"	2½	50 000	27 Sept
Canada Bonds	4	52 200	1 Nov
Keighley Corporation	B.R.	35 000	1 April
Treasury Bills		996 000	12 July
West Riding County Council	2½	2 400	1 Sept

Figure 7: Breakdown of "other private deposits"



WEEKLY ANALYSIS OF "OTHER PRIVATE DEPOSITS."

1866	January 3	January 10	January 17	January 24	January 31	February 7	February 14	February 21	February 28	March 7	March 14	March 21	March 28
Private Draw[s] Office	3589	4023	3738	3910	3755	3549	3460	3431	3489	3489	3486	3414	3426
Sun[ds] Pub. D[rs] Office	1022	1254	620	724	842	723	697	734	693	693	985	836	666
Scotch & Irish Banks	306	372	257	282	325	260	169	188	234	202	206	218	163
Bankruptcy	26	30	32	26	32	29	21	26	30	26	24	15	13
Acct[s] Sundries	123	123	123	123	123	122	122	122	264	264	264	214	214
Bank Stock Div[ds]	42	40	39	35	34	33	31	28	24	24	23	23	21
Suspense Account	39	39	39	39	39	39	39	43	43	43	43	43	43
Western Branch	627	551	559	556	561	555	562	533	560	536	544	550	579
Deposits at Branches	2127	2148	1944	1715	1952	1770	1767	1772	1920	1830	1863	1720	2034

However, the daily books also show information, usually highlighted in red ink, of "off-balance sheet" or "undisclosed operations". In the next section we show how this can be used to decipher "borrowing from the market" operations in the early C20th which were effectively repo operations that drained central bank reserves in order to provide control of market rates during World War 1. We look at this more closely in the final section of the paper. As mentioned, the Daily Account books were put together from information in more detailed underlying ledgers. Again, the General Ledger mentioned for the pre-1844 period would have been used for some figures. In addition for this period, the information on Discounts and Advances to the private sector can be identified as coming from the Daily Discount Ledgers (C28), which survive from the 1850s onwards.

4. Case Study – Bank Borrowings from the Market during WW1

It is well known how the Bank of England operated in pre-World War 1 gold standard even if there is disagreement on how closely the Bank followed the "rules of the game" and whether it acted to reinforce or counter the impact of gold flows on the domestic money supply. The Bank of England's chief instrument was Bank Rate, a minimum discount rate on bills of exchange. This was increasingly supplemented by an Advances Rate, a secured borrowing rate or reverse repo facility which allowed the Bank to make loans of varying maturity to the market with bills and other securities used as collateral. If the Bank needed to expand its balance sheet either to try and counter or reinforce the impact of a gold outflow, it would typically discount more bills or expand its advances which would create additional note or deposit liabilities as a counterpart.

What is less well known is that the Bank's discount rate or advances rate operated as a ceiling and could often be well above prevailing market rates. The Bank did not attempt to control rates in the market with anything like the precision they do today nor, as Ugolini (2016) argues, did it have the power or credibility to merely use Bank Rate as signal of its desire to change short-term rates and drag the market along with it. This could be problematic if the Bank needed to tighten policy and make

its rate effective in the market. The Bank would typically need to drain liquidity to force market rates upwards in line with any increase in Bank Rate. But like many other commercial banks, the Bank typically held any bills of exchange it discounted to maturity, so it would not typically sell bills back into the market to drain liquidity. In part this was because by discounting and holding a bill of exchange the Bank had become one of the names endorsing it and so selling the bill back into the market would imply a contingent liability for the Bank to redeem the bill should the acceptor or drawer of the bill be unable to pay. As a result, the Bank used other means to drain liquidity from the market.

One of the tools the Bank began to use was "borrowing from the market". The Bank's policy at this time was to pay no interest on its note or deposit liabilities. It chose not compete with the rest of the commercial banking system to attract deposits. However, by borrowing from the market the Bank essentially operated a (secured) interest-paying deposit facility carried out as repo operation where the Bank would post collateral such as government securities for the loan. The Bank could borrow from the banking system directly or more generally from other private depositors with much the same effect.

These operations began in the 1890s and carried on throughout the first decade of the C20th. They were discussed in detail in Sayers (1936, 1976) and the underlying archival data was uncovered and analysed by Ugolini (2017). What is less well known is that these operations were also important in allowing the Bank to control short-term market rates during World War 1. The rate of interest charged on borrowings from the market effectively established a floor to market rates and in represented the establishment of a narrower corridor system for rates. A modern day analogy would be the Federal Reserve's Overnight Reverse Repo facility (ON RRP) introduced to help stabilise the interest rate floor from 2014 onwards[3] .

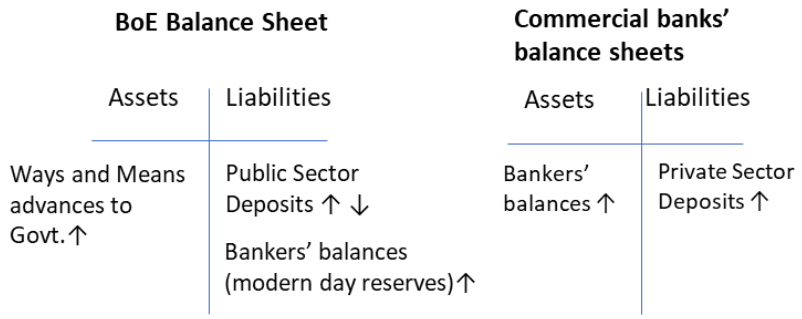
The use of these facilities in the war was outlined in detail by Morgan's (1952) retrospective study of the financial system during and after World War 1. The war ushered in many changes to the Bank of England's *modus operandi*. The seizing up of the international bill market at the outbreak of WW1 led to unprecedented emergency measures, including the introduction of low denomination currency notes issued by the Treasury and managed under the Currency Note Redemption Account that was discussed earlier (Anson et al. (2019)).

In addition, the Bank was required to help the government with its burgeoning deficit by providing short-term loans known as Ways and Means (W&M) advances which were typically used during the War to buy the Government and the Bank time to prepare for large issues of longer-term securities. These advances essentially acted as the government's overdraft facility at the Bank and still exists today. This allowed them to spend money without issuing bills or bonds into the market. In the first instance, the Bank would allow the government to draw on its overdraft and would credit the amount borrowed to the Government's account at the Bank (this would increase "public sector deposits" on the Bank's Balance sheet). But when the government spent the money, this would get paid into commercial bank accounts and so, to settle with the banks, the Bank would credit the commercial banks'

[3] It allowed non-depository institutions who did not have access to interest-bearing reserve accounts to lend secured to the Federal Reserve.

reserve accounts at the Bank (known then as bankers' balances). So public sector deposits at the Bank would fall back and bankers' balances would increase. The balance sheet operations are shown in **Figure 8** below:

