The Deposit-Taker of Last Resort

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Abstract

What are the consequences of making central bank reserves accessible to actors beyond the banking sector? We exploit novel micro data on deposit accounts historically held with the Bank of England by individuals and firms other than banks to study their role in a major financial panic. We document a sharp increase in the use of deposit accounts, driven by a surge in their convenience yield during the crisis. The expansion in the number of active accounts was fueled by individuals, while the intensive margin increase in balances came from firms. Recourse to central bank deposits was heterogeneous and persisted well beyond the panic, reflecting easy access, low opportunity costs, and positive network externalities. At the same time, retail borrowers seeking liquidity support from the Bank during the crisis preferred receiving loan proceeds in the form of cash rather than deposits.

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1 Introduction

What are the consequences of making central bank reserves in the form of central bank digital currency (CBDC) accessible to actors beyond the banking sector? A recent theoretical literature argues that retail CBDC could accelerate and amplify panic-driven funding drains from commercial banks, thereby fragilizing the financial sector (e.g. Kumhof and Noone, 2021; Keister and Monnet, 2022; Williamson, 2022a; Ahnert et al., 2023; Kim and Kwon, 2023; Muñoz and Soons, 2023; Tercero-Lucas, 2023; Bidder et al., 2024). Yet, apart from a handful of survey experiments (e.g. Abramova et al., 2022; Bijlsma et al., 2024), the literature lacks empirical insights on the microeconomic motives shaping retail decisions to hold CBDC in a crisis (Andolfatto, 2021).

Empirical evidence remains elusive for several reasons. First, recent attempts at retail CBDC implementation bear limited external validity. They mostly involve small island states (e.g., *Sand dollar*, *DCash* and *Jam-Dex*) whose economies and financial systems cannot be easily compared to major monetary areas around the world. Second, due to CBDC's recent nature, the empirical record only covers a short time period and few, if any, episodes of severe financial distress. Third, modern regulation complicates the identification of causal effects. For example, behavioral distortions induced by deposit insurance (e.g. Calomiris, 1989; Calomiris and Jaremski, 2019) make it hard to test theoretical predictions on the financial stability implications of CBDC. Finally, data protection and privacy restrictions would likely limit, if not inhibit, researchers' access to CBDC-related micro data (International Monetary Fund, 2023).

Our paper seeks to address the empirical gap in the CBDC literature by building on a simple core idea: many central banks allowed retail customers to open deposit accounts in the past (Bank for International Settlements, 2018; Bordo, 2021; Bordo and Roberds, 2022).[1] We exploit the availability of rich transaction-level data on thousands of accounts historically held with the Bank of England by individuals and firms other than banks. We hand-collect several novel micro data sets (covering, *inter alia*, more than 22,000 individual credit and debit transactions) to investigate the role and the information conveyed by the extensive and intensive margin dynamics on central bank deposit accounts in the run up to, during and in the aftermath of a major financial panic.

We focus on the British financial panic of 1866, which offers a particularly relevant and clean empirical setting. The panic represented a full-blown financial crisis that struck the

[1] CBDC can take many forms. Apart from central bank deposit accounts, future CBDCs may also be issued as coins, tokens or wallets.

world's leading financial center, London. It was caused by a shock that was exogenous to broader economic and financial developments, and to the Bank of England's own policies (e.g. Reinhart and Rogoff, 2009; Schularick and Taylor, 2012; Turner, 2014; Kenny et al., 2021; Xu, 2022). The failure of Overend & Gurney, a systemically important financial institution, led to an abrupt, generalized loss of confidence in the financial system, triggering a scramble for liquidity and a flight to safety (Flandreau and Ugolini, 2013, 2014). Crucially, in 1866 deposit accounts at the Bank of England were costless, unremunerated, had no maximum holding limits, and co-existed with commercial bank deposit accounts in an environment without deposit insurance. We can therefore study the dynamics on central bank accounts in a setting characterized by the absence of economic and legal frictions.

Our findings are as follows. First, we show that the Bank of England truly served as a "deposit-taker of last resort": the onset of the panic led to a large increase in the recourse to central bank deposit accounts. In terms of newly opened accounts, 1866 dwarfed all previous years. Whereas this increase along the extensive margin was mainly driven by individuals, we find a discontinuous jump in daily balances after the panic outbreak for corporations only. Using statistical break point analysis and event-study techniques, we document that the panic led, on average, to a 35% increase in the daily balances of firms other than banks. Moreover, we find evidence for a ratchet effect: the amounts firms had deposited during the turmoil proved persistent until long after the end of the panic. Drawing on difference-in-differences models, we also document that recourse to the deposit-taker of last resort varied across individuals, reflecting, *inter alia*, differences in the ease of access and in financial literacy.

Second, we build a simple theoretical framework to investigate the economic mechanisms behind the recourse to the deposit-taker of last resort. Using qualitative and quantitative historical evidence, and model simulations, we show that the large increase in daily balances during the panic can be explained by a substantial, sudden rise in the convenience yield afforded by deposit accounts held with the Bank of England. We also provide evidence suggesting that the medium-run ratchet effect was likely due to two factors: 1) a historically low interest rate environment in the aftermath of the crisis that reduced the opportunity cost of holding unremunerated deposits at the Bank; and 2) positive network externalities arising from the fact that many customers who previously banked with diverse financial institutions shifted their funds to accounts at the Bank of England. Furthermore, we show that financially conservative account-holders and account-holders who found it particularly easy to access their funds at the Bank were

more likely to hold onto their newly opened account in the longer run.

Third, we exploit the fact that the Bank of England – like many other central banks in the past – historically permitted individuals and firms other than banks to access its standing facilities. Since the Bank's borrowers could choose between receiving the proceeds of their loan in cash (i.e., Bank notes which were redeemable in specie) or having them credited to their deposit account, we can study whether retail customers seeking *liquidity* relief – rather than merely a means of safe storage – considered cash and central bank deposit account balances as equivalent means of payment during the panic. We find that this was not the case. In the weeks following the onset of the crisis, borrowers expressed a relative preference for cash over central bank deposits.

Our paper makes several novel contributions to the literature. We provide the first systematic empirical study of retail recourse to central bank deposits as a safe haven. A key consequence of the possible issuance of CBDC is that its introduction would make central bank reserves accessible to actors beyond the banking sector (Bank for International Settlements, 2018; European Central Bank, 2020; Niepelt, 2020; Board of Governors of the Federal Reserve System, 2022; Williamson, 2022b; Keister and Sanches, 2023; Bank of England and HM Treasury, 2023). CBDC thus opens the door for a retail flight to safety into the central bank balance sheet, potentially amplifying panic-driven funding drains from the financial system. When previously information-insensitive commercial bank deposits are suddenly perceived as risky (Dang et al., 2020), individuals and non-financial corporations may mimic the behavior of financial intermediaries which often sharply increase their holdings of central bank reserves during panics (Bagehot, 1873; Acharya and Merrouche, 2013; Acharya and Mora, 2015). Instead of converting their commercial bank balances into cash – the only form of central bank money they can currently obtain (Niepelt, 2024) – or shifting funds into large or highly reputed commecial banks (Monnet et al., 2021; Caglio et al., 2024), retail investors may run into CBDC as their new preferred safe asset (Gorton, 2017).

Exploiting a setting without deposit insurance and no maximum CBDC holding limits, we show that only balances of firms increased markedly and persistently during a major financial panic. A fast-growing literature argues that design features such as tiered remuneration or holding limits can help reduce funding drains from the banking sector but may also lower the attractiveness of CBDC for retail investors (e.g. Bindseil, 2020; Bank for International Settlements, 2021; Ahnert et al., 2023; Bank for International Settlements, 2023; Choi et al., 2023; Meller and Soons, 2023; Bidder et al., 2024). Our results suggest that restrictive CBDC holding limits to forestall disintermediation are necessary

for firms but might be quantitatively less important for individual account-holders. These empirical insights are consistent with the notion that many private individuals exhibit low levels of financial literacy and employ unsophisticated liquidity management techniques that make them less prone to run into CBDC during a crisis (e.g. Klapper and Lusardi, 2020; Chan et al., 2022).

Our findings regarding a ratchet effect in the use of drawing accounts relate to prior work studying the drivers of persistent behavioral shifts in response to temporary shocks, such as economic scarring effects (Malmendier and Nagel, 2011; Giuliano and Spilimbergo, 2014), the link between banking crises and trust (Fungáčová et al., 2022), and the stickiness of deposit dollarization in emerging economies (Honohan and Shi, 2003). Crises can solve a coordination problem by suddenly removing psychological entry barriers, boosting broader acceptance or accelerating infrastructure improvements. As a corollary, many agents simultaneously try out a new technology, giving rise to positive network externalities that render *ad-hoc* responses permanent. For example, recent research documents a new post-pandemic equilibrium in which the use of digital payment means remains well above pre-COVID levels (Auer et al., 2022).

Leveraging detailed information on account-holder characteristics, our paper also investigates heterogeneity in the recourse to the deposit-taker of last resort. By capturing the investment decisions of a broad variety of retail customers, the introduction of retail CBDC could give rise to beneficial information effects (Keister and Monnet, 2022). The ability to monitor sophisticated insider accounts and early flows into CBDC may allow central banks to identify incipient runs before they gain momentum. Central banks could also use information on the flows into CBDC as a real-time indicator for the quality of their own counterparties. Yet, whether retail CBDC effectively generates novel information effects remains an empirical question: the financial decisions of individuals are often characterized by rational inattention until a signal of sufficient importance triggers widespread information acquisition (Maćkowiak et al., 2023). For this reason, financial distress is frequently associated with mass herding that tends to produce conformity and simultaneity in response to observable shocks (e.g. Shiller, 2000; Cipriani and Guarino, 2014). Using difference-in-differences models, we document several sources of heterogeneity in the recourse to central bank deposit accounts *after* the outbreak of the panic. However, we find no statistically significant evidence that users identifiable *ex ante* as well-informed insiders anticipated the turmoil.

Policy-makers around the world emphasize that retail CBDC would be designed to complement, rather than replace cash (e.g. Cœuré, 2020; Panetta, 2023; Ueda, 2024).

Our results suggest that cash and central bank deposits indeed served different purposes during the crisis of 1866. Retail customers actively seeking liquidity relief from the lender of last resort overwhelmingly opted to receive the proceeds of their loans in the form of cash. Bank notes responded to the demand for a fast means of payment; deposit accounts were primarily regarded as a safe place to store value. While this finding could be specific to our historical context, it also resonates with the "dash for cash" in modern scenarios where structural frictions (e.g., due to power outages or natural catastrophes) render electronic transfers between accounts impossible (Khiaonarong et al., 2021; Anagnostakos et al., 2023).

Although several official histories mention retail deposits at the Bank of England (e.g. Hankey, 1867; Clapham, 1958a,b; Sayers, 1976a; Kynaston, 2017), we are not aware of any prior work that studies account-level, much less transaction-level, data extracted from the Bank Archive. By combining novel historical micro data with statistical analysis techniques, our paper is closest in spirit to recent papers by Grodecka-Messi and Zhang (2023) and Jorge-Sotelo (2024). In contrast to these two studies, we draw on transaction-level data to tackle micro-oriented research questions regarding the use of retail CBDC during financial crises. Two other related papers examine the provision of a "central bank safety net" in the very long run (Ferguson et al., 2023; Jamilov et al., 2024). While these authors use annual cross-country aggregate data and focus on the implications of movements on the asset side (i.e., lending operations) of the central bank balance sheet, our paper instead dissects flight-to-safety dynamics by dis-aggregating changes on the liabilities side of the central bank safety net.

The remainder of this paper is organized as follows. In Section 2, we provide the historical background for our study. Section 3 describes our sources and novel data, and shows descriptive statistics. In Section 4, we analyze the extensive and intensive margin dynamics on central bank deposit accounts held by individuals and firms other than banks. In Section 5, we study the economic mechanisms behind the recourse to the deposit-taker of last resort. Section 6 investigates whether retail customers seeking liquidity relief considered cash and deposit account balances at the Bank as substitutes during the panic. Section 7 concludes. We attach an Online Appendix at the end of the main paper.

2 Historical and Institutional Background

2.1 The Bank of England as a Central Bank

Founded in 1694, the Bank of England was owned and governed by private shareholders until its nationalization in 1946 (De Kock, 1954). The Bank's original purpose was to advance money to the Government. In return, the institution received the privilege – although initially not the monopoly – to issue notes (Clapham, 1958a). The Bank regularly paid for the renewal of its special rights (Broz and Grossman, 2004): the Bank's charter was never dissolved but it was renewed nine times between 1694 and 1844. When the Government saw its fiscal needs increase, it took the occasion to obtain a new loan from the Bank by opening charter renegotiations. The new charters and other concomitant laws in turn consolidated the Bank's prime position on the British financial market: it received the right to establish branches in 1826; its notes were declared sole legal tender in 1833; and from 1844 onward, the Bank became the only institution in England allowed to issue new notes (Kisch and Elkin, 1928; De Kock, 1954). The 1844 Bank Charter Act consolidated the Bank's position at the top of the London money market and provided an institutional framework whose main pillars remained largely unchanged until World War I.

From their first issuance until 1914, the Bank's notes were convertible into specie, except during the so-called Restriction Period (1797–1821) (Antipa, 2016; O'Brien and Palma, 2020). To guarantee convertibility, and thus monetary stability, the Bank held a bullion reserve. The Bank Act of 1844 for the first time explicitly regulated the Bank's fiduciary issue (Anson et al., 2017). With the exception of an initial £14 million fiduciary issue, new Bank notes had to be backed one-for-one with gold. This fixed limit was raised several times before 1914 (Sayers, 1976b).

Initially in competition with other financial intermediaries, the Bank gradually assumed responsibilities that involved defending a broader public interest (Ziegler, 1990a; Goodhart, 2018). Its evolution into a reliable lender of last resort during financial crises is a case in point. For a variety of ideational, institutional and legal reasons (Rieder et al., 2023), it took the Bank some episodes of trial-and-error before it fully adopted Bagehot's principles by the 1860s (Bagehot, 1873; Bignon et al., 2012; Flandreau and Ugolini, 2013).

2.2 Private Drawing Accounts at the Bank of England

The so-called "private drawing accounts" – deposit accounts held by financial institutions, other firms and individuals with the Bank of England – were introduced shortly after the foundation of the central bank in 1694. One of the oldest surviving official documents, the Court Book of 1695, a compendium of minutes for Bank directors' meetings (top-level management), already notes that "the Bank will receive such deposits of money as any persons shall be willing to make" (Clapham, 1958a, p.20). Permanent drawing accounts in a firm's or individual's name appeared within four years of the Bank's foundation (Giuseppi, 1966). Some retail deposit accounts remained active until 2017, when the Bank closed the last personal accounts for members of staff and Bank pensioners.[2]

Any person or firm could open a drawing account at the Bank upon being "respectably introduced" to the Court of Directors (Hankey, 1867). In practice, in the early days, account holders were almost exclusively domiciled in London because the Bank disliked business relationships that were not personal (Clapham, 1958a) and it did not have branches before 1826. The only condition for opening an account was that the account needed to be "remunerative". According to the Bank, an account met this criterion as long as its ordinary balance was large enough to enable Bank clerks "by the use of the balance at the average rate of interest for money to realize a profit greater than the expense of keeping the account" (Hankey, 1867, p.98). Private drawing accounts were not remunerated and overdrafts were prohibited (Clapham, 1958a; Bank of England, 1963; Ziegler, 1990b; Hanes, 2020).

Account holders deposited funds in the Bank's Cashier's Office by paying in specie, coins, notes or cheques. Another way to increase one's account balance was to sell bills of exchange to the Bank's Discount Office. Advances, i.e. short-term collateralized loans, could also be credited to the borrower's drawing accounts. Vice versa, account holders withdrew deposits in the form of specie or Bank notes, and received a cheque book to order draw-downs of their account to the benefit of the cheque bearer (Giuseppi, 1966). It was also possible to transfer funds directly between accounts at the Bank. Drawing account holders could also authorize third parties (relatives, servants, cashiers, secretaries, officials or other clerks) to "write on and off" their account (Clapham, 1958b).

Narrative evidence suggests that keeping an account with the Bank was already considered advantageous early on because its notes commanded the greatest confidence and

[2]See administrative history entry for archival reference C98 on the website of the Bank of England Archive (last accessed on 27 February 2025).

the widest circulation (De Kock, 1954). Yet, data on the total number of drawing accounts during the 18th century are not available. Giuseppi (1966) mentions 825 accounts as of 1823 but also remarks that their number had grown to nearly 4,000 ten years later. By 1850, the Bank's Private Drawing Office managed 4,855 private drawing accounts (Clapham, 1958b, p.219). At year-end 1866, the Bank serviced 53 accounts belonging to bankers, 1,156 accounts of other firms and 2,694 accounts held by private individuals. Until 1871 (1878), the number of accounts held by firms other than banks and individuals remained roughly constant at 1,131 (1,128) and 2,784 (2,710), respectively.[3] Data on the aggregate funds stored in deposit accounts of individuals and firms have been published for all years from 1844 onward (Anson et al., 2017). From September 1844 to June 1914, retail deposits represented, on average, 26% of the Banking Department's total assets, and this share varied between 12% and 64% over time. During the same period, the average ratio of retail deposits to notes in circulation stood at 0.53, and ranged from 0.31 to 1.39.

These numbers explain why the Private Drawing Office had one of the largest staff among the Bank's operational offices. In 1867, the total head count of the Private Drawing Office's staff was 71: 1 principal, 1 deputy principal, 4 superintendents, 20 cash book, correspondence and counter clerks, 35 ledger clerks and 10 auxiliary staff members.[4] The total staff count increased to 100 over the following years. In 1914, the Private Drawing Office still had 90 employees (Kynaston, 2017). In contrast, the Discount Office only employed, on average, seven staff throughout the 19th century (Anson et al., 2017).

The existing literature provides little information regarding the daily use of and turnover on individual private drawing accounts. Clapham (1958b) only states that a non-negligible fraction (22%) of all deposit accounts were considered as unremunerative in 1850. The lion's share of unremunerative accounts in 1850 belonged to individuals. In general, however, deposits at the Bank exhibited considerable "traffic" and their balances changed frequently and substantially. According to Clapham (1958b, p.171), individuals' private drawing account balances with the Bank were in fact more volatile than those held with private bankers in the City because "a man felt some personal obligation [to his private banker]" whereas "to a 'soulless' corporation [i.e. the Bank of England] he felt none."

[3] Own data for 1866, 1871 and 1878; for our sources, see Section 3. For comparison, the Bank only had between 416 to 448 unique regular discount customers in London each year from 1840 to 1854 (Clapham, 1958b).

[4] See Report of the Committee of Inspection for the Cashier's Office presented to the Court of Directors on 7 February 1867, Court Meeting Minutes (last accessed 27 February 2025).

