

# Death of a Reserve Currency\*

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## **Abstract**

The Dutch bank florin was the dominant currency in Europe for much of the seventeenth and eighteenth centuries. The florin was an essentially fiat money that existed only on the ledgers of an early central bank, the Bank of Amsterdam. We explore the florin's loss of "reserve currency" status over the period 1781-1792, using a new reconstruction of the Bank's balance sheet. We show that the florin was initially weakened by highly accommodative open market and credit policies over 1781-1783. We show that these actions, combined with ongoing fiscal exploitation by the City of Amsterdam, caused the Bank to become "policy insolvent," meaning that its net worth would have been negative under continuation of its traditional policy objectives. A second crisis in 1790 led the City to shore up the Bank through a capital injection. Our reconstruction shows that the recapitalization was insufficient to remedy the Bank's insolvency, however, and the bank florin was soon forced off the world stage. The florin's downfall provides an early and classic lesson on the limits to unconventional monetary policy.

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The U.S. dollar reigns as the dominant reserve currency today. The British Pound occupied a similar status in the nineteenth and early twentieth centuries. Preceding the British pound in this leading role was the Dutch guilder, also known as the florin. This paper explores the florin's loss of reserve currency status over the period 1781-1792, employing a new dataset constructed from archival sources.

We would argue that this historical episode is of continued relevance, because the reserve-currency florin was in many ways a modern construct. The "florin" in question was not a coin, but existed only as ledger entries in the accounts of an early central bank, the Bank of Amsterdam (or "Bank"). And, unusually for the time, the Bank's money was not inherently redeemable in coin, nor was its value defined by any specific coin. To call it by its modern name, the florin was fiat money.

As a supplier of fiat money, the Bank of Amsterdam engaged in many of the same activities as central banks today. The Bank operated a large-value payment system; it provided liquidity to the Amsterdam money market through repo-like arrangements; it engaged in outright purchases and sales to stabilize market conditions; it lent to selected counterparties; and it returned seigniorage to its sponsoring government, the City of Amsterdam ("City"). The principal policy objective of the Bank was to stabilize the market price of its money relative to high-quality collateral—the large-denomination "trade coins" circulating among merchants in Amsterdam—while smoothing short-term fluctuations in the stock of Bank money. The Bank's adherence to this goal of "price stability" made the florin into a bellwether unit of account for much of the seventeenth and eighteenth centuries.

When confronted with a major crisis in 1781, the Bank reacted in a manner that may also seem familiar to modern observers. Responding to the outbreak of war between the Dutch Republic and Britain (the Fourth Anglo-Dutch War), the Bank embarked on a policy of aggressive open market purchases. This policy was paired with an unprecedented increase in the Bank's lending activity, particularly to a large government-sponsored enterprise, the Dutch East India Company ("Company"). This last policy was especially daring, as wartime disruptions to the Company's operations soon meant that it was in no position to repay its debts to the Bank. By 1783, the value of the florin began to suffer. The Bank reacted by re-

versing the direction of its open market activity, but, by this point, it was running low on reserves with which to conduct defensive operations. Difficulties, however, ran deeper than illiquidity. Persistent nonperformance of its credit portfolio had caused the Bank to become “policy insolvent” even under optimistic assumptions, i.e., its net worth was negative under a continuation of its traditional objectives (Stella and Lönnberg 2008). A lasting solution to the Bank’s problems required either a fiscal intervention or a modification of its policies, but neither option was pursued at this stage.

Following the cessation of hostilities in 1783, the Bank continued to operate from a weakened state. The florin came under renewed pressure in 1790, in the wake of the French Revolution. The Bank responded by attempting to enforce a sudden nine percent reduction in the value of its money. Protests from market participants led the City to inject capital into the Bank over 1791-1792. The recapitalization temporarily halted the decline in the value of the Bank’s money, but was unable to restore the Bank’s credibility over the longer term. Our analysis of the archival data indicates that the capital injection failed to remedy the Bank’s policy insolvency, because 1) the City did not give up its claim on the Bank’s income and 2) much of the injection was diverted to the City’s own fiscal needs.

The Dutch florin’s downfall teaches that preeminence of a central bank does not necessarily guard against fiscal overexploitation or a sudden loss of market confidence. Our dataset offers a precise narrative of a dominant currency’s quick transition from a reserve asset to a monetary also-ran. The transition is punctuated by two large monetary shocks—the war-time crises of 1781 and 1790—and two mismanaged policy responses. The first response—the expansionary bravado of 1781-1783—undermined market confidence in the Bank. The second—the belated and ineffective recapitalization of 1791-1792—helped ensure that this loss of confidence would be permanent.

The rest of this paper is organized as follows. Section 1 reviews some relevant literature. Section 2 lays out the structure and policies of the Bank. Section 3 provides a detailed analysis of the florin’s decline. Some discussion is provided in Section 4, and Section 5 concludes.

# 1. Connections to the Literature

The narrative history of the Bank of Amsterdam's decline is well known from the classic works of Mees (1838) and Van Dillen (1925, 1964). Van Dillen (1934) provides an English synopsis of this history and an annual (yearend) summary of the Bank's accounts. Our analysis extends this literature by providing the first detailed, high-frequency (monthly) breakdown of the Bank's balance sheet over this period, presented in a manner compatible with modern central bank accounting. Examination of the details provides new insights about the Bank's actions over this period, e.g., the course of the Bank's open market operations and the true extent of the City's attempted recapitalization.

Central bank accounting and central bank solvency in particular are studied in an extensive body of literature, recently surveyed in Archer and Moser-Boehm (2013). A prominent theme of this literature is that standard concepts of solvency are difficult to apply to central banks, which, because of the unique monetary status of their liabilities, are often able to operate with thin or even negative levels of equity (assets minus liabilities). Below we will show that the Bank of Amsterdam offered no exception to this rule, as its equity was virtually always negative. Fry (1993) argues that empirically, net worth (equity augmented by an "off balance sheet" item, the discounted value of expected future net income<sup>1</sup>) generally provides a better measure of the sustainability of a central bank's policies than does conventional equity.<sup>2</sup> Negative net worth is problematic since it can force a central bank to compromise its policy goals in order to meet its financial commitments. This conclusion has been echoed in subsequent papers, theoretical and empirical (see e.g., Stella 1997, Ize 2005, Stella 2005, Buiters 2008, Klüh and Stella 2008). Our dataset will offer some additional confirmation.

