



# The rise and fall of Silvergate Bank: lessons for prudential regulation of crypto-sector banking

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## Abstract

Silvergate Bank began to “wind down operations and voluntarily liquidate” its bank in March 2023. Whereas Silicon Valley Bank and Signature Bank would be shut down by the Federal Deposit Insurance Corporation in the following days, this “crypto-sector bank” was able to satisfy depositor withdrawals and enter into voluntary liquidation. This paper examines how Silvergate Bank managed its balance sheet in a manner that maintained liquidity and its ability to satisfy substantial and unpredictable outflows from depositor withdrawals by its “crypto-firm” clients. Its approach was consistent with the ethos of the Basel III liquidity requirements to which many banks—though not Silvergate Bank—are subject. Yet the Silvergate model went further by recognising the idiosyncratic depositor dynamics of “crypto-firms”. This paper argues that prudential regulation should apply this model to (i) any bank that sources a substantial proportion of its funding from “crypto-firm” clients, irrespective of that bank’s size, and (ii) all deposits related to crypto-asset market participants at all banks.

**Keywords** Banking · Liquidity · Bank run · Crypto-assets · Basel III

**JEL Classification** G21 · G28 · K23

## Introduction

Silvergate Capital Corporation (ticker: SI) (“SCC”) [1], holding company of Silvergate Bank (“Silvergate”), announced on 8 March 2023 that it would “wind down operations and voluntarily liquidate” Silvergate.<sup>1</sup> This announcement promptly fell into insignificance in the financial news. It was overshadowed by the ongoing collapse of Silicon Valley Bank (“SVB”). SVB would be shut down by the Federal Deposit Insurance Corporation (“FDIC”) [3] on 10 March

2023, the (then-)second-largest bank failure in US history. Signature Bank (“SBNY”) would follow on 12 March 2023 [4]. The US Treasury, the US Federal Reserve (the “Fed”) and the FDIC [5] would eventually commit to backstop depositors of SVB and SBNY and provide additional liquidity to prevent runs on other US banks. The reverberations for mid-sized US banks led to First Republic Bank (“FRB”) soon supplanting SVB as the second-largest US bank failure on 1 May 2023.<sup>2</sup>

<sup>1</sup> The New York Stock Exchange [2] suspended trading of SCC shares on 10 May 2023 and delisted SCC shares on 22 May 2023.

<sup>2</sup> The FDIC [6] brokered a sale of “all of the deposits and substantially all of the assets” of FRB.

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Silvergate, SVB and SBNY are popularly grouped together as representing a tech/crypto-inspired banking collapse. However, Silvergate has been a distant third-place in terms of popular attention.<sup>3</sup> This is probably because of the ostensibly orderly wind down of Silvergate compared to the panics triggered by SVB and SBNY. The nature of Silvergate’s rise and fall is stunning and is worthy of a case study on corporate failure. However, SCC finding itself with the capability to resolve Silvergate itself, whereas SVB and SBNY have suffered FDIC intervention, is worthy of a case study on prudential banking regulation. Lessons are at risk of being missed amidst scrutiny being focused on the collapses of SVB and SBNY—and thereafter FRB.

Silvergate was a bank servicing those operating in the crypto-asset eco-system (“crypto-firms”).<sup>4</sup> It became focused on acting as a bank servicing crypto-firms, in particular crypto-asset market participants (a “crypto-sector bank”).<sup>5</sup> This paper highlights how Silvergate managed its balance sheet in a manner to accommodate relying on unstable wholesale deposit funding—the consequence of being a crypto-sector bank. These deposit liabilities were not matched by assets that maximised bank profits but rather maintained substantial liquidity to meet depositor withdrawals. Although this business model proved to be unsustainable, it appears to have protected the bank’s depositors against losses upon a bank run. This outcome was not inevitable given the regulatory requirements applicable to Silvergate. The relatively orderly wind down of Silvergate misleadingly suggests that existing prudential regulation sufficiently

<sup>3</sup> For example, the US Senate Committee on Banking, Housing and Urban Affairs [7] has held a hearing on “Examining the Failures of Silicon Valley Bank and Signature Bank”, inviting former executives from SVB and SBNY as witnesses.

<sup>4</sup> The term “crypto-asset” here is intended to capture the broad range of instruments that are commonly treated as part of the crypto-asset eco-system under a variety of names. This includes crypto-currencies (e.g. Bitcoin and Ether); crypto-tokens; stablecoins (e.g. Tether, USD Coin and Binance USD); and non-fungible tokens. There is a common understanding discernible from the various regulatory definitions offered for these instruments.

The US Federal Reserve [8] refers to “any digital asset implemented using cryptographic techniques”.

In its Markets in Crypto-Assets (MiCA) Regulation [9], the EU refers to “a digital representation of a value or of a right that is able to be transferred and stored electronically using distributed ledger technology or similar technology”.

The Basel Committee on Banking Supervision [10] refers to “private digital assets that depend primarily on cryptography and distributed ledger or similar technology”.

<sup>5</sup> The term “crypto-sector bank” in this paper is not supposed to imply that such a bank is holding crypto-assets as assets on its balance sheet. Such banks hold the same type of assets on their balance sheet as any commercial bank, but rather specialise in servicing the crypto-sector (e.g. providing a bank account and payment services). Although SEN Leverage lending by Silvergate was collateralised by Bitcoin, that collateral would be liquidated to repay the loan rather than being transferred to Silvergate.

addresses the greater liquidity risk encountered by crypto-sector banks. Rather, Silvergate highlights a vulnerability in prudential regulation that did not manifest itself in a bank collapse only due to the discretionary decisions made by Silvergate’s management and/or bank supervisors. That vulnerability may be exploited or overlooked in the future where a bank prioritises short-term profit above ensuring that depositors can be paid in full.

Silvergate offers a regulatory model for prudential regulation of those banks that are servicing crypto-asset market participants. It would be consistent with the imposition of liquidity requirements on banks that were anticipated under the “Basel III” banking regulations (the “Basel Framework”) agreed by the Basel Committee on Banking Supervision (“BCBS”) and implemented by the USA. Those liquidity requirements were not applicable to Silvergate under US banking regulations due to the smaller size of its balance sheet. Furthermore, the Silvergate model offers even stricter liquidity requirements that reflect the volatile nature of the deposits from crypto-asset market participants. This paper argues that the liquidity requirements in the Silvergate model should apply to (i) crypto-sector banks of any size and (ii) all deposits related to crypto-asset market participants at all banks.

Section “[The instability of banks](#)” of this paper outlines the centrality of the balance sheet to banking. Section “[The incentives behind a crypto-sector bank](#)” explains how the funding model of crypto-sector banks makes them especially fragile. Section “[Silvergate as a crypto-sector bank](#)” demonstrates the history of Silvergate’s operations with crypto-asset market participants and how this corresponded with its management of its balance sheet in recent years. Section “[The inevitable unprofitability of crypto-sector banking](#)” highlights that the business model of crypto-sector banks is unsustainable and can only be profitable in especially favourable financial conditions. Section “[A regulatory model for crypto-sector banking](#)” offers a regulatory model for crypto-sector banks that can mitigate the prudential risks from relying on funding from deposits from crypto-asset market participants. Section “[Conclusion](#)” concludes.

## The instability of banks

The function of a bank is well understood and explained in the literature (e.g. [11] ch. 13). The typical bank is predominantly funded by taking deposits from accountholders, together with some traditional debt financing (e.g. corporate bonds, covered bonds, securitisation, commercial paper) and some equity (and sometimes also equity-like) capital. The bank uses its funds to issue loans and purchase debt securities (and make other investments). Banks create their own commercial-bank-issued money on their balance sheet



when issuing loans [12]. But they are disciplined when creating such money by the need to account for outflows to other banks by transferring central-bank-issued money (i.e. reserves) [13]. Most people are not necessarily aware of the conceptual distinction between commercial-bank-issued money and central-bank-issued money. Nonetheless, they implicitly recognise this distinction once their bank is in financial trouble. They know that their account balance no longer necessarily represents how much central-bank-issued money (i.e. cash) they can recover from their bank. It is then rational for the depositors to run on the bank to recover as much of their money from the bank as they can [14]. This would either be a withdrawal of central-bank-issued money (i.e. cash) or an exchange for another bank's commercial-bank-issued money (i.e. wire transfer to another bank).

The bank profits by earning more money on its assets than it pays for its liabilities (together with its operating expenses and taxes). This profit can be summarised by deducting the weighted interest (or interest rate) that the bank pays on its liabilities from the weighted interest (or interest rate) that the bank receives on its assets—typically referred to as “net interest income” (or “net interest margin”). The bank's balance sheet is a delicate balancing act, however. Much of its liabilities are demand deposits, which can be withdrawn by depositors on demand. Much of its assets are not cash or reserves, but are investments that do not repay principal until a maturity date in the future. In general, the longer-term that the bank can lend out its money, the higher the rate of return that it can expect to earn (for a debtor of otherwise equivalent credit risk). The bank only holds enough cash to satisfy a fraction of deposits being withdrawn at any time, while investing the remainder of its funds. This proves problematic if there is a bank run where too many depositors want their money back at one time. Evidently, this maturity transformation function makes banks and the banking system fragile and vulnerable to sudden shifts in the behaviour of depositors (and other creditors) [e.g. 15, 16].

Retail depositors are considered to be a typically stable source of funding. Deposit insurance provides a state-backed guarantee that depositors will be promptly repaid up to the insured limit even if their bank goes insolvent. This guarantee removes the incentive for insured depositors to run and prevents the self-fulfilling prophecy triggered by fears about the soundness of a bank [14]. In the USA, deposit insurance protects up to \$250,000 per depositor at any FDIC-insured bank. Therefore, retail depositors, who typically hold a personal account that holds no more than the insured limit, generally do not run. However, uninsured depositors (i.e. deposits in excess of \$250,000 held by any depositor) remain

incentivised to run.<sup>6</sup> Accordingly, wholesale deposits, such as those of crypto-asset market participants, represent an unstable source of funding for banks.

This behaviour is reflected in the Basel III [18, 19] liquidity requirements: the liquidity cover ratio (“LCR”) and the net stable funding ratio (“NSFR”). Both the LCR and the NSFR require applicable banks to maintain sufficient liquidity to meet anticipated outflows from the bank. Both are calculated on the basis that wholesale deposits are more likely than retail deposits to be withdrawn from a distressed bank. A bank that has a greater proportion of its funding from wholesale deposits (or debt financing) requires a greater proportion of its assets in more liquid assets, which can be readily converted into cash at face value to meet withdrawal requests.

The particularly destructive impact of a bank run occurs where a bank has good quality assets on its balance sheet but “merely” suffers from a lack of liquidity. (If a bank has made bad loans and investments that have irretrievably reduced the value of its assets below its liabilities, that bank typically should enter into resolution.) The bank's commitment to repay demand deposits immediately upon demand means that the bank may be required to sell its assets below their value to generate cash. In such circumstances, what was originally a solvent bank lacking liquidity can quickly become an insolvent bank. It is for this reason that the Basel III liquidity requirements exist. A focus on capital adequacy of banks can be misleading if illiquidity forces a bank to sell a substantial portion of its assets below their book value and realise accounting losses on its balance sheet.