Apart from the interest rate spread between the non-remunerated drawing accounts and the positive deposit rate offered by other banks, a series of institutional changes likely influenced the attractiveness of retail drawing accounts over time. For example, the suspension of convertibility at a fixed gold parity during the Restriction period meant that deposit accounts suddenly lost their previous *de facto* insurance against inflation. Moreover, the Bank's newly gained permission to open branches after 1826 should have boosted access to deposit accounts for actors domiciled outside London. Only a little later, in 1833, joint-stock banks were first allowed to operate in London, introducing fiercer competition for deposits in the capital (Clapham, 1958b). Another innovation came in 1878, when the Bank began offering preferential rates to discount window customers[5] who held a drawing account (Hanes, 2020). This practice was previously entirely absent (Anson et al., 2017) and represented a form of *de facto* remuneration by indirect means.

2.3 The Panic of 1866

We specifically chose the panic of 1866 to study the dynamics on central bank deposit accounts because this episode of financial turmoil ticks several crucial boxes.

The panic of 1866 is unanimously cited as one of the most severe systemic financial crises in British history (e.g. Clapham, 1958a; Reinhart and Rogoff, 2009; Schularick and Taylor, 2012; Turner, 2014; Kenny et al., 2021). Importantly, the panic occurred at a time when the Bank of England had already consolidated its central position in the London money market and the British payment system more generally (Kisch and Elkin, 1928; De Kock, 1954). By 1866, the Bank had the monopoly right to issue legal tender, served as a reliable lender of last resort, and its discount rate (known as Bank rate) represented an effective ceiling to money market rates. Hence, when the panic started, the Bank had fully assumed the role of a powerful "proto central bank".

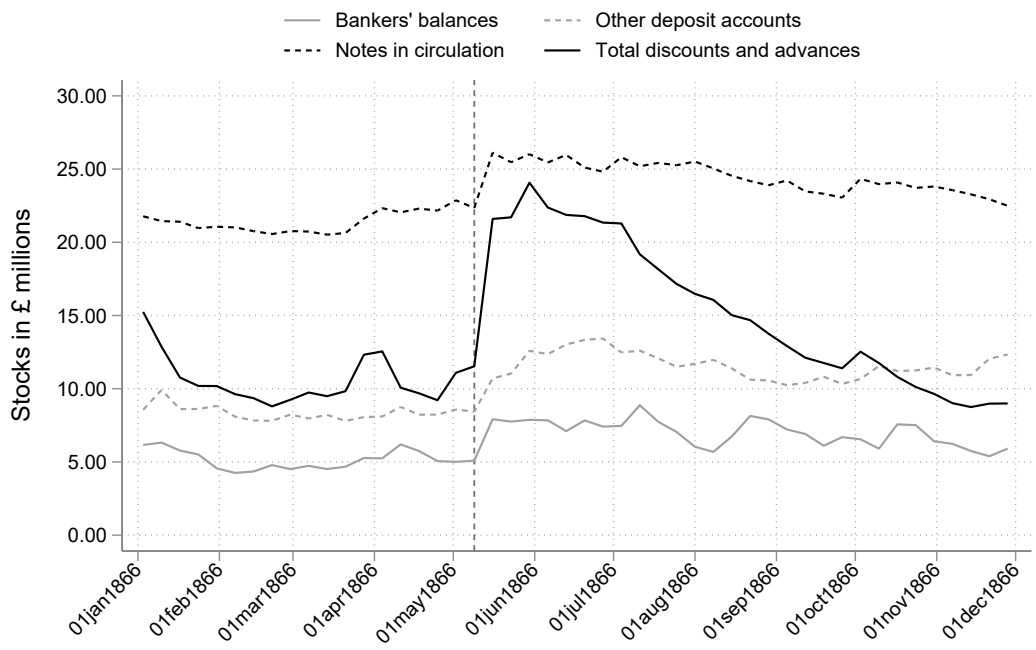
The panic of 1866 was caused by a shock that was largely exogenous to broader economic as well as financial developments, and to the Bank of England's own policies (Bank of England, 2016). As *The Economist* noted in its lead article of 19 May 1866, "[t]he panic of 1866 was, to speak strictly, a credit panic – not a capital, nor a bullion panic."[6] The spark that led to the onset of the panic was the failure of Overend & Gurney, a leading discount house in the London money market that "had the greatest

[5] Before 1914, the Bank's standing facilities were also accessible to individuals and firms other than banks.

[6] *The Economist, Weekly Commercial Times, Bankers' Gazette, and Railway Monitor: A Political, Literary, and General Newspaper*, Saturday, May 19, 1866, p.581.

and oldest name for credit."[7] Today, Overend & Gurney would likely be considered a SIFI, a systemically important financial institution (Anson et al., 2017). Its balance sheet was bigger than those of its three next largest competitors combined and several decades of profitable business conduct had contributed to an outstanding reputation. Still, in May 1866, Overend & Gurney had been on the brink of demise for some months, continuously incurring enormous losses from bad loans extended without proper credit risk assessment.

Figure 1: **Deposit accounts and other Bank balance sheet items in 1866**



This figure shows weekly data on the aggregate amounts deposited in Bank of England accounts, the amount of Bank notes in circulation and the outstanding amount of discount loans and advances. Bankers' balances are deposit accounts held by banks. Other deposit accounts include deposit accounts held by other firms and individuals. The vertical line indicates the last weekly statement before the panic outbreak (10 May 1866). Source: Anson et al. (2017).

The combination of rumors and a court case, which ruled that the financial institution could not collect from a large debtor, eventually pushed Overend & Gurney into failure. Following the lost court case on 9 May 1866, Overend & Gurney asked the Bank of England for emergency assistance – which was, however, refused because the firm was considered insolvent. Rumors about the firm's state of affairs led to a run on its deposits and other short-term liabilities. On the next day, Overend & Gurney suspended payments

[7] *The Economist, Weekly Commercial Times, Bankers' Gazette, and Railway Monitor: A Political, Literary, and General Newspaper*, Saturday, May 19, 1866, p.581.

at 3.30pm (Bank of England, 2016; Schneider, 2022). The suspension sent shock waves through the financial system, triggered a generalized loss of confidence, and led to a scramble for liquidity (Flandreau and Ugolini, 2013, 2014). Crucially for our paper, this timeline of events is well documented: primary and secondary sources concur in dating the outbreak of the systemic panic to the day after the run on 10 May 1866.

To mitigate the ensuing turmoil, the Bank extended more liquidity support to the financial system than it had ever done before (Bagehot, 1873; Bignon et al., 2012). Figure 1 depicts the weekly evolution of selected balance sheet items in 1866. The Bank's interventions manifested themselves first and foremost in a steep and sudden increase in its total discounts and advances. Yet, the rise in bankers' balances and in other deposits held with the Bank also indicate important changes on the liabilities side of the balance sheet. In the days and weeks following 10 May 1866, a pronounced flight into central bank deposit accounts took place. Interestingly, whereas the impact on bankers' balances subsided after some weeks, the increase in other deposit accounts seems to have been permanent. As shown in Figure C1 in the Online Appendix C, the ratio of funds deposited in retail drawing accounts relative to the Bank's total liabilities remained above its pre-crisis average several months after the panic had subsided.

While aggregate data broadly outline the contours of developments in the aftermath of the panic, more granular information is essential to understand the mechanisms and motivations underlying the recourse to central bank deposit accounts. We introduce our novel data in the next section.

3 Data

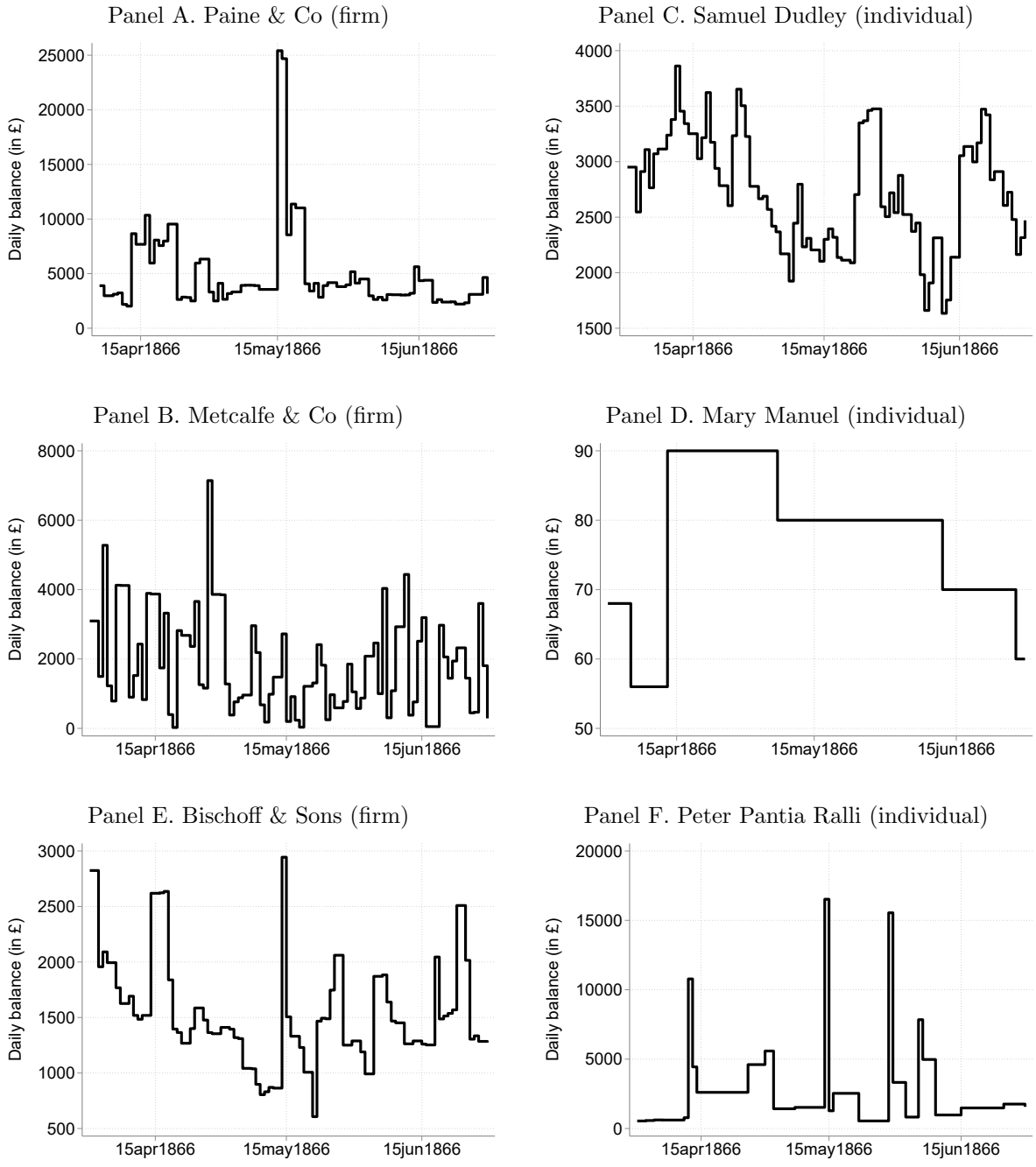
3.1 Drawing Accounts

To compile our novel account-level panel data set for an event study window around the panic of 1866, we drew on two primary sources.[8] First, we digitized the so called "drawing account index" for 1866, which lists all active accounts in alphabetical order (including those opened in 1866). We also digitized the index for 1871 and 1878 to be able to study the number of active accounts over time. This first step provides us with an overview of all active accounts held by individuals and firms other than banks in the selected years and indicates in which year these accounts were first opened.

Second, to collect information on high-frequency changes in the intensive margin of

[8]We provide more details on the available data in the Bank of England Archive in Online Appendix A, where we also show example pictures for our primary sources.

Figure 2: **Examples of the evolution of daily account balances**



This figure shows examples for the daily evolution of account-level balances on three firm and three individual accounts between 1 April and 30 June 1866. The purchasing power of £100 in 1866 corresponds to approximately £10,300 in May 2025. Source: own data.

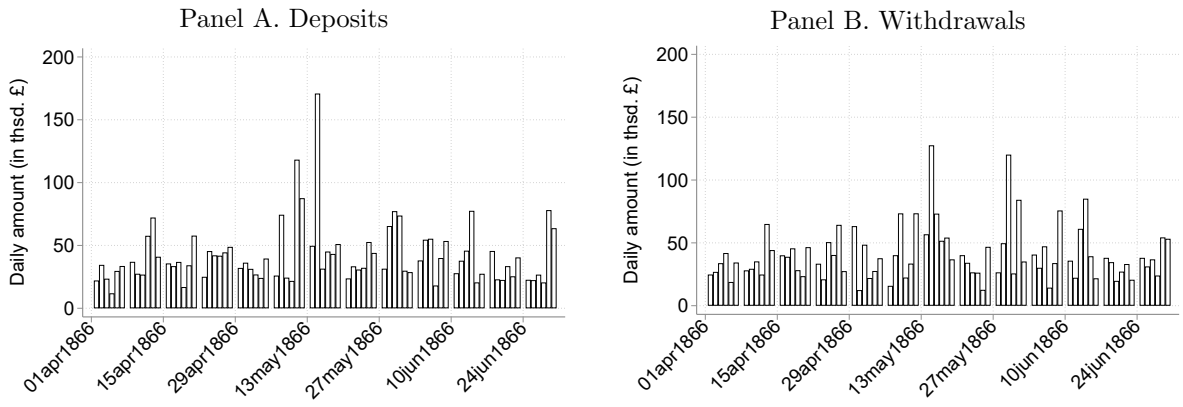
retail recourse to drawing accounts, we drew a stratified 10% random sample of all accounts held by individuals and firms other than banks active in 1866. We stratified accounts by opening year and account type (firms vs. individuals). For the stratified random sample of accounts, we collected the entire transaction-level history of incoming and outgoing payments during an event window covering the time period from 1 April 1866 until 30 June 1866. Transaction-level data are available in the so-called "customer account ledgers". The ledgers also contain useful meta information such as the address and the occupation/business of the account-holder, as well as various additional information (e.g. who was allowed to draw from the account). Starting from the monthly balance at the end of March 1866, we reconstructed the daily net balance for each account using the transaction-level data. The second step yields daily cross-section of net balances on each deposit account in the random sample, and thus a day-account panel data set. Figure 2 provides some examples for the evolution of individual account balances. It shows that account balances fluctuated considerably during the event window, were heterogeneous in size across accounts but could be substantial. For reference, the purchasing power of £100 in 1866 corresponds to approximately £10,300 in May 2025.

Our final panel data set covers 95 out of 1,156 firms and 239 out of 2,694 individuals present in the 1866 index.[9] In total, our micro data set comprises 14,844 outgoing (of which 7,379 from firm accounts) and 7,291 (of which 4,539 into firm accounts) incoming transactions. Figure 3 plots the aggregate amounts deposited in and withdrawn from deposit accounts at the Bank of England during our event study window. Transaction amounts clearly peaked around the outbreak of the panic in mid-May 1866. In contrast, the number of daily transactions was remarkably stable (see Figure C2 in Online Appendix C). In order words, the Bank's customers completed larger transactions during the panic, but did not transact more often than in normal times.

After filling in days on which the net balance did not change for a given account and after dropping Sundays when the Bank was closed for business, the final daily account-level panel data set reaches 24,299 observations (7,048 for firms and 17,251 for individuals). The panel is fully balanced for 86% of all observations, with the remainder being unbalanced due to early closures or newly opened accounts during the event window. The data set thus provides enough degrees of freedom to analyze fine-grained differences in the recourse to the deposit-taker of last resort between various groups of accounts within each type.

[9]Some sampled accounts represent latecomers or early exits (entering the ledger only after 30 June 1866 or exiting before 1 April 1866). Moreover, some relevant ledger pages are not legible or missing.

Figure 3: **Aggregate turnover on sampled deposit accounts**



This figure shows the daily amounts deposited in (Panel A) and withdrawn from (Panel B) the drawing accounts in our random sample between 1 April and 30 June 1866. The purchasing power of £100 in 1866 corresponds to approximately £10,300 in May 2025. Source: own data.

We provide summary statistics for the daily balances comparing firms to individuals in Table 1. Perhaps not surprisingly, the average amounts and turnover on firm accounts are larger than for individuals (differences are statistically significant at the 1% level throughout). In Table B1 in Online Appendix B, we also test whether amounts and turnover differed by domicile, opening year and gender. We find that account-holders residing outside London, accounts opened before 1866 and accounts held by women experienced significantly less traffic.

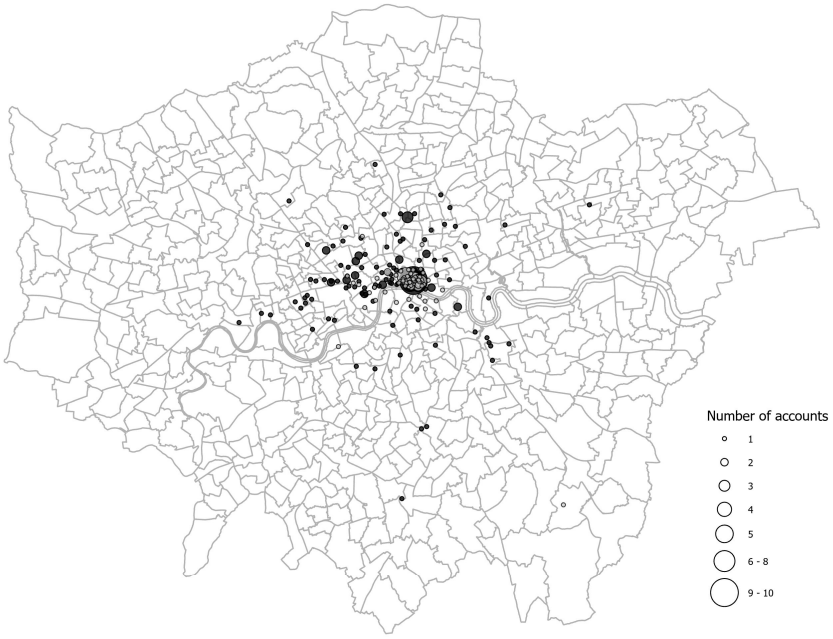
Finally, we collect and geocode the street addresses of all account-holders in our random sample. We are able to locate all firms and 94% of all individual accounts. We plot the distribution of addresses in the wider London area and the City of London in Figure 4. Account-holders outside London are not displayed. Addresses outside London include, among many other smaller towns, Bristol, Brighton, Cairo (Egypt), Exeter, Maesteg, Manchester, Oxford, Paris (France), and Tunbridge Wells. Figure 4 suggests that the firms in our sample generally tended to be more clustered around the City than private individuals.

3.2 Other Data Sources

Thanks to the efforts of Anson et al. (2017), daily transaction-level data on the Bank's lending operations (discounts and advances) are publicly available in digitized format for

Figure 4: **Account-holders domiciled in London**

Panel A. Wider London area



Panel B. City of London

This figure shows the street addresses of the firms (in gray) and individuals (in black) that are in our random sample and located in the capital on a modern map of London. Panel A plots the wider London area and Panel B focuses on the wards in and around the City of London. We are geo-locating street addresses rather than exact house numbers because numeration may have changed over time. For this reason, several accounts can be associated with the same street address. Source: own data.