Figure 8: Financing the government deficit with Ways and Means Advances

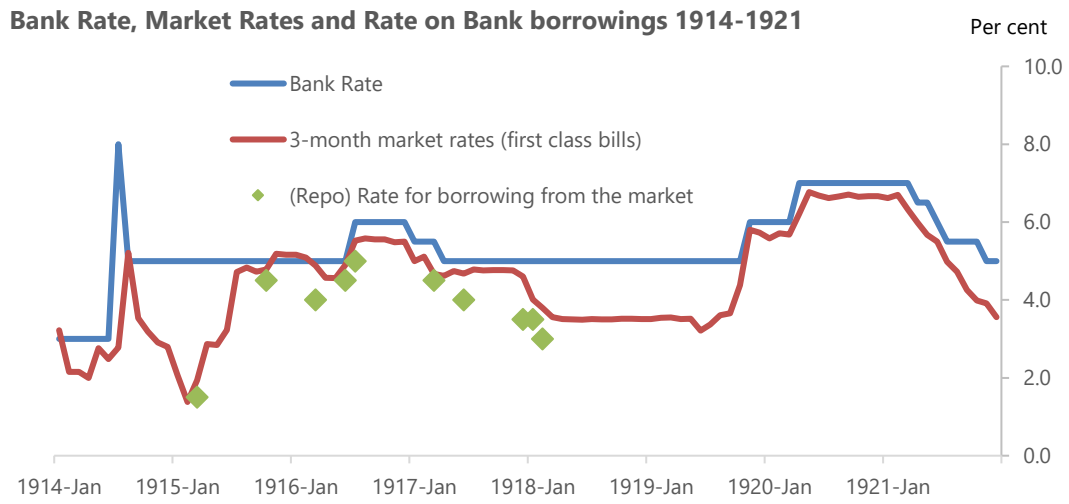


However, this caused a problem in the money market. As noted, commercial bank reserve accounts, or "bankers' balances" as they were known at the time, did not earn interest (and were not remunerated by the Bank until May 2006). Other things equal, operations such as a Ways and Means advance that expanded bankers' balances would put downward pressure on market interest rates as the banks either directly, or indirectly via the discount market, attempted to buy bills from the market. So large amounts of Ways and Means advances would increase money market liquidity and affect the Bank's ability to set short-term interest rates. As can be seen, this was particularly so in 1915 and 1917/18 when market rates fell well below Bank Rate. The Bank in WW1 was not operating a cheap money policy. It wanted to limit the fall in rates to help check inflationary pressures arising from the war and avoiding downward pressure on the exchange rate given the need to finance imports vital for the war effort.

As a result, the Bank re-employed borrowing from the market to retain control over market rates, when liquidity and downward pressure on market rates was temporarily high. By offering a suitable rate of interest the commercial banks would be induced to switch from unremunerated unsecured deposits held at the central bank to remunerated secured deposits. The loans were typically short-term and were unwound once funding the fiscal deficit via the issuance of government securities into the market took place. But the loans were often rolled over when the need arose. As noted, during their operation they effectively applied a floor to market rates and narrowed the corridor within which they fluctuated. **Figure 9** shows Bank Rate, short-term market rates and the rates on Bank's borrowing obtained from the unpublished history of the Bank in WW1 available in the Bank's archive[4].

[4] Unpublished War History (Vol 1) - Chapter 2 (bankofengland.co.uk)

Figure 9

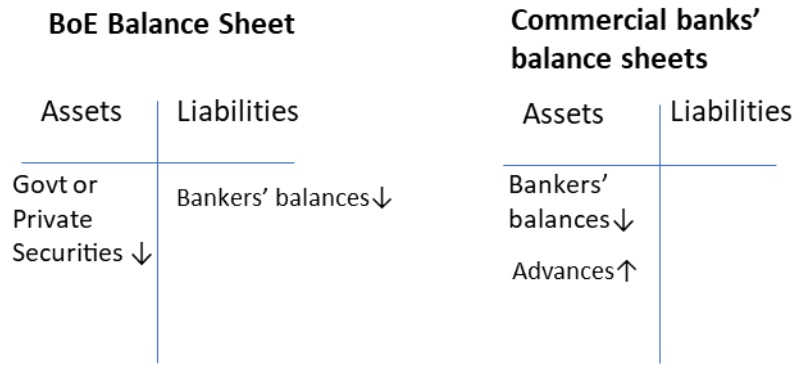


Market and financial commentators of the time were aware of these operations but there was some uncertainty about how it was accounted for on the central bank balance sheet and whether the amounts involved could be discerned from the disclosed Weekly Return given all the different influences on the Bank's balance sheet in any given week.

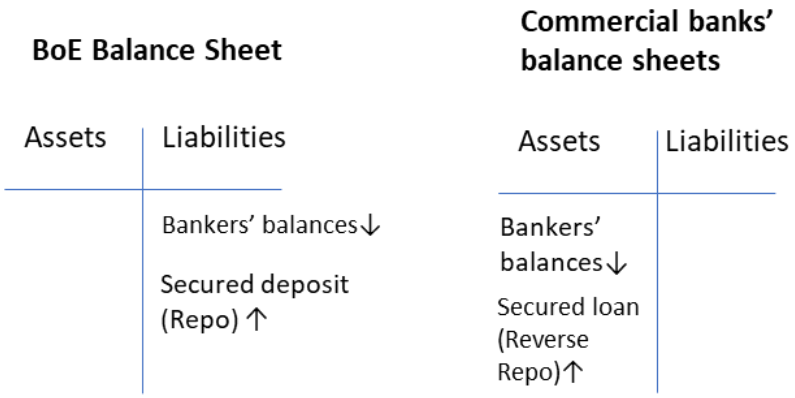
The archival evidence shows that borrowing from the market was accounted for as if it were an outright sale by the Bank so that it's overall balance sheet would be observed to shrink (other things equal). The loan from the banks to the Bank of England would reduce commercial bank reserve balances. But instead of recording the loan as an offsetting increase in secured deposits or repo liabilities of the Bank as in the modern treatment (see **Figure 10(b)**), it was recorded as a reduction in the securities used as collateral (either private or government) securities (see **Figure 10 (a)**). There are various possible reasons mooted by Sayers (1936, 1976) for this method of accounting, some of them going all the way back to the provisions of the 1844 Charter Act. In part, because the Bank saw these measures as exceptional and did not want to pay interest on its liabilities in normal times, it may have preferred to avoid accounting for this borrowing as a deposit liability.