A central bank is supposed to function as a “lender of last resort” (“LOLR”) to the country's banks to provide emergency funding in such circumstances.<sup>7</sup> The LOLR lends cash, collateralised against the bank's assets (including its illiquid assets), and avoids the need for a “fire sale” by a solvent bank [e.g. 21]. But LOLR funding is discretionary for the central bank.<sup>8</sup> LOLR funding cannot formally fall within a bank's contingency funding strategy. Furthermore, US banks are notoriously reluctant to access the Fed's “discount window” for short-term liquidity assistance due to concerns regarding “stigma” once their access is publicly disclosed (or speculated to have occurred) [22]. Ironically, it is feared that relying on LOLR funding may make counterparties less

<sup>6</sup> Retail depositors holding more than \$250,000 can mitigate this risk by dividing their deposits across accounts at multiple banks. IntraFi [17] offers ICS (Insured Cash Sweep) and Certificate of Deposit Accounts Registry Service (CDARS) services that effectively utilise this workaround to offer “multi-million-dollar FDIC protection” to a given client.

<sup>7</sup> See also the Code of Federal Regulations [20] rules governing the Fed.

<sup>8</sup> This includes the Fed [20 ss.201.3(b), 201.4(d)(11)].



willing to transact with that bank—despite it being a condition of receiving LOLR funding that the bank is solvent.<sup>9</sup> Basel III liquidity requirements aim to lead the bank to hold sufficient liquidity to survive a stress situation without recourse to LOLR funding.

## The incentives behind a crypto-sector bank

In light of these concerns, why would Silvergate or any other crypto-sector bank seek to rely on depositor funding from such an unstable source as crypto-firms? Many crypto-firms, such as crypto-asset exchanges and stablecoin issuers, were having difficulty finding a bank. Chief among banks' concerns would be the risk that the cryptocurrencies issued and traded via these crypto-firms would be facilitating money laundering. The bank transferring funds for these crypto-firms would potentially be facilitating money laundering. Banks have incurred huge fines in recent years, both in the USA and internationally, for their anti-money-laundering failures [23]. However, crypto-firms would potentially have billions of dollars' worth of deposits. These could be funds from investors intended for the firm's operations and expansion plans ("operating funds") and funds from customers that credit their crypto-asset exchange account for trading purposes or funds from issuing crypto-assets ("investor funds").<sup>10</sup> Market rates were at historic lows, which meant that depositors would tolerate leaving their funds in demand deposit accounts that offer no interest. Crypto-firms were flush with money. Crypto-assets were so popular (and gaining in popularity) that crypto-asset market participants could expect to maintain large sums being credited to them by their customers and investors. Any bank willing to accept a crypto-firm as a client could obtain huge deposit funding at little or no cost.

In such circumstances, even making meagre returns on highly-liquid shorter-term debt securities and money market instruments appeared to be an easy carry trade for a crypto-sector bank. A low-margin, high-volume business model. Partially using such deposits to fund higher-yielding (but longer-term maturity) bank lending would be even more lucrative. Silvergate CEO Alan Lane [25] publicly acknowledged that access to these billions of unbanked dollars was the motive behind Silvergate's transition from a traditional community bank to a crypto-sector bank. Rapid balance sheet expansion could follow.

<sup>9</sup> This includes the Fed [20 s201.4(d)(5)]. The Fed is, however, permitted to lend to "undercapitalized insured depository institutions" and "critically undercapitalized insured depository institutions" under limited circumstances [20 s201.5].

<sup>10</sup> Silvergate [24] used these terms "operating funds" and "investor funds" to distinguish between two types of funds that crypto-firms would deposit with the bank.

There are foreseeable compliance risks with such a strategy. While being adamant that they "neither prohibited nor discouraged" banks servicing crypto-firms, US banking regulators [8, 26] have highlighted the risk management concerns that banks should contemplate. The wary consensus of the banking community towards crypto-firms is justified. There have been numerous collapses and scandals involving crypto-assets and crypto-firms.<sup>11</sup> There continue to be concerns regarding money laundering and facilitating fraudulent activity.

There are also foreseeable financial risks to this funding model. Crypto-firms are at a heightened risk of suffering a decline in deposits. A cooling in the crypto-asset craze could see investor funds decline and crypto-firm deposits correspondingly decline. That could similarly see new investment—and the operating funds held in bank accounts—dwindle. An increase in market interest rates could precipitate a draining of liquidity in financial markets and a cooling of the hunt for yield that has manifested itself in crypto-asset speculation. Higher market rates could also encourage crypto-firms to place more of their funds in higher-yielding alternatives rather than settle for zero interest on their deposits. The target range for the Federal Funds Rate set by the Fed (the "Fed Rate") had been low since 2008 and reduced back close to zero upon the onset of the COVID-19 pandemic in March 2020. Nonetheless, it was inevitable that interest rates would eventually have to normalise. It was simply a question of *when*, not *if*, this would occur. Billions of dollars of "free money" could, therefore, suddenly and swiftly evaporate from a crypto-sector bank.

## Silvergate as a crypto-sector bank

Silvergate was a state-chartered bank and a member of the Federal Reserve System, headquartered in San Diego, California. It was regulated by both the Federal Reserve Bank of San Francisco (the "FRB San Francisco") at the federal level and California's Department of Financial Protection & Innovation at the state level.<sup>12</sup> Silvergate began operating in 1988 as an "industrial bank", only operating as a commercial bank since 2009.<sup>13</sup> When Alan Lane became its CEO in 2008, Silvergate still represented a small community bank

<sup>11</sup> For example, the collapse of the TerraUSD stablecoin and Terra Luna token [27]. For example, the collapse of FTX and the indictment [28] of its founder Sam Bankman Fried.

<sup>12</sup> Due to its FDIC-insured deposits, Silvergate was also subject to FDIC supervision.

<sup>13</sup> In California [29], there is a distinction between an "industrial bank", which cannot accept demand deposits, and a "commercial bank", which can.



that specialised in commercial and residential real estate lending and business lending.<sup>14</sup>

Silvergate's transition towards becoming a crypto-sector bank began in 2013, as crypto-firms were accepted among its diverse pool of depositors.<sup>15</sup> Silvergate only became a specialised crypto-sector bank in 2019. Silvergate sold its business loan portfolio in March 2019 and had reduced itself to a single bank branch by June 2019. SCC only became a public corporation at this point, listing on the New York Stock Exchange in November 2019. Silvergate's business strategy was to become a key market player in the crypto-sector. Silvergate had opened an inter-client payment system to facilitate payments between crypto-firms in 2017, the Silvergate Exchange Network ("SEN"), which continually grew in importance. Silvergate began offering US dollar loans collateralised by Bitcoin in 2020, known as "SEN Leverage" [30, 31]. SCC took over Facebook's failed cryptocurrency project, Diem, in January 2022 in pursuit of Silvergate offering its own stablecoin: a project which ultimately came to nought.<sup>16</sup>

The many compliance concerns associated with accepting crypto-firms as clients and becoming a crypto-sector bank came to fruition. FTX, the then-second-largest crypto-asset exchange and a banking client of Silvergate, collapsed in November 2022. In response, Silvergate has faced scrutiny from members of the US Congress regarding its relationship with FTX [35]. SCC, Silvergate and Lane face a class action lawsuit for executing FTX bank transfers that allegedly perpetuated misappropriation of FTX client funds [36]. Silvergate has also been accused of having facilitated money laundering [37]. Silvergate's former Chief Risk Officer, Tyler Pearson, was quietly demoted in November 2022, shortly before the collapse of FTX [38]. There have been queries as to whether Pearson's demotion was connected to risk management failings at Silvergate in relation to its crypto-firm clients [35, 39]. These concerns have been exacerbated by accusations of nepotism [39]: Pearson is the son-in-law of Lane.<sup>17</sup>

These compliance issues have, however, been overshadowed by the unravelling of Silvergate's funding model.

The Fed began increasing the Fed Rate in March 2022 to increase market interest rates and combat inflation. During the remainder of 2022, the crypto-asset eco-system suffered tumult caused by a crash in the price of Bitcoin, the collapse of the TerraUSD stablecoin/Terra Luna token and the failure of various crypto-firms, including Three Arrows Capital, Voyager Digital, Celsius Network, BlockFi and, most importantly, FTX. Crypto-firm deposits declined with little prospect of returning anytime soon. Silvergate's business model had become unviable [41, 42]. The business strategy to transition into a specialised crypto-sector bank had led Silvergate to liquidation in four years. The Office of Inspector General (the "OIG") has identified all of these factors—concentration risk in the crypto-sector, reliance on uninsured non-interest-bearing deposits and ineffective risk management (tied to nepotism in senior leadership)—as contributing to Silvergate's failure [43, p. 1].

To some extent, the strategy of Silvergate to transition from a community bank to a crypto-sector bank reflected some of the tenets of corporate finance. Diversification of activities within a firm (e.g. forming a conglomerate) is typically associated with a reduction in the volatility of the firm's profits but a greater risk of inefficient management decisions [44, 45, p. 1008]. Conglomerates are, therefore, typically subject to a discount in their market valuation [46]. Such diversification within a firm does not offer a benefit for investors, who are able to assemble a diversified investment portfolio by acquiring shares in a number of specialised firms by themselves [45, p. 1008].

When operating as a crypto-sector bank offered lucrative profits, it would be dilutive to bank profits to build a diversified bank. That would require more stable funding and lower rates of return to facilitate typical longer-term bank lending. Investors could instead build their own diversified bank within their portfolio by buying shares in a number of banks. Investors would, therefore, find it unnecessary for SCC to offer Silvergate as an investment opportunity that was diversified to be less risky (at the expense of being less profitable) [47]. Rather, when investors wanted investment exposure to the crypto-asset craze without speculating in crypto-assets themselves, SCC shares offered a "pick-and-shovel" investment opportunity.<sup>18</sup>

These principles are sound in the abstract. Nonetheless, there is an inevitable consequence to offering such a specialised investment opportunity as a crypto-sector bank. There are market abnormalities that allow a crypto-sector bank to generate excessive levels of profit for a limited period

<sup>14</sup> SCC's IPO prospectus [24] details the history of Silvergate.

<sup>15</sup> Silvergate's crypto-firm clients included crypto-asset exchanges, stablecoin issuers, institutional investors in crypto-assets and other companies operating in the crypto-asset eco-system (e.g. mining operators).

<sup>16</sup> Silvergate acquired "intellectual property and other technology assets" related to Diem for \$181.6 million, including \$50 million in cash [32]. Those assets were effectively written off by end-2022. Silvergate recorded a \$196.2 million impairment charge on those assets in 2022 Q4 [33, pp. 100–101, 34, p. 5].

<sup>17</sup> In addition, as of the date of the proxy statement [40, pp. 33–34], Silvergate's Chief Technology Officer was Lane's son and Silvergate's Manager Correspondent Banking was Lane's son-in-law.

<sup>18</sup> A "pick-and-shovel" investment strategy refers back to the "Gold Rush" in nineteenth century California. Many speculators mined for gold; some successfully, some unsuccessfully. The safer, profitable investment was to sell picks and shovels (and other supplies) to all of the miners, rather than engage in mining yourself.