Table 1: **Descriptive account-level statistics**

	Firms	Individuals	Diff. of means	SE of mean diff.	t-stat for diff.
Daily avg. amount deposited	359.18	41.94	317.24	17.53	18.10***
	[7,048]	[17,251]			
Daily avg. number of deposits	0.70	0.21	0.49	0.01	33.51***
	[7,048]	[17,251]			
Daily avg. amount withdrawn	356.77	38.60	318.17	15.84	20.09***
	[7,048]	[17,251]			
Daily avg. number of withdrawals	1.60	0.96	0.63	0.06	11.08***
	[7,048]	[17,251]			
Daily average balance	1,386.19	849.91	536.27	40.15	13.36***
	[7,048]	[17,251]			

This table presents descriptive statistics for the daily account-level transactions and balances of firms and individuals contained in our random sample. The purchasing power of £100 in 1866 corresponds to approximately £10,300 in May 2025. Number of observations indicated in brackets. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

the entire crisis event window in 1866.[10] For each lending transaction, the daily ledger transcribed by Anson et al. (2017) provides the following information: date, type (discount or advance), full borrower name, size of the discount/advance requested, number of bills presented (for discount), size of the discount/advance granted, number and amount of bills rejected, and interest rate charged. The daily ledger also contains additional transaction-level remarks such as "altered", "irregular", "returned", "withdrawn" etc. that serve as justification for the eventual lending decision taken by the Discount Office. Importantly, the ledgers earmark all loans deposited in drawing accounts (loans marked with "D.O."). The daily ledgers also provide summary statistics for total discounts and total advances granted and for the total amount of outstanding discounts and advances collected/redeemed on a given day. We cleaned the data set compiled by Anson et al. (2017) to match it to the names of drawing account-holders from the 1866 index.

We also use individual-level historical census data and trade directories to obtain additional or missing meta information on the individuals and firms owning drawing accounts. For individuals, we rely on the digitized full count Great Britain census for 1851, 1861 and 1881 censuses as compiled by the Integrated Census Microdata (I-CeM) project. The data are accessible and searchable through Find my Past. We collected

[10] See The Bank of England as Lender of Last Resort Historical Dataset (last accessed on 16 July 2025).

information on the address, profession, gender, marital status and birth year of individual account-holders. For firms, we draw on the Post Office London Directories for 1860, 1865, 1870 and 1875 available online through Ancestry to collect data on firms' addresses and their line of business.

Finally, we hand-collected time series on commercial bank deposit rates from the weekly newspaper *The Economist*. The supplemental *Bankers' Gazette* reports weekly deposit rates for joint stock banks and discount houses. All digitized issues of the newspaper are available in *The Economist Historical Archive* (online), starting in 1843. Our time series cover the period from 7 January 1865 until 25 December 1869.

4 Recourse to the Deposit-Taker of Last Resort

4.1 Extensive Margin

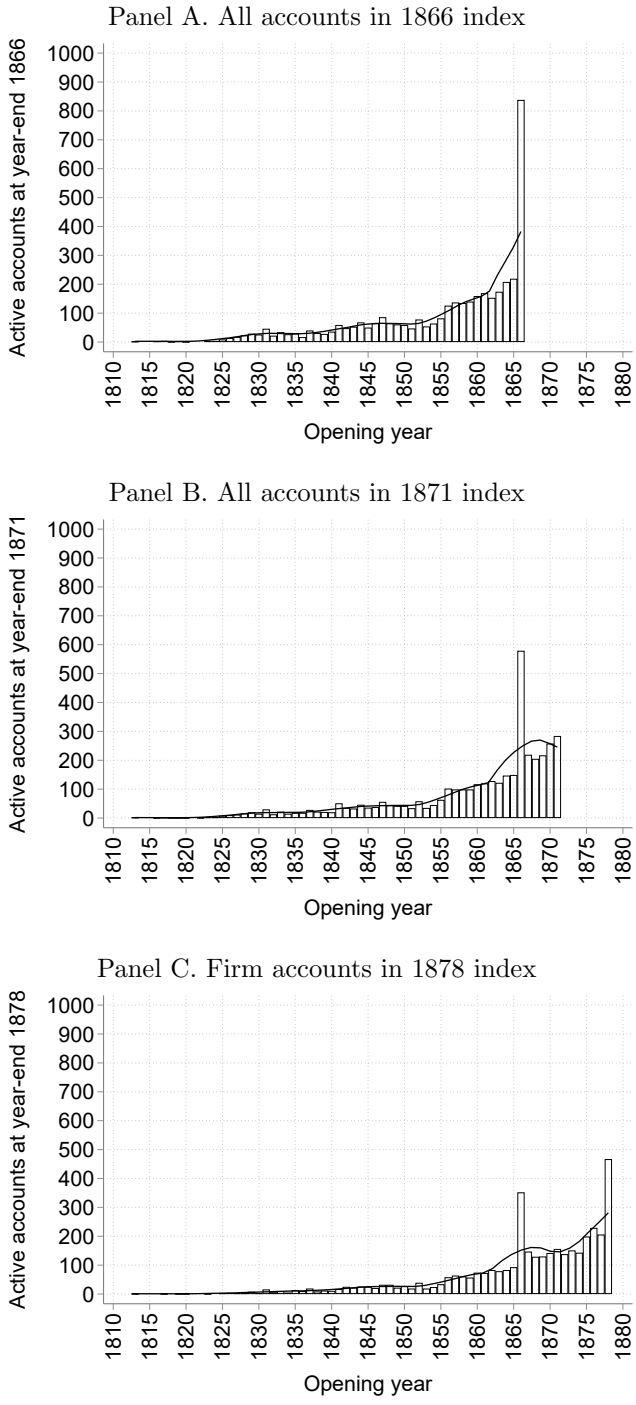
Did the panic of 1866 lead to an increase in the number of deposit accounts held at the Bank of England? Panel A in Figure 5 shows that the absolute number of newly opened accounts in 1866 clearly stands out relative to previous years. For 1866, the smoothed median-spline plot suggests an abrupt break in the longer-run correlation between the number of active accounts and opening year.

This pattern could be due to an "index-year effect", whereby the current year (in our case 1866) is systematically over-represented relative to previous ones due gradual account closures over time. Yet, Panel B in Figure 5 illustrates that 1866 remains an abnormal year even after we account for the index-year effect. The opening year distribution of active accounts in the 1871 drawing account index shows that 1866 continues to stand out more than five years after the panic.

In Panel C, we consider extensive margin dynamics during another episode of financial market turmoil that occurred twelve years after the panic of 1866. Although the crisis during the fall of 1878 is generally considered a minor incident, with only a few small bank failures scattered around the country (e.g., see Appendix D in Kenny et al., 2021), Panel C documents another local peak in the number of newly opened accounts. However, the extensive margin increase in 1878 is clearly dwarfed by the developments during the earlier panic of 1866. Furthermore, Panel C reveals that the jump in newly opened accounts in 1866 continues to stand out in 1878, more than twelve years after the panic.

Figure C3 in Online Appendix C decomposes total accounts in each index year into newly opened firm and individual accounts. While the jump in the number of accounts in 1866 is reflected in both account types, the lion's share of the extensive margin increase

Figure 5: **Extensive margin dynamics of central bank deposit accounts**



This figure shows extensive margin dynamics of central bank deposit accounts using data from the 1866, 1871 and 1878 drawing account indices. Panels A, B and C plot the number of all active deposit accounts at year-end 1866, 1871 and 1878 against their respective opening year. Source: own data.

was driven by individuals. Note that a sizable portion of accounts from each opening year cohort are closed over the five and twelve year horizons shown in Figure 5. We study the drivers of account survival rates in more detail in Section 5 below.

Finally, we conduct a series of t-tests comparing the characteristics of accounts that were opened in 1865 to those of accounts opened during the panic year of 1866. By definition, we can only compare the characteristics of accounts that we were able to match using official census data (for individuals) and the Post Office London Directories (for firms). The matching rates for individuals are 54% (1865) and 32% (1866). We are able to match 99% (1865) and 82% (1866) of all firms that opened a new account. The lower matching rates for 1866 indicate the presence of more common names (e.g., John Smith or Smith & Co) that are impossible to match to unique census or Post Office records without further information, even within London.

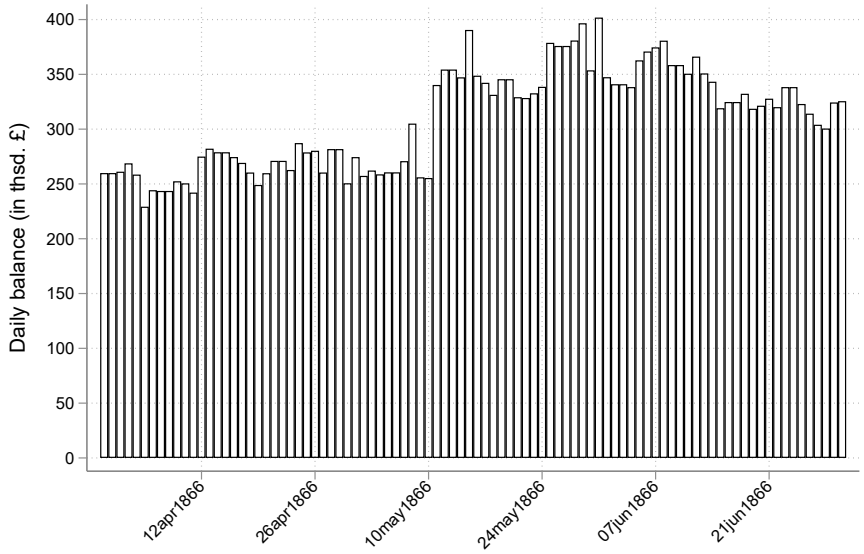
Table B2 in Online Appendix B summarizes the test results and provides several insights. Conditional on a successful match, we find no evidence suggesting that the professions of new individual account-holders in 1865 and 1866 systematically differed. The share of female and old account-holders is slightly higher in 1865, but these results have no clear economic interpretation. Since all firms that opened new accounts in 1865 and 1866 were headquartered in London, we can only compare their branches of business. The results reveal one major difference between new corporate accounts in 1865 and 1866. The share of firms opening a new account that was involved in some type of financial activity (i.e., bill, discount, exchange or stock brokers, and insurance agents) was more than four times higher in 1866 than in 1865 (18% versus 4%, with the difference statistically significant at the 1% level). Hence, if anything, the conditional t-test results suggest stronger, rather than weaker, selection into central bank deposit accounts during times of distress.

4.2 Intensive Margin

Did the outbreak of the panic in May 1866 lead to a sudden increase in the funds deposited with the Bank of England? Figure 6 suggests that daily balances on sampled accounts in our micro data set indeed jumped discontinuously after 10 May 1866. Hence, the hike in daily balances coincided with the first day after the run on Overend & Gurney in the City of London.

To confirm this visual analysis and to evaluate the statistical significance of the break point in May 1866, we first apply structural break point analysis to our panel data as

Figure 6: **Daily balance on sampled deposit accounts**



This figure shows aggregate daily balances for our sample of drawing accounts (firms and individuals) between 1 April 1866 and 30 June 1866. Source: own data.

proposed by Ditzen et al. (2025). In other words, we take an agnostic approach by letting the algorithm detect a single unknown break in the panel data for daily balances: we do not assume *ex ante* that the structural break identified in Figure 6 existed. Table 2 summarizes the results. The analysis confirms the visual break point after 10 May 1866 for all accounts but only yields an imprecise confidence interval of $+/-15$ days around the identified break point. To better understand the drivers of this imprecision, we run separate tests for firm accounts and individual accounts. We find that the structural break after 10 May 1866 is precisely estimated for firms only. Figure C4 in Online Appendix C visually corroborates this finding. For accounts held by individuals, the agnostic approach to break point identification even flags a different, earlier date (28 April 1866) that remains imprecisely estimated.

Motivated by these results, we use event study techniques (regression discontinuity in time, or RDiT, analysis) to quantify the impact of the panic onset on daily balances held with the Bank of England. We estimate the following equation:

$$Y_{i,t} = \alpha_i + \tau \cdot \mathbb{1}\{t \geq t_0\} + \beta_1(t - t_0) + \beta_2(t - t_0) \cdot \mathbb{1}\{t \geq t_0\} + \varepsilon_{i,t} \tag{1}$$

In equation 1, α_i is an account-level fixed effect, $\mathbb{1}\{t \geq t_0\}$ represents a dummy indicating the period starting on the cut-off date 11 May 1866 (t_0), and $(t-t_0)$ is the running variable

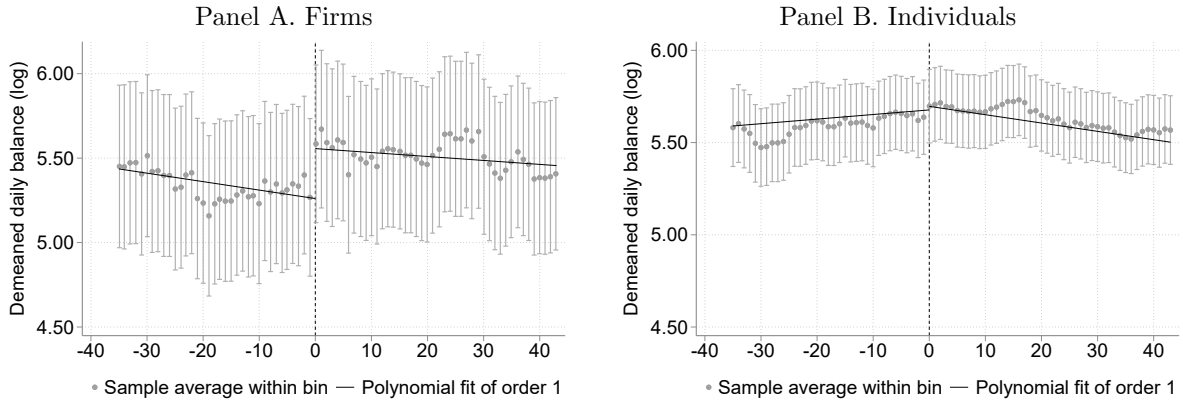
Table 2: **Break point analysis**

	Outcome: daily balance (log)			
Account type	Estimated breakpoint	95% CI	Accounts	Time periods
All accounts	Day 35 (10 May 1866)	[20; 50]	276	79
Firms	Day 35 (10 May 1866)	[34; 36]	74	79
Individuals	Day 25 (28 April 1866)	[18; 32]	202	79

This table presents tests for a single unknown break point in the daily balances on drawing accounts using the panel data approach proposed by Ditzen et al. (2025). Confidence intervals are based on heteroskedasticity- and autocorrelation-consistent standard errors. Source: own data.

centered at the cut-off date. To allow for flexible slopes left and right of the cut-off, we also interact the running variable with the treatment indicator. The main coefficient of interest is τ, the effect of the panic outbreak on daily balances ($Y_{i,t}$). We take the natural logarithm of our main outcome variable of interest to obtain an estimate of the average percent change in daily balances due to the outbreak of the panic. The slope coefficient to the right of the cut-off, β_2, allows us to approximate the time until the discontinuous jump in daily balances fully dissipated. We estimate equation 1 using local linear and global polynomial regressions.

Figure 7: **Event study plots for panic outbreak after 10 May 1866**



This figure shows event study plots using global polynomial fitting (regression discontinuity in time, RDiT) for an event window of +/− 40 days around the outbreak of the financial panic after 10 May 1866. Panel A shows event study results for all firm accounts in our random sample. Panel B plots the results for retail accounts. 95% confidence bands are displayed for daily bins. Source: own data.

Figure 7 illustrates the event study design for firms and individuals. To check for robustness, we provide plots for higher order polynomials in Figure C5 in Online Appendix C. Table 3 summarizes the event study estimates using local linear regression. We esti-

mate the effect of the panic outbreak for the total sample, and for firms and individuals separately. For each group, we run regressions on the unbalanced and balanced sample of observations.

Columns 1–2 in Table 3 show that the onset of the panic led to a sudden average increase in daily balances between 8% and 11% (0.08 and 0.10 log points) when all accounts are considered. This jump is statistically significant at the 5% level. Columns 3–6 show that the discontinuous increase after the onset of the panic was entirely driven by firm accounts. The balance on firm accounts sharply increased by between 34% and 36% after the run on Overend & Gurney. This effect is statistically significant at the 1% level. We find no evidence for systematic discontinuous movements in the daily balances of individuals. Global polynomial fitting (see Table B3 in Online Appendix B) corroborates the large difference in account dynamics between firms and individuals after the onset of the panic.

Table 3: **Impact of panic outbreak on daily account-level balances**

	Outcome: daily balance (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
	All accounts	All accounts	Firms	Firms	Individuals	Individuals
Post-panic outbreak (dummy)	0.1001**	0.0774**	0.2960***	0.3042***	0.0191	-0.0057
	(0.0424)	(0.0385)	(0.0349)	(0.0354)	(0.0155)	(0.0145)
Running variable (days)	0.0003	0.0014	-0.0050***	-0.0033**	0.0025***	0.0031***
	(0.0018)	(0.0018)	(0.0013)	(0.0014)	(0.0007)	(0.0007)
Post-panic outbreak × running variable	-0.0042	-0.0046*	0.0027	0.0003	-0.0070***	-0.0064***
	(0.0026)	(0.0024)	(0.0017)	(0.0017)	(0.0008)	(0.0008)
Observations	24,184	21,804	6,994	5,846	17,190	15,958
Adjusted R^2	0.8855	0.8994	0.8940	0.9036	0.8790	0.8965
Sample	Full	Balanced	Full	Balanced	Full	Balanced
Account-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

This table presents coefficient estimates for the impact of the panic outbreak on account-level daily balances. We estimate equation 1 using a local linear regression approach. The outcome variable is the natural logarithm of the daily balance. Heteroskedasticity-robust standard errors are reported in parentheses. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

The local linear estimates for β_2 suggest that the discontinuous jump in daily balances after 10 May 1866 was persistent. According to the coefficients in columns 1–2, it took between 200–250 days until the sudden increase dissipated. For firms, β_2 is very small but positive, suggesting a permanent impact on daily balances. Hence, our analysis based on

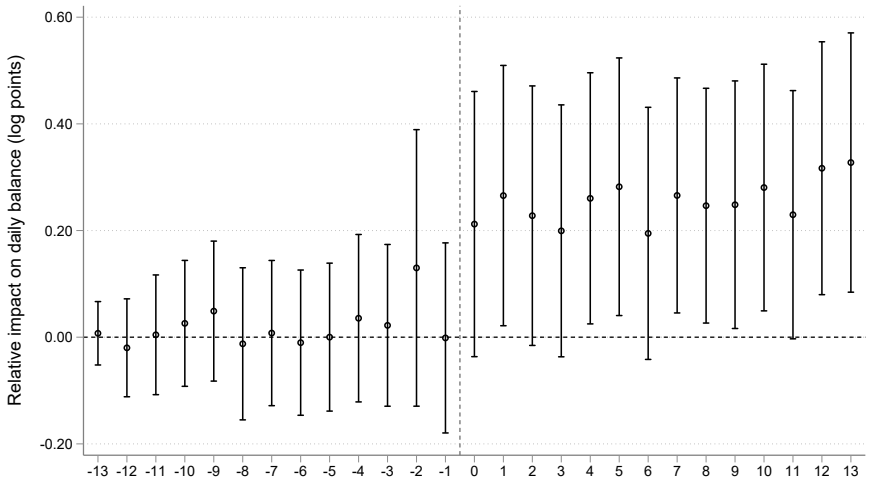
account-level micro data shows that the ratchet effect for retail deposits visible in Figure 1 above was entirely driven by the increased holdings of firms.