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<sup>1</sup> Archer and Moser-Boehm (2013, 7) call this "comprehensive net worth."

<sup>2</sup> The empirical relevance of this distinction is easily seen from figures compiled by Archer and Moser-Boehm (2013, 11) for the European Central Bank (€411 billion equity versus €5.1 trillion net worth in 2010) and the Federal Reserve System (\$134 billion equity versus \$4.1 trillion net worth in 2010).

A related theme that has been stressed in this literature is the importance of fiscal backing for the effectiveness of central banks, and particularly of mechanisms for recapitalization under certain scenarios. Sims (2004) lays out the essential policy dilemma, arguing that a central bank without credible fiscal backup will either miss its policy targets or be forced to amass politically unsustainable amounts of reserves (to fend off speculative attacks). Below we describe how the Bank of Amsterdam traditionally confronted this dilemma by using market funding. Its continuous rollover of market-supplied reserves both anchored policy targets and prevented the City from depleting this category of reserves. Confidence in this solution met its limits in 1781-1783 when the Bank was called upon to provide emergency funding to the cash-strapped East India Company. The inadequate recapitalization of 1791-92 made the Bank's lack of fiscal underpinnings all the more obvious to contemporary observers.

Recently there has been an upsurge of interest in the topic of central bank accounting, stemming from the rapid expansion of central banks' balance sheets since the 2008 Lehman crisis (see Fawley and Neely 2013 for a survey). A number of studies (as of this writing: Carpenter, Ihrig, Klee, Quinn, and Boote 2013, Del Negro and Sims 2013, Greenlaw, Hamilton, Hooper, and Mishkin 2013, Hall and Reis 2013) have considered the effects of the Federal Reserve's quantitative easing (QE) programs on its equity position going forward.<sup>3</sup> One message of this literature is that the unwinding of QE could diminish the Fed's equity by as much as \$100 billion under unfavorable scenarios, although book equity must remain nonnegative under the Fed's accounting rules.<sup>4</sup> Even potential losses of this magnitude, however, are dominated by other components of the Fed's net worth, estimated in trillions of dollars when potential income from note seigniorage is included in the calculation (Buiter and Rahbari 2012, Del Negro and Sims 2013). Equity impacts from the unwinding of QE are thus seen as unlikely to constrain the Fed's future policy decisions.

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<sup>3</sup> Comparable exercises for the European Central Bank can be found in Buiter and Rahbari (2012) and Hall and Reis (2013).

<sup>4</sup> If the Fed's income were to be insufficient to cover expenses, its accounting rules call for the creation of reserves against a "deferred asset," which is a claim against future remittances by the Fed to the U.S. Treasury.

The discussion below will make clear that while the design of the Bank of Amsterdam was in many respects comparable to modern central banks, one key difference was that it did not issue circulating notes backed by a transparently funded government debt. In the eighteenth century this was a new concept in central banking, one that was still being worked out by the Bank of England (Clapham 1970) and a few other central banks. As will be seen below, the Bank of Amsterdam did have other sources of income, which, though adequate in normal times, proved insufficient during the circumstances of 1781-1792.

The demise of the Bank of Amsterdam ushered in a long period of currency dominance for the British pound. The passing of the torch from the florin to the pound in the 1780s has a number of parallels with the better-known transition between the pound and the dollar in the 1920s and 1930s (Eichengreen and Flandreau 2009, 2010). These include the pound's loss of trade dominance to the dollar in the early twentieth century, the initial weakening of the pound by the fiscal pressures of World War I, followed by a second crisis and the removal of the pound from the gold standard in 1931 (Kindleberger 1984). There are also some noteworthy differences. Chief among these is that the pound survived while the bank florin did not. France's military conquest of the Dutch Republic in 1795 brought about the last phase of the florin's collapse. After the Napoleonic period, the remnant portion of the Bank of Amsterdam was liquidated, and its functions were taken over by a national institution of the newly established Kingdom of the Netherlands, De Nederlandsche Bank (De Jong 1934).

## **2. Some (very) old-style central banking**

This section describes the Bank of Amsterdam's structure and balance sheet. Additional details are provided in Van Dillen (1934), Quinn and Roberds (2010), and Dehing (2012).

The Bank was founded in 1609 and liquidated in 1820. It was owned by the City of Amsterdam and was directed by an appointed commission of merchants, bankers, and former municipal magistrates ('t Hart 2009, 154). The principal objective of the Bank was to provide a stable money for the settlement of bills of exchange payable in Amsterdam. As noted above, this involved stabilizing the value of the bank florin relative to trade coins. This stability

made payment by book-entry transfer of Bank balances popular with the international bill market, and use of Bank money generated revenue for the City.

## 2.1 Balance sheet structure

To begin with the familiar, **Table 1** gives a stylized balance sheet for a modern central bank.

<i>Assets</i>	<i>Liabilities</i>
Securities held under repurchase agreements	Circulating notes
Securities held outright	Account balances
Loans	Equity

**Table 1:** Balance Sheet of a Modern Central Bank

Modern central banks generally hold two types of assets: securities and loans.<sup>5</sup> Securities may be held under repurchase agreements or may be purchased outright, depending on how a central bank implements its open market operations. Central banks also hold loans, most commonly loans issued through a Lombard or other credit facility. Central bank liabilities are created either as circulating notes or as balances in accounts at the central bank (often called “reserves” though this term is misleading, since reserve requirements no longer exist in many countries).

**Table 2** gives a stylized balance sheet for the Bank of Amsterdam during our era of interest.

<i>Assets</i>	<i>Liabilities</i>
Coins held subject to receipts	Account balances
Unencumbered coins	Equity
Loans	

**Table 2:** Balance Sheet of the Bank of Amsterdam (18<sup>th</sup> century)

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<sup>5</sup> This simplified presentation abstracts from assets such as foreign exchange holdings and bullion, which comprise a significant portion of central bank assets in some countries today. Also, Table 1 does not contemplate the possibility that a central bank may engage in reverse repurchase transactions.

A comparison of Tables 1 and 2 reveals two fundamental differences between the Bank and modern central banks. The first is on the asset side, where the traditional “building blocks” of the Bank’s portfolio were not securities but high-quality silver (much less often, gold) coins, known generically as “trade coins.”<sup>6</sup> The second is on the liability side, the Bank’s monetary liabilities existed only as balances on its books, never as circulating notes.<sup>7</sup>

The Bank did not engage in repurchase agreements, but it did create money through a comparable mechanism, famously described by Adam Smith in the *Wealth of Nations*. Anyone with an account at the Bank could sell a high-quality trade coin to the Bank at a fixed price, receiving in return a credit in their account with the Bank, and a *receipt*. The receipt entitled its holder to repurchase the exact same coin (and no other) within a six month interval at the same price they sold it for, plus a small fee ( $\frac{1}{4}$  percent for most silver coins and  $\frac{1}{2}$  percent for gold coins).<sup>8</sup> Receipts could be rolled over at 6-month intervals and were also negotiable. Most receipts were eventually redeemed, so in practice they gave rise to “term repos” between the Bank and its account holders.

A curious quality of the Bank’s liabilities (i.e., account balances), of great fascination to Adam Smith and other contemporary observers, was their fiat nature: after the introduction of the receipt system in 1683, Bank balances *could no longer be redeemed for coin without a receipt*. This led to the creation of a daily secondary market in Bank funds, in which Bank money could be traded against (the equivalent of) circulating coin or “current money.” Bank

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<sup>6</sup> Trade coins had special liquidity value as the preferred medium of exchange for transactions in foreign markets. There were several reasons why the Bank used trade coins rather than government bonds as its principal backing asset. Government finance in the Dutch Republic was relatively advanced for its era, but unlike Britain, was not consolidated into a unified national debt (De Vries and Van der Woude 1997, Chapter 4). The debt of the largest province, Holland, played a somewhat similar role to a national debt (Gelderblom and Jonker 2011) but the secondary market for Holland debt was generally quite thin (Van Bochove 2013). Finally, the charter of the Bank did not incorporate any explicit role for the Bank in government finance.

<sup>7</sup> This distinction mattered because it meant that the Bank’s money was a “wholesale” product used primarily by wealthy merchants. During our era of interest, there were approximately 2000 people with accounts at the Bank, around one percent of Amsterdam’s population (Van Dillen 1925, 985). The average value of a payment over the Bank’s books was about 2500 florins (Dehing 2012, 82 and 140) as compared to a typical laborer’s daily wage of about one florin (De Vries and Van der Woude 1997, 616).

<sup>8</sup> In modern terms, a receipt was an American call option on the coin sold, or a put option on the bank florin.



money, which was backed predominantly by trade coins, almost always went at a premium (called the *agio*) to current money, which consisted of a mixture of coins of varying quality. The distinction between Bank money and current money gave rise to two legally distinct, parallel units of account in the Dutch Republic, known as the *bank florin* or bank guilder, and the *current florin* or current guilder. For expositional shorthand, we will often use the term “florin” for bank florins and “guilder” for current florins.

In addition to coins held under receipt arrangements, the Bank held coins not encumbered by receipts. These might consist of coins for which receipts had expired, but more commonly they were coins acquired through the Bank’s open market operations. In the eighteenth century, such operations were generally conducted in small-denomination (one-guilder nominal value in current guilders) coins. Guilder coins were not recognized as trade coins and were thus ineligible for sale to the Bank against receipts. To ease monetary conditions, the Bank would on occasion purchase such coins at the going price (always less than one bank florin for a positive *agio*), and to tighten, the Bank would sell these coins into the market.<sup>9</sup>

In the analysis presented below, it is convenient to divide Bank balances into those matched by an unexpired coin receipt (“encumbered balances”) and other balances (“unencumbered balances”). It should be emphasized, that this however an artificial distinction that never occurs in the Bank’s accounts during our period of interest: the right to redeem Bank balances in coin was bound to receipts rather than the balances themselves.

Unencumbered coin residing in the Bank’s vault was also a source of revenue for the City. Annually, the City paid itself a seigniorage “dividend” by removing the Bank’s profit from the previous year, so the Bank had no retained earnings. Occasionally, the City would take

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<sup>9</sup> Note that guilder coins were purchased with bank florins at a market price, rather than a fixed price as with trade coins. Also, no receipts were given for purchased guilders, so that someone who sold their guilders to the Bank had no right to withdraw coin from the Bank, without the purchase of a receipt from someone who had sold trade coins to the Bank. This is somewhat analogous to the situation with modern central banks, where a party that sells collateral to a central bank in a repo may (and is expected to) repurchase that same collateral, but a party that sells a security outright to a central bank may not then request return of that collateral at fixed price.

more coin and call it a loan to prevent acknowledging a negative equity position. The City did not pay interest nor principal to the Bank. Throughout this paper, we treat City “loans” as takings and adjust the Bank’s equity accordingly.

The charter of the Bank did not allow it to engage in lending activity. In practice, the Bank routinely lent to the Dutch East India Company. For most of the eighteenth century, Bank lending to the Company took the form of short-term loans that allowed one year’s trading fleet to be dispatched while the previous year’s fleet was still on its return voyage from Asia. These loans provided a regular source of income to the Bank (Uittenbogaard 2009). Occasional loans to the Province of Holland added a minor source of income.

Putting the elements together, the Bank of Amsterdam was an amalgam of two structures. The receipt system created a “narrow” bank with 100 percent reserves that could be withdrawn on demand. This portion of the bank generated fee income. At the same time, a fractional reserve bank made loans backed by unencumbered coins. This portion generated interest income and profits from open market operations.

## **2.2 Monetary policy**

As a central bank in an open economy, the Bank of Amsterdam was subject to the constraints of the standard policy trilemma—mutual incompatibility of fixed exchange rates, capital controls, and control over the money stock. The Bank generally attempted to resolve the trilemma by ceding control over its money, with some qualifications. By offering to “re-po” trade coins, the Bank anchored (within arbitrage bands) the value of its balances vis-à-vis silver, which served as the metallic standard for most of eighteenth-century Europe. In addition, the  $\frac{1}{4}$  percent six-month redemption fee for receipts anchored Amsterdam’s risk-free short-term interest rate at slightly more than  $\frac{1}{2}$  percent per annum.<sup>10</sup> Unlike modern central banks, the Bank had no mechanism for varying this rate. There were no capital controls, and apart from occasional open market interventions, the stock of Bank money ebbed and flowed according to market conditions.

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<sup>10</sup> This was strictly a lending rate, as the Bank never paid interest to its account holders.

In its overall approach to monetary policy, the Bank may be compared to a modern currency board, but with some noteworthy differences. First, the Bank did not offer to buy and sell foreign exchange at fixed prices, but instead offered fixed terms for the equivalent of repo transactions in trade coins, both foreign and domestic. Second, Bank's operational target was not a foreign exchange rate, but the market value of the bank florin's domestic exchange expressed through the agio. Throughout most of the eighteenth century, the agio remained within the 4½ to 5 percent range that was embodied in the coinage laws of the Dutch Republic. These assigned two official values to each trade coin, one in bank florin and a slightly higher one in current guilders (Polak 1998, 73-74). An agio within this range signaled a stable value of the bank florin relative to circulating money. Third, maintenance of the agio appears to have been a relatively informal target, as an explicit target band is not mentioned in the Bank archives until 1782 (Van Dillen 1925, 433-434). Informality of its target band apparently allowed the Bank to engage in operations to smooth short-term fluctuations in its money (Quinn and Roberds 2010). The Bank was also sometimes willing to tolerate deviations of the agio from its target range during periods such as the Seven Years' War (1754-1763), when heavy wartime demand for coin depressed the agio to around two percent.

A fourth and final difference between the Bank and modern currency boards is that the latter typically operate with a 100 percent (or greater) "backing ratio" of external assets to central bank money. The Bank, on the other hand, often operated with a backing ratio that was substantially lower, averaging 80 percent over its lifetime (Dehing and 't Hart 1997, 49). One reason the Bank may have felt comfortable with this lower ratio was the relatively lax, informal nature of its policy target. Another reason may have been the apparent safety of the receipt system: account holders could not threaten the Bank with a classic bank run, since the Bank did not traditionally redeem its balances except against a receipt, and the total stock of receipts was always less than the stock of bank florins. The market value of the bank florin could suffer, however, and for the Bank, the safety of the receipt system ultimately proved more apparent than real.

## 2.3 Reserve currency role

Amsterdam's combination of steady exchange rates, absence of capital controls, and low interest rates allowed its markets to flourish, and conferred something of a "reserve currency" status on the bank florin. Bills of exchange drawn on Amsterdam were a liquid form of short-term credit readily available in most European commercial cities (Flandreau, Galimard, Jobst and Nogués-Marco 2009, Dehing 2012). The bank florin was a dominant unit of account (Gillard 2004 terms it "the European florin") and top-quality bills payable through the Bank were a reliable and liquid store of value.<sup>11</sup> At the center of this network, in Amsterdam's capital markets, the bank florin served both as numeraire and the most liquid medium of exchange. By 1770 or so, however, Europe's financial center of gravity was shifting toward London (Carlos and Neal 2011). Amsterdam's markets nonetheless continued to thrive during the 1770s; quantitative indicators such as the level of Bank balances and payments activity show relatively modest declines from peak values observed in the 1760s (Dehing 2012, 82).

One modern "reserve currency" function the bank florin could not fulfill was to serve as a backing asset for other currencies. There were two reasons why the bank florin could not play this role. One was operational: the City limited ownership of Bank accounts to local residents (in practice, merchants and wealthy individuals), its own treasury, and government-sponsored entities such as the East India Company. The other was conceptual: in the eighteenth century, the only universally acceptable backing asset for money was precious metal.

## 2.4 Equity, income, and net worth

As explained above, the Bank did not hold a portfolio of income-generating securities, nor did it issue circulating notes. This meant that the Bank did not have access to the most

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<sup>11</sup> Bills of exchange drawn on merchant banks served this role rather than deposits in commercial banks or government securities. As in most of pre-Napoleonic Continental Europe, deposit banking in Amsterdam was underdeveloped. By contrast, bills on reputable merchant banks were widely available and easily traded in secondary markets.

common source of revenue for modern central banks, which is income from note seigniorage derived from government bonds. The Bank did have other streams of income, however, and it was solidly profitable for most of its existence. This section presents a stylized summary of the Bank’s income and expenses, and describes how these impacted the evolution of its net worth. The Appendix describes the actual data series, which are somewhat more complicated than this summary may suggest.

Following the tradition of the macroeconomics literature, our notation divides time into discrete model “periods,” which are taken as six months (the maturity of a coin receipt). For simplicity, we assume coin receipts are not allowed to expire (in reality they were usually redeemed or rolled over). Primes are used to denote variables one period ahead, and all values are given in bank florin<sup>12</sup>. From Table 2, the Bank held three types of assets:

$$S_r = \text{trade coins held under receipt}; \quad (1)$$

$$S_u = \text{unencumbered coins}; \quad (2)$$

$$B = \text{loans outstanding at interest rate } r \text{ per period}. \quad (3)$$

The liabilities of the Bank, from Table 2, are given by its account balances. Conceptually, these can be divided into “restricted” and “unencumbered” categories, i.e.,

$$V_r = \text{balances matched by an unexpired coin receipt}; \quad (4)$$

$$V_u = \text{other bank balances}, \quad (5)$$

although we would again emphasize that the Bank’s actual ledgers do not make this distinction. The Bank’s equity  $Q$  at any given time is just the value of its assets minus the value of its liabilities, i.e.,

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<sup>12</sup> Standard practice would be to deflate these values by a price index to obtain real values. We do not do this for two reasons. First, monthly price series are not available for this time period. Second, available data (Van Zanden 2013) suggest that inflation was largely negligible in the Dutch Republic over most of the eighteenth century. Measured annual inflation averages 0.5 percent for 1700-1792 and for 1781-1792, annual inflation averages 0.4 percent. These rates are close enough to zero that it did not seem worthwhile to introduce an additional source of error into our calculations by using an interpolated monthly price series.

$$Q = S_r + S_u + B - V_r - V_u. \quad (6)$$

Since  $S_r = V_r$  by definition, i.e., restricted balances are perfectly matched by coins under receipt, equation (6) simplifies to

$$Q = S_u + B - V_u. \quad (7)$$

To keep track of the evolution of the Bank's equity position (7), we first introduce the following notation. Let

$$D = \text{net "deposits" of trade coin into the bank;}^{13} \quad (8)$$

$$b = \text{the market price of guilder coins;} \quad (9)$$

$$b^* = \text{the Bank's "official" price of guilder coins;}^{14} \quad (10)$$

$$P = \text{net number of guilder coins purchased;} \quad (11)$$

$$\delta = \text{the fee charged for redemption/renewal of receipts;} \quad (12)$$

$$L = \text{net lending (loans less repayments of principal);} \quad (13)$$

$$W = \text{writeoffs of bad loans;} \quad (14)$$

$$F = \text{transactions fees charged by the Bank;} \quad (15)$$

$$O = \text{operating expenses;} \quad (16)$$

$$T = \text{taking of profits (unencumbered coin) by the City.} \quad (17)$$

The Bank's sources of income include receipt fees  $\delta V_r$  charged on restricted balances  $V_r$  (effectively, an interest rate of  $\delta$  is charged on these balances), fees charged for transactions made through the Bank's accounts  $F$  (these were 2.5 basis points on the transferred

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<sup>13</sup> Here we use the term "deposit" as shorthand for sale of trade coins in return for Bank credit and a receipt. These were not deposits in the modern sense of a general, demandable debt claim. I.e., the receipt only gave its holder the option to repurchase the specific coin sold, at a slight premium above its original sale price.

<sup>14</sup> On the asset side of the Bank's ledgers, purchased guilder coins were carried at a fixed agio of five percent, or 1.05 current guilders per bank florin (equivalent to  $b^* = .95238$ ). Lacking practical alternatives, our reconstruction reluctantly follows this accounting convention. This causes a slight undervaluation (on the order of ½ percent) of the Bank's total assets relative to market value. As will be seen below, however, quantitatively this distortion is swamped by fluctuations in the value of the Bank's loan portfolio.

amount), income from loans  $rB$ , and gains/losses from open market operations  $(b - b^*)P$ . The Bank's expenses include writeoffs of bad loans, operating expenses and takings of profits by the City. The one-period change in the Bank's assets is given by

$$D + b^*P + L - W - O - T, \quad (18)$$

i.e., by the sum of: "deposits," net purchases of unencumbered coin, and net lending less: loan writeoffs, operating expenses, and the City's profit taking. The one-period change in the Bank's liabilities is given by

$$D + bP + L - rB - F - \delta V_r, \quad (19)$$

i.e., by the sum of: "deposits," open market purchases, and net loans less: interest payments, transaction fees, and fees on receipts. The Bank's profit  $\pi$  is the one-period change in the Bank's equity, and is given by expression (18) less (19), which simplifies to

$$\pi \equiv \Delta Q = rB + (b^* - b)P + \delta V_r + F - W - O - T, \quad (20)$$

i.e., by the sum of: income from loans, losses on purchases (gains on sales), income from receipts, and fee income; less: loan write-offs, operating expenses, and profit taking. Transition equations for the Bank's assets are:

$$S'_r = S_r + D, \quad (21)$$

$$S'_u = S_u + b^*P - T - O, \quad (22)$$

$$B' = B + L - W, \quad (23)$$

and for Bank liabilities, transitions are

$$V'_r = V_r + D, \quad (24)$$

$$V'_u = V_u + bP + L - rB - F - \delta V_r. \quad (25)$$

Finally, following the literature on central bank accounting, the net worth of the Bank is given by the value a hypothetical, fully informed outside investor would place on the Bank. This is equity plus the expected discounted sum of the Bank's future profits with future takings  $T$  set to zero, i.e., for model period  $t$ , net worth is given by

$$NW_t = Q_t + E \left( \sum_{j=1}^{\infty} \mu_{t,t+j} \pi_{t+j} \right), \quad (26)$$

where  $\mu_{t,t+i}$  is the appropriate discount factor. For simplicity, our analysis will use risk-neutral pricing and assume constant interest rates over the horizon, i.e., we will take  $\mu_{t,t+j} = (1+i)^{-j}$  for an interest rate  $i$  of three percent annualized. This is the average implicit rate for a bill of exchange (i.e., an unsecured debt claim) drawn on a high-quality counterparty (often a merchant bank) during this time period, comparable to AAA commercial paper in a modern context.<sup>15</sup> Thus, under a hypothetical scenario, with sufficiently positive net worth the Bank could have always made its account holders whole by issuing debt at this favorable rate. Negative net worth, on the other hand, is taken as an indication of the unsustainability of the Bank's policies.

A few remarks are in order before we turn to the data. The apparent "safety" of the Bank's traditional operating regime can be seen from equation (7). The City felt comfortable skimming off the Bank's stock of unencumbered coin ( $S_u$ ), since the other major contributor to Bank equity, credit granted to the East India Company ( $B$ ), consisted of short-term, self-liquidating loans to a traditionally strong borrower. Also, such takings would not have seriously detracted from the Bank's liquidity position, as long as the bulk of the balances at the Bank were matched by coins encumbered by receipts. Observe that the Bank's overall reserve ratio  $\rho$  (or "cash ratio" or "backing ratio") of metal assets against all liabilities is

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<sup>15</sup> Such bills were liquid and generally secure. We use this as benchmark rate rather than a rate on short-term government debt (commonly used in central bank accounting exercises) since the debt issues of the Dutch Republic and its provinces were rather thinly traded.



$$\rho = \frac{S_r + S_u}{V} = \frac{S_r + S_u}{V_r + V_u}. \quad (27)$$

As long as international demand for the Bank florin remained strong,  $V_r \approx V_u$ , and  $\rho$  would have remained close to unity, since  $S_r / V_r = 1$  identically. Since, however, Bank's encumbered coin was only temporarily "parked" there under repo-like arrangements, its reserve ratio could change quickly under adverse conditions. The analysis below will sometimes focus on the evolution of the unencumbered reserve ratio, defined as

$$\rho_u = \frac{S_u}{V_u}. \quad (28)$$

### 3. Data

The Bank of Amsterdam did not operate in an era of central bank transparency, and it never published balance sheets or income statements. However, many of the original documents of the Bank of Amsterdam are preserved at the Amsterdam Municipal Archives, and these can be used to reconstruct the Bank's financial statements with a high degree of accuracy. To piece together the Bank's history over the period January 1775-January 1792, data were hand-collected from original documents.<sup>16</sup> Our dataset starts in 1775 to provide a five-year baseline of pre-crisis activity by the Bank and ends in 1792 because this is the last year that specialized data is available for the Bank's master account.

The actual balance sheet of the Bank involves 22 categories of assets and liabilities that generally enter at a daily frequency, potentially yielding over 4200 daily observations on the Bank's condition. For clarity in presentation, these data were condensed to more manageable series of 204 monthly observations. Because some income items only show up at a yearly frequency, income data were further condensed to annual series. Full details of the

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<sup>16</sup> These documents are the general ledgers of the Bank (AMA 5077/ 507-603), detailed breakdowns of the Bank's master account (AMA 5077/ 1402-1419), and accounts of the Municipal Loan Chamber (AMA 5077/38-40). The Bank's master account is roughly comparable to the Federal Reserve's System Open Market Account and analogous accounts at other modern central banks.

data reconstruction are given in the Appendix. Agio data are taken from Gillard (2004) and exchange rate data (average of London and Hamburg sight rates on Amsterdam) are from Schneider, Schwarzer, and Schnelzer (1991).

### **3.1 Reconfiguration: 1781-1783**

The Bank's initial loss of credibility occurred during the Fourth Anglo-Dutch War (declaration in December 1780; ceasefire in January 1783). This section traces the fundamental changes experienced by the Bank during the wartime period.

**Figure 1** depicts the evolution of the Bank's balance sheet over our data sample. The aggregate size of the balance sheet stays roughly constant at about 20 million florins over the sample. What changes markedly is the composition of the Bank's assets. Lending replaces coins held under receipt, and this dramatic change mostly occurs during the Fourth Anglo-Dutch War. Figure 1 shows that the stock of encumbered coin held at the Bank began falling with the threat of hostilities in 1780 and continued to fall throughout the course of the war. People rapidly abandon receipts, a funding stream that had been continuously rolled-over for one hundred years. The level of coins under receipt (and accounts under receipt) collapses from 17 million florins in March 1780 to a mere 0.3 million by January 1783. The "narrow bank" within the Bank of Amsterdam implodes.

We conjecture that this collapse is a run that cascades from a fear that fiscal distress might imperil receipt claims. Account holders might worry that the Bank will not promptly return high-value collateral, or that the Bank will retroactively hike the fees charged for redeeming a receipt. Functionally this "run" on the Bank is somewhat the opposite of that experienced by Lehman Brothers in 2008, when repo investors in Lehman unwound positions for fear that funds sold might not be returned (Copeland, Martin, and Walker 2011). Here, people return funds for collateral. Furfine (2006) observes that, in such situations, even a slight fear of a counterparty's default can be sufficient to provoke a mass unwind of positions with that counterparty.

The overall balance sheet, however, does not collapse because the Bank simultaneously builds its asset holdings with loans and open market purchases.<sup>17</sup> During the war, the credit portfolio grows by 7.6 million and the level of unrestricted coins by 3.8 million. Both activities create unencumbered accounts, so total monetary liabilities remains relatively stable despite the run. This balance sheet reconfiguration remains the norm through the remainder of the sample.

To underscore the transformation, **Figure 2** reports the Bank of Amsterdam's reserve ratio  $\rho$  (coins to accounts, equation (27)) over our sample period. From 1775 through 1779, the average was 95 percent, and even the ratio of unrestricted coins to unencumbered accounts  $\rho_u$  was 87 percent. For comparison, the Bank of England's average ratio is 42 percent over the same period (Clapham 1970, 296-297). By 1783, the Bank of Amsterdam's ratio is down to 37 percent, and the unencumbered ratio is nearly identical because so few coins are under receipt. At war's end, Amsterdam is still above London's ratio of 14 percent, but remainder of the decade shows a new pattern. From 1785 through 1791, the Bank of England rebounds to an average of 55 percent while the Bank of Amsterdam retains an average of 31 percent. In other words, the Bank of Amsterdam experiences a persistent shift from minimal to substantial fractional reserves.

**Figure 3** details the composition of the Bank's new lending. Before the war, its credit activity was dominated by loans to the East India Company called anticipations. Anticipations were short-duration, seasonal loans secured on the return of fleets from Asia, typically towards the end of the year. The longest maturity for anticipations during the first three years of our sample was 4 months. In 1779, however, the Company delays some for over a year, after borrowing heavily. In 1780, the Company again borrows heavily and fails to repay any of these anticipations, but it does manage intermittent interest payments. War then reduces shipments to and from Holland fall to their lowest levels in a century (De Korte 1984, appendix 8C). In February 1781, the largest division or "chamber" of the Company receives

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<sup>17</sup> Also, in July 1782, the City puts coins worth 85,714.3 bank florins into the Bank. That sum is about one year's operating profit and is the only capital injection of coins that we know of over the Bank of Amsterdam's entire two-century existence.

permission from the province of Holland to suspend payment on its anticipations (Steur 1984, 116). The Bank stops new lending to the Company in 1781, and receipt-holders begin to “run” the Bank, with the extent of the run limited by the stock of outstanding receipts.

In 1782, near the end of the run, the Company offers to convert its suspended anticipations into Company bonds that, in theory at least, will be guaranteed by the States (Parliament) of Holland (De Korte 1984, 81). To participate, however, current creditors of the Company have to loan an additional 50 percent. In May, the City formally sanctions Bank participation in this conversion (Van Dillen 1964, 417), and the Bank loans the Company an additional 2.5 million. By year end, total Company debt at the Bank is 7.7 million florins.

During the war, the City also uses the Bank to fund City lending to the Province of Holland.<sup>18</sup> The City takes 2 million from the Bank and lends it to Holland in exchange for obligations paying 3 percent. Perhaps to reclaim some credibility for the Bank’s balance sheet, the City commits to redirect the expected interest towards amortization. Instead of the becoming the non-performing City loan, these debts become zero-interest obligations that are scheduled to be incrementally repaid over four decades.

The war also saw credit expanded through another channel, a City-operated lending facility known as the Loan Chamber (Van Dillen 1964, 418).<sup>19</sup> The Loan Chamber was entirely funded by the Bank and provided credit to local merchants. By January 1783, this facility owes 1 million florins. After the war, the Loan Chamber’s debt rises to over 2 million and becomes an important source of income for the Bank.

From Figure 1 and 3, we see lending to the East India Company and to the Loan Chamber directly create unencumbered account balances  $V_u$  to replace the loss of balances matched

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<sup>18</sup> The Bank starts the war already holding a small perpetual Holland annuity with a principal of 227,000 bank florin.

<sup>19</sup> The Municipal Loan Chamber was originally created in response to the financial crisis of 1772-1773 (Breen 1900, De Jong 1934). Creation of the Loan Chamber was necessary because direct lending to merchants was seen as a violation of the Bank’s charter. At that time the Loan Chamber saw only light use, and it was closed within a few months. Loss of credit availability during the Fourth Anglo-Dutch War resulted in the Chamber’s reopening.

by a receipt,  $V_r$ . The Bank adds more unencumbered balances with aggressive open market operations. From May 1781 to July 1782 (the nadir of the receipt run), purchases add 7.1 million in unencumbered balances to the balance sheet. Besides creating bank money, this incoming coin more than offsets the coins removed by the City. The City's depletions cause the Bank's adjusted equity (i.e., equity net "loans" to the City), which starts off slightly negative at -482,001 florins in January 1780, to decline to -778,200 by the end of the war and to -2.3 million by 1791.

Finally, the rapid restructuring of the balance sheet alters the Bank's flow of income. **Figure 4** breaks down the Bank's income by source and shows that before the crisis, the Bank made most of its revenue from usage fees. The run greatly reduces fee income, so interest income now dominates. Massive lending to the East India Company initially resulted in a substantial rise in the Bank's profits -- until the Company stopped paying. Thereafter, interest from the Loan Chamber rivals fee income. In a short period, earnings flip from being primarily derived from people using the receipt facility to one heavily reliant on interest from loans.

### **3.2 Decline: 1784-1789**

The armistice of January 1783 effectively ends the Fourth Anglo-Dutch War (the treaty arrives in May 1784), but peace does not return the Bank to its prewar condition. This section summarizes the various attempts by the Bank at repairing its balance sheet before the outbreak of a second crisis in 1790.

The disruptions of the Fourth Anglo-Dutch War to the Company's operations are severe, and as a condition of peace, the British gain permanent free trade access to the Dutch East Indies, undermining an important source of the Company's profit. Costs to equip outbound ships exceed the Company's revenue from traded goods in every year from 1780 until the end of the Dutch Republic in 1795 (De Korte 1984, 85). At war's end, the Company's total debt is 38 million (20 percent held by the Bank; De Korte 1984, 87 and appendix 1E), and subsequent government injections inflate the Company's total debt to 91 million by 1790, by which time 81 million is in arrears (De Korte 1984, 84).

The immediate consequence of this for the Bank is that its single largest debtor completely fails to perform for three years. By early 1783 this situation begins to erode the value of the bank florin (**Figure 5**). A directive from the governing commission of the Bank, dated April 1782, instructs Bank employees to try and hold the agio between four and five percent through open market operations, when these can be undertaken without significant losses to the Bank (Van Dillen 1925, 433-434). By early 1783, however, Figure 5 shows that the agio on the bank florin is already trading in the three percent range. Moreover, the foreign exchange value of the florin falls by about five percent over the course of the war. The Bank responds to these depreciations through a “tightening operation”: selling 3.5 million florins’ worth of current guilders into the market during the first half of 1783. This policy seems to have had some beneficial effect: by January 1783 the slide in the agio abates and by year-end, the agio briefly returns to the four percent range. Trade coins trickle back into the Bank (Figure 1).

Yet the Bank cannot sustain this policy. By the summer of 1783, the Bank’s stock of unencumbered coins falls to 4.4 million florins, leaving its overall reserve ratio at a perilously low 28 percent (Figure 2). This ratio was 97 percent just four years earlier. Open market sales of silver are abruptly interrupted.

The Bank’s problems, however, extend beyond illiquidity, for the continued nonperformance of loans to the Company cause the Bank to be fundamentally and deeply insolvent. As long its profits are taken by the City, the Bank has no way to offset its losses on loans to the Company. And, even if the Bank did start to retain all of its earnings, it is doubtful that these would have proved sufficient to return the Bank to solvency. **Figure 6** gives some illustrative calculations. Figure 6 charts the evolution of the Bank’s net worth (cf. equation (26)) in January of each year, under scenarios where the 1) entirety of its expected future profits can be incorporated into net worth as a “deferred asset,” and 2) profits follow a random walk. The upper line reports the Bank’s net worth if East India Company loans are expected to perform on schedule. The lower line writes off all Company loans. So, by January 1784, if the Company fully defaults, then the Bank’s shortfall is substantial at -8.4 million

florins. Actual expectations likely fell between the two extremes, so net worth would fall between these bounds.

To visualize the possible impact of Company loan performance on expectations of the Bank's net worth, Figure 6 places a circle on each January to categorize Company debt repayments during the previous year. These enter somewhat randomly into the Bank's accounts; see the Appendix for full details. In the Figure, loan repayment on schedule is depicted as a circle on the top line, full non-performance on the bottom line, and partial performance on the middle line (the average of the top and bottom line). For example, we categorize the Company paying interest but extending maturities in 1779 through 1782 as partial performance. Partial performance is a catch-all term: for example, the Company remains in that category in 1782 when it does not pay all interest due, and the Bank duly accrues the unpaid interest.

The accounting treatment of Company debt shifts in 1783. The Company stops all payments and the Bank stops accruing interest. The Bank rolls over, or "evergreens," Company loan balances. It seems most likely that the Bank's net worth goes negative in 1783 and remains negative during the sample period. Under the no-recovery scenario, net worth drops to almost -9 million for most of the 1780s.<sup>20</sup> Under a scenario that optimistically assumes a 50 percent recovery rate for loans to the Company the shortfall is less extreme, but net worth still bottoms out at a non-negligible at -3.8 million. The actual shortfalls would have been larger than those depicted in Figure 6, since the City never fully foregoes Bank profits as a source of revenue.

Although the Bank did not publish balance sheets, the market prices the Bank's weakness over the rest of the 1780s. The agio and the foreign exchange rate continue to decline (Figure 5) and the Bank does not engage in defensive open market operations. And new initiatives indirectly acknowledge the Bank's credibility problem. For example, the City attempts

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<sup>20</sup> Histories of the Company over this period (De Korte 1984, Steur 1984) make clear that an expectation of little to no recovery would have been warranted, since from 1781 the Company is frozen out of the capital markets and dependent on governmental support for its continued existence. This support ends in 1793 with the outbreak of war with France, and the Company's operations effectively end in 1795 after its ships are seized by the British navy. Between 1781 and 1795 there are however numerous official proposals to reform the Company, each expressing confidence in its eventual recovery.

to limit dividends beyond yearly profit by treating them as actual loans. In 1783, the City opened a line of credit with the Bank and repaid 800,000 (with interest!) of the 1.4 million borrowed. The effort, however, soon ends as the remaining principal returns to non-performance in 1784. The City returns to form and takes an additional 943,714 florins in non-performing loans over the rest of our sample.

The City has more success expanding the amortization policy used with loans during the war. In 1786, after a three-year abeyance, the Company starts paying the City 3 percent per year on the 7.65 million in bonds held by the Bank. The City then uses the funds to shift bonds from the Bank's balance sheet and, presumably, to the City's balance sheet. From the Bank's perspective, the process slowly amortizes the principal but ignores interest due. Figure 6 categorizes this as partial performance, and the Company makes its payment each year but one. The process starts an incremental improvement of the Bank's net worth under the non-performance scenarios.<sup>21</sup>

Amortization reduces the Bank's vulnerability to future Company non-performance at the expense of immediate gains. If the Bank instead accounts for Company payments as interest income on a perpetual debt, then the Bank's net worth would increase substantially: discounted at 3 percent, these payments would have added a present value of 7.65 million. The City would benefit as well, taking the income as dividends. Instead, principal was reduced. As a result, the amount of potential insolvency was made less each passing year (see Figure 6). This policy better helps the Bank *if* the Company's long-term credibility is highly suspect. At the time, Holland was subsidizing the Company with vast sums, and the Company's unsubsidized outlook remained bleak. With this policy, the City chose to slowly re-separate the bank florin from the Company rather than accept a bank florin permanently built on a massive Company debt.

Sustained growth in receipt balances (Figure 1) brings a different sort of relief for the Bank in 1789. This coincides with political instability of the French Revolution, but we cannot

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<sup>21</sup> Resumption of payments seems to have allowed the Bank to reopen some short-term lending to the Company. The Bank makes three new loans, and the Company repays each in full. One loan, a 1788 loan for 700,000, is even repaid with interest.



track where coins are coming from. Still, the influx of new coin types from Brabant, Prussia, Russia, and Sweden suggest a new pattern at work. Yet, the bank florin continues to weaken both in terms of the agio and relative to London and Hamburg, so the inflows are unlikely to be coming through those channels. A contemporary observer attributes the florin's weakness to sovereign loans made by Amsterdam merchant banks to Russia, Sweden, and Austria in amount of 40 million florins (Van Dillen 1964, 420). In contrast, Amsterdam appreciates by 5.6 percent against Paris in 1789, and then the Parisian market degrades and new quotes cease altogether.

### **3.3 Crisis: 1790-1791**

The 1790 crisis forced the Bank to undertake a series of unusual and increasingly desperate policies designed to restore its credibility with the markets. This section describes the nature and extent of these policies.

Beginning in 1790, Bank attempts to use the inflow of trade coins to stabilize the rest of the Bank and halt the decline in the agio. First, the Bank acquires encumbered silver coins by purchasing receipts on the market instead of purchasing coin outright as it had in the past. From June 1790 to May 1791, the Bank converts 3.7 million in silver coin from encumbered to unencumbered. The logic behind this operation may have been to reduce the scope of a possible run by diminishing account holders' ability to redeem Bank balances in coin. From a modern perspective, however, a policy of purchasing receipts is seen as the Bank purchasing a large number of put options on its own currency. Not surprisingly, this intervention does not stop the florin's decline.

The agio drops below zero by November 1790 (Figure 5). In a desperate move to halt the florin's slide, on November 12, the Bank offers to redeem the balances of large account holders in silver bars at a price of 26.75 florins per silver mark (Van Dillen 1964, 421). This is a de facto devaluation of 9-10 percent over the traditional (implicit) silver value of the florin, of 24.1-24.25 florins per mark. No one takes the Bank up on this offer. Instead, in January 1791, prominent account holders file a formal protest with the City, accusing the Bank of having increased its money stock in an "unnatural fashion" without "backing of

saleable specie or coin material” (Van Dillen 1964, 422). The protesters demand that all accounts be made directly convertible to (silver) specie at the former value, as had occurred prior to the introduction of the receipt system.

We find the Bank makes two additional policy moves in early 1791. The first of these is to raise the bank price of gold coins by 2.5 percent, effectively a reduction in the Bank’s “hair-cut” when people use gold as collateral: a backdoor devaluation. The second move, an apparent response to the account holders’ protest, is to set a price floor for the agio by using unencumbered silver coins to fund a traditional (i.e. non-receipt) process of withdrawal: an option that has been in abeyance for over a century. The Bank makes the new facility available only to dealers in the agio market and sets the initial withdrawal agio of -1 percent. This means people get 99 current guilder coins per 100 bank florin in account. At that below-market rate (Figure 5), dealers withdraw 344,000 bank florins in two weeks. Perhaps feeling overly confident, the Bank then raises the withdrawal agio to zero percent (just above market rates), and 1.6 million leaves in two weeks. Belatedly realizing that it has been funding a run, the Bank abandons this effort to stabilize the agio in mid-February 1791. The Bank proves unable to re-stabilize itself.

### **3.4 Recapitalization: 1791-1792**

Over an eight year span beginning in 1783, the Bank is too far from solvency to re-establish credibility. Efforts to introduce a meaningful, if devalued, peg for the florin fail. Efforts also fail to add loans that perform. Indeed, the City continues to take operating profits, and more, from the Bank. Under pressure from market participants, the City finally attempts to recapitalize the Bank in 1791. This section describes the recapitalization.

On February 17, 1791, the City Council authorizes a bond issue of 6 million florins (Van Dillen 1964, 422) for recapitalization, with prominent merchant banks agreeing to support the issue. Calculations shown in Figure 6 suggest that this was, on its face, a reasonable move given the extent of the Bank’s accumulated losses. And, examination of the Bank’s ledgers confirms that from April 1791 through January 1792, the City gives over 6 million in balances to the Bank for destruction.

Reconstruction of the Bank's balance sheet shows why the recapitalization did not succeed in restoring the bank florin. The City does not restrict the use of the injected funds to restoring equity. As **Table 3** shows, 40 percent goes to increasing the Bank's equity, but the remainder is diverted. Almost one-third goes to retire self-amortizing loans secured by Holland bonds and by interest-earning loans to the City Loan Chamber. 28 percent is taken out by the City as coin. During the operation, the agio appreciates 1.4 percentage points (from .56 to .84) and the exchange rate appreciates 2.8 percent. The Bank's reserve ratio rises to 48 percent, a ratio similar to the Bank of England's. At the same time, the nonperforming East India Company debt remains, and this means that the Bank is insolvent with a net worth of -4.96 million florins under the no-recovery scenario. Again, even that estimate of net worth assumes the City will stop taking all future earnings, which seems unlikely given the City could not resist taking 1.7 million in coin from the Bank's