**Table 1** Deposits and other liabilities

	(as of 31 December, in \$ thousands)					
	2017	2018	2019	2020	2021	2022
Total deposits (% of total liabilities)	1,775,146 (97.63%)	1,783,005 (98.34%)	1,814,654 (95.65%)	5,248,026 (99.17%)	14,290,628 (99.26%)	6,296,550 (58.56%)
<i>Non-interest-bearing demand accounts</i> (% of total liabilities)	<i>1,464,154</i> (80.53%)	<i>1,525,922</i> (84.16%)	<i>1,343,667</i> (70.83%)	<i>5,133,579</i> (97.01%)	<i>14,213,472</i> (98.73%)	<i>3,852,547</i> (35.83%)
<i>Interest-bearing accounts, exc. certificates of deposit</i> (% of total liabilities)	<i>208,076</i> (11.44%)	<i>123,175</i> (6.79%)	<i>146,499</i> (7.72%)	<i>113,603</i> (2.15%)	<i>76,616</i> (0.53%)	~ <sup>a</sup> (~0.00%)
<i>Certificates of deposit</i> (% of total liabilities)	<i>102,916</i> (5.66%)	<i>29,736</i> (1.64%)	<i>324,488</i> (17.10%)	<i>844</i> (0.02%)	<i>540</i> (0.00%)	~2,444,003 (22.73%)
Financing liabilities (% of total liabilities)	36,788 (2.02%)	20,659 (1.14%)	68,530 (3.61%)	15,831 (0.30%)	15,845 (0.11%)	4,315,859 (40.14%)
<i>FHLB advances</i>	<i>15,000</i>	–	<i>49,000</i>	–	–	<i>4,300,000</i>
<i>Notes payable</i>	<i>6,000</i>	<i>4,857</i>	<i>3,714</i>	–	–	–
<i>Subordinated debentures, net</i>	<i>15,788</i>	<i>15,802</i>	<i>15,816</i>	<i>15,831</i>	<i>15,845</i>	<i>15,859</i>
Total liabilities	1,818,148	1,813,072	1,897,091	5,291,936	14,396,659	10,752,332

<sup>a</sup>The composition of interest-bearing accounts at end-2022 Q4 was not provided in the 2022 Q4 quarterly earnings press release. The total represented about \$2,444,003,000, of which about \$2.4 billion was in the form of brokered certificates of deposit

of time. When those abnormalities disappear, at best, that crypto-sector bank generates lower levels of profit that underwhelm those investors that overpaid for their shares based on loftier projections. At worst, that crypto-sector bank becomes too unstable to survive the loss of confidence triggered by a sudden exodus of deposits. In particular, a sudden loss of liquidity for a bank can spiral into the dreaded “fire sale” of its assets and a declining (book) value of its equity being recognised on its balance sheet.

For a crypto-sector bank, those market abnormalities essentially originate from the near-zero-interest rate policy in the Fed Rate and the use of quantitative easing for most of the period since 2008. This has driven a hunt for yield among investors (and speculators). The COVID-19 pandemic saw interest rates return back close to zero, quantitative easing resume and huge fiscal stimulus packages provide money to the public in 2020 and 2021. This period also saw a huge influx of retail investor speculation in the stock market and the crypto-asset market. These are not normal market conditions upon which a bank can build sustainable foundations for long-term profitability. The OIG has identified that Silvergate’s bank supervisors could have, and should have, intervened as Silvergate’s balance sheet grew in size accompanied by a more precarious funding model [43, p. 2]. The persistent increase in the Fed Rate since March 2022 returned market interest rates closer to normality and undermined any business model premised on the persistence of a near-zero interest Fed Rate.

Silvergate has disappeared as those banking market abnormalities driven by the crypto-sector have faded. Another crypto-sector bank may arise in the future if market

conditions again incentivise its existence—subject to overcoming the regulatory hurdles involved in chartering and operating a bank. In blackboard economics, this is merely illustrated in shifts of the demand and/or supply curves. In the real world, this manifests itself in a more dramatic spectacle: the periodic liquidation of crypto-sector banks.

### Analysis of the SCC financial statements 2017–2022

Tables 1, 2, 3, 4, 5 and 6 illustrate the rise and fall of Silvergate through SCC’s consolidated financial statements during 2017–2022.<sup>19</sup>

Table 1 shows that Silvergate’s deposits grew from \$1.8 billion at end-2017, to \$14.3 billion at end-2021 and then fell to \$6.3 billion at end-2022.<sup>20</sup> As anticipated by Silvergate, the growth in usage of the SEN encouraged the growth of deposits.<sup>21</sup> Deposits had become almost entirely in the form

<sup>19</sup> The financial statements examined for the purposes of this paper are the consolidated group financial statements provided by SCC [24, 33, 34, 48–52] in its SEC filings: its IPO prospectus (dated 6 November 2019); its annual reports (including its audited financial statements) in 2019, 2020 and 2021; its quarterly reports (including its unaudited financial statements) in 2022 Q1, 2022 Q2 and 2022 Q3; and its quarterly earnings press release (including its unaudited financial statements) in 2022 Q4.

SCC [53–55] will not publish its annual report (including its audited financial statements) for 2022.

<sup>20</sup> In addition, total deposits were \$544.2 million at end-2014, \$633.5 million at end-2015 and \$767.9 million at end-2016.

<sup>21</sup> SEN transfers were worth \$8.3 billion in 2018, \$32.7 billion in 2019, \$135.7 billion in 2020, \$787.4 billion in 2021 and \$563.3 billion in 2022.



**Table 2** Cash, loans, securities and other assets

	(as of 31 December, in \$ thousands)					
	2017	2018	2019	2020	2021	2022
Cash and cash equivalents (% of total assets)	797,668 (42.16%)	674,420 (33.65%)	133,604 (6.28%)	2,962,087 (53.02%)	5,387,946 (33.66%)	4,574,584 (40.28%)
<i>Cash and due from banks</i>	3,951	4,177	1,579	16,405	208,193	555,581
<i>Interest earning deposits in other banks</i>	793,717	670,243	132,025	2,945,682	5,179,753	4,019,003
Securities available-for-sale, at fair value (% of total assets)	191,802 (10.14%)	357,178 (17.82%)	897,766 (42.19%)	939,015 (16.81%)	8,625,259 (53.89%)	5,732,539 (50.48%)
<b>Assets readily convertible into cash (% of total assets)</b>	<b>989,470 (52.30%)</b>	<b>1,031,598 (51.47%)</b>	<b>1,031,370 (48.46%)</b>	<b>3,901,102 (69.83%)</b>	<b>14,013,205 (87.55%)</b>	<b>10,307,123 (90.77%)</b>
Loans held-for-sale, at lower of cost or fair value (% of total assets)	190,392 (10.06%)	350,636 (17.49%)	375,922 (17.66%)	865,961 (15.50%)	893,194 (5.58%)	181,846 (1.60%)
<b>Assets convertible readily or with delay (% of total assets)</b>	<b>1,179,862 (62.36%)</b>	<b>1,382,234 (68.96%)</b>	<b>1,407,292 (66.13%)</b>	<b>4,767,063 (85.34%)</b>	<b>14,906,399 (93.13%)</b>	<b>10,488,969 (92.37%)</b>
Securities held-to-maturity, at amortised cost (% of total assets)	119 (0.01%)	73 (0.00%)	–	–	–	–
Loans held-for-investment, net of allowance for loan losses (% of total assets)	689,303 (36.43%)	592,781 (29.58%)	664,622 (31.23%)	746,751 (13.37%)	887,304 (5.54%)	408,328 (3.60%)
<b>Assets not intended to be sold (% of total assets)</b>	<b>689,422 (36.44%)</b>	<b>592,854 (29.58%)</b>	<b>664,622 (31.23%)</b>	<b>746,751 (13.37%)</b>	<b>887,304 (5.54%)</b>	<b>408,328 (3.60%)</b>
Total assets	1,891,948	2,004,318	2,128,127	5,586,235	16,005,495	11,355,553

**Table 3** Asset maturity

	(as of 31 December or 30 September, as applicable; in \$ thousands)					
	2017	2018	2019	2020	2021	2022 Q3
Loans held-for-sale, at lower of cost or fair value	190,392	350,636	375,922	865,961	893,194	924,644
Loans held-for-investment, net of deferred fees	697,468	599,504	668,089	751,461	894,220	470,962
<i>One year or less</i>	***	***	92,937	140,769	542,054	108,281
<i>More than one year through five years</i>	***	***	178,599	277,006	168,315	317,278
<i>More than five years</i>	***	***	396,553	333,686	183,851	45,403
Securities available-for-sale, at fair value	191,802	357,178	897,766	939,015	8,625,259	8,317,247
<i>One year or less</i>	***	***	–	–	–	34,834
<i>More than one year through five years</i>	***	***	–	–	2,170	134,166
<i>More than five years through 10 years</i>	***	***	408	15,694	1,401,733	1,435,430
<i>More than 10 years</i>	***	***	897,358	923,321	7,221,356	6,712,817
Securities held-to-maturity, at amortised cost	119	73	–	–	–	3,104,557
<i>One year or less</i>	***	***	–	–	–	–
<i>More than one year through five years</i>	***	***	–	–	–	1,246,108
<i>More than five years through 10 years</i>	***	***	–	–	–	288,276
<i>More than 10 years</i>	***	***	–	–	–	1,570,173
Total assets	1,891,948	2,004,318	2,128,127	5,586,235	16,005,495	15,467,340

of non-interest-bearing demand deposits rather than time deposits. This peaked in 2020 and 2021, when nearly all of Silvergate’s liabilities were non-interest-bearing demand deposits (97.0% and 98.7%, respectively).<sup>22</sup> This meant that

Silvergate could receive nearly all of its funding at zero cost, but with no commitment from depositors that they would keep their money at the bank.

However, as depositors became less willing to receive nothing for their deposits during the course of 2022, coupled with the crypto-asset market reaction to the collapse of FTX, deposits declined at Silvergate. The obvious

<sup>22</sup> Non-interest-bearing deposits as a percentage of total deposits were 12.4% as of end-2013 [24, p. 11].



**Table 4** Average yields and rates

	2017	2018	2019	2020	2021	2022 <sup>a</sup>	2022 3Q	2022 Q4
Total interest earning assets	4.24%	3.65%	3.96%	3.29%	1.21%	2.27%	1.96%	3.27%
<i>Interest earning deposits in other banks</i>	1.32%	1.95%	2.24%	0.49%	0.14%	1.84%	0.85%	3.88%
<i>Securities, taxable</i>	2.13%	2.78%	2.87%	2.37%	0.96%	1.73%	1.46%	2.64%
<i>Securities, tax-exempt</i>	–	–	–	3.32%	2.24%	2.46%	2.46%	2.47%
<i>Loans</i>	5.20%	5.52%	5.45%	4.64%	4.40%	5.64%	5.16%	7.69%
Total deposits	0.44%	0.10%	0.43%	0.27%	0.00%	0.18%	0.05%	0.77%
Total interest-bearing liabilities	1.11%	1.11%	2.47%	2.42%	1.04%	3.30%	1.84%	3.87%
<i>Interest-bearing deposits</i>	0.90%	0.69%	2.26%	2.72%	0.15%	3.01%	1.82%	3.70%
- <i>Interest-bearing demand accounts</i>	0.16%	0.14%	0.14%	0.14%	0.12%	***	0.03%	0.00%
- <i>Money market and savings accounts</i>	0.67%	0.59%	0.87%	0.46%	0.15%	***	0.05%	0.01%
- <i>Certificates of deposit, brokered</i>	1.32%	–	3.54%	5.65%	–	***	2.18%	3.77%
- <i>Certificates of deposit, other</i>	1.39%	1.45%	1.49%	0.92%	0.65%	–	–	–
Net interest spread <sup>b</sup>	3.13%	2.54%	1.49%	0.87%	0.17%	(1.03%)	0.12%	(0.60%)
Net interest margin <sup>c</sup>	3.68%	3.49%	3.47%	3.00%	1.20%	1.71%	1.86%	1.54%
Net interest income (in \$ thousands)	41,951	69,623	70,957	72,364	129,267	255,618	201,929	53,689