To rule out spurious correlation concerns and to quantify the difference in the dynamics of firm and individual accounts after 10 May 1866, we estimate the following fully interacted difference-in-differences specification:

$$Y_{i,t} = \alpha_i + \lambda_t + \sum_{k \neq 0} \gamma_k \cdot (D_i \times \mathbb{1}\{t = t_0 + k\}) + \varepsilon_{i,t} \tag{2}$$

In equation 2, α_i is an account-level fixed effect, λ_t represents day fixed effects, D_i is a dummy indicating firm accounts, and t_0 stands for the reference day. We estimate equation 2 for a window of $+/-14$ days around the outbreak of the panic, drawing on the fully balanced sample of firm and individual accounts.

Figure 8: **Relative impact on deposit account balances (firms vs. individuals)**



This figure shows coefficient estimates γ_k obtained from estimating equation 2 on the fully balanced sample of firms and individuals. Day 14 before the panic outbreak serves as reference date. 95% confidence intervals based on clustered (account-level) standard errors are displayed for estimated coefficients. The joint test for pre-trends cannot reject the null of no pre-trend (p-value: 0.5908). The average treatment effect for the entire 14-day post-panic outbreak period is 0.2371 (clustered standard error: 0.0885, p-value 0.0080). We report canonical average treatment effect estimates in column 1 of Table B4 in Online Appendix B. Source: own data.

Figure 8 plots the full set of coefficient estimates γ_k. Figure 8 first visually confirms that the joint test for pre-trends cannot reject the null of no pre-trend (p-value: 0.59). Second, the estimates show a clear-cut relative impact on the daily balances of firms that emerges immediately after 10 May 1866. The average treatment effect for the entire 14-day post-panic outbreak period is 0.24 (statistically significant at the 1% level). In

other words, in the 14 days after the 10 May 1866 firms on average increased their daily balance by 27% more than individuals. We report canonical (non-interacted) average treatment effect estimates in column 1 of Table B4 in Online Appendix B.

Overall, this subsection finds that the Bank of England served as a deposit-taker of last resort during the panic of 1866. Deposit accounts represented a safe haven for funds in the immediate aftermath of a systemic erosion of confidence in the financial system. The sums deposited in drawing accounts at the Bank jumped discontinuously on the day after the run on Overend & Gurney. In contrast to changes along the extensive margin, however, the intensive margin increase in daily balances was entirely driven by firms. Furthermore, the increase in firms' daily balances was persistent and did not immediately dissipate once financial market turmoil had abated.

4.3 Sources of Heterogeneity in Intensive Margin Recourse

The heterogeneity of account-holders may mask substantial variation in the recourse to the deposit-taker of last resort. Even though we do not find evidence for a discontinuous jump in the daily balances of individuals' deposit accounts after 10 May 1866, it is possible that the distinct behaviors of subgroups canceled each other out.

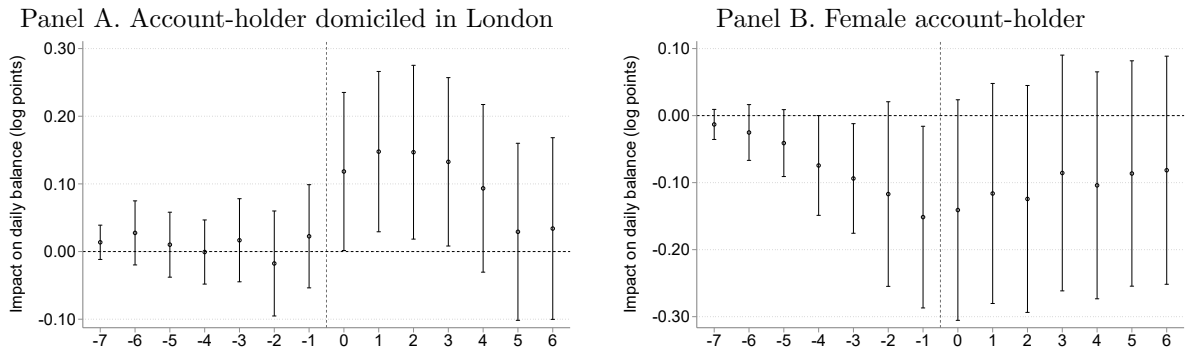
Existing work suggests that ease of use and financial literacy may influence the recourse to central bank deposit accounts as a safe haven during panics. We test these hypotheses by generating two proxies based on the meta data for individual account-holders. For ease of use, we rely on account-holders' home address. We suspect that individuals residing in London saw faster increases in daily balances than their peers living elsewhere. Our sample contains 45 accounts held by individuals domiciled outside London (19% of the total sample of individuals).[11] For financial literacy, we draw on the gender[12] of the account-holder. It is well established that women – due to a combination of legal restrictions (e.g., coverture) and entrenched patriarchal gender stereotypes – had substantially lower levels of financial literacy than men in the 19th century, a difference that sadly persists today (Lusardi and Mitchell, 2023). Our sample contains 22 female-held deposit accounts, i.e. 9% of the total sample of individuals.

To investigate whether ease of use and financial literacy played a role in the recourse to the deposit-taker of last resort, we estimate variants of equation 2 above. We replace

[11] We flag addresses as London-based if they were located in one of the official list of London districts defined in the Metropolis Management Act of 1855.

[12] We can only infer the gender of a person using first names or prefix (e.g., Mrs or Ms). We acknowledge that sex and gender can differ. Our sources do not allow us to ascertain underlying gender identity.

Figure 9: **Impact of ease of use and financial literacy**



This figure shows coefficient estimates γ_k obtained from estimating equation 2 on the fully balanced sample of accounts held by individuals. Day 8 before the panic outbreak serves as reference date. 95% confidence intervals based on clustered (account-level) standard errors are displayed for estimated coefficients. Panel A shows the impact of a London domicile on the daily balance, relative to account-holders residing outside the city. The joint test for pre-trends cannot reject the null of no pre-trend (p-value: 0.4951). The average treatment effect for the entire 7-day post-panic outbreak period is 0.0913 (clustered standard error: 0.0540, p-value: 0.0920). Panel B shows the evolution of daily balances held by female account-holders relative to male account-holders. The joint test for pre-trends for the entire week before the panic outbreak cannot reject the null of no pre-trend (p-value: 0.2523). In contrast, a pre-trend test conducted for the last four days before the panic outbreak rejects the null (p-value: 0.0825). The average treatment effect for the entire 7-day post-panic outbreak period is -0.0411 (clustered standard error: 0.0632, p-value: 0.5170). We report canonical average treatment effect estimates in columns 2–3 of Table B4 in Online Appendix B. Source: own data.

D_i with a dummy indicating account-holders residing outside London or deposit accounts held by women. We plot the coefficient estimates for γ_k in Panels A and B of Figure 9 and report average treatment effects in columns 2–3 of Table B4 in Online Appendix B.

We find that individuals located in London deposited relatively more funds in their drawing accounts in the immediate aftermath of the run on Overend & Gurney. More precisely, between 11 May and 15 May 1866, account-holders domiciled in London deposited 10-15% more than individuals residing elsewhere (coefficient estimates all significant at the 5% level). Interestingly, the effect fades away after 15 May 1866, suggesting that account-holders domiciled outside London caught up with their peers after a delay of several days. This result is consistent with the fact that, by 1866, many locations were reasonably well connected to London via the British railway network, making it perfectly possible for letters and cheques to reach the capital within 2–3 days.[13]

Turning to our proxy for financial literacy, we find no evidence for any treatment effect after the onset of the panic. Yet, Panel B in Figure 9 suggests that, before 11 May

[13]Note that we cannot replicate this exercise for firm accounts because virtually all firms with drawing accounts were located in London.

1866, men tended to make relatively more net deposits on a daily basis. The outbreak of the financial crisis stopped this negative pre-trend. This development is consistent with the notion that the salience of the run on Overend & Gurney led women who previously made little use of their drawing accounts to actively shift funds into their accounts at the Bank of England. If anything, this result calls into question the informational value of gender gap measures in financial literacy that focus on gender-based differences in financial service usage during normal times.

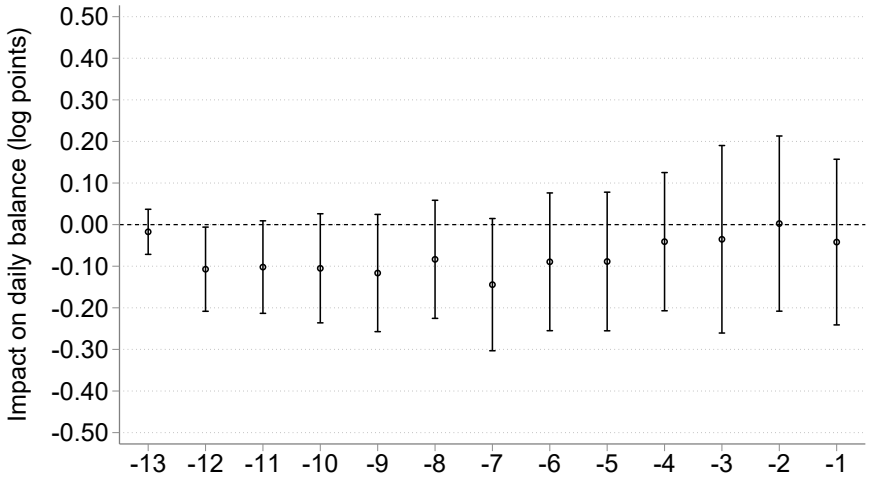
In unreported results, we also tested for heterogeneity by account size as measured by the mean balance prior to the panic outbreak and account activity as measured by the mean number of daily transactions prior to the panic outbreak. In neither case do we find evidence for statistically significant treatment effects. This finding again aligns with the notion that the salience of the panic aroused individuals' attention across the board, prompting small and normally passive accounts to react in ways comparable to large and active accounts.

Recent evidence from the run on U.S. money market funds in March 2020 suggests that sophisticated and unsophisticated investors exhibited different run behaviors (Cipriani and Spada, 2024). Whereas the former ran preemptively based on fundamentals, the latter engaged in *ex post* herding. In the final part of this subsection, we build on this insight to investigate whether the Bank of England could have reaped positive information effects by monitoring the behavior of sophisticated "insider" account-holders in the run-up to 10 May 1866 (Keister and Monnet, 2022). For this purpose, we digitized all transactions on accounts belonging to users that can reasonably be identified *ex ante* as well-informed insiders. This complementary group of accounts consists of private drawing accounts held by partners and owners of financial firms (banks and stockbrokers) in the City of London. We report the names and addresses of all insider accounts in Table B5 in Online Appendix B. We can draw on fully balanced data for 22 individual accounts (1,738 additional observations for the entire period between 1 April and 30 June 1866).

We use the difference-in-differences model in equation 2 to evaluate whether the Bank could have foreseen the outbreak of the panic by surveilling insider accounts during the 14 days preceding 10 May 1866. We rely on all individual accounts in our random sample as the control group but the results discussed below remain qualitatively unchanged if we exclude control group accounts whose proprietors were active in the financial industry.

Figure 10 plots the resulting coefficients. We find no statistically significant evidence for observable pre-trends in the daily balances of insider accounts: neither the daily coefficients nor the joint test for pre-trends (p-value of 0.48) suggest the presence of

Figure 10: **Impact of *ex ante* insider status**



This figure shows coefficient estimates γ_k obtained from estimating equation 2 on the fully balanced sample of accounts held by individuals and complementary insider accounts. Day 14 before the panic outbreak serves as reference date. 95% confidence intervals based on clustered (account-level) standard errors are displayed for estimated coefficients. The joint test for pre-trends cannot reject the null of no pre-trend (p-value: 0.4722). We report the canonical average treatment effect estimate for the 7-day post-panic outbreak period in column 4 of Table B4 in Online Appendix B. Source: own data.

systematic account movements in the run-up to the panic outbreak. While it is difficult to fully rule out the presence of beneficial information effects, contemporary accounts written during the crisis help rationalize this finding. As suggested by an article published in *The Economist* on 12 May 1866, the suspension of payments took the financial market by surprise, even though Overend & Gurney's difficulties had already been common knowledge in the City for some time:

> "It has been signally shown how much an old name, which all really instructed people knew to have lost its virtue, still retains its magical potency over the multitude. Lombard street has been thronged and almost stopped by curious wonderers in a way we never saw it stopped before, and on the whole we doubt if there ever was a collapse of credit more diffused and more complete."
> – *The Economist, Weekly Commercial Times, Bankers' Gazette, and Railway Monitor: A Political, Literary, and General Newspaper*, Saturday, May 12, 1866, p.553.

This description of events is consistent with the idea that even well-informed individuals remained passive until a sufficiently strong signal – the announcement of Overend & Gurney's inability to pay – triggered widespread herding behavior (Maćkowiak et al., 2023; Shiller, 2000; Cipriani and Guarino, 2014).

5 Economic Mechanisms

Which economic mechanisms can explain why retail investors used the deposit-taker of last resort during the panic of 1866? And why did they hold onto their increased balances and newly opened accounts until long after the panic had subsided? In Online Appendix D, we present a simple theoretical framework to rationalize our empirical findings. In this section, we first briefly summarize the intuition behind this framework. The remaining subsections below marshal empirical evidence from our historical setting to plausibilize the key elements and dynamics in the toy model.

5.1 Theoretical Framework

Online Appendix D lays out a parsimonious framework that can rationalize both, crisis-driven inflows into a safe "0% bank" (i.e., a financial institution that offers no pecuniary remuneration for deposits), and the persistence of such inflows beyond the crisis. The model features three time periods: pre-crisis, the panic episode and the post-distress period. The key ingredients of the framework are (i) a convenience yield attached to deposits held with the "0% bank" that increases in times of distress, (ii) a net interest margin constraint that limits rival banks' ability to increase deposit rates, and (iii) positive network externalities due to faster transfers and settlement that increase with the number of depositors banking with the same financial institution.

Safe assets offer a positive non-pecuniary convenience yield that rises when confidence in other investments falls. We model the value investors reap from depositing funds with the "0% bank", henceforth Bank A, as a function of a time-varying convenience yield. While its safe institution status affords Bank A a certain convenience edge relative to more risky peers (captured by a representative Bank B) even in normal times, rival banks can compensate this dis-advantage by offering positive deposit rates. More precisely, Bank B can set a positive deposit rate subject to a net interest margin constraint (NIM) that ensures profitability, i.e. a minimum spread between the average yield that the bank obtains from its asset-side investments and the deposit rate. As a corollary, in normal times, the market share of deposits held with Bank A is modest and only remains non-zero due to frictions. For example, some depositors are highly risk-averse and overweight the convenience edge, are partly rate-insensitive for other reasons or face large switching costs (deposit stickiness).

When the panic occurs, the absence of deposit insurance and positive default risk cause Bank B to lose investor confidence relative to Bank A. The convenience yield afforded by

deposits held at Bank A rises sharply. Bank B may increase its deposit rate (modeled as a function of the risk-free rate plus an add-on chosen by the bank) to maintain its customer base, but it can only do so subject to the NIM. Increasing deposit rates beyond the NIM would make Bank B unviable in the longer run and is counterproductive as it amplifies withdrawals. The panic triggers deposit flows from Bank B to Bank A if the increase in the deposit rate Bank B offers cannot fully compensate for the rise in the convenience yield.

As the panic abates, the convenience yield bump dissipates. All else equal, investors would face strong incentives to shift deposits back to Bank B to benefit from a positive interest rate. We consider two factors that can hinder the re-balancing of funds and cause deposits to remain at Bank A. First, via the NIM, a post-crisis environment characterized by low interest rates constrains the spread Bank B can offer relative to the 0% rate of Bank A. Combined with switching frictions, this factor alone may motivate some depositors with lower rate sensitivity to keep their funds at Bank A long after the crisis has ended.

Second, as the market share of deposits held at Bank A increases with the panic outbreak, so do the positive network externalities that investors reap from banking with the safe institution. Previously scattered across many different rival banks, many more depositors begin to share the same financial institution (i.e., Bank A) after the onset of the panic. In our historical setting, the transfer of funds across different banks implied higher costs, paperwork and time due to the writing and clearing of cheques than transfers from one account to another within the same institution.

In sum, the market share of deposits held at Bank A in the post-crisis period remains above the pre-crisis level if positive network externalities can compensate for the renewed increase in deposit spread between the two banks, the size of which is a function of the overall interest rate environment.

5.2 The Convenience Yield on Central Bank Deposit Accounts

The convenience yield on Bank of England drawing accounts is not directly observable because it represents a non-pecuniary form of remuneration. Furthermore, given that the Bank paid 0% interest on its deposit accounts, we cannot compute the convenience yield as a residual in the spirit of Krishnamurthy and Vissing-Jørgensen (2012). For these reasons, we pursue two alternative strategies to indirectly evidence the sudden rise in the convenience yield during the panic of 1866. First, we rely on qualitative sources to

document the large shift in investor confidence placed in the Bank of England relative to other financial institutions after the onset of the crisis. Second, we leverage observable historical time series and our theoretical framework in Online Appendix D to approximate the convenience yield during the panic of 1866.

We reviewed prominent historical news outlets in search for "smoking guns" on a hike in the convenience yield after 10 May 1866. The following quote from *The Economist* clearly highlights the special role the public attributed to the Bank of England during the panic. The Bank suddenly became the *only* financial institution nation-wide which investors continued to trust:

> "It has not been sufficiently observed how very peculiar and technical is the sense in which we now talk of 'panic'. It would naturally signify a general destruction of all confidence, a universal distrust, a cessation of credit in general. But a panic is now come to mean a state in which there is a confidence in the Bank of England, and in nothing but the Bank of England. [...] At such times an enlarged trust is reposed in the Bank, but there is a much diminished confidence in every one else. Distrust is diffused, but the Bank of England does not feel it; the use of its credit is augmented." – *The Economist, Weekly Commercial Times, Bankers' Gazette, and Railway Monitor: A Political, Literary, and General Newspaper*, Saturday, May 12, 1866, p.554.