Figure 10

(a) Treatment at the time: Repo of securities to banks recorded as fall in holdings of the securities used as collateral

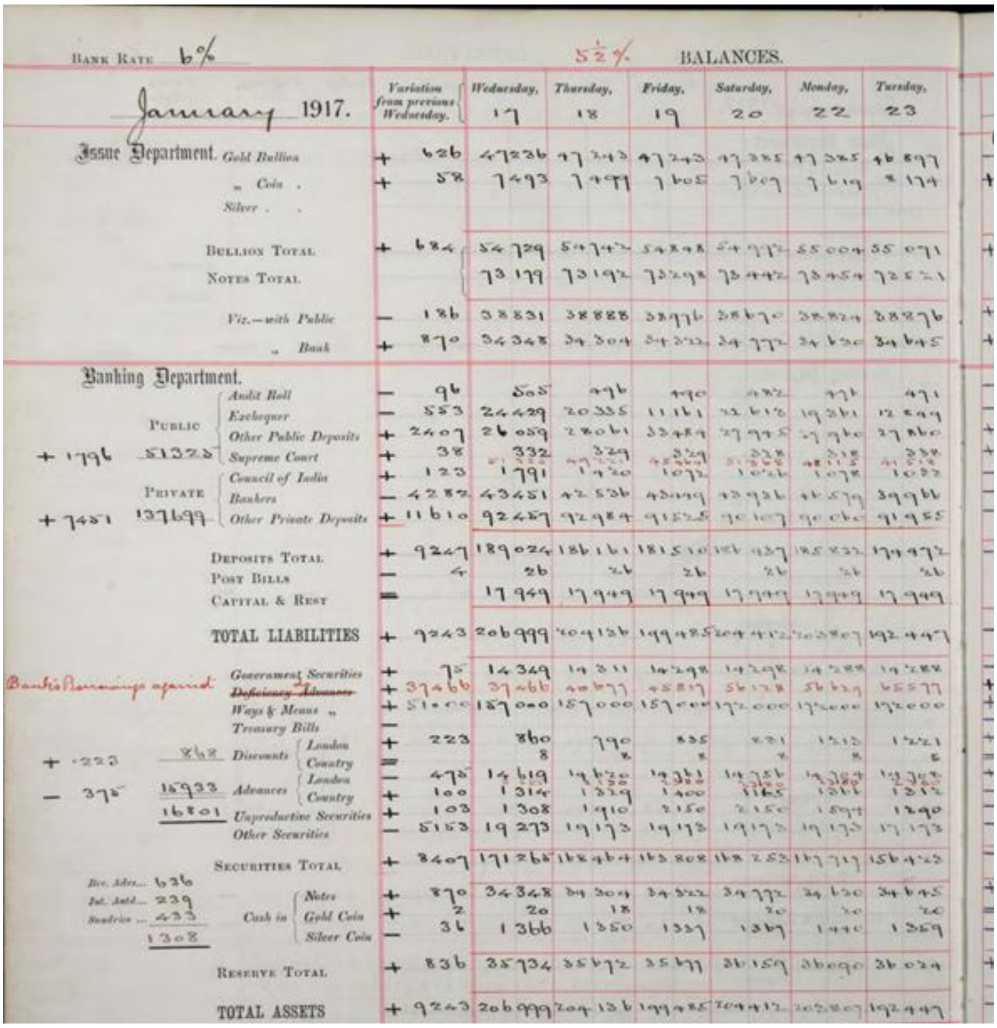


(b) Modern Treatment: Repo of securities to banks



The source for verifying the method of accounting is the Bank's daily accounting books mentioned earlier. This was evident from Ugolini's (2016) analysis of such borrowings before WW1. As Bank borrowings were a non-standard operation the transactions were handwritten in red over the normal ledgers. It can be seen from the example in January 1917 in **Figure 11** that borrowing from the banks was treated as a fall in the securities pledged as collateral for the loan (in this particular case, government securities). The "Securities Total" reported in black requires the subtraction of the pledged securities in red under "Bank borrowings against" for the components to sum to the total. This was not apparent in the published Weekly return available to Morgan and other writers, because the published return only disclosed "total government securities" (including W&M advances) held by the Bank so they had to rely on other information to discern what was going on

Figure 11: Recording of Bank borrowings on the balance sheet



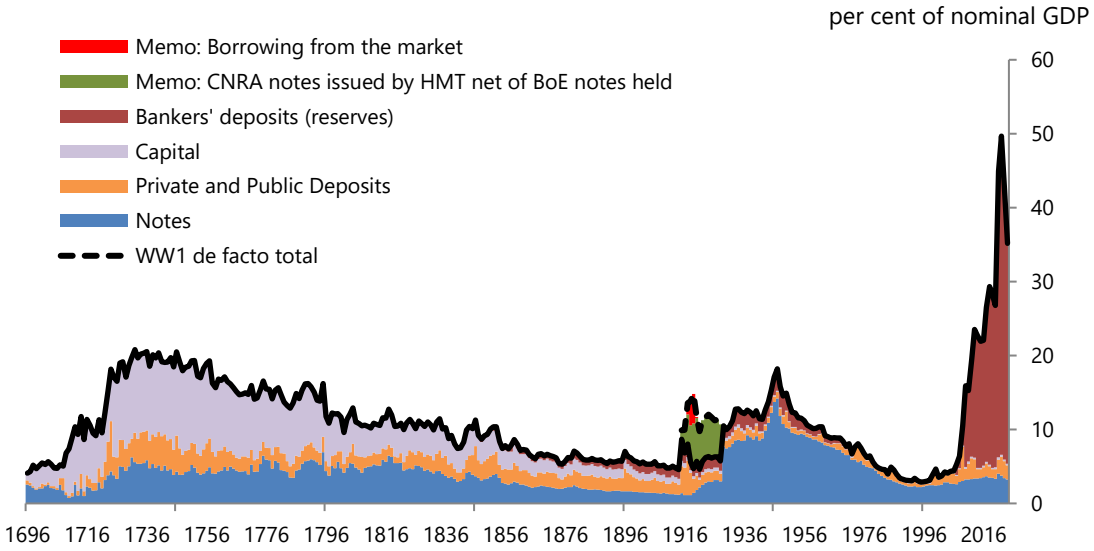
It is worth noting that the sum effect of the two operations – i.e. Ways and Means Advances in **Figure 8** followed by borrowing from the market in **Figure 10(a)**- would result in no overall change in bankers' balances or reserves. The Bank, under the contemporary method of accounting, would have more Ways and Means advances on the asset side of its balance sheet but fewer "other government securities", which it had pledged in return for a loan from the commercial banks. The commercial banks would now have a secured loan to the Bank to match the increase in the amount of bank deposits held by the public (as a result of the increased government spending) – in other words it would lead to an expansion of broad money even though there was no expansion of reserve balances.

The scale of these operations was significant and, together with the impact of the introduction of Treasury Notes held under the CNRA discussed earlier, shows the the *de facto* increase in the size of the central bank balance sheet over WW1 which is not apparent in the published balance sheet statistics (as shown in Figure 12), once one uses modern accounting methods and anticipating the merging of Treasury and Bank of England note liabilities that occurred later. However, it is really the composition of the balance sheet that really reveals what is going on.

Central bank lending to the government boosted the monetary liabilities of the central bank, which it was forced to sterilise through repo operations in order to drain reserve balances and retain control of short-term interest rates. So the *de facto* expansion of the balance sheet in part reflected a secured deposit liability to the commercial banks rather than a liquid reserve account liability that could be used as a settlement asset, the expansion of which would drive down market rates. The modern method of accounting shows this was effectively a loan from the banks to the government intermediated via the Bank of England and indeed this was how many commentators of the time described the operation.