<sup>a</sup>Average yields and rates for the entire 2022 were not provided in the 2022 Q4 quarterly earnings press release, except for total deposits and net interest margin. These are calculated in Table 4 based on available information in the 2022 Q3 quarterly report and the 2022 Q4 quarterly earnings press release

<sup>b</sup>In SCC's financial statements, "net interest spread" is defined as "the difference between interest rates earned on interest earning assets and interest rates paid on interest bearing liabilities"

<sup>c</sup>In SCC's financial statements, "net interest margin" is defined as "a ratio calculated as annualised net interest income divided by average interest earning assets for the same period"

**Table 5** Profits and equity

	(as of 31 December or year ended 31 December, as applicable)					
	2017	2018	2019	2020	2021	2022
Net income (in \$ thousands)	7,643	22,333	24,846	26,038	78,528	(937,910)
Total comprehensive income (in \$ thousands)	7,980	21,489	33,308	65,673	25,570	***
Diluted earnings per share	\$0.79	\$1.31	\$1.35	\$1.36	\$2.91	(\$30.07)
CET1 capital to risk-weighted assets, Bank	13.11%	23.68%	24.55%	22.71%	53.89%	53.89%
Total shareholders' equity (in \$ thousands)	73,800	191,246	231,036	294,299	1,608,836	603,221
Book value per share	\$8.00	\$10.73	\$12.38	\$15.63	\$46.55	\$12.93
Share price	–	–	\$15.91	\$74.31	\$148.20	\$17.40

response was to raise the interest offered on deposits. Therefore, while overall deposits were falling at Silvergate, there was also an increase in interest-bearing deposits. This shift is most visible in Silvergate changing from having practically no certificates of deposit (i.e. time deposits) outstanding at end-2021 (\$540,000 with an average interest rate of 0.65% in 2021) to about \$2.4 billion outstanding by end-2022 (with an average interest rate of 3.77% in 2022 Q4).

SCC and Silvergate did not ordinarily use debt financing to any material extent. SCC had subordinated debentures outstanding throughout the period and a term loan from a commercial bank that was prepaid in 2020. These represented no more than 4% of its liabilities by the end of each year. This is unsurprising. Silvergate would instead match the size of its assets with the growth of its deposit funding. The anomaly here is the advances from the Federal Home Loan Bank of San Francisco ("FHLB") in 2022 Q4. However, as discussed further below, these FHLB





**Table 6** 2022 liquidity management

	(as of 31 December/31 March/30 June/30 September; in \$ thousands)				
	2021 Q4	2022 Q1	2022 Q2	2022 Q3	2022 Q4
Cash and cash equivalents	5,387,946	1,385,509	1,893,788	1,886,823	4,574,584
Securities available-for-sale, at fair value	8,625,259	9,463,494	8,686,307	8,317,247	5,732,539
Assets ready to fund withdrawals	14,013,205	10,849,003	10,580,095	10,204,070	10,307,123
Securities held-to-maturity, at amortised cost	–	2,751,625	3,131,321	3,104,557	–
Loans held-for-sale, at lower of cost or fair value	893,194	937,140	872,056	924,644	181,846
Loans held-for-investment, net of allowance for loan losses	887,304	739,014	594,671	467,786	408,328
Assets capable to fund withdrawals	1,780,498	4,427,779	4,598,048	4,496,987	590,174
Total assets available or invested	15,793,703	15,276,782	15,178,143	14,701,057	10,897,297
Total deposits	14,290,628	13,396,162	13,500,720	13,238,426	6,296,550
FHLB advances	–	800,000	800,000	700,000	4,300,000

advances were not an ordinary course line of credit for Silvergate but an emergency lifeline.

Table 2 shows that Silvergate largely either parked its deposits with other banks (including the Fed) as interest-bearing deposits or acquired highly-liquid debt securities. These debt securities included US Treasuries, US agency securities, mortgage-backed securities, asset-backed securities relating to government-sponsored student loans and municipal bonds. These debt securities were held on an available-for sale basis. Silvergate anticipated selling them before maturity—and accordingly valued them on the balance sheet on a mark-to-market basis (i.e. “at fair value”). Any decline in their market value would be recognised as losses on the balance sheet. These would remain paper losses, only to be realised upon a sale of those securities. These securities available-for-sale were, however, intended to be readily convertible into cash to meet any excessive deposit withdrawals that would otherwise exhaust the cash that Silvergate retained to ordinarily satisfy depositors.

Cash and cash equivalents generally represented between 30 and 55% of Silvergate’s assets. Securities available-for-sale formed an increasing proportion of Silvergate’s assets: about 17.8% at end-2018, 42.2% at end-2019 and 50.5% at end-2022. The balances of cash and securities available-for-sale were both generally increasing, even as their proportions of the balance sheet shifted. Silvergate was in a situation of effectively deciding how to divide its assets among these “readily-convertible assets” in response to crypto-asset market conditions and anticipated depositor behaviour. In aggregate, these “readily-convertible assets” would typically represent more than half of its assets—and this proportion grew as its deposits grew so substantially from 2020.

The alternative to securities available-for-sale are those securities intended to be held-to-maturity. These are valued at cost on the balance sheet. This is because they would not be affected by fluctuations in their current market price

if they are never sold on the market.<sup>23</sup> This avoids mark-to-market losses being recognised on the balance sheet. Nonetheless, the flexibility sought in Silvergate’s securities portfolio—and the low interest rate environment in which it was operating—meant that Silvergate generally did not designate its securities as securities held-to-maturity until 2022 (see also Table 6).

As deposits grew at Silvergate, the bank’s loan portfolio also grew but by a relatively small amount. Accordingly, the proportion of its assets represented in loans—both loans held-for-sale (the loan equivalent of securities available-for-sale) and loans held-for-investment (the loan equivalent of securities held-to-maturity)—declined as deposits grew from 2020 onwards.<sup>24</sup> Moreover, Silvergate adopted some lending practices in favour of maintaining a nimbler balance sheet. Mortgage warehouse lending represents shorter-term lending that can offer a higher yield than money market instruments of a similar maturity.<sup>25</sup> Warehouse lending represented an increasingly larger proportion of Silvergate’s asset portfolio.<sup>26</sup> Reverse mortgage lending represents longer-term lending, and the bank is unable to anticipate

<sup>23</sup> The debt security remains a promise to repay principal of 100. Therefore, irrespective of its market value prior to maturity, its value at maturity reverts back to 100 and (in the absence of a default) there is no loss realised.

<sup>24</sup> Loans held-for-sale fell from 17.7% of assets in 2019, to 15.5% in 2020 to 5.6% in 2021. Loans held-for-investment fell from 31.2% of assets in 2019, to 13.4% in 2020 to 5.6% in 2021.

<sup>25</sup> Mortgage warehouse loans entail the warehouse lender providing a loan to mortgage originators, who use those funds to issue mortgage loans. Those mortgages are intended to be pooled together and either resold or securitised. The proceeds are used to repay the warehouse lender.

<sup>26</sup> Mortgage warehouse lending (consisting of both loans held-for-sale and held-for-investment) represented \$252.6 million of Silvergate’s loans at end-2018, \$405.0 million at end-2019, \$963.9 million at end-2020, about \$1.1 billion at end-2021 and \$181.8 million at end-2022.



when the loan will be repaid.<sup>27</sup> Silvergate ceased reverse mortgage lending in mid-2014 and began selling its loans in the secondary market. The residential and commercial real estate mortgage loans that Silvergate previously specialised in funding—but which represent longer-term lending—similarly declined.<sup>28</sup> Meanwhile, SEN Leverage lending, which represented essentially crypto-asset margin lending but was classified as “commercial lending”, increased as a proportion of Silvergate’s lending following its introduction in 2020.<sup>29</sup>

The distinction between loans held-for-sale and loans held-for-investment is an imprecise means to approximate how readily these loans could be converted into cash. Mortgage warehouse loans were classified under both categories. Therefore, some loans held-for-investment could expect to be repaid in a shorter-term timeframe. Some loans held-for-sale presumably would not have been sold nor capable of being promptly sold in the secondary market. Nonetheless, using Silvergate’s loans held-for-sale as an imperfect proxy demonstrates how Silvergate sought to supplement its “readily-convertible assets” with further assets that can be converted into cash if necessary, with some delay. In aggregate, these assets already represented 62.4% of its assets at end-2017, increasing to 85.3% at end-2020 and 93.1% at end-2021.

Table 3 shows that Silvergate did not maintain a securities portfolio of short-term debt securities. Despite the duration risk of rising market rates eventually reducing the value of longer-term securities, Silvergate’s securities typically did not have a maturity of one year or less. Rather, Silvergate relied upon a substantial proportion of its assets either being interest-bearing deposits or loans and securities with floating rates (or subject to interest rate hedging). Those assets with adjustable rates would increase their yield and maintain their market value as market rates increased. The bank was then prepared to accept a portion of its assets being longer-term fixed-rate securities. These securities were acquired in an environment of low interest rates where the concern was interest rates falling, not rapidly rising.<sup>30</sup> Silvergate had enough of a cash pile to assume that this fixed-rate rump of

assets would not need to be sold prior to maturity if they accumulated unrealised losses. This proved to be a problematic assumption in 2022 and 2023. As market interest rates steeply increased in line with Fed Rate rises, the market value of longer-term securities declined at the same time as substantial withdrawals were being made by depositors.<sup>31</sup>

The maturity profile of Silvergate’s loan portfolio, however, demonstrates a trajectory towards shorter-term lending, as discussed above (see also Table 2). By end-2021, Silvergate’s loans were concentrated in loans held-for-sale and those loans held-for-investment due within one year or less. That dynamic had likely only changed by end-2022 Q3 due to Silvergate reducing its loan origination to conserve cash within the bank. This naturally led to shorter-term loans maturing and not being replaced by new shorter-term loans while longer-term loans would remain outstanding.

Table 4 shows how Silvergate’s funding model transitioned towards being low-margin, high-volume in order to generate greater net interest income. As deposits grew larger in size in 2020 and 2021, net interest margin declined: from being around 3–4% until 2020 to around 1–2% in 2021 and 2022.<sup>32</sup> Silvergate recognised that these additional deposits were vulnerable to being withdrawn just as quickly as arrived. Accordingly, Silvergate kept an increasing proportion of its (growing) assets in the form of “readily-convertible assets”. These assets were receiving the lowest yields available—at a time of near-zero interest rates in response to the COVID-19 pandemic—and reduced the average yield on Silvergate’s assets. Nonetheless, the huge increase in volume of its assets, funded by non-interest-bearing deposits, meant that Silvergate would still increase its profitability, even if the rate of return on its assets severely declined. This is visible in Silvergate’s net interest income increasing each year, even as its net interest spread and net interest margin declined.

However, this funding model meant that Silvergate’s net interest margin was being squeezed as market rates normalised during 2022. This is particularly visible in Silvergate’s asset yields and funding rates in 2022 Q1-Q3 compared to 2022 Q4. Its deposit funding shifted from non-interest-bearing deposits to certificates of deposit. This would offer a

<sup>27</sup> Reverse mortgage loans (also known as home equity conversion mortgage loans) entail mortgage lending to homeowners aged 62 or older, who do not make monthly mortgage repayments, and repayment is made upon their death (or the sale of their home prior to their death).