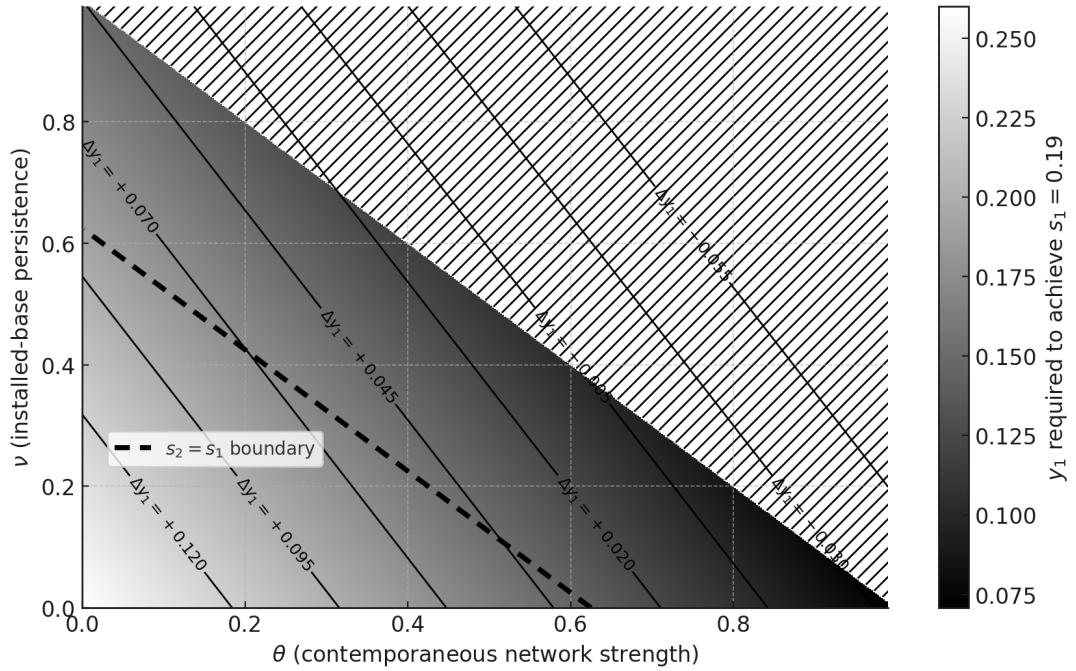
While the preceding excerpt suggests that the Bank experienced an increase in the recourse to its lending facilities, it does not explicitly refer to private drawing accounts. Yet, another citation, taken from an article published in *The Observer* on 20 May 1866, emphasizes that deposit accounts at the Bank were regarded as a particularly attractive means of storing funds:

> "While the Bank of England has been lavishing its accommodation to banks in difficulties, its private deposits have increased by above £5,000,000. A double process seems to have been going on at one and the same time. The Bank of England has enabled, for instance, a London bank to pay its depositors, who, as soon as they have received their money, have taken it to the Bank of England, as the only place in which it could be lodged with safety." – *The Observer*, Sunday, May 20, 1866, p.4.

Contemporary reports thus leave little doubt as to why the number of drawing accounts and the sum of deposit balances held with the Bank rose to unprecedented levels during the panic of 1866. In the eyes of investors, the unparalleled safety of accounts boosted

their perceived, non-pecuniary value. This increase in the convenience yield motivated retail customers to shift resources from their commercial bank accounts to drawing accounts at the Bank.

Figure 11: **Simulated convenience yield in crisis period $y_1(\theta, \nu)$**



This figure plots the simulated levels of the convenience yield during the panic (shaded gray to black area, see right-hand side legend) that are consistent with the observed 8% increase in the Bank of England's market share of deposits during the panic. Isolines indicate those combinations of deposit stickiness (ν) and network externalities (θ) for which the simulated increase in the convenience yield relative to the pre-crisis level is identical. The hatched area flags unfeasible parameter combinations. The dashed line ($s_1 = s_2$ boundary) captures all combinations of the convenience yield, ν and θ that are consistent with an increase in the market share that persists in the post-crisis period (ratchet effect). Assumptions and chosen parameters are summarized in Table D1 in Online Appendix D. Source: own calculations.

But just how large was this increase? To approximate the panic-induced change in the convenience yield, we draw on the theoretical framework described in the previous subsection. In Online Appendix D, we discuss the parameterization of our simple model using historical data on key time series. We document that the Bank of England's market share of deposits in London rose from 11% just before May 1866 to 19% during the panic. Figure 11 plots all simulated *levels* of the convenience yield during the panic (shaded gray to black area, see legend on the right-hand side of the graph) that are consistent with the observed 8% increase in the Bank's market share. The convenience yield is shown as a function of deposit stickiness (ν) and network externalities (θ). The simulated levels range

from 7.5% to 25%.[14] Higher deposit stickiness and more important contemporaneous network effects render the 8% increase in the market share consistent with lower levels of the convenience yield during the panic. Isolines indicate those combinations of ν and θ for which the necessary *increase* in the convenience yield relative to the base edge is identical. Importantly, among all feasible[15] combinations of the convenience yield, ν and θ, only those on the dashed line ($s_2 = s_1$ boundary) are consistent with an increase in the market share that persists in the post-crisis period (ratchet effect). Hence, the panic-driven rise in the convenience yield necessary to explain a permanent 8% boost to the Bank's market share ranges between 3.5% (low ν, high θ scenario) and 8.5% (high ν, low θ scenario). Assuming a middle-ground scenario with moderate values for both ν and θ results in an upward jump in the convenience yield of 600 basis points, i.e., a change more than twice as large as the observed change in the commercial deposit rate at the time (+250 basis points, see Figure D1 in Online Appendix D).

5.3 The Continued Use of Deposit Accounts in Normal Times

In our theoretical framework, we rely on the presence of deposit stickiness and positive network externalities to generate a ratchet effect in the daily balances held with the Bank of England. In this subsection, we discuss historical evidence from our setting that could reflect these forces.

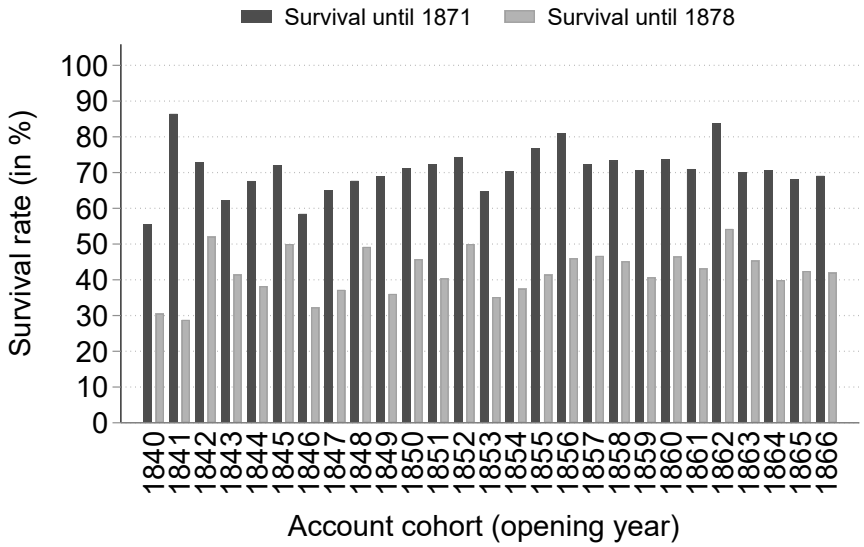
A natural starting point for this discussion is to ask why the panic of 1866 led to a persistent increase in the number of new accounts, whereas other, arguably equally severe crises did not. Figure 5 above provided no indication that the crises of 1847 and 1857 left a permanent mark on the population of drawing accounts. Primary sources suggest that the Bank itself noticed that 1866 was special. An internal report noted that "the past experience of former panics has shown that accounts were merely brought to the Bank as a precautionary measure, and were but temporary" (Bank of England, 1867, p.245). Yet, referring to the large increase in drawing accounts following the financial crisis of 1866, the memo also argued that, "in this instance, there is every probability of a large proportion of the increase being permanent" (Bank of England, 1867, p.245–246). The report explicitly connected this conjecture to the Bank's admission to the London Clearing House in 1864. Clearing House membership, so the internal memo, enabled the Bank to offer the same advantages to its depositors as those provided by other clearing bankers. While the report does not detail the exact amenities in question, it is likely

[14] For comparison, the assumed pre-crisis convenience edge is 10.5%.

[15] All combinations in the hatched area are not feasible in our parsimonious framework.

that the main advantage for customers was the increased velocity of transfers between accounts at different financial institutions. Without Clearing House membership, cheques drawn on accounts elsewhere could take several days or weeks to clear. At first sight, our data provide *ex post* evidence in favor of the report's hypothesis. The benefits of the financial services attached to Bank of England deposit accounts appears to have become sufficiently high by 1866 to warrant keeping accounts active long after the panic.

Figure 12: **Share of deposit accounts in 1866 index still active in 1871 and 1878**



This figure shows, for each opening year between 1840 and 1866, the share of deposit accounts listed in the 1866 index that remained active in 1871 and 1878. Source: own data.

On closer inspection, however, this narrative proves less convincing. Accounts opened in 1866 were not special in terms of their survival rate relative to previous age cohorts. Figure 12 plots, for each opening year cohort, the share of accounts present in the 1866 index that remained active in 1871 and 1878. It shows that the survival rate is approximately constant across cohorts and averages around 70% for the five year horizon and 40% for the 12 year horizon. Hence, Figure 12 suggests that it was mainly the sheer number of newly opened accounts that caused 1866 to stand out relative to previous crisis years.

The increased quality of services attached to drawing accounts does not seem to have made it more attractive to keep them in the longer run. Yet, the Bank's adherence to the London Clearing House likely allowed individuals and firms to transfer large amounts during the height of the panic in a much quicker way than during previous episodes of

distress. Clearing House membership could therefore help explain both, the particularly high absolute increase in the number of new account-holders relative to previous crisis years and the observed jump at the intensive margin. The observed medium-run ratchet effect in turn may have been due to positive network externalities that grew with the number of depositors and the amount of funds held at the Bank. Once these externalities had surpassed a certain threshold, they may have more than compensated the opportunity costs of maintaining funds at the Bank beyond the panic.

Two pieces of historical evidence lend support to this conjecture. First, the post-crisis environment was characterized by depressed interest rates with commercial deposit rates hovering around 1% (see Figure D1 in Online Appendix D). Thus, the opportunity costs of maintaining funds with the Bank were historically low and likely increased deposit stickiness. Second, we find suggestive evidence that the presence of network externalities boosted the survival rate of accounts opened in 1866. To show this, we created a subsample of all firm and individual accounts opened in 1866 and match them to the drawing index for 1871, i.e. five years after the crisis.[16] Next, we manually matched individual accounts opened in 1866 to British census data to identify account-holders' occupation, gender, age and address.[17] Moreover, we manually matched firms to entries in the Post Office London Directories to identify their business areas and exact addresses (all firms in the sample are located in London). We are able to uniquely match 32% of all individual accounts (194 out of 605) and more than 80% of all firm accounts (212 out of 258) opened in 1866.

Our key hypothesis is that firms and individuals that had the highest *ex ante* potential to benefit from positive network externalities – e.g., because they usually engaged in a large number of daily financial transactions and many of their commercial partners also started to bank with the Bank of England – were more likely to keep their account. Our underlying assumption is that transfers of funds between two accounts at the Bank were cheaper, easier and faster than transfers between accounts at different commercial banks. To test this hypothesis in a regression framework, we created dummy variables flagging deposit accounts that were held by merchants and firms and individuals involved or employed in financial services.

[16] Around 37% of all firm accounts and 34% of all individual accounts that had been opened in 1866 were closed again by 1871. The survival rates for firms and individuals are not statistically different from each other (see column 1 of Table 4).

[17] Note that our sample in this section represents the entire population of accounts opened in 1866. For this reason, the matching exercise is a separate one from the one we implement for our 10% random sample above.

Table 4: **Predicting survival of accounts opened in 1866**

	Outcome: P(account still active in 1871)		
	(1)	(2)	(3)
Individuals (dummy)	0.03		
	(0.04)		
Merchant (dummy)		0.15**	0.20**
		(0.06)	(0.08)
Involved in finance (dummy)		0.01	0.17
		(0.09)	(0.11)
Annuitants and rentiers (dummy)			0.29***
			(0.10)
London area (dummy)			0.11
			(0.07)
BoE employee (dummy)			0.38***
			(0.05)
Female (dummy)			-0.04
			(0.12)
Age > 65 in 1866 (dummy)			-0.31**
			(0.12)
Observations	863	212	194
Sample	All accounts	Firms	Individuals
Adjusted R^2	-0.0003	0.0129	0.0919

This table presents coefficient estimates obtained by estimating the linear probability model in equation 3. The outcome variable is a binary variable indicating whether an account opened in 1866 was still active in 1871. Heteroskedasticity-robust standard errors in parentheses. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

We control for other potential determinants of account survival. For example, theory would predict that individual account-holders who relied on deposit accounts to receive regular income and/or could be expected to have been particularly conservative in their investment strategies should be more likely to keep accounts at the Bank, in particular after the panic experience in 1866. We therefore coded a binary variable indicating all account-holders that were annuitants or rentiers. Also, customers that found it particularly easy to access and use their account at the Bank (relative to their previous personal banker) should have exhibited a higher likelihood of keeping their account. Hence, we include dummy variables for individual account-holders who resided in London and who were an employee of the Bank of England. Finally, to control for additional confounders, we also incorporate dummies indicating women and old account-holders in 1866 (aged 65 years or more). The latter had a high likelihood of dying and thus closing their drawing

account for "natural reasons". We estimate the following linear probability model:

$$Y_i = \beta_0 + \sum_{j=1}^{n} \beta_j D_{j,i} + \varepsilon_i \tag{3}$$

In equation 3, Y_i is a binary variable indicating whether an account opened in 1866 was still active in 1871, β_0 is a conventional constant and $D_{j,i}$ stands for the vector of binary explanatory variables described above.

The results displayed in columns 2 and 3 of Table 4 broadly confirm the hypotheses above. Column 2 summarizes the estimation results for firms and column 3 provides the coefficients for individual accounts. We find that merchants, annuitants/rentiers and Bank of England employees had a higher probability – both statistically and economically highly significant – of keeping their newly opened account five years after the panic. Our results also suggest that individuals younger than 65 years in 1866 were more likely to keep their account.

6 Cash vs. Central Bank Deposits During the Panic

The fact that firms other than banks and individuals could open deposit accounts at the central bank is not the only enticing feature of our historical setting. Until the first decades of the 20$^{\text{th}}$ century, most central banks also permitted individuals and non-financial firms to access their standing credit facilities (i.e., the discount window and the Lombard facility, also known as advances). In the case of the Bank of England, all borrowers could choose between receiving the proceeds of their loan in cash – i.e., Bank notes, which were redeemable in specie – or having them credited to their drawing account (assuming they had one).

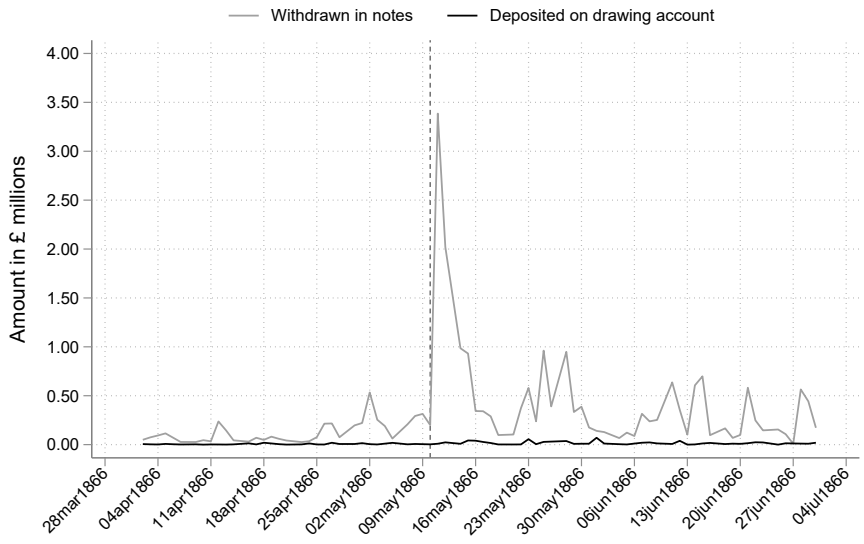
This direct access to the central bank allows us to answer the question whether individuals and corporations seeking *liquidity* relief – rather than merely a means of safe storage – considered cash and deposit account balances at the Bank as true substitutes during the panic. This question is of interest because contemporaries commenting on the panic of 1866 emphasized the premium that distressed economic agents placed on Bank notes. For example, in an article published in the *Journal of the Statistical Society of London* three years after the crisis, Patterson (1870, p.223) wrote:

> "The public, including the financial companies, suddenly withdrew from the London banks an unusually large amount of their deposits, and kept the

> amount (in notes) in their own hands, or for their own use. [...] Bank of England notes were hoarded – partly by the public, but partly also by the banks themselves, which were apprehensive of a continuance of the run upon them, and which accordingly laid in an extra supply of notes to meet this possible emergency. This was the true cause of the great withdrawal of notes from the Bank of England."

Using the loan-level data transcribed by Anson et al. (2017) for the period between 1 April and 30 June 1866, we first ascertain the share of borrowers from the central bank who had an active drawing account in 1866. We find that virtually all borrowers had such an account. Only 5 out of 589 unique borrowers (i.e. less than 1%) are not listed in the drawing account index for 1866.

Figure 13: **Decomposition of daily lending by the Bank of England**

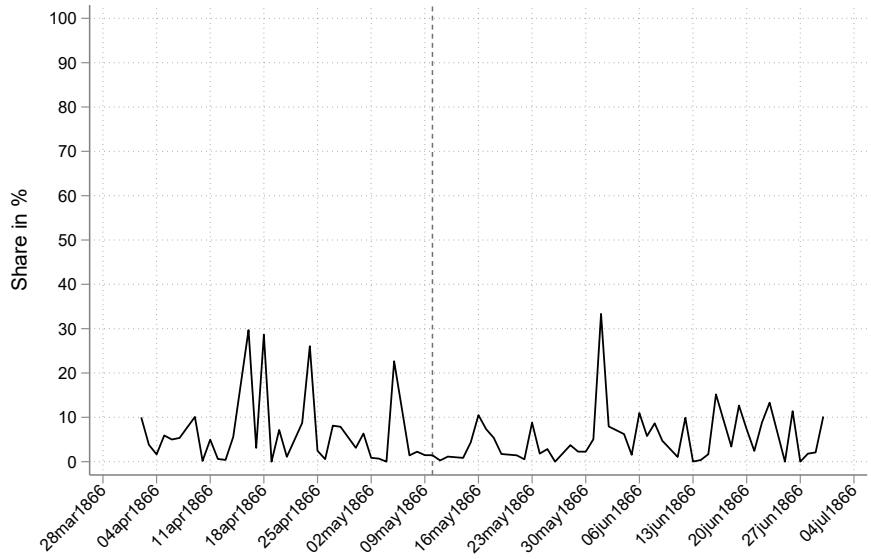


This figure decomposes loans granted by the Bank of England according to whether loan proceeds were withdrawn in cash or deposited on the borrower's drawing account. The amount of daily lending flows includes both discount loans and advances. The vertical line indicates the date of the panic outbreak (10 May 1866). Source: Anson et al. (2017) and own calculations.