Figure 12

The Bank of England Consolidated Balance Sheet 1696-2024 - Liabilities



Conclusion

The recent BIS project to reconstruct historical balance sheet data for the Bank of England and other central banks (Bogdanova et al. (2024)) provides an important first step in understanding the evolution of central bank balance sheets across countries. This paper has considered the hidden insights that can be gleaned from the additional archival evidence underlying those aggregate balance sheet estimates. Using evidence from the Bank's archives covering WW1 we have shown that the operations employed by the Bank allowed it to lend more to the government without compromising its control of interest rates by re-introducing a (reverse) repo or secured borrowing facility with the banks that it had employed previously in the late C19th and early C20th. Episodes such as these may provide useful historical insights and context for the current debates about the size and composition of central bank balance sheets and methods of interest rate control.

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Appendix 1

A summary of key ledgers and their information content is below.

(i) Yearly and Half-Yearly Accounts ADM31 ADM32

The Yearly accounts are summary volumes derived from the General Ledgers (ADM7) discussed below containing a snapshot of the balance sheet from 1729 at the end of August of each year. The Half Yearly Accounts are also summary volumes based on the General Ledgers (ADM7) discussed in (iii) below and provide estimates in February and August of each year (the Yearly Accounts are for August only) from 1766 onwards. As noted, I have yet to crosscheck the 1774 puzzle.

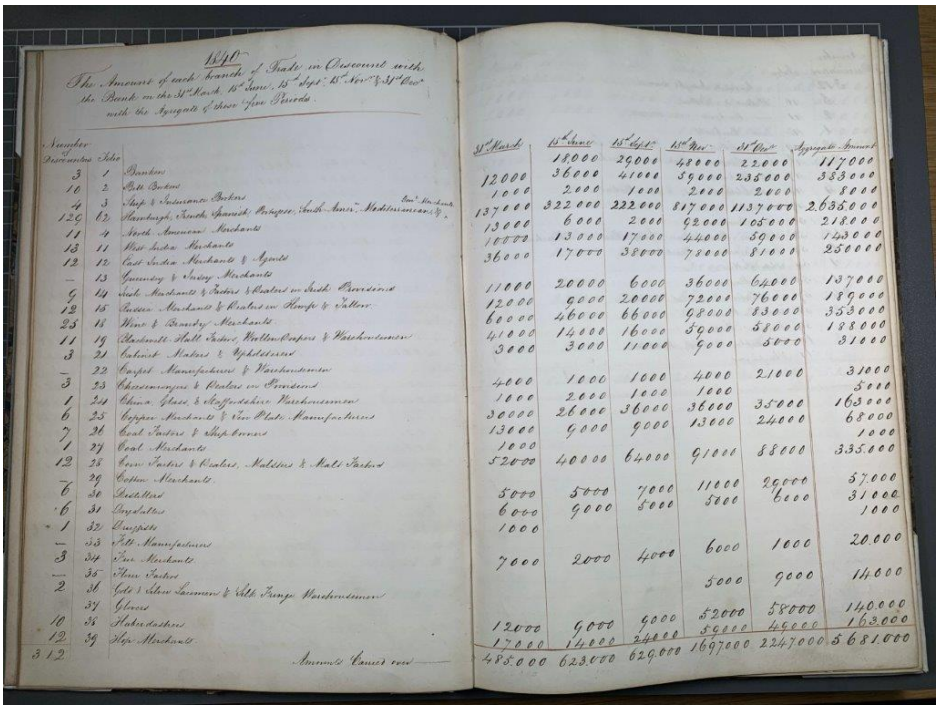
(ii) Stock estimates books ADM19
Known familiarly as 'Red Books', these ledgers contain the half-yearly balances of the Bank. The class of Stock Estimates (ADM19) conveys the same information as the Half Yearly Accounts and commences in August 1806. Originally the entries consisted of the Stock Account (a summary of assets and liabilities), the Profit and Loss Account and an 'Estimate of the State of the Bank of England as it is supposed it will be' on Dividend days (5 April and 10 October). The Estimates were discontinued following the formation of the Issue Department in 1844.

(iii) Banking Department General Ledger ADM7
The Banking Department General Ledger was the Bank's main book of account. It contains details of all income and expenditure and the Profit and Loss Account. Examples of account titles at different periods are: interest on securities, bills and notes discounted, interest on advances, management charges, wages, income tax, and Bank stock dividends. They also contain details of loans made to individuals.

(iv) Committee on Discounts Analyses C36
These are analyses of the discounting done by the Bank, giving for example amounts discounted, and number of discounts. They were presented to the Committee on Discounts, in whose minutes much of the analysis appears. The Discount Analyses provide an industrial breakdown of the Bank's discounts at various points between 1800 and 1840[5]. A picture of the extra information is in Figure A1.

[5] This was used by Neal (1998) to analyse the 1825 financial crisis.