<sup>28</sup> Whereas real estate loans represented 89.8% of Silvergate’s loan portfolio (gross loans held-for-investment) at mid-2019, they only represented 26.5% at end-2022.

<sup>29</sup> SEN Leverage lending represented \$77.2 million (4.8%) of Silvergate’s loans at end-2020, \$335.9 million (18.9%) at end-2021 and \$301.7 million (51.1%) at end-2022.

<sup>30</sup> Silvergate implemented a hedging strategy in March 2019 to hedge against *declining* interest rates on its cash, loans and securities.

<sup>31</sup> If a debt security offering interest at 2% p.a. was purchased for 100 when the Fed Rate was 0.00%-0.25%, that debt security becomes less valuable as the Fed Rate increases. With the Fed Rate at 4.75%-5.00%, any investor could buy newly issued debt at 100 from the same (or an equivalent) issuer offering interest at perhaps 7% p.a. The market value of that existing 2% debt security inevitably becomes far less than 100 to compensate any purchaser for the lower interest rate being earned compared to newly-issued debt. The difference between this market value and the originally-paid 100 is an unrealised loss for the security holder.

<sup>32</sup> In addition, the net interest margin was 3.25% in 2014, 3.52% in 2015 and 3.68% in 2016.



measure of stability to Silvergate. These funds could not be withdrawn by depositors on demand. However, this came at a cost: materially increasing Silvergate's funding costs from 2022 Q4. Silvergate's (floating-rate) assets similarly earned higher yields at this point. Nonetheless, having a smaller and more volatile deposit base reduced the leeway for Silvergate to deploy a portion of its funding towards higher-yielding lending that would require funds to be committed for a prolonged period of time. This manifested itself in Silvergate ceasing its warehouse lending during 2022 Q4. Although warehouse lending represents short-term lending, the bank remains hostage to the speed with which the mortgage originator is able to sell its mortgage loans in the secondary market and use the proceeds to repay its warehouse loan. As interest rates rise, it also typically reduces borrower demand for mortgages and lender demand for mortgage origination. Silvergate would instead need to maintain its assets in the (lower-yielding) deposits at banks rather than maximising returns on its assets as market rates increased. This highlights the pro-cyclical nature of Silvergate's balance sheet, with both its cheap deposit funding and its yield-generating activities dwindling as interest rates increased. Even if the bank had survived its liquidity difficulties, Silvergate may have come to struggle for profitability once its non-interest income and its operating expenses are also considered. Silvergate was becoming a low-margin, low-volume funding model as its crypto-firm deposits declined.

Table 5 shows that the crypto-sector bank funding model was originally very profitable for Silvergate. Net income tripled from \$7.6 million in 2017 to \$22.3 million in 2018. It tripled again from \$26.0 million in 2020 to \$78.5 million in 2021. The SCC share price [56] indicates that investors perceived that the crypto-sector bank funding model would generate increasingly more profits in the long-term. Having been listed at the IPO price of \$12.00 in November 2019, the (closing) share price peaked at \$222.13 in November 2021. SCC's strategy was to reinvest profits and raise additional share capital to expand Silvergate. SCC never declared any dividends on its common stock.<sup>33</sup> Investors appeared to endorse this strategy. SCC had issued further shares throughout 2021, including at prices of \$63.00 in January 2021 and \$145.00 in December 2021. The SCC share price only began a sustained decline in March 2022 (then priced around \$160), closely aligned to the beginning of Fed tightening of the Fed Rate. The share price started to sharply and irreversible decline in November 2022. The collapse of FTX underscored how far the "crypto winter" had set in. Market rates had normalised at a rapid rate. Silvergate's funding

model and business strategy had become visibly unsustainable.<sup>34</sup> By end-2022, the share price was a mere \$17.40—an 88% decline from end-2021.

The corporate impact on SCC from the market shift in 2022 is visible in the \$937.9 million loss suffered. During 2022, Silvergate had redesignated about \$1.9 billion of its securities available-for-sale (at their fair value) into being securities held-to-maturity. This initially avoided recognising any further decline in the market value of these securities on its balance sheet. By end-2022 Q3, Silvergate had accumulated about \$590.9 million of (net) unrealised losses on its securities available-for-sale and \$426.7 million of (net) unrecognised losses on its securities held-to-maturity. About \$896 million of the (gross) unrealised and unrecognised losses had arisen within the past 12 months. Yet management at this time [52, p. 13] still believed that "it will more than likely not be required to sell" these securities and crystallise these paper losses. Silvergate had entered into various interest hedging derivatives contracts during 2021 and 2022. Silvergate had already received \$507.2 million in proceeds from its securities available-for-sale during the first three quarters of 2022 with only \$5.6 million in losses from selling securities. This position changed dramatically in 2022 Q4 as the demand for withdrawals accelerated in response to the collapse of FTX. Silvergate recognised a loss of \$751.4 million on securities and \$8.7 million on derivatives from the sale of \$5.2 billion of debt securities and related securities in 2022.

Table 6 shows the fluctuations in the assets and deposits during the course of 2022, which are hidden in merely comparing the figures at end-2021 and end-2022. The beginning of Fed Rate rises in March 2022 did not immediately create a problematic balance sheet for Silvergate. As noted above, Silvergate began allocating some of its securities portfolio as securities held-to-maturity to mitigate the accounting impact of higher market rates. By end-2022 Q1, securities held-to-maturity had become \$2.7 billion, of which \$1.9 billion were a redesignation of securities available-for-sale already held. Deposits had declined<sup>35</sup> by about \$900 million during 2022 Q1, but Silvergate had cash to accommodate this outflow. Deposits remained relatively stable in 2022 Q2-Q3, around \$13.2–\$13.5 billion. Cash and cash equivalents (around \$1.4–\$1.9 billion) and "readily-convertible assets" (around \$10.2–\$10.8 billion) were similarly stable.

Those figures may be somewhat misleading as there would have inevitably been volatile intra-period money

<sup>33</sup> SCC issued 5.375% fixed rate non-cumulative perpetual preferred stock in August 2021 and paid dividends on its preferred stock in 2021 (\$3.0 million) and 2022 (\$10.8 million).

<sup>34</sup> The share price closed at \$50.96 on 7 November 2022 and at \$39.42 on 8 November 2022. Binance [57] had announced on 8 November 2022 having signed a "non-binding [letter of intent]" to acquire FTX in response to FTX having "a significant liquidity crunch".



movements in response to financial market and crypto-asset market developments. Furthermore, Silvergate's cash position was aided by advances from the FHLB (of \$700–\$800 million in aggregate). One may question whether Silvergate should have devoted fewer of its funds as they became newly available (e.g. from loan repayments and maturing securities) towards securities rather than cash and cash equivalents. The exact nature of these increasing securities, in terms of their maturity, fixed/floating-rate interest and hedging, is not clear (although see Table 3). Nonetheless, Silvergate was seemingly surviving the strains on its balance sheet.

As has already been noted, that strategy was severely hampered by crypto-asset market developments in 2022 Q4. In response, deposits declined from \$13.2 billion to \$6.3 billion. That \$6.9 billion in deposit withdrawals could theoretically have been accommodated by the \$10.2 billion in “readily-convertible assets” held by Silvergate at end-2022 Q3. The paper losses on its securities available-for-sale were already recognised on the balance sheet. However, those paper losses would be irrecoverable to Silvergate once those losses were realised upon a sale. Selling a large quantity of its securities portfolio in a rising rates environment would also inevitably risk suffering somewhat of a “fire sale” scenario, leading to realising further losses on its balance sheet. These are evident in the \$937.9 million loss ultimately recorded for 2022 (see Table 5). Again, the FHLB helped to minimise the need to suffer these losses with an advance of a further \$3.6 billion in 2022 Q4.

## What happened in 2023?

The remainder of Silvergate's decline into a failed bank, having taken place in 2023 Q1, is not visible in SCC's financial statements.<sup>35</sup> Nonetheless, it is apparent how the trends continued and climaxed in March 2023. As market rates continued to increase, some of its securities available-for-sale would suffer further unrealised losses. The need for liquidity denied Silvergate the time to let its unrealised losses unwind from its securities portfolio. As deposit withdrawals continued, Silvergate had to continue to sell its securities to generate cash.<sup>36</sup> Cash could be conserved by Silvergate allowing its maturing loans (such as warehouse lending) to mature without new loans being originated.<sup>37</sup> Silvergate had

pre-emptively recorded an impairment of \$134.5 million in 2022 Q4 in anticipation of selling \$1.7 billion of securities during 2023 Q1. By 17 January 2023, \$1.5 billion of securities had been sold, recognising further (net) losses of about \$6.4 million. Its securities portfolio had to continue to be liquidated for cash.

These are the circumstances where the LOLR may intervene to lend cash collateralised against securities and loans held by a distressed bank. It is unknown to what extent Silvergate engaged with the Fed regarding recourse to LOLR support.<sup>38</sup> Silvergate had historically maintained limited borrowing capacity under the discount window as part of its contingency funding plan.<sup>39</sup> There would have been limitations to how much liquidity could be extracted from its assets. Silvergate's remaining loan book by 2023 Q1 was only worth about \$600 million, consisting mainly of real estate and SEN Leverage loans. Those loans collateralised by Bitcoin under SEN Leverage would be problematic as LOLR collateral. Nonetheless, Silvergate's securities portfolio represented a substantial amount of potential collateral for LOLR funding.

This LOLR role was de facto assumed by the FHLB.<sup>40</sup> Silvergate [52, pp. 22, 57, 58] had \$4.3 billion outstanding in FHLB advances by end-2022, which functioned as emergency liquidity for Silvergate. The Federal Home Loan Banks (“FHLBanks”) provide advance loans to member banks, collateralised against a pool of that member bank's mortgage loans or certain securities. As a member bank, despite residential mortgage loans and “community lending” representing only a small proportion of Silvergate's assets in 2022, Silvergate was entitled to access such funding from its FHLBank.<sup>41</sup> There is criticism of the potential moral hazard created by the FHLBanks' willingness to provide liquidity to a broad range of (sometimes troubled) financial institutions that would otherwise be subjected to market discipline on its balance sheet management [61].<sup>42</sup> Nonetheless, FHLB liquidity was available to help Silvergate

<sup>35</sup> SCC [55] will not publish its quarterly report (including its unaudited financial statements) for 2023 Q1.

<sup>36</sup> Banks frequently lend at a floating rate (or have interest rate hedging on its fixed-rate loans). The market value of such loans remains aligned with their book value as market rates rise, provided the borrower remains unlikely to default. However, loans are ordinarily difficult to sell in a short timeframe. Therefore, a bank must sell its liquid fixed-rate debt securities rather than its illiquid floating-rate loans to generate cash.

<sup>37</sup> Outstanding mortgage warehouse loans fell from \$1.1 billion at end-2021 to \$181.8 million at end-2022. Meanwhile, total loans fell from \$1.8 billion at end-2021 to \$590 million at end-2022.

<sup>38</sup> The identity of the specific institution that has utilised the discount window is only disclosed by the Fed after about two years [58 s11(s)]. Silvergate could disclose such utilisation itself sooner, however.

<sup>39</sup> This borrowing capacity was only \$35.2 million as of end-2022 Q3.

<sup>40</sup> The Federal Home Loan Bank system has been described as the “lender of next-to-last resort” [59].

<sup>41</sup> FHLBanks have increasingly lent to financial institutions that would not be considered “community banks” [60].