As mentioned in Section 3, Bank of England clerks systematically earmarked every loan whose proceeds were credited to the borrower's drawing account. In Figure 13, we plot the daily total amount of loan proceeds that was withdrawn in notes and compare it to the time series of proceeds deposited on drawing accounts. Figure C6 in Online Appendix C depicts cumulative amounts starting from 1 April 1866 rather than daily flows. The figures provide two main insights. First, only a fraction of the overall increase

in the daily balances on retail deposit accounts after 10 May 1866 came from loan proceeds. While the overall increase amounted to 5 million pounds sterling (see Figure 1), only about £1 million came from loan proceeds. A glance at the primary sources for our random sample of accounts shows that the lion's share of the increase in daily balances originated from transfers and cheques drawn on other accounts at the Bank or elsewhere (for an example page, see Figure A2 in Online Appendix A).

Figure 14: **Share of loan proceeds credited to drawing accounts**



This figure shows the daily share of total loan proceeds deposited on drawing accounts. The vertical line indicates the date of the panic outbreak (10 May 1866). Source: Anson et al. (2017) and own calculations.

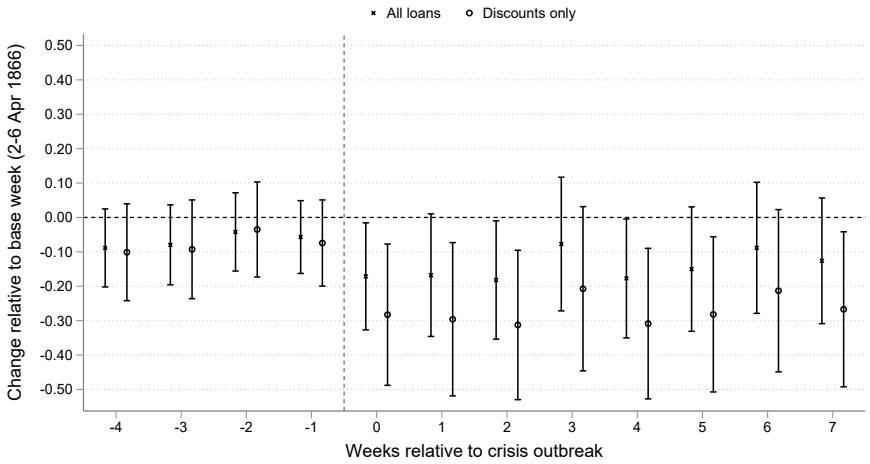
Second, despite the fact that virtually all borrowers had deposit accounts with the Bank, the loan proceeds deposited on these accounts are clearly dwarfed by those withdrawn in Bank notes. The last statement holds particularly true for the days immediately following the run on Overend & Gurney. Figure 14 suggests that the weeks in the immediate aftermath of 10 May 1866 saw a decrease in the relative share of loan proceeds deposited on drawing accounts relative to amounts withdrawn in notes. To evaluate these dynamics in a more rigorous *ceteris paribus* framework, we estimate the following logistic regression model at the loan level:

$$\Pr(Y_i = 1 \mid \mathbf{X}_i, \text{Week}_t) = \Lambda\left(\beta_0 + \mathbf{X}_i^\top \boldsymbol{\beta} + \sum_{t=1}^{T} \delta_t \cdot \text{Week}_{i,t}\right) \tag{4}$$

In equation 4, Y_i stands for a binary outcome variable that indicates whether the proceeds

of a given loan were deposited on the borrower's drawing account. Vector **X** includes two continuous control variables: the loan amount and the interest rate charged. Our main coefficients of interest are δ_t, i.e. the coefficients on a saturated set of week dummies. We estimate equation 4 for the full sample of loans (discounts and advances) and for discounts only. We use the first week of April 1866 as the reference week.

Figure 15: **Estimated change in probability of depositing loan proceeds**



This figure shows average marginal effects obtained from estimating the logit regression model summarized in equation 4. Week 5 before the panic outbreak serves as reference week. The outcome variable is a dummy indicating whether the proceeds of a given loan were deposited on the borrower's drawing account. The vertical line indicates the week before the panic outbreak on 10 May 1866. The reference week is the first week of April 1866. Source: Anson et al. (2017) and own calculations.

We plot the coefficients on week dummies in Figure 15 and report the remaining estimates for the control vector in Table B6 in Online Appendix B. The coefficients δ_t indicate no pre-trend in the weeks before the panic outbreak (p-value for joint test for pre-trends: 0.58) but show an economically and statistically significant reduction (between -10% and -30%) in the probability of depositing loan proceeds on drawing accounts after the 10 May 1866. Our results suggest that borrowers of the Bank of England – who were perfectly free to choose between two safe haven assets that were equivalent on paper – expressed a relative preference for cash over central bank deposits in the immediate aftermath of the panic outbreak.

At first sight, this result is somewhat puzzling because both assets represented direct claims on the central bank and were redeemable in specie. Moreover, deposits could be withdrawn in the form of Bank notes on demand. One explanation for our finding is that cash and central bank deposits served different purposes during the crisis. Bank notes

likely allowed customers to meet maturing liabilities faster and with even less frictions than drawing orders on their deposit account. At the same time, customers may have viewed their account balances primarily as a safe store of value rather than as a medium of payment.

The observed preference for cash to satisfy liquidity needs in a panic-stricken environment could be a product of our paper's historical setting. Modern central bank deposits would arguably allow for frictionless and fully instantaneous transfers of funds. Yet, scenarios where electronic payments are suddenly expected to become unavailable (e.g., due to power outages or natural catastrophes) could be extreme examples for the modern equivalent of the historical phenomenon we observe in 1866. In these situations, a "dash for cash" is arguably much more likely to satisfy (anticipated) liquidity needs than a run into CBDC.

7 Conclusion

This paper provides the first systematic empirical study of retail recourse to central bank deposits as a safe haven. We exploit the fact that many central banks allowed retail customers to open deposit accounts in the past. Using micro data covering thousands of individual credit and debit transactions on accounts held with the Bank of England by individuals and firms other than banks, we analyze account-holders' behavior during the panic of 1866.

We find that retail users responded to the crisis by sharply and persistently increasing the funds they placed with the central bank to benefit from the safety afforded by its deposit accounts. While expansion in the absolute number of active accounts was fueled by individuals, the intensive margin increase in balances stemmed entirely from firms. Recourse to central bank accounts was also heterogeneous within individuals: the extent and timing of account usage during the panic varied by financial literacy and ease of access. Moreover, many accounts that were opened during the panic remained active for years to come. Customers more likely to benefit from positive network externalities or easier access to the Bank, and users with conservative financial preferences exhibited a higher probability of keeping their account in normal times. Finally, our study reveals that retail borrowers seeking liquidity support from the central bank – rather than merely a means of safe storage – displayed a preference for receiving their loan proceeds in the form of Bank notes rather than deposits during the panic.

Overall, our findings contribute to the ongoing debate about the potential risks and

benefits of extending central bank balance sheet access to actors beyond the traditional banking sector. Our results also suggest several avenues for future research. The literature would benefit from more empirical work studying retail recourse to central bank deposit accounts during other types of market distress (e.g., currency crises, sovereign debt crises, and political turmoil or war) and in other institutional contexts. Future research could also investigate the impact of innovations altering the attractiveness, for retail customers, of depositing with the central bank, including changes in the accessibility and the remuneration of accounts.

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APPENDIX FOR ONLINE PUBLICATION

A Additional Details on Drawing Account Data

The records of the Drawing Office constitute the most voluminous corpus available in the Bank of England Archive and are intact from the very start of the Bank's business operations.[18] The Archive hosts 5,660 customer account indices and ledgers, covering the universe of drawing accounts held at the Bank's headquarters in London.[19] Both indices and ledgers are large-sized and heavy physical books with hard covers. Indices are initially handwritten and later partly typed, whereas ledgers are handwritten throughout. All documents in the Bank's Archive are accessible to researchers.

The indices exist for each year between 1694 and 1938 and list all active accounts in alphabetical order (including those opened in the index year), alongside indications on where to find the accounts in the ledger books (i.e. ledger and page number). The indices clearly separate between banks, single names (individuals) and firms (corporations other than banks), and indicate the year in which an account was opened. Figure A1 below provides an example page extracted from the drawing account index for 1866.

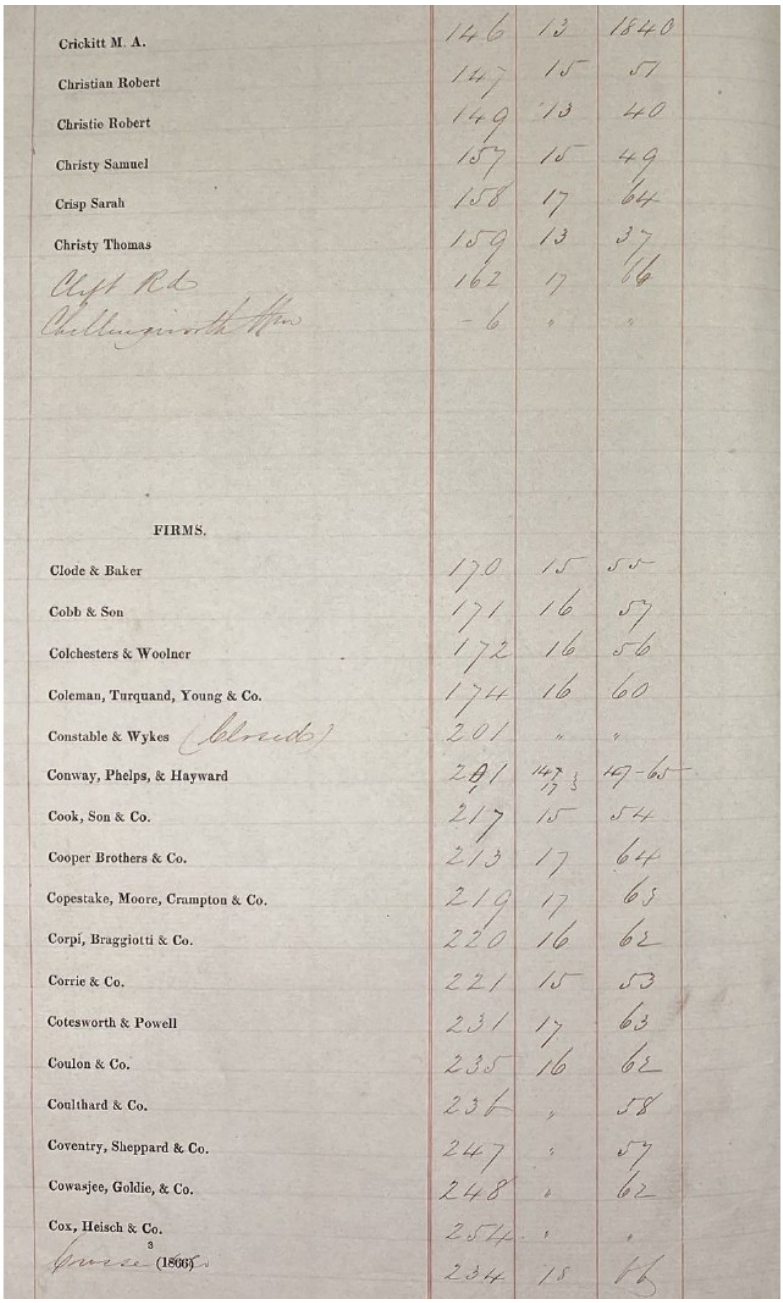
The ledgers in turn document daily transaction-level information (i.e. all debits from and credits to the account) for each individual deposit account held at the Bank. Transaction-level data include date, size and various indications on the type of transfer.[20] The ledgers also provide information on the turnover and the end-of-month balance. For each account, the first ledger page dedicated to a given account each year provides additional details on the account holder, in particular the precise date when the account was first opened, full name and address. All ledgers covering the period from 1694 to 1900 survived (post-1900 ledgers were destroyed in 2001). Figure A2 below provides an example page extracted from one of the ledgers for 1866.

[18] Data are accessible to researchers subject to a 100-year embargo. The archival reference number is C98 and the list of available volumes can be inspected on the website of the Bank of England Archive (last accessed on 17 July 2025).

[19] Drawing account data from the Bank's branches in the provinces also seem to have survived. The indices for 1866 and 1878 show that several account-holders domiciled outside London also had active accounts at the Bank's headquarters.

[20] For example, a credit to an account may be labeled "bills discounted" or bear the name of the payer. Outgoing payments also differentiate between account names or "cash" etc.

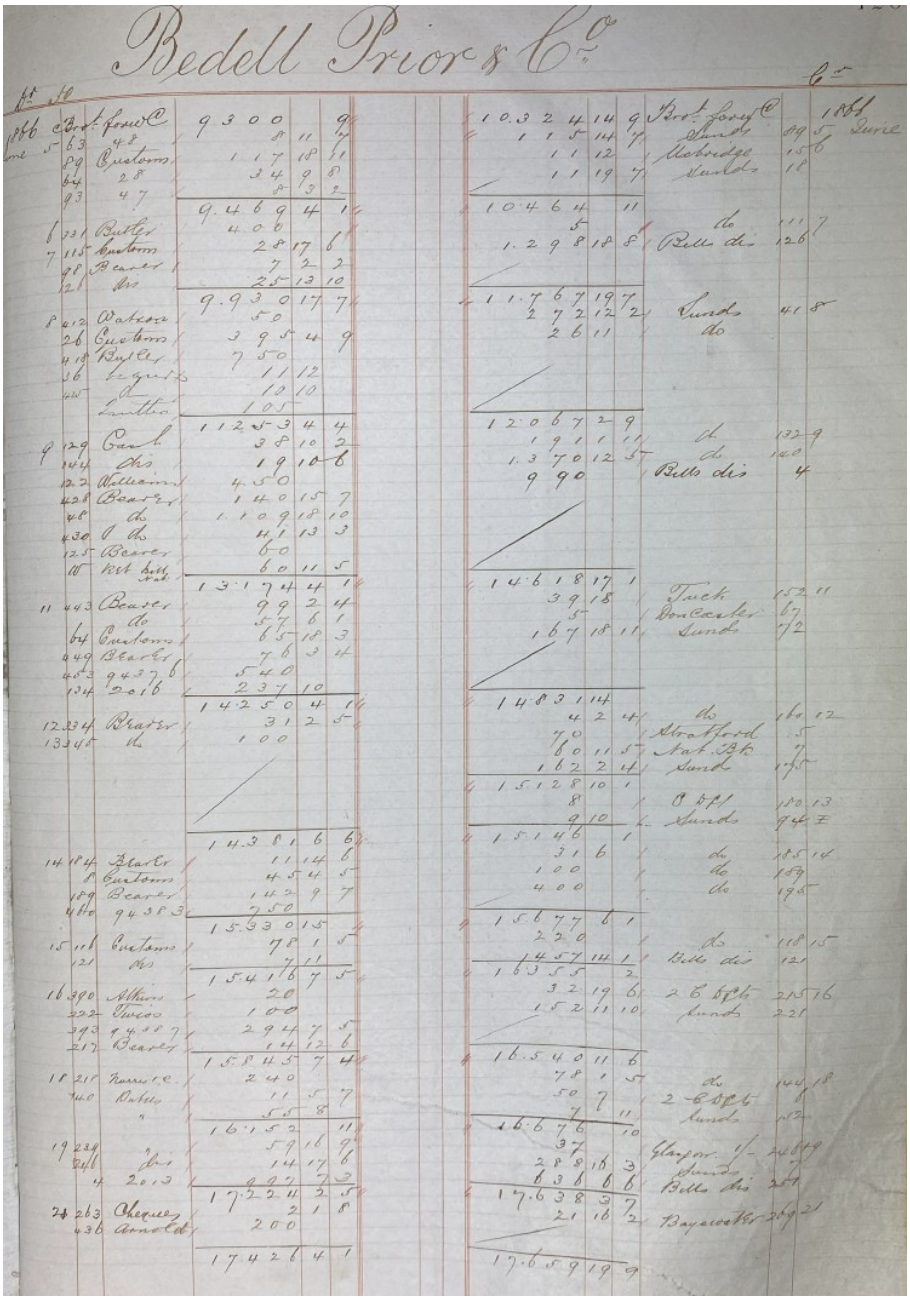
Figure A1: **Example page from the drawing account index for 1866**



Crickitt M. A.	146	13	1840
Christian Robert	147	15	51
Christie Robert	149	13	40
Christy Samuel	157	15	49
Crisp Sarah	158	17	64
Christy Thomas	159	13	37
Capt Rd	162	17	66
Chillingworth Mrs	6	"	"
FIRMS.			
Clode & Baker	170	15	55
Cobb & Son	171	16	57
Colchesters & Woolner	172	16	56
Coleman, Turquand, Young & Co.	174	16	60
Constable & Wykes (Bloomds)	201	"	"
Conway, Phelps, & Hayward	201	147 17 3	49-65
Cook, Son & Co.	217	15	54
Cooper Brothers & Co.	213	17	64
Copestake, Moore, Crampton & Co.	219	17	65
Corpi, Braggiotti & Co.	220	16	62
Corrie & Co.	221	15	53
Cotesworth & Powell	231	17	63
Coulon & Co.	235	16	62
Coulthard & Co.	236	"	58
Coventry, Sheppard & Co.	247	"	57
Cowasjee, Goldie, & Co.	248	"	62
Cox, Heisch & Co.	254	"	"
Crewe (1866)	234	18	66

This figure shows an example page from the drawing account index for 1866. The upper part of the picture lists individuals (called "single names") and the lower part provides the names of corporations other than banks ("firms"). Hand-written entries constitute newly opened accounts in 1866. The first two columns after the name of the account-holder indicate page and ledger book. The last column lists the opening year. Source: Bank of England Archive.

Figure A2: **Example page from a ledger book for 1866**



This figure shows an example page from a ledger book for 1866. The picture is an extract from the account of Bedell, Prior & Co, a firm in our random sample, covering the period between 5 June and 21 June 1866. The left-hand side of the page lists outgoing transactions from the account. The right-hand side provides all incoming transactions. The columns contain the following information (from left to right): date of outgoing transaction, Bank internal transaction number, beneficiary/type of outgoing transfer, amount of outgoing transfer (and running turnover), end of month balance (middle column, here empty), amount of incoming transaction (and running turnover), provenance/type of incoming transaction, Bank internal transaction number, date of incoming transaction. For example, the second incoming transaction on 15 June 1866 amounted to £457 and represented the proceeds of a sale of bills to the Bank's discount window ("Bills disc."). Source: Bank of England Archive.