Figure A1: Industrial breakdown of the Bank's discounts



(v) Daily Account Books C1 and available here

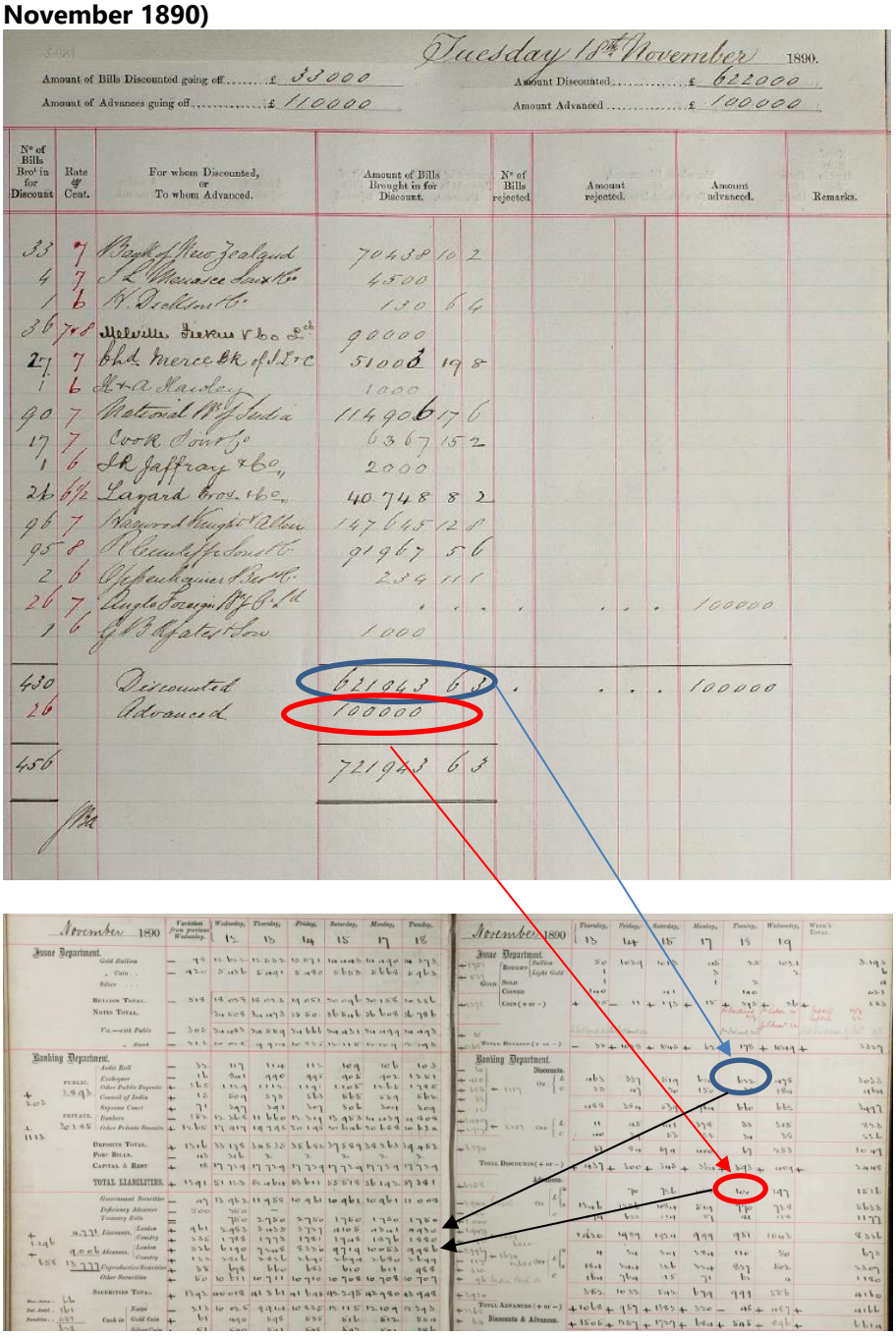
The "Daily Books" contain daily figures relating to the assets and liabilities of both the Issue Department, which covered everything connected to the issue of bank notes, and the Banking Department which covered all other areas at the Bank. The separation of the two departments for accounting purposes was a consequence of the 'Bank Charter Act' of 1844. The two accounts were then brought together to form the Bank Return which was published weekly on the Bank's notice board and in the press, making it accessible to the general public. Although the Bank Charter Act was passed in 1844, the Archive only holds daily account books from 1851. These volumes, which are strictly known as the Daily Accounts for 'Books', collated the accounts for the Issue and Banking Departments for a meeting known as 'Books' at the Bank of England. 'Books' was a morning meeting of the Governor, Deputy Governor and senior staff. It is initially thought to have taken place on a weekly basis, and was an opportunity for any member to report on events that had arisen since the previous meeting. By 1931 meetings were scheduled twice weekly with ten to twelve senior members, along with the Governor and Deputy Governor. However, by the early twenty-first century it was recognised that senior management could obtain the information discussed at 'Books' by other means and in 2003 it was to be replaced by a weekly meeting of the Executive Team.

(vi) Daily Discounts ledgers C28

These ledgers give daily summaries of Discount Office business with individual counterparties. They show the amount of bills and advances 'going off' and total

amounts discounted and advanced. They also show for each discounter the number of bills presented, the total value, the amount and number discounted, the amount and number rejected, and the amount of any advances. These have been used in several recent studies on the Bank's counterparties in C19th financial crises such as Bignon, Flandreau and Ugolini et al (2012), Anson et al. (2017). But our interest here is how they map into the balance sheet figures. **Figure A2** below shows the link between the Daily Books and the Daily Discount Ledger.

Figure A2: Link between Daily Discount Ledger and Daily Books (18th November 1890)



Notes: The Blue and Red arrows show the new discounts and advances made by the Head Office of the Bank in London on 18th November are recorded in the Daily Books as new flows coming "on" to the balance sheet. The Black arrows link those flow positions to the stock estimates on the previous page, which add these new discounts

Bank of England

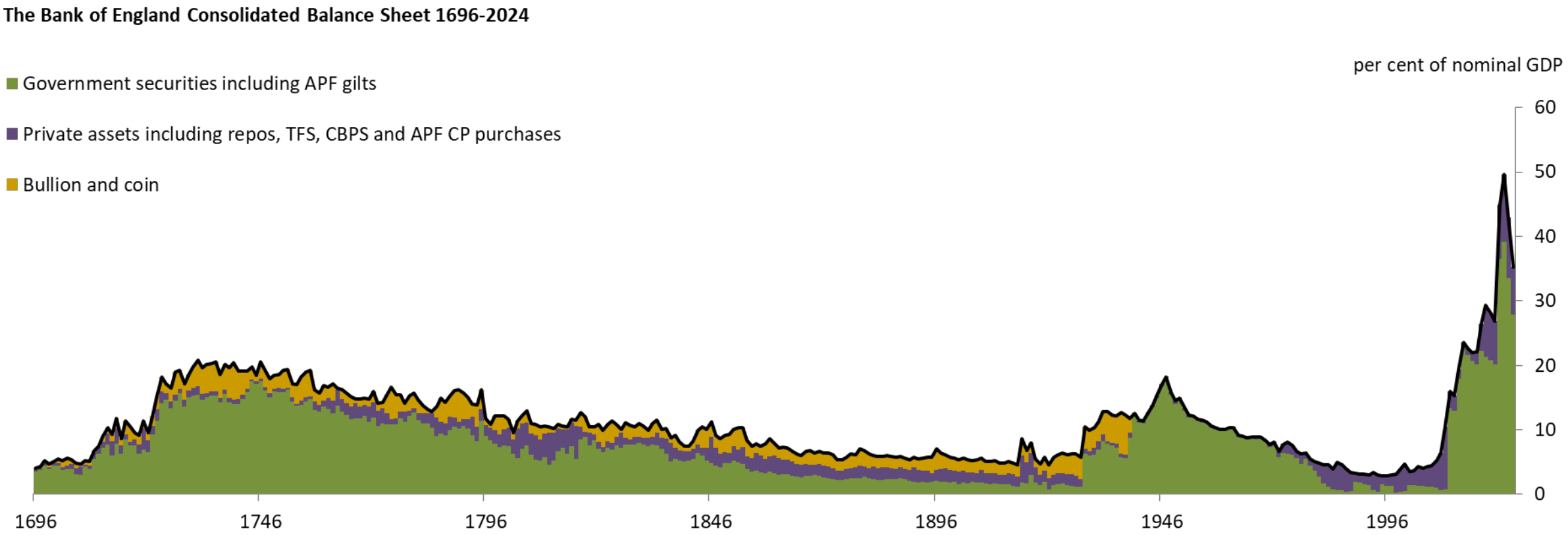
Using archival data at the Bank of England to understand the evolution of central bank balance sheets

Ryland Thomas

Bank of England

IFC Conference Presentation, Basel August 2024

Bank of England balance sheet data



- Annual balance sheet back to 1696, weekly balance sheet data from 1844
- This is the basis of the data used in the cross-country BIS project (Bogdanova et al. (2024))

Part of that data reflects public disclosure of the Balance Sheet

- Various balance sheet statistics submitted to parliament in C19th following reports into various monetary and financial crises
  - Largely put together by William Smee, the chief accountant of the Bank for much of this period
  - All available in Hathitrust digital library (see note)

- From 1844 the **Bank's Weekly Return**
  - But possible to hide a lot of operations in "Other securities" and "Other Deposits"

- From 1946 the **Bank's Annual Report** (end February data)

- But from 2014, Bank restricted Weekly Return to subset of assets/liabilities because of stigma attached to Emergency Liquidity Assistance ("Plenderleith Review")
  - Full balance sheet only published *quarterly* with a 5 quarter lag
  - Not possible to construct monthly series for the whole balance sheet (but can for monetary liabilities ie notes and reserves)

Secondary sources derived from the Bank's archives

- **Clapham's 1945 Bank History Volume 1**
  - Added series for Drawing Office Accounts (Private deposits at the Bank)

- **Silberling/Gayer Rostow Schwartz (1953)**
  - High frequency (monthly) data on sub-components of the balance sheet obtained from the Bank archivists in the 1920s covering the 1790-1850 period

- **Bank Return Exercise in the 1960s (1967 QB article)**
  - Prompted in part by Radcliffe Committee which called for more data on financial system
  - Went back to original ledgers to reconstruct the balance sheet from back to 1696, using Smee's original work as a guide
  - The record of that exercise still exists in the Bank archive and allows us to map the "data pipeline"

Issues with aggregate balance sheet data

- **Sometimes monetary policy operations were carried out which were not visible or not reported on-balance sheet.**
  - Liquidity schemes (SLS, FLS) using collateral swaps during GFC
  - CRNA and EEA accounts used to manage Treasury notes and FX reserves

- **Changes in the composition of the balance sheet can be as important as the size** in understanding how central banks have used their balance sheets to promote monetary and financial stability.

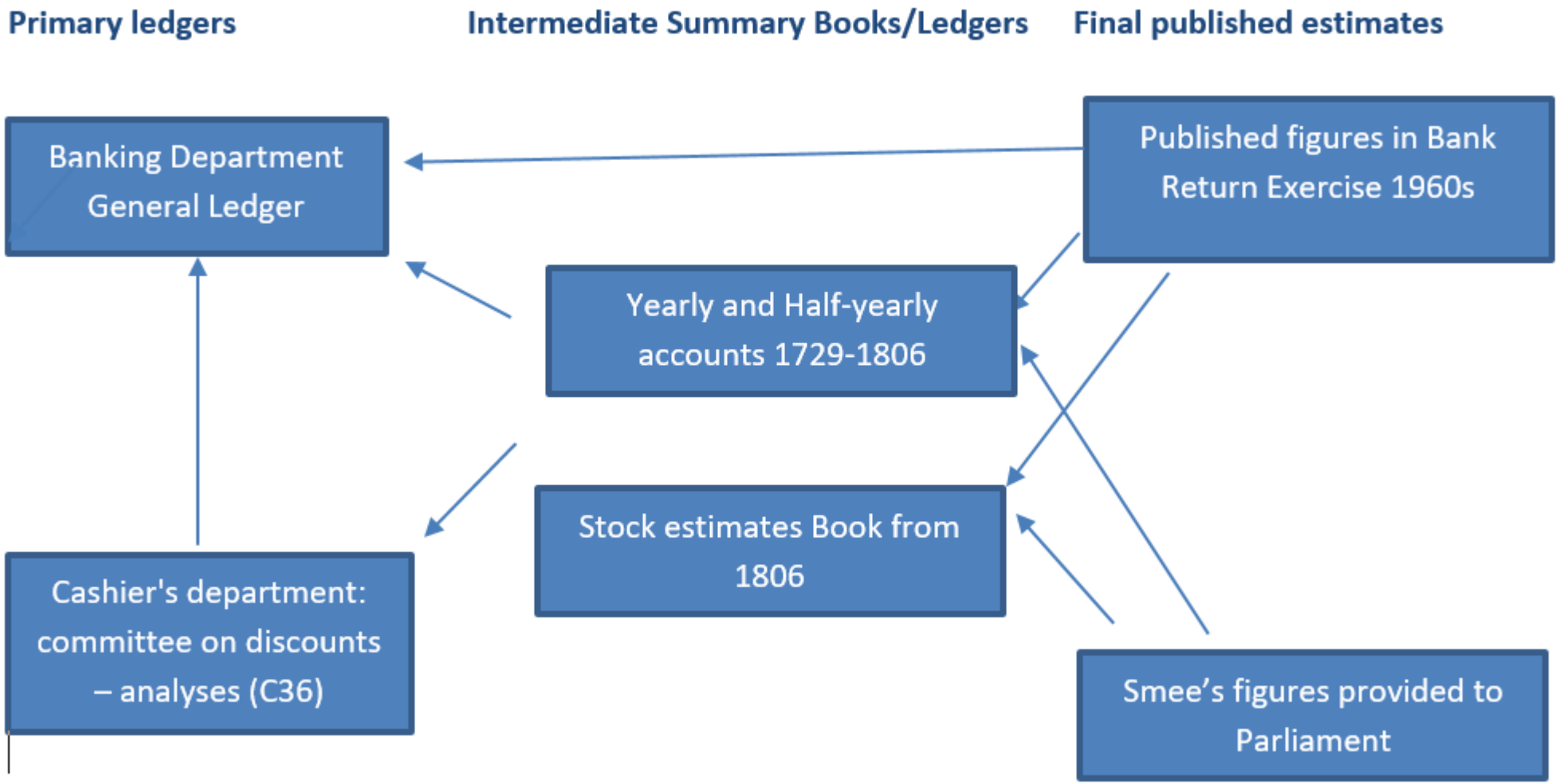
- **Accounting and disclosure procedures have changed over time which may hamper direct comparisons of the balance sheet over time.**

Idiosyncracies and other accounts to consider

- **Issue Department – Banking Department split from 1844**
  - To consolidate or not consolidate ?
  - Need split to understand operations (eg note reserve in Banking Department)
- **Issuance of Treasury notes 1914-1928 – Currency Note Redemption Account (CNRA)**
  - Those notes brought back on to the Bank's balance sheet in 1928
- **Exchange Equalisation Account (EEA) for managing FX reserves on behalf of government after 1931**
- **Asset purchase facility (APF), subsidiary of Bank to carry out QE post 2009**
- **Collateral swaps and other off-balance sheet operations (SLS and FLS scheme in GFC)**
- **Lack of full disclosure post 2014**
  - Not possible to construct a monthly series of the full balance sheet post 2014

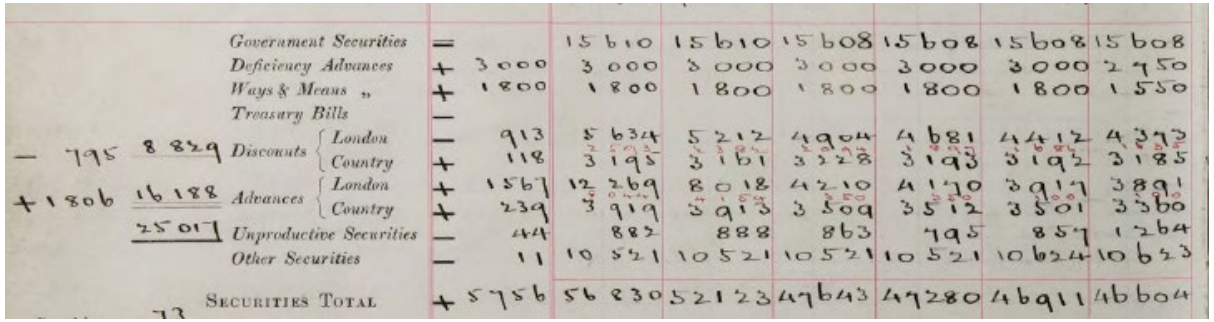
Going back to archival data can help uncover these issues

Pipeline from data to underlying ledgers



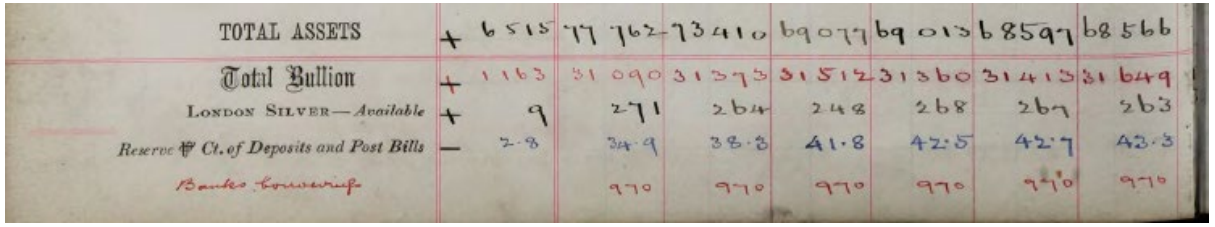
Advantages of going back to the ledgers

- More granular and high frequency data on assets and liabilities



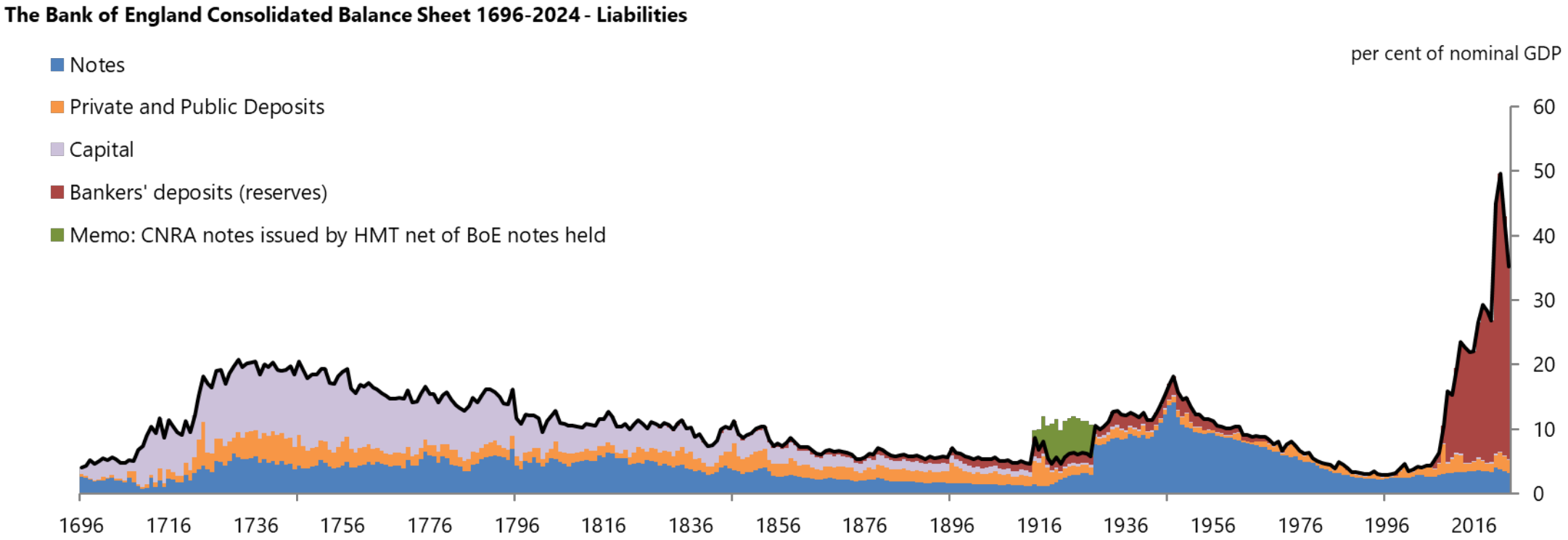
Government Securities	=		15 610	15 610	15 608	15 608	15 608	15 608
Deficiency Advances	+	3 000	3 000	3 000	3 000	3 000	3 000	2 950
Ways & Means „	+	1 800	1 800	1 800	1 800	1 800	1 800	1 550
Treasury Bills	—							
Discounts — *London*	—	913	5 634	5 212	4 904	4 681	4 412	4 373
Discounts — *Country*	+	118	3 195	3 181	3 228	3 193	3 192	3 185
Advances — *London*	+	1567	12 269	8 018	4 210	4 170	3 917	3 891
Advances — *Country*	+	239	3 919	3 913	3 809	3 512	3 501	3 380
Unproductive Securities	—	44	882	888	863	795	857	1 264
Other Securities	—	11	10 521	10 521	10 521	10 521	10 624	10 623
SECURITIES TOTAL	+	5756	56 830	52 123	47 643	47 280	46 911	46 804

- Reveals hidden/off-balance sheet operations not visible in the disclosed breakdown of assets and liabilities, “Red ink” entries e.g. “borrowing from the market”



TOTAL ASSETS	+	6 515	77 762	73 410	69 077	69 013	68 597	68 566
Total Bullion	+	1 163	31 090	31 373	31 512	31 360	31 413	31 649
LONDON SILVER — *Available*	+	9	271	264	248	268	267	263
Reserve % Ct. of Deposits and Post Bills	—	2·8	34·9	38·8	41·8	42·5	42·7	43·3
Banks Fiduciary			970	970	970	970	970	970

Case Study: BoE balance sheet in WW1



- Treasury issued emergency notes in 1914
- Notes were managed in a separate Currency Notes Redemption Account (CNRA)
- Amalgamated with Bank of England note issue in 1928, causing spike in the reported data

Case Study: "Borrowing from the market" in WW1

Treatment at the time: Repo of securities to banks recorded as fall in holdings of the securities used as collateral

BoE Balance Sheet

Assets	Liabilities
Govt or Private Securities ↓	Bankers' balances ↓

Commercial banks' balance sheets

Assets	Liabilities
Bankers' balances ↓	
Advances ↑	

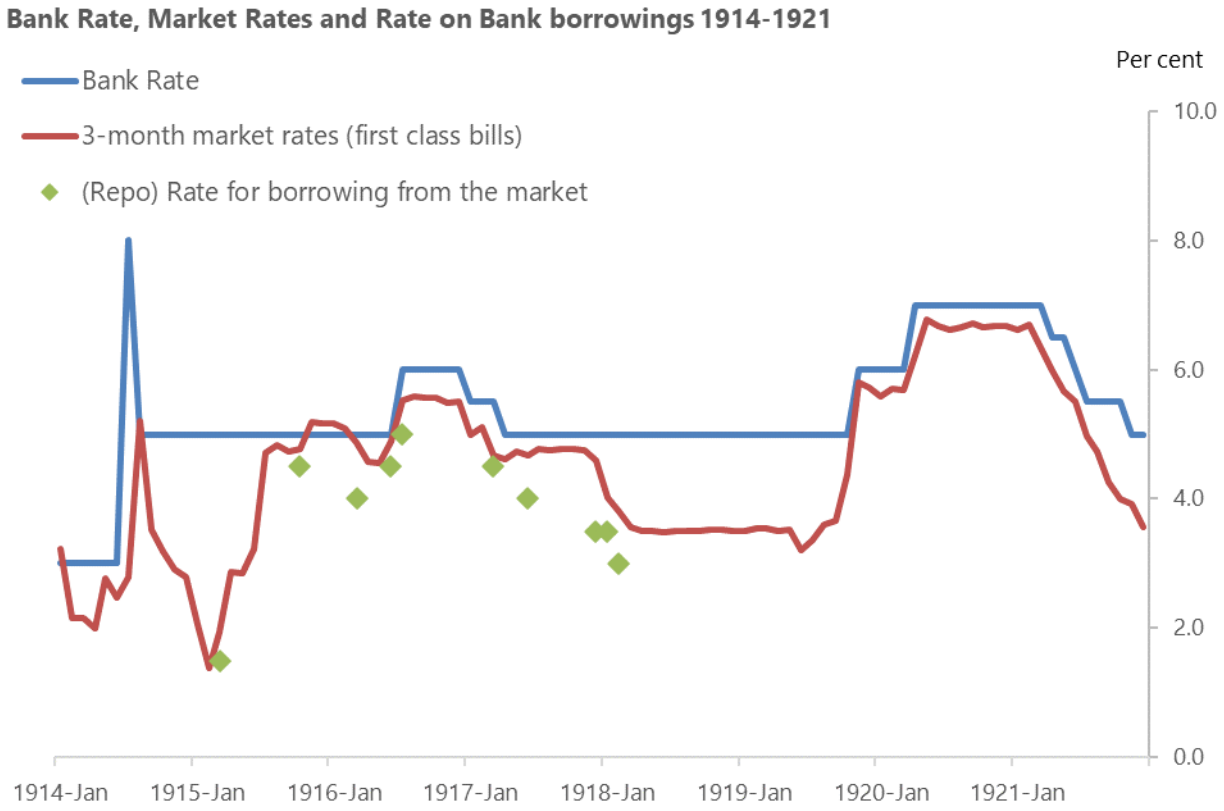
Modern Treatment: Repo of securities to banks leads to switch in liabilities

BoE Balance Sheet

Assets	Liabilities
	Bankers' balances ↓
	Secured deposit (Repo) ↑

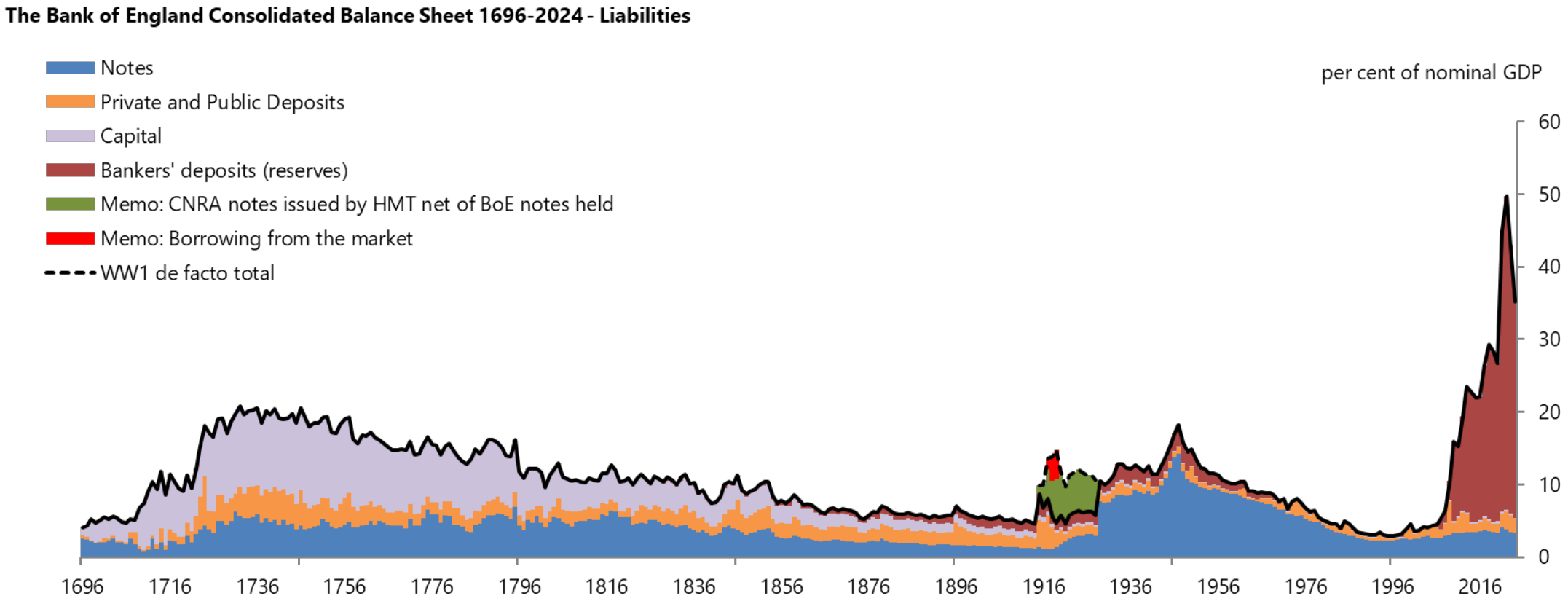
Commercial banks' balance sheets

Assets	Liabilities
Bankers' balances ↓	
Secured loan (Reverse Repo) ↑	



- Bank also lent money to the government which created additional liquidity and put downward pressure on market rates
- The Bank (re)-introduced a repo facility to absorb liquidity, borrowing from the banks secured on govt/private securities
- Provided a floor to market rates. But accounting treatment differed from modern methods

Case Study: Borrowing from the market in WW1



- Combining currency notes and “borrowing from the market” shows different “de facto” movement in the balance sheet in WW1 when using modern accounting methods