<sup>42</sup> Furthermore, some argue that the FHLBanks' lending practices may be artificially incentivised. The relevant assets that are offered as collateral to the FHLBank are subject to a “super lien”, granting the





avoid selling its longer-term fixed-rate securities to satisfy deposit withdrawals.

As late as 2022 Q3, Silvergate [52, pp. 57, 59] was explicitly stating that it considered FHLB advances to be a readily available funding source “to meet liquidity needs”. Nor was Silvergate unique in this respect. At the time of its aborted share offering in March 2023, SVB referred to having “\$65 billion of available borrowing capacity ... primarily based on FHLB facilities and repurchase agreements” [63]. SVB already had \$15 billion in FHLB advances outstanding and \$25.9 billion “available to support additional borrowings” at end-2022 [64]. SBNY had about \$11.3 billion in outstanding FHLBank advances at end-2022 [65]. The difference between the three banks is their degree of dependence on the FHLBanks for funding by end-2022. Although a lesser monetary amount, Silvergate’s FHLB advances represented about 40% of its liabilities at end-2022.<sup>43</sup> What is not apparent is the extent that SVB and SBNY became further dependent on the FHLBanks under liquidity pressure in 2023 Q1.

However, Silvergate made the ostensibly baffling decision to sell further securities (and realise losses) in January and February 2023 and voluntarily prepay the FHLB by March 2023. The reason for this prepayment remains unclear. Silvergate did receive public criticism from members of the US Congress [66] that it was effectively using the FHLB as “its functional “lender of last resort”” with funds that are intended “to support the financing of housing”. There are accusations of political pressure.<sup>44</sup> Congress seemingly ignored (or was oblivious to) the prevalence of FHLBank funding of other banks that were not necessarily utilising those funds for “community lending”. Silvergate seemingly received political scrutiny of its FHLB borrowings due to its relationship with FTX.

Irrespective of the rationale, that FHLB prepayment led to SCC “evaluating the impact that these subsequent events have on its ability to continue as a going concern for the twelve months” [54]. By this point, SCC’s management likely did not see it as worthwhile to SCC’s shareholders (and managers) to resort to the Fed discount window in a battle to merely keep the husk of Silvergate’s balance sheet in operation. That FHLB prepayment apparently pushed Silvergate towards its eventual determination to wind down its banking operations.

Footnote 42 (continued)

FHLBank priority in being repaid ahead of other creditors [59]. This argument is contested, however [62].

<sup>43</sup> FHLBank advances represented about 8% and 11% of liabilities for SVB and SBNY, respectively, at end-2022.

<sup>44</sup> There is speculation [e.g. 67] that members of the US Congress pressured the FHLB or Silvergate to ensure prepayment of the loan. The FHLB [68] has denied that it required Silvergate to prepay the loan.

Shareholders have shouldered the losses from the demise of Silvergate. The announcement by Silvergate to voluntarily wind down its banking operations—and the absence of the FDIC in facilitating that process—suggested that Silvergate had wiped out much of the value of its equity but its creditors, in particular its depositors, could expect to be repaid in full.<sup>45</sup> In November 2023, SCC confirmed that Silvergate had indeed repaid its depositors in full [69]. By contrast, a bank run frequently results in losses being suffered by the bank’s creditors, including uninsured depositors and the FDIC’s deposit insurance fund (on behalf of insured depositors). SVB suffered a \$1.8 billion loss realised due to the sale of longer-term debt securities to meet a decline in deposits [70]. However, the juxtaposition in how these securities portfolio losses have been absorbed by Silvergate and SVB—the winding down of Silvergate and the FDIC intervention at SVB—is particularly galling in this respect.

### The inevitable unprofitability of crypto-sector banking

The funding model of banks requires that each bank offers a sufficiently high rate of interest to incentivise depositors to keep their money with that bank while making loans (or other investments) at a sufficiently high interest rate to remain profitable. In simple terms, banks may increase their profits by increasing their lending income or decreasing their funding costs.<sup>46</sup> For crypto-sector banks, there was an expectation that they could simply boost their profits by taking the latter approach: reducing funding costs by relying more on cheaper deposit funding sourced from crypto-firms. However, the funding model of Silvergate deteriorated as market interest rates normalised away from historic lows and the crypto-asset market cooled. Non-interest-bearing deposits severely declined. Deposits became a more expensive source of funding. Silvergate was no longer a bank that invested substantially in higher-yielding, longer-term bank lending. It could not shift its strategy from lower funding costs to higher lending income.

Accordingly, crypto-sector banks will struggle to operate profitably in a world where depositors can generate a reasonable yield from interest earning deposits and money market instruments and investors can generate a reasonable yield from bonds and other debt securities. In a normalised

<sup>45</sup> However, any successful tort claimants or regulatory fines—with respect to FTX, for example—would increase the size of Silvergate’s and SCC’s liabilities and reduce recoveries by creditors and shareholders.

<sup>46</sup> Banks, of course, can also make other adjustments to increase their profits, such as increasing non-interest income, reducing operating costs and reducing their tax rate.





interest rate environment, it can reduce the supply of funds into those firms operating in the crypto-asset eco-system. This includes both (a) investment in crypto-firms by venture capital (and other investors) and (b) funds being credited to crypto-asset exchange accounts or spent to purchase newly-issued stablecoins by those seeking to speculate in the crypto-asset market. Those crypto-firms, in turn, are also likely to reduce the proportion of their funds that they deposit with their banks, in particular as non-interest-bearing deposits. As depositors seek a higher yield from their bank to be willing to keep their money deposited, crypto-sector banks are constrained in offering a higher yield. Crypto-sector banks need a substantial proportion of their assets to be available on demand or have a shorter-term maturity. These assets must be ready to be converted into cash to satisfy excessive deposit withdrawals due to the unpredictability of money inflows and outflows from crypto-firm clients. Banks ordinarily increase their net increase margin as market interest rates increase.<sup>47</sup> Banks pass on a smaller increase in their deposit rates compared to the larger increase they apply to their lending rates. That, however, presupposes that the bank's investments predominantly consist of loans. That is not the case with crypto-sector banks. Theirs becomes a lower-margin, low-volume business model. At that point, after operating costs, can a crypto-sector bank be profitable? Even if it is modestly profitable, can a crypto-sector bank project a high enough return on equity to attract investment?

The crypto-sector bank funding model in a normalised interest rate environment would tempt crypto-sector banks to seek more illiquid, higher-yielding investments to fund their greater funding costs but without increasing the stability of their deposits. Crypto-sector banks would be amping up their liquidity mismatch risk and the prospect of a “fire sale” insolvency upon any liquidity squeeze. Such a crypto-sector bank (and its shareholders) would need to be willing to tolerate a high-risk, low-return business model. Bank executives would need to be prepared to risk the future collapse of their bank (and termination of their employment) once a boost to its profits during a “crypto boom” period turns sour during any “crypto winter” period. That is an unrealistic proposition.<sup>48</sup> One would also expect a responsible prudential regulator to block any bank from migrating to such a business model. Banking is a confidence business. If banks were to be allowed to operate as pop-up stores that exploit low interest rates then fold once interest rates normalise, there is a risk

that a “few rotten apples spoil the barrel” in the minds of depositors at large.

This may indicate that crypto-sector banking is only viable within a diversified bank. The liquidity requirements of crypto-sector banking would remain the same. The unstable deposit liabilities of crypto-firms should be largely matched by highly-liquid, shorter-term assets on the balance sheet. Importantly, when deposits dwindle from crypto-firms, they would represent a smaller proportion of a diversified bank's deposits. When the bank needs to increase its deposit rate to retain deposits, it would have recourse to an increase in its lending rate on its loan portfolio (i.e. highly illiquid, longer-term assets) to counterbalance that additional expense. If a specialised crypto-sector bank is characterised by boom or bust, it is the diversification of a bank's assets and depositor base that can minimise the risk of a bust when the business cycle (or crypto-asset market cycle) turns. In crypto-asset market downturns, crypto-sector banking would represent a drag on profits for a diversified bank. However, if there is a belief that (i) there will be crypto-asset market upturns that will be exceptionally profitable for crypto-sector banking; (ii) there are sufficiently high barriers to entry and exit that would deter newcomers entering the crypto-sector banking market to capture those profits; and (iii) the wider compliance concerns regarding participation in the crypto-asset eco-system are not dissuasive, a bank may be persuaded to include crypto-sector banking within its banking product mix.

The collapse of SBNY, however, indicates how crypto-sector banking remains problematic even within a diversified bank.<sup>49</sup> SBNY classed about \$28.7 billion (27.1%) of its deposits as being “digital-related deposits” as of end-2021 [73, p. 3]. \$12.4 billion of its crypto-firm deposits were withdrawn in 2022, but it still held \$88.6 billion in total deposits. SBNY could make a strategic decision to not raise its deposit rates in 2022 Q4 and allow an outflow of crypto-firm deposits to ensue [65]. Indeed, SBNY expressed a “plan to reduce these deposits significantly because of concentration purposes”—anticipating a further \$3–\$5 billion reduction in crypto-firm deposits during 2023 [74]. Nonetheless, SBNY had been presenting itself as “the recognized leader in the digital banking arena” [73, p. 3]. 92% of its deposits were uninsured as at end-2021 [73, p. 54]. 90% of deposits consisted of uninsured deposits and about 20% of deposits were “digital-related deposits” as at end-2022 [75]. This may have at least given the perception that SBNY had less stable

<sup>47</sup> This increase in net interest income has been visible in 2023. However, it has not necessarily translated into higher bank profits. In some banks, the gain has been offset by the special assessment levied on banks to cover the losses suffered by the FDIC in 2023 and increased loan loss provisions [71].

<sup>48</sup> Regarding bank executives, see, for example, [47].

<sup>49</sup> C.f. Barney Frank, independent director at SBNY, former US Congressman and co-sponsor of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (the “Dodd-Frank Act”), argued that the New York Department of Financial Services, SBNY's prudential regulator at state level, had “shut us down, I think unnecessarily” [72].



funding than many other commercial banks and community banks. This was a perception that SBNY was keen to dispel in early 2023 [e.g. 76]. The collapse of SVB highlighted the vulnerability of “mid-sized banks” whose deposits are nearly all uninsured. About 96% of SVB’s deposits were uninsured as at end-2022 [70]. Therefore, SVB triggered concerns regarding which other banks may be subject to a bank run by its uninsured depositors. Meanwhile, Silvergate had already indicated that crypto-sector banking was problematic by announcing that it was to wind down its operations. Consequently, SBNY became a target for depositor panic. There was a certain self-fulfilling prophecy to panicked uninsured depositors withdrawing more than \$10 billion in deposits from SBNY in a matter of hours on 10 March 2023 in response to the FDIC shutting down SVB [77]. Nonetheless, SBNY was ultimately only deemed able to reopen its doors following the weekend as a FDIC-operated bridge bank that had assured all depositors that they “will be made whole” [4]. This action was supplemented by the Fed having offered additional liquidity to banks to ensure that they can meet the demand for withdrawals by depositors [78].

Even before witnessing the events that have unfolded at Silvergate and SBNY, it appears that bank executives have generally not been persuaded that crypto-sector banking is a worthwhile long-term investment for their bank. Many crypto-firms do remain banked. Those crypto-firms have enough of a veneer of respectability and are constrained by banks’ anti-money-laundering measures. There will be some banks that are willing to accept a given crypto-firm on the same basis as any other business. That crypto-firm represents a tiny proportion of their diversified balance sheet and cannot destabilise the bank. However, it appears unlikely that a crypto-sector bank will appear soon that is designed to offer specialised crypto-asset market expertise to crypto-firms.