B Additional Tables

Table B1: **Additional account-level statistics**

Panel A.	Domiciled elsewhere	London	Δ of means	SE of Δ	t-stat for Δ
Daily avg. amount deposited	19.83	153.30	-133.47	22.74	-5.87***
	[3,521]	[20,778]			
Daily avg. number of deposits	0.12	0.39	-0.26	0.02	-13.86***
	[3,521]	[20,778]			
Daily avg. amount withdrawn	19.82	149.70	-129.89	20.57	-6.31***
	[3,521]	[20,778]			
Daily avg. number of withdrawals	0.67	1.23	-0.56	0.07	-7.52***
	[3,521]	[20,778]			

Panel B.	Opened before 1866	Opened in 1866	Δ of means	SE of Δ	t-stat for Δ
Daily avg. amount deposited	124.91	256.98	-132.07	31.68	-4.17***
	[22,633]	[1,666]			
Daily avg. number of deposits	0.35	0.32	0.04	0.03	1.42
	[22,633]	[1,666]			
Daily avg. amount withdrawn	123.78	227.42	-103.64	28.67	-3.62***
	[22,633]	[1,666]			
Daily avg. number of withdrawals	1.13	1.35	-0.22	0.10	-2.11**
	[22,633]	[1,666]			

Panel C.	Men	Women	Δ of means	SE of Δ	t-stat for Δ
Daily avg. amount deposited	45.89	3.49	42.41	12.67	3.35***
	[15,644]	[1,607]			
Daily avg. number of deposits	0.22	0.09	0.13	0.01	8.78***
	[15,644]	[1,607]			
Daily avg. amount withdrawn	42.21	3.44	38.77	10.71	3.62***
	[15,644]	[1,607]			
Daily avg. number of withdrawals	0.99	0.63	0.36	0.10	3.55***
	[15,644]	[1,607]			

This table presents additional statistics for the daily account-level transactions and balances of firms and individuals contained in our random sample. Panel A and Panel B draw on the full random sample. Panel C uses the sample for individuals only. The purchasing power of £100 in 1866 corresponds to approximately £10,300 in May 2025. Number of observations indicated in brackets. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

Table B2: **Comparison of newly opened accounts in 1865 and 1866**

	Opened in 1865	Opened in 1866	Diff. of means	SE of mean diff.	t-stat for diff.
Panel A. Individuals					
Female (dummy)	0.17	0.10	0.07	0.03	2.07**
	[111]	[435]			
London area (dummy)	0.56	0.61	-0.05	0.07	-0.76
	[73]	[219]			
BoE employee (dummy)	0.04	0.07	-0.02	0.03	-0.70
	[71]	[215]			
Landowner/rentier	0.17	0.10	0.07	0.04	1.51
	[71]	[215]			
Involved in finance (dummy)	0.10	0.12	-0.02	0.04	-0.51
	[71]	[215]			
Merchant (dummy)	0.14	0.18	-0.04	0.05	-0.70
	[71]	[215]			
Age (in years)	45.24	46.87	-1.62	1.99	-0.82
	[70]	[195]			
Age > 65 (dummy)	0.16	0.08	0.08	0.04	1.79*
	[70]	[195]			
Panel B. Firms					
Involved in finance (dummy)	0.04	0.18	-0.15	0.04	-3.29***
	[82]	[212]			
Merchant (dummy)	0.44	0.36	0.08	0.06	1.27
	[82]	[212]			

This table presents results for t-tests comparing all accounts opened in 1865 to all accounts opened in 1866. We report results for individuals in Panel A and results for firms in Panel B. The means comparison tests only include accounts that we were able to match using official census data (for individuals) and the Post Office London Directories (for firms). The matching rates for individuals are 54% (1865) and 32% (1866). Moreover, we are able to match 99% (1865) and 82% (1866) of all firms that opened a new account. Since we can infer individuals' gender from their first names, we obtain a higher matching rate for this variable. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

Table B3: **Global polynomial regressions for the panic outbreak after 10 May 1866**

	Outcome: daily balance (log)			
	(1)	(2)	(3)	(4)
	Firms	Firms	Individuals	Individuals
Treatment effect	0.2278***	0.2106***	0.0466**	0.0489**
	(0.0750)	(0.0687)	(0.0188)	(0.0193)
Observations	6,994	5,846	17,190	15,958
Sample	Full	Balanced	Full	Balanced
Account-level fixed effects	Yes	Yes	Yes	Yes

This table presents bias-corrected RD coefficient estimates for the impact of the panic outbreak on account-level daily balances. We estimate equation 1 by drawing on a global polynomial regression approach using a triangular kernel and a common MSE-optimal bandwidth selector. The outcome variable is the natural logarithm of the daily balance. Heteroskedasticity-robust (plug-in residuals variance estimator with HC3 weights) standard errors are shown in parentheses. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

Table B4: **Heterogeneity analysis**

	Outcome: Daily balance (log)			
	(1)	(2)	(3)	(4)
Post-panic outbreak × firm (dummy)	0.2371***			
	(0.0885)			
Post-panic outbreak × London area (dummy)		0.0913*		
		(0.0540)		
Post-panic outbreak × female (dummy)			-0.0411	
			(0.0632)	
Post-panic outbreak × insider (dummy)				0.2101
				(0.1356)
Observations	7,728	3,030	3,030	4,704
Adjusted R^2	0.9459	0.9640	0.9640	0.9485
Sample	All accounts	Individuals	Individuals	Individuals
Estimation window	$+/-14$ days	$+/-7$ days	$+/-7$ days	$+7/-14$ days
Fixed effects	Account & day	Account & day	Account & day	Account & day
P-value pre-trends test	0.5908	0.4951	0.2523	0.4722

This table presents estimates for τ obtained from estimating the following canonical two-way fixed effects difference-in-differences equation: $Y_{i,t} = \alpha_i + \lambda_t + \tau \cdot D_{i,t} + \varepsilon_{i,t}$. The outcome variable is the natural logarithm of the daily balance. $D_{i,t}$ flags treated observations in the treatment period. Clustered (account-level) standard errors are reported in parentheses. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: own data.

Table B5: **Accounts held by *ex ante* insiders**

Full name	Year account opened	Street address in London
George Henry Aston	1852	Royal Exchange
Charles Cave	1817	Mincing Lane
Lionel Benjamin Cohen	1847	New Court
John Cooper	1838	Holmfield Place, Notting Hill
Edward Price Coventry	1843	Tower Bridge Road
William Oliver Dodgson	1845	Royal Exchange
James Wynn Downing	1861	Shoreditch
Thomas Edwards	1841	Old Broad Street
John Whittle Finlinson	1864	Royal Exchange
Thomson Hankey	1844	Mincing Lane
Sydney Kennedy	1857	Royal Exchange
James Kerwin	1856	Angel Court
Albert George Kitching	1865	Angel Court
Edwin Walker Lermitte	1857	Royal Exchange
Frederic David Mocatta	1865	King's Arms Yard
Norman Morris	1864	Threadneedle Street
James Pope Pittmann	1846	Kildare Gardens
Charles Ponza	1843	Throgmorton Street
John Pyemont	1857	Throgmorton Street
William Rickard	1834	Lothbury
Henry Scott	1861	Throgmorton Street
Horace Wilkinson	1864	Threadneedle Street
Norman Wilkinson	1864	Threadneedle Street

This table provides a list of individual account-holders that can reasonably be identified *ex ante* as well-informed insiders. The individuals listed were partners or owners of financial firms (banks and stockbrokers) in the City of London. Source: own data.

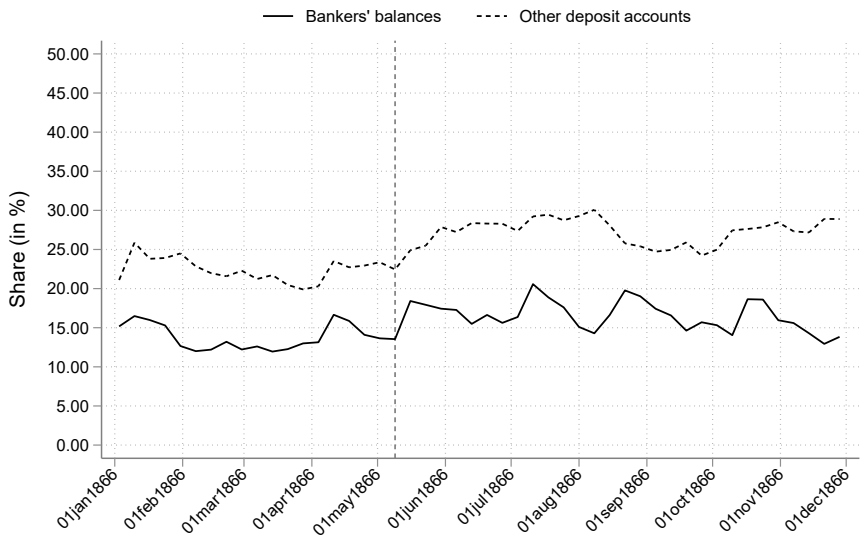
Table B6: **Determinants of the probability of depositing loan proceeds**

	(1)	(2)
	All loans	Discount loans
Rate charged	0.04	0.08**
	(0.03)	(0.04)
Loan amount	-0.41***	-0.41***
	(0.09)	(0.11)
Observations	2,122	1,843
Week FE	Yes	Yes
Pseudo R^2	0.09	0.08
P-value pre-trends test	0.5783	0.5780

This table presents average marginal effects obtained from estimating the logit regression model summarized in equation 4. The outcome variable is a dummy indicating whether the proceeds from a Bank of England loan are deposited in the borrower's drawing account. The independent variables are standardized and the marginal effects displayed correspond to a one standard deviation increase in the independent variables. Heteroskedasticity-robust standard errors for marginal effects in parentheses. Asterisks indicate statistical significance: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Source: Anson et al. (2017) and own calculations.

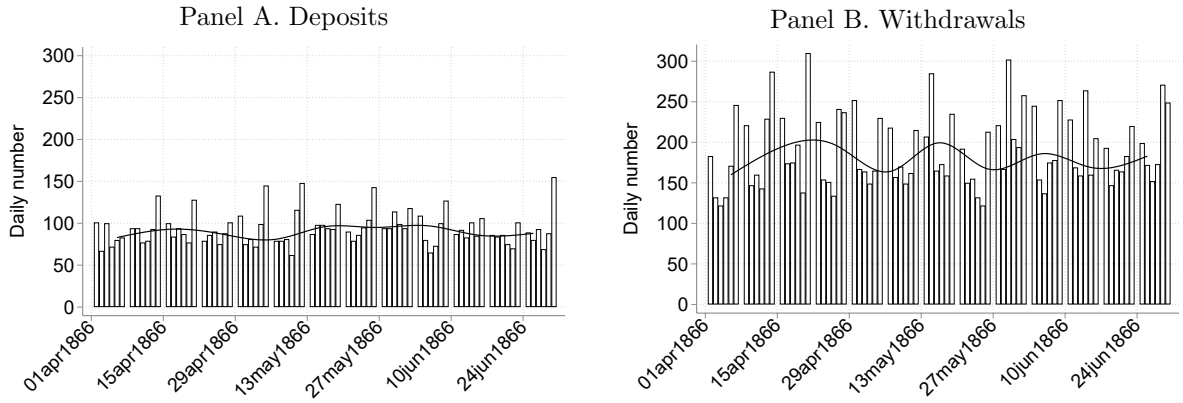
C Additional Figures

Figure C1: **Deposit accounts relative to Banking Department liabilities**



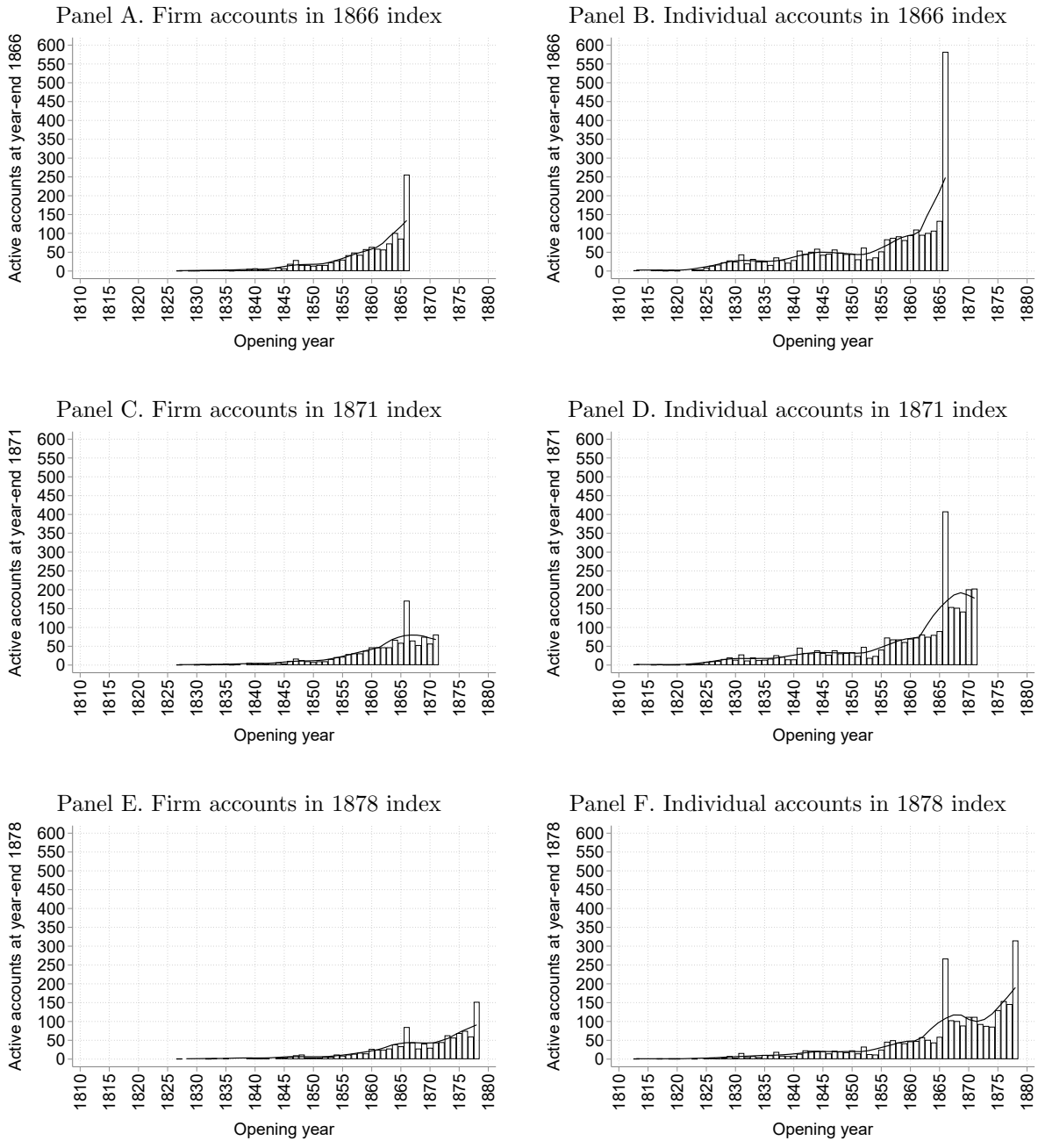
This figure shows weekly data on the share of deposits in Bank of England accounts relative to the total liabilities of the Bank's Banking Department. Bankers' balances are deposit accounts held by banks. Other deposit accounts include both retail and wholesale deposit accounts. The vertical line indicates the last weekly statement before the panic outbreak (10 May 1866). Source: Anson et al. (2017) and own calculations.

Figure C2: **Daily transactions on sampled deposit accounts**



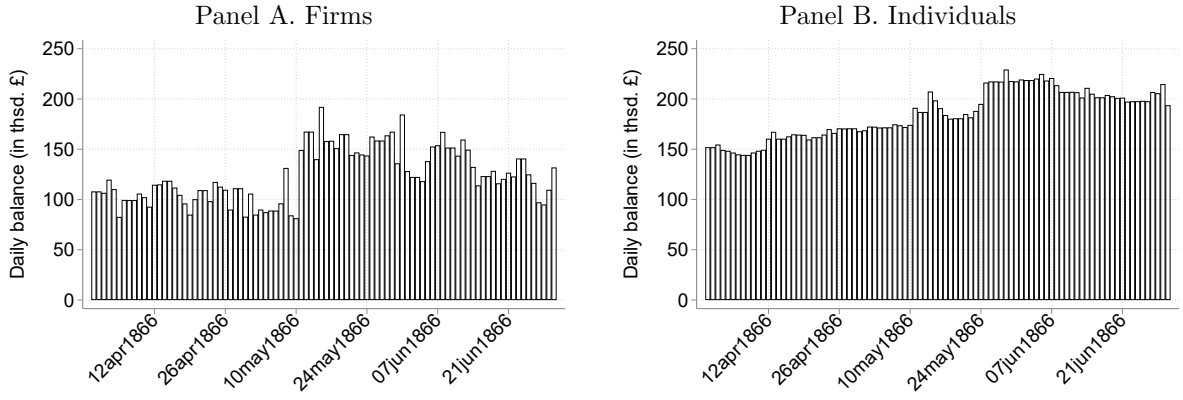
This figure shows the total number of deposits on (Panel A) and withdrawals from (Panel B) the drawing accounts in our random sample between 1 April and 30 June 1866. Each panel also features a median spline graph to better illustrate the absence of clear trends over time. Source: own data.

Figure C3: **Extensive margin dynamics of central bank deposit accounts (decomposition)**



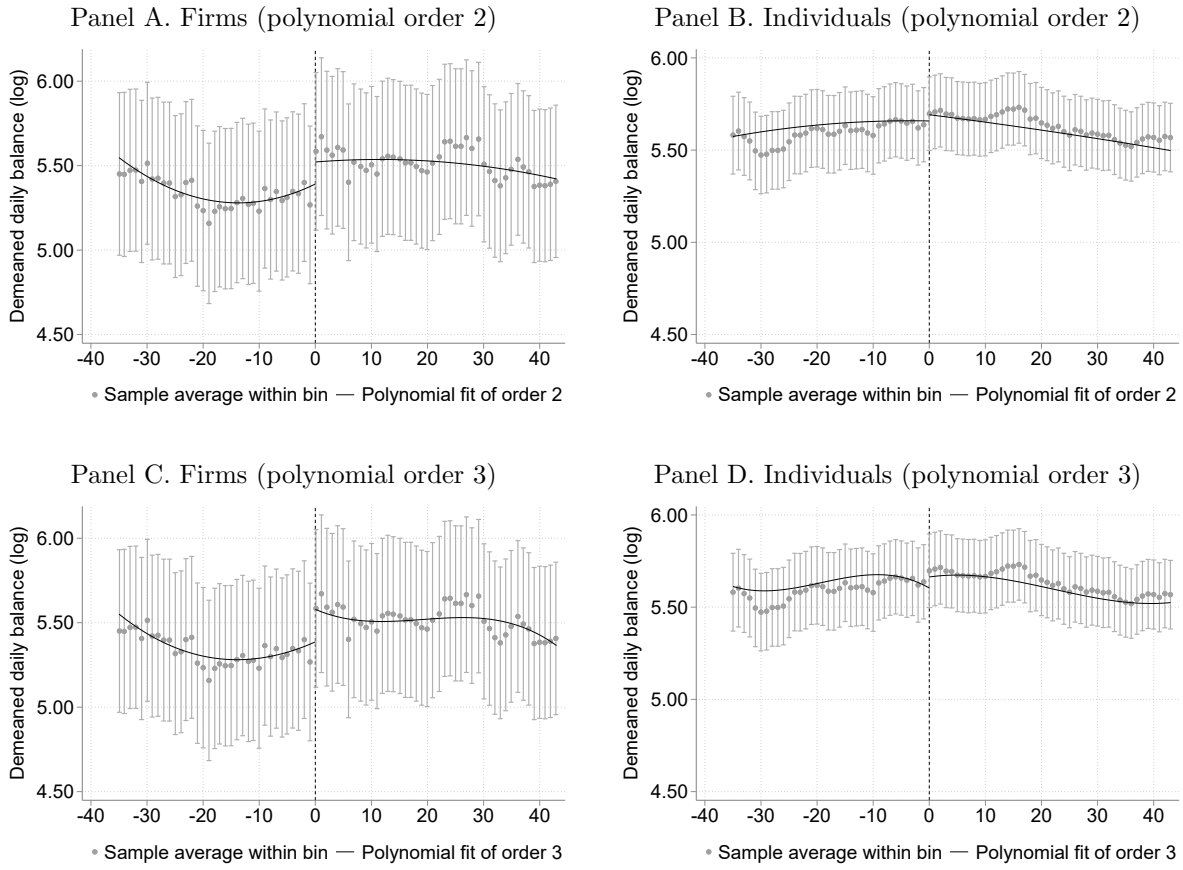
This figure shows extensive margin dynamics of central bank deposit accounts using data from the 1866, 1871 and 1878 drawing account indices. The panels decompose the total number of active accounts in each index year into firm accounts (left column) and retail accounts (right column). Source: own data.

Figure C4: **Total daily balances on sampled firm and individual accounts**



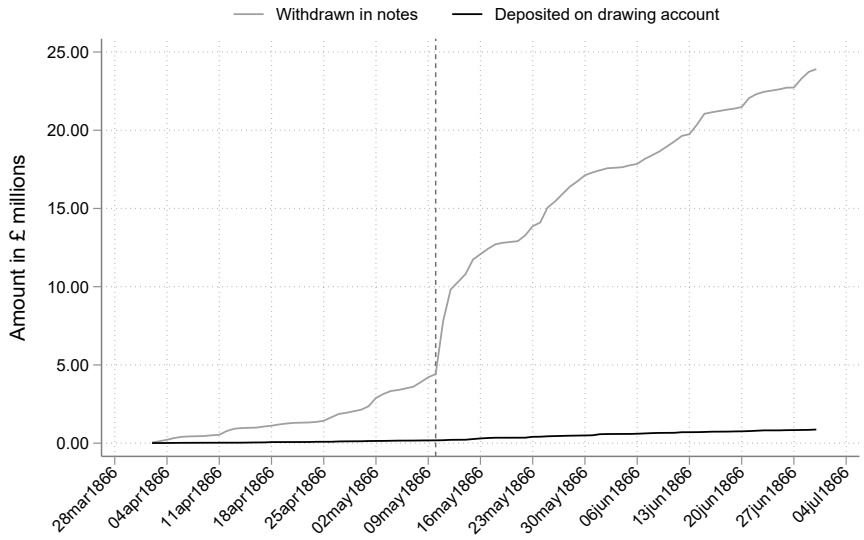
This figure shows the total daily balance on drawing accounts in our sample for firms (Panel A) and individuals (Panel B) between 1 April and 30 June 1866. Source: own data.

Figure C5: **Event study plots for higher order polynomials**



This figure shows event study plots using global polynomial fitting (regression discontinuity in time, RDiT) for an event window of +/− 40 days around the outbreak of the financial panic after 10 May 1866. Panels A and C show event study results for all firm accounts in our random sample. Panels B and D plot the results for retail accounts. 95% confidence bands are displayed for daily bins. Source: own data.

Figure C6: **Cumulative loans granted by the Bank of England**



This figure decomposes cumulative loans granted by the Bank of England since 1 April 1866 according to whether loan proceeds were withdrawn in cash or deposited on the borrower's drawing account. The amount of cumulative loans includes both discount loans and advances. The vertical line indicates the date of the panic outbreak (10 May 1866). Source: Anson et al. (2017) and own calculations.

D Theoretical Framework

D.1 Set-Up

Time is $t \in \{0, 1, 2\}$, corresponding to pre-crisis ($t = 0$), panic ($t = 1$), and post-crisis ($t = 2$). A unit mass of depositors allocates funds between two institutions. Bank A is a "safe" bank (e.g., a large commercial bank or a central bank issuing central bank digital currency) that pays a deposit rate $r_t^A \equiv 0$. Bank B is a representative commercial bank that chooses a deposit rate r_t^B subject to a net-interest-margin (NIM) constraint.

D.2 Bank B's Deposit Rate and the NIM Constraint

Let r_t^f denote the risk-free rate, $a_t \geq 0$ an add-on chosen by Bank B, R_t the (gross) average asset yield on B's asset portfolio, and $m > 0$ the NIM floor ensuring profitability. Bank B's rate is pinned down by the following equation:

$$r_t^B \;=\; \min\{\, r_t^f + a_t,\; R_t - m \,\}. \tag{D.1}$$

Thus, if the NIM is not binding Bank B chooses $r_t^B = r_t^f + a_t$. When the cap binds because R_t is depressed relative to the risk-free rate r_t^f, then Bank B sets $r_t^B = R_t - m$.

D.3 Depositors, Convenience Yield, and Network Effects

Each depositor compares the utility they would reap from keeping deposits at Bank A versus Bank B. The value from holding deposits at A includes a convenience yield y_t that reflects a base edge and the panic-time safety differential; contemporaneous network externalities $\theta\, s_t$ (e.g., cheaper/faster intra-bank transfers when more users are depositing with A); and an installed-base effect $\nu\, s_{t-1}$, with $\nu \geq 0$. Let $s_t \in [0, 1]$ denote Bank A's market share at t. The value gap between deposits at Bank A and deposits at Bank B is defined as follows:

$$\Delta_t \;=\; y_t \;+\; \theta s_t \;+\; \nu s_{t-1} \;-\; r_t^B. \tag{D.2}$$

Depositors face i.i.d. switching/friction costs $\kappa_i \sim \text{Unif}[0, K]$ with $K > 0$. A depositor chooses to deposit with Bank A if and only if $\Delta_t \geq \kappa_i$. Given the assumption of a uniform distribution, the market share of deposits held at A is simply:

$$s_t \;=\; \Pr(\kappa_i \leq \Delta_t) \;=\; \frac{\Delta_t}{K} \tag{D.3}$$

D.4 Equilibrium (Fixed Point) and Closed Form

We assume an interior solution so that $0 < s_t < 1$ holds. Plugging Equation (D.2) into Equation (D.3) yields:

$$s_t \;=\; \frac{y_t \;-\; r_t^B \;+\; \nu s_{t-1}}{K-\theta}. \tag{D.4}$$

We take a conventional stationary baseline assumption for the pre-crisis period, so that $s_{-1} = s_0$ and with r_0^B given by Equation (D.1). Therefore, the market share of deposits held with Bank A in the pre-crisis period (s_0) equals:

$$s_0 \;=\; \frac{y_0 - r_0^B}{K-\theta-\nu} \tag{D.5}$$

An interior solution for s_0 requires $K > \theta + \nu$. For the panic and post-crisis periods, s_1 and s_2 are determined as follows:

$$s_1 \;=\; \frac{y_1 - r_1^B + \nu s_0}{K-\theta}, \qquad s_2 \;=\; \frac{y_2 - r_2^B + \nu s_1}{K-\theta}, \tag{D.6}$$

Thus, an interior solution for s_1 and s_2 requires that $\theta < K$.

D.5 Comparative Statics: Crisis Inflow and Persistence

We define the following changes relative to the pre-crisis period: $\Delta y_{1,0} \equiv y_1 - y_0$, $\Delta y_{2,0} \equiv y_2 - y_0 \equiv 0$, and analogously $\Delta r_{1,0}^B \equiv r_1^B - r_0^B$, $\Delta r_{2,0}^B \equiv r_2^B - r_0^B$. Subtracting (D.5) from the two equations in (D.6) yields:

$$\textbf{Crisis inflow:} \qquad s_1 - s_0 = \frac{\Delta y_{1,0} - \Delta r_{1,0}^B}{K-\theta}, \tag{D.7}$$

$$\textbf{Persistence:} \qquad s_2 - s_0 = \frac{-\Delta r_{2,0}^B + \nu\,(s_1 - s_0)}{K-\theta} > 0 \tag{D.8}$$

Interpretation. In the panic, a spike in the convenience yield y_1 drives inflows to Bank A unless Bank B can raise r_1^B by enough to compensate the increase in the convenience yield. The NIM cap in Equation (D.1) limits the ability of Bank B to raise r^B. Post-crisis, persistence stems from the installed base $\nu(s_1 - s_0)$, the size of network externalities θ and any low-yield environment that keeps r_2^B compressed by the NIM, limiting Bank B's spread over Bank A's 0% rate.

D.6 Assumptions and Parameterization

We use historical data sources to parameterize our theoretical framework and to rationalize several key assumptions. First, we draw on observed key interest rates in the pre-crisis, crisis and post-crisis period, as depicted in Figure D1 below. The market interest rate for the discount of prime bills – our proxy for the yield on commercial banks' asset-side investments – increased sharply after the onset of the panic, likely reflecting the concomitant hike in counterparty risk. At the same time, commercial banks hiked call deposit rates, suggesting that they took immediate action to maintain their customer base. Moreover, we proxy changes in the risk-free rate by changes in the current yield of British consols with a 3% annual coupon – the archetype of a safe asset in the 19$^{\text{th}}$ century (Homer and Sylla, 2005). Consols represented perpetual government bonds, redeemable at the option of the government. For this reason, the *level* of the current yield on consols was not equivalent to the *level* of the prevailing short-term risk-free rate. Given the absence of a reliable short-term alternative[21], we therefore proceed as follows. We assume that *changes* in the consol yield are informative about *changes* in the short-term risk-free rate. Based on the insight that the yield on consols barely moved during the panic and to ensure that the market rate is always greater or equal to the short-term risk-free rate, we assume a constant risk-free lending rate of 1.5%.[22]

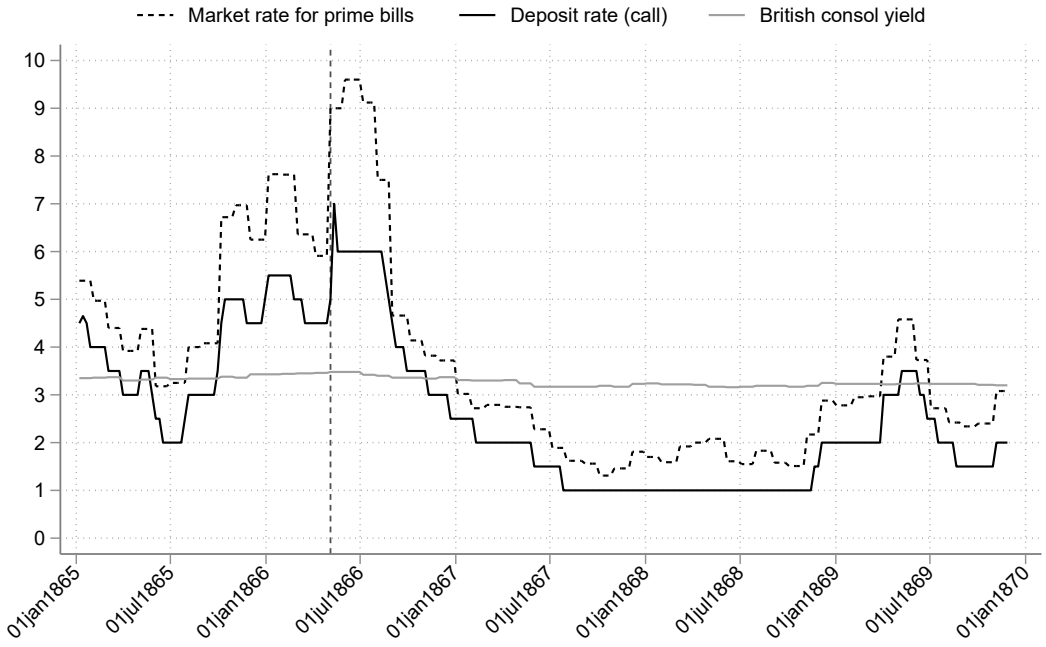
Second, to compute the Bank of England's market share of deposits in London before and after the panic, we draw on a supplement to *The Economist* published on 20 October 1866. The supplement contains balance sheet data for all joint-stock banks in the United Kingdom as of December 1865. We collected the total amount of deposits held with London joint-stock banks at year-end 1865 (about £80,000,000).[23] Given the Bank's deposits of about £9,000,000 just before the failure of Overend & Gurney (see Figure 1), we estimate the pre-crisis market share to be around 11%. The total inflow of funds during the crisis amounted to approximately £5,000,000. Assuming a zero-sum game, the panic thus increased the Bank's market share to 19%. Based on the empirical results reported above, we postulate that the Bank's market share stayed fixed at 19% in the post-crisis period.

[21] By design, the Bank's official discount rate, Bank rate, functioned as an *upper* limit to market rates at the time. For completeness, Figure D2 plots the evolution of Bank rate and deposit rates for longer than overnight maturities.

[22] Due to the simple set-up of our theoretical framework, assuming a different level for the risk-free rate has no impact on the simulation results reported in the main paper.

[23] We checked the plausibility of this amount against nation-wide aggregates previously published by Capie and Webber (1985) and Jansson (2018).

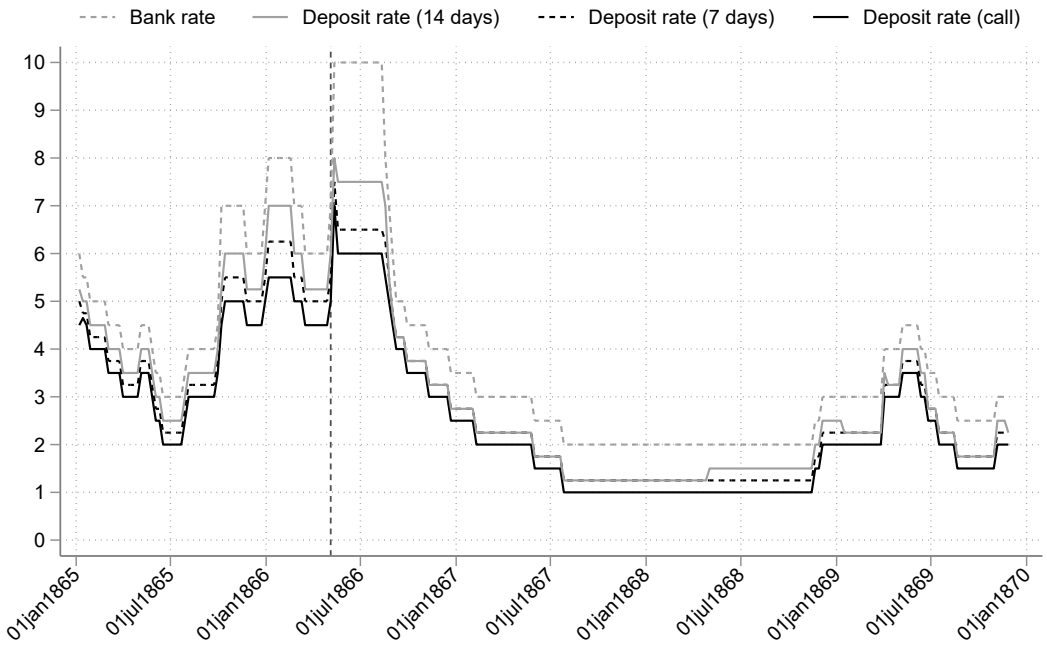
Figure D1: **Key interest rates (1865–1869)**



This figure shows weekly data for commercial bank deposit rates, i.e. the interest rate paid on call deposits at joint-stock banks. Moreover, it plots the monthly average of the market rate charged for the discount of prime (first-class) bills on the London money market and the yield on British consols. The vertical line indicates the last weekly statement before the panic outbreak (5 May 1866). Source: own data for the deposit rate (*The Economist* Historical Archive); other rates sourced from Thomas and Dimsdale (2017).

Third, we need to assume a positive base convenience edge to explain the Bank's pre-crisis market share of 11% – despite the substantial rate spread on deposits offered by commercial banks. We also assume that the convenience yield fell back to the level of the base edge after the panic. Table D1 summarizes all chosen and observed values for the variables and fixed parameters in the model.

Figure D2: **Bank rate and commercial deposit rates (1865–1869)**



This figure shows weekly data for Bank rate (the Bank of England's discount rate) and commercial bank deposit rates of different maturities. The vertical line indicates the last weekly statement before the panic outbreak (5 May 1866). Source: own data for deposit rates (*The Economist* Historical Archive); Bank rate taken from Thomas and Dimsdale (2017).

Table D1: **Parameters and assumptions used to simulate $y_1(\theta, \nu)$**

Symbol	Value	Role
r_0^B, r_1^B, r_2^B	$0.05, 0.07, 0.02$	Bank B's deposit rate (observed)
R_0, R_1, R_2	0.07, 0.095, 0.025	Bank B's gross asset yield (observed)
s_0	0.11	Pre-crisis market share of Bank A (observed)
s_1, s_2	0.19	(Post-)crisis market share of Bank A (observed)
y_0, y_2	0.105	Pre-/post-crisis convenience yield (assumed)
r^f	0.015	Risk-free rate (assumed, constant)
m	50bp	Ensuring $r_t^B = \min\{r_f + a_t,\ R_t - m\}$ (assumed)
K	1	Scale/normalization in the model
a_0, a_1, a_2	$0.035, 0.055, 0.005$	Add-ons to r^f (chosen to match observed r_t^B)
θ	see Figure 11	Contemporaneous network strength
ν	see Figure 11	Installed-base persistence

This table summarizes the key assumptions and parameter values used to simulate the level of the convenience yield afforded by Bank of England accounts during the panic of 1866. Source: own data and calculations.