The only constituency that stands to gain from the incorporation of crypto-sector banking into commercial banks is the crypto-asset market participants, who rely on access to payment settlement. The funding gap for a bank could be plugged if these firms could be convinced to pay a fee premium for the privilege of accessing the bank payment system through a specialised crypto-sector bank rather than any typical commercial bank. That has not occurred to date—as reflected in the demise of Silvergate.<sup>50</sup>

Nonetheless, as the demise of Silvergate demonstrates, the inevitable unprofitability of crypto-sector banking is not

<sup>50</sup> Silvergate’s strategy did include “develop[ing] and deploy[ing] fee-based solutions” from its crypto-firm clients [24, pp. 112–113]. Silvergate did earn some service fees from its crypto-firm clients. However, these did not materialise to a level substantial enough alone to sustain a profitable bank that is otherwise lacking net interest margin (i.e. the yield on its lending and investments compared to the interest rate paid on its deposits and other funding). This “fee

always a sufficient deterrent. Nor does it sound convincing to rely solely on bank supervisors to employ their discretion to rein in a bank. Regulatory capture, political pressure and the mantra “this time it’s different” can all inhibit such discretion being exercised—as has been identified in the case of SVB [79]. Bank supervisors may also simply underestimate the risks. The OIG has revealed that the Fed and the FRB San Francisco did not consider Silvergate to have changed its business model in order to require their approval under Regulation H: Silvergate still accepted deposits and made loans and so it was still a traditional bank [43, p. 2]. In addition, while crypto-firms, in particular crypto-asset market participants, remain in existence and operate bank accounts, they raise prudential consequences for any bank. Even a diversified bank may see the relative concentration of its deposits between different market sectors alter over time. The regulatory concern regarding crypto-sector banking, therefore, extends beyond crypto-sector banks and extends to deposit liabilities related to the crypto-sector. It remains necessary to consider how prudential regulation could help contain the risks emanating from crypto-sector banking.

## A regulatory model for crypto-sector banking

Despite taking the radical approach of becoming a crypto-sector bank, Silvergate opted to take a conservative approach to maintaining liquidity [41]. The bank matched the deposits of crypto-firms on the liabilities side of its balance sheet with a portfolio of cash, loans and securities that would be reasonably promptly convertible to cash on the assets side of its balance sheet. This is the Silvergate model. The implication from Silvergate’s operations as a crypto-sector bank is that sound banking in the crypto-sector—to the extent sound banking is possible for any prolonged period of time—requires this same approach to balance sheet management to be adopted.

Nevertheless, such a regulatory requirement does not typically apply to banks that accept deposits from crypto-firms. A prudential regulator that closely examines a given crypto-sector bank’s stability may make such a determination that that bank can only safely operate with a greater liquidity buffer. But the OIG has identified a current lack of Fed guidance to bank supervisors on assessing liquidity risk, unstable deposits and banks experiencing rapid growth [43, pp. 2–3]. Furthermore, generally applicable capital and liquidity requirements do not necessarily impose such a requirement

Footnote 50 (continued)

income” was worth \$35.8 million in 2021 and \$32.2 million in 2022 [34].



on banks. Importantly, Basel III liquidity requirements are only required by the BCBS [18 para164, 19] para50) to be applied to “internationally active banks” and jurisdictions are otherwise left to determine whether to extend applicability further. The EU has opted to apply liquidity requirements to all of its banks.<sup>51</sup> However, in the USA, liquidity requirements do not ordinarily apply to any bank that has less than \$100 billion in average total consolidated assets or \$50 billion in average weighted short-term wholesale funding [82].

The Economic Growth, Regulatory Relief, and Consumer Protection Act of 2018 (the “Regulatory Relief Act”) reduced some of the regulatory burdens placed on mid-sized US banks under the Dodd-Frank Act of 2010.<sup>52</sup> This included raising thresholds so that some banks were no longer subject to enhanced prudential supervision [83 s165, 84 s401]. This reform has been criticised in light of SVB’s collapse [85]. SVB would have been subject to enhanced prudential supervision under the original thresholds of the Dodd-Frank Act. The Fed has acknowledged that its supervision of SVB was likely less rigorous in response.<sup>53</sup> However, Silvergate was not a large enough bank for enhanced prudential supervision under any iteration of the Dodd-Frank Act thresholds.<sup>54</sup> The Regulatory Relief Act did mean that Silvergate was no longer required to conduct its own annual stress tests.<sup>55</sup> But, as already noted above, Silvergate essentially coped with its stress situation to meet depositor withdrawals without FDIC intervention.<sup>56</sup> Therefore, the

Regulatory Relief Act appears to have been inconsequential to the failure of Silvergate.

When Basel III liquidity requirements are applicable to a given bank, they represent an important safeguard that can minimise the liquidity mismatch that otherwise would arise with crypto-sector banks. The LCR focuses on the sufficient availability of unencumbered “high-quality liquid assets” (“HQLA”) that a bank can convert into cash to satisfy withdrawals for a hypothetical “significant stress scenario” lasting 30 calendar days [18, para4]. The NSFR requires a bank to have “sufficiently stable sources of funding” relative to the maturities of its assets over the forthcoming year [19, para5]. Longer-term liabilities are generally treated as more stable than shorter-term liabilities [19, para13]. Evidently being funded by crypto-firm depositors represents unstable funding. The NSFR would, therefore, expect a crypto-sector bank to not be heavily exposed to assets (i.e. loans and securities) that have a longer-term maturity. Longer-term assets require stable funding. That avoids the bank falling into a stress situation to repay its unstable funding source and then contemplating a “fire sale” of such longer-term assets to generate the funds.

Nonetheless, even the LCR and NSFR requirements may underestimate the run dynamics of crypto-firm deposits compared to other wholesale deposits. The LCR operates under the assumption that essentially 40% of corporate deposits run.<sup>57</sup> Similarly, the NSFR operates under the assumption that only 50% of corporate deposits can be depended upon to be available to fund the bank for more than a year.<sup>58</sup> As Silvergate demonstrated, crypto-sector banks can expect a larger proportion of their deposits to be withdrawn than a typical commercial bank. Insured deposits ordinarily minimise the “fire sale” that is being prompted by the fleeing (wholesale) depositors. The absence of retail deposits as a significant proportion of the funding on its balance sheet may intensify any bank run. Wholesale depositors may be even less confident in a crypto-sector bank’s ability to maintain enough liquidity to meet withdrawals and, consequently, even more likely to run. This dynamic was visible at SVB. Although its depositor base was tech firms rather than crypto-firms, about 96% of its deposits were uninsured

<sup>51</sup> All deposit-taking institutions operating within the EU (besides a few defined exceptions) require authorisation by the competent authorities as a “credit institution” (i.e. a bank) pursuant to Articles 8–9 of the Capital Requirements Directive [80]. These constitute the applicable “institutions” that are subject to liquidity requirements provided under Articles 411–428 of the Capital Requirements Regulation [81].

<sup>52</sup> SCC [24, p. 158] noted that the Regulatory Relief Act “does make regulatory changes that are favorable to depository institutions ... such as the Bank and to [bank holding companies] ... such as the Company”.

<sup>53</sup> The Fed’s response to the Regulatory Relief Act [79, p. 1] led to “a shift in the stance of supervisory policy [that] impeded effective supervision by reducing standards, increasing complexity, and promoting a less assertive supervisory approach”.

<sup>54</sup> Enhanced supervision and prudential standards originally applied to bank holding companies (and nonbank financial companies supervised by the Fed) with total consolidated assets equal to or greater than \$50 billion. This threshold was increased to \$250 billion (with discretion for the Fed to lower that threshold to \$100 billion for a given company).

<sup>55</sup> Fed-run stress tests only apply to those entities already subject to enhanced supervision. The original requirement for company-run stress tests applied to those companies already subject to enhanced supervision (tested semi-annually) and those other financial companies with total consolidated assets of more than \$10 billion but less than \$50 billion (tested annually). This threshold was increased to \$250 billion and changed to periodic stress tests.

<sup>56</sup> Admittedly, Silvergate may have been assisted in this process by the additional liquidity support offered by the Fed [78] to banks in response to the collapse of SVB and SBNY.

<sup>57</sup> To the extent that such deposits constitute “deposits and other extensions of unsecured funding from non-financial corporate customers (that are not categorised as small business customers)” and are not protected by deposit insurance [18, para107]. The same has been implemented in the USA [82 s249.32].

<sup>58</sup> To the extent that such deposits constitute “funding (secured and unsecured) with a residual maturity of less than one year provided by non-financial corporate customers” [19, para23]. The same has been implemented in the USA [82 s249.104].



as at end-2022 [70]. SVB depositors were, therefore, aware that there would not be insured (retail) deposits remaining with the bank to fund the illiquid assets on SVB's balance sheet. Simply, the relationship between insured deposits and the motivation to run may not be linear, but exponential. One can expect to see a difference in the behaviour of a bank's uninsured depositors, depending on whether insured deposits represent 40% or 60% of their bank's funding. But that difference in behaviour will not be the same when comparing banks where insured deposits represent 5% and 25% of their bank's funding. The modelled dynamics of a bank run that underpin bank liquidity requirements need to be cognisant of those banks that have idiosyncratic funding models, such as crypto-sector banks.

Furthermore, although the BCBS includes "low duration" within the "low risk" characteristics expected of HQLA, in determining what constitutes HQLA, Basel III [18 para24] prioritises the ease with which the asset "can be easily and immediately converted into cash at little or no loss of value". HQLA may, therefore, consist of liquid assets that have longer-term maturity dates. If a crypto-sector bank opts to maintain liquidity by holding such assets (without hedging the risk that market interest rates change), that crypto-sector bank risks recognising material unrealised losses upon any change in market interest rates. The USA relies upon the "fair value" of HQLA on any given calculation date for calculation purposes [82 s249.21]. This ensures that the regulatory value of HQLA adjusts to the market value to account for unrealised mark-to-market losses. However, this does not remove the risk that the value of a bank's HQLA may be especially sensitive to market rate fluctuations. Such a bank may appear to have a deceptively liquid asset portfolio that leaves it suddenly unprepared for a stress situation. Its HQLA generates less cash than anticipated and requires accounting losses to be realised. Again, this dynamic occurred at SVB (which was not subjected to these Basel III requirements). SVB's securities portfolio consisted largely of HQLA with a longer-term maturity (e.g. US Treasuries and mortgage-backed securities) and no interest rate hedging. These assets could be sold at (or around) market price but a sale would create a hole in its balance sheet. Unrecognised losses on held-to-maturity HQLA were realised. Losses already recognised on available-for-sale HQLA were irrecoverably crystallised. Investors were unwilling to participate in a \$2.25 billion share issue to plug the hole in SVB's balance sheet [70]. Bank supervisors need to monitor such risks beyond the indications offered by the LCR.

It is apparent that Silvergate went beyond merely applying Basel III liquidity requirements. There are particular risks to a crypto-sector bank that could still arise while meeting LCR and NSFR requirements. The BCBS [10] has produced guidance on prudential treatment of crypto-assets held as assets by banks or offered as collateral to banks.<sup>59</sup>

However, the idiosyncrasies of a bank's wholesale deposits being concentrated in the volatile crypto-sector do not fall within the generalised guidance from the BCBS. Instead, financial stability relies upon effective risk management by crypto-sector banks, as supplemented by supervision from prudential regulators.

Indeed the Basel Framework goes beyond the explicit capital and liquidity requirements that represent its Pillar 1. The Basel Framework [86] also relies upon the banking supervision process and internal bank risk management to address risks not caught by Pillar 1 requirements (Pillar 2) and the public disclosure of information in order to enforce market discipline on banks (Pillar 3). It is not apparent to what extent prudential regulators participated in Silvergate's balance sheet management. It may be the case that its supervisors at the Fed and/or at the state level are responsible for mandating the balance sheet measures implemented by Silvergate. The Fed [79] has highlighted the failings by its bank supervisors as a contributory factor in the failure of SVB. There may be unsung heroes that equally merit being commended for their work with respect to Silvergate. The proposed Silvergate model is intended to promulgate a clear directive to banks and their supervisors as to how the liquidity on a bank's balance sheet should be managed when its deposit liabilities are sensitive to the volatility of the crypto-sector.

Furthermore, there is the classic concern of risk-shifting at banks [87, pp. 65–66]. A bank's management may face the incentive to engage in riskier activities that prioritise shareholder returns above depositor recoveries [88]. There will always be the temptation to invest too large a proportion of the bank's assets in higher-yielding but more illiquid assets during a relatively tranquil period in crypto-asset markets. It cannot be assumed that the relatively orderly wind down of Silvergate would occur at other banks faced with the same investment decisions in the future. In the absence of explicit regulatory requirements, there is a risk that crypto-sector banks do not voluntarily manage their liquidity on a stricter basis than is mandated by the quantitative ratios from banking regulation or pressured by movements in the stock price of its bank holding company. If a crypto-sector bank underestimates its liquidity needs, volatility in the crypto-sector is at risk of triggering liquidity stress periods for that bank. That may lead to a "fire sale" of assets to generate cash, potential insolvency of the bank and eventually losses borne by uninsured depositors and the FDIC. The relationship between bank and depositor is inhibited by information asymmetry regarding the state of the bank's balance sheet

<sup>59</sup> If applied to Silvergate, this would have been relevant to regulatory treatment of Bitcoin (as a "Group 2" crypto-asset) provided as collateral under SEN Leverage lending [10, para60.94].





[14]. To the extent that prudential regulation aims to protect depositors from suffering losses, the Silvergate model is intended to further that regulatory objective. Banking is already a closely-regulated industry that is premised on risk mitigation. This paper is not proposing the introduction of greater regulation of the banking sector. Rather, the Silvergate model is a proposal to adjust existing banking regulations to be better tailored to the idiosyncratic risks that banks are likely to face when accepting deposits from crypto-firms, in particular crypto-asset market participants.

The Silvergate model is based on a sample size of one bank. One can reasonably question whether Silvergate's practices and outcomes alone are sufficient to offer a model to be applied more widely to the banking sector. Nonetheless, this paper has attempted to demonstrate how the risks associated with the crypto-sector bank funding model and the precautions adopted by Silvergate are consistent with orthodox understanding of banking and balance sheet management. There are currently only a few banks directly servicing crypto-firms. Bank failures are not a common occurrence. It is problematic to wait for a larger sample of failed crypto-sector banks to arise before addressing regulatory vulnerabilities. In the same way that lessons could be drawn from the 2007 bank run on British bank Northern Rock, the 2023 demise of Silvergate can serve such a purpose [16, p. 117].

Why should crypto-sector banking be subject to targeted prudential regulation? Banking regulation accepts the risk of bank runs and the inability to pay all depositors in full rather than simply demand that all banks operate as "narrow banks" to minimise this risk. The ability for depositors to withdraw their deposits on demand brings a tension that can serve as a disciplining factor on a bank's behaviour in exercising its maturity transformation function [89].<sup>60</sup> Silvergate's depositors were wholesale depositors with large deposits at the bank; these are the depositors that are incentivised to monitor their bank.<sup>61</sup> Indeed, Silvergate's depositors withdrawing their funds served as the catalyst for the bank eventually opting to wind down. Furthermore, any bank is at risk when its lending or funding is too concentrated in a particular industry, particularly when that is a cyclical industry.<sup>62</sup> SVB was highly concentrated in the tech

sector. A cooling-off in the tech sector in 2022–2023 and the resultant "elevated cash burn levels" is credited with triggering the decline in deposits at SVB [64, p. 42]—and its eventual collapse.

The justification for requiring relevant banks to apply the Silvergate model lies in the speculative nature of crypto-assets. This makes such banks especially vulnerable to "hot money" flows that are not tethered to any economic fundamentals. The automobile industry suffers upon falling consumer demand during economic downturns. The crypto-asset market—and the associated inflows and outflows of investor funds and operating funds—is typically driven by speculative bursts of excitement and panic. This makes any crypto-sector bank especially vulnerable to having its balance sheet subject to unpredictable liquidity stresses. This conflicts with the "law of large numbers" whereby a bank anticipates a consistent proportion of its depositors to make withdrawals on any given day, allowing that bank to confidently engage in the maturity transformation function of banks (e.g. [11] ch 13.2.1). The same concern applies to diversified banks to the extent that their deposits relate to crypto-asset market participants. The lack of diversification in the nature of its depositor composition makes a crypto-sector bank especially vulnerable here though. The inability to anticipate its liquidity needs necessarily consigns a crypto-sector bank to minimising its credit intermediation function and acting as a "narrow bank" more akin to a money market mutual fund or a stablecoin issuer. In this light, it is unsurprising that SCC was the buyer of Diem's assets: SCC was transforming Silvergate's commercial-bank-issued money into a stablecoin. This leads to the conclusion that the Silvergate model should apply both to crypto-sector banks (and their entire balance sheet) and diversified banks (but only to the extent that their deposit liabilities relate to crypto-asset market participants).

One may argue that the FDIC, the Fed and the US Treasury would remain inclined to intervene in a crypto-sector bank that operated under the Silvergate model but at a greater scale. The relatively smaller size of the bank's balance sheet and the concentration of the bank's clientele in the crypto-sector meant that Silvergate's demise had a lower possibility of any systemic spillover effects.<sup>63</sup> Did this factor—rather than the state of Silvergate's balance

<sup>60</sup> This is consistent with the argument by Jensen and Meckling [90, p. 355] that "in industries where the freedom of management to take riskier projects is severely constrained ... we should find more intensive use of debt financing".

<sup>61</sup> However, the shortcomings of depositor discipline of banks are also recognised, in particular the inability or unwillingness of unsophisticated (retail) depositors to actively monitor their bank [16, p. 117].

<sup>62</sup> Concentration risk is identified in Pillar 2 of the Basel Framework [86, para30.20–30.28].

<sup>63</sup> A particular concern upon the failure of SVB was that many employers would be unable to access funds to continue day-to-day operations, including paying employees, on Monday morning [91]. In the absence of an immediate buyer for SVB, this prompted the extraordinary intervention by the US Treasury, the Fed and the FDIC [5] to guarantee that SVB depositors will be able to access their deposits on Monday morning.





sheet—determine the FDIC opting not to intervene in Silvergate? However, a glance at the “Failed Bank List” of the FDIC [92] highlights that size is no obstacle to FDIC intervention. When the FDIC is appointed as receiver of a failed bank, the FDIC facilitates a buyer acquiring that bank’s assets (and deposits) before the bank is wound down. There is a cost borne by the FDIC’s deposit insurance fund. Therefore, it would be a value destructive measure for the FDIC to gratuitously intervene when a bank is capable of meeting its withdrawal requests and winding itself down. One cannot pre-empt the supervisory and political response to a troubled bank. However, it is apparent that Silvergate is not merely a case of a bank that was “too small to fail”. Silvergate has been able to wind down its balance sheet outside of FDIC receivership or other regulatory intervention because the Silvergate model afforded Silvergate sufficient leeway to do so.

Silvergate’s approach to crypto-sector banking demonstrates that liquidity management is central to any crypto-sector bank minimising its vulnerability to bank runs and losses being suffered by depositors. Silvergate’s failure does not indicate that its balance sheet management was a failure. Rather, once a bank ceases to have many people willing to place deposits with that bank, its *raison d’être* ceases, and that bank should be liquidated. Where a bank can calmly liquidate its assets and return their funds to depositors in full, this is indicative of a safely-managed bank from a prudential regulation perspective. SVB, SBNY and FRB were not afforded such time and the FDIC expects its deposit insurance fund to be called upon as a consequence.<sup>64</sup>

## Conclusion

Banks fail. A bank failure does not indicate a regulatory failure. The failure of Silvergate appears to be a case of corporate failure: the culmination of an unsuccessful business strategy to concentrate the bank’s operations on the crypto-sector. Silvergate having the capacity to meet deposit withdrawals and liquidate the bank of its own accord indicates that Silvergate’s demise was not a regulatory failure. Nor was the orderly winding down of Silvergate necessarily a regulatory success. This outcome was not apparently the product of prudential regulation that mitigated the risks of Silvergate acting as a crypto-sector bank. In the future, another bank may not necessarily make the same choices to

mitigate the liquidity risks that accompany deposits related to crypto-firms.

Basel III provides liquidity requirements for banks. However, these were not applicable to Silvergate under US banking regulations. Nor would these have necessarily sufficed to address the uniquely unstable funding base that Silvergate relied upon once it became a specialised crypto-sector bank. Silvergate was instead equipped due to the nature of the asset side of its balance sheet. This remained concentrated in cash, deposits held at other banks, liquid debt securities (some of which had a floating rate or interest rate hedging) and short-term bank lending. Many of these assets could be readily liquidated into cash to satisfy depositor withdrawals. Others could be expected to mature within a reasonably short-term timeframe before either offering further liquidity or being redeployed towards further short-term lending. There were mistakes made by Silvergate in assuming that the low interest rate environment would persist. Its securities portfolio would have been more robust had a greater proportion of its securities had a short-term maturity date or floating rate. Nonetheless, Silvergate maintained a balance sheet that avoided its depositors bearing the losses from those investment decisions. Therefore, there is a more nuanced model for liquidity regulation required for crypto-sector banks and any bank accepting deposits from crypto-asset market participants. Merely complying with the LCR and NSFR requirements of Basel III is not necessarily enough for prudential regulation to guard against the risks of crypto-sector banking. Rather, the model is the Silvergate model.

The Silvergate model requires the banking of crypto-firms to be distinguished from regular bank clients. Those banks that wish to become crypto-sector banks, making the servicing of crypto-firms all or a substantial part of their business, should be subject to these strict liquidity requirements irrespective of their size and the proportion of their liabilities represented by crypto-firm deposits. Those banks that service crypto-firms as a typical diversified commercial bank should have their deposit liabilities from crypto-asset market participants similarly subject to the Silvergate model.

The implication of the Silvergate model, however, is that crypto-sector banking may be unprofitable in market conditions with interest rates regularised away from a zero interest rate policy. Those banks left servicing individual crypto-firms may also decide that these firms are not worth the regulatory headache when their deposits offer a lower net interest margin coupled with heightened compliance risks. This also offers a *modus operandi* for regulators hostile to crypto-assets. Rather than legislators or regulators prohibiting banks from servicing crypto-firms, prudential regulation may subtly steer the crypto-sector banking business model, and possibly even the broader proliferation of crypto-firms in the economy, to die on the vine.

<sup>64</sup> The FDIC [93, 94] expects the cost to its deposit insurance fund to be \$20 billion due to SVB and \$2.5 billion due to SBNY. The FDIC [6] also expects the cost to its deposit insurance fund to be \$13 billion due to FRB.



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## Declarations

**Conflict of interest** The author states that there is no conflict of interest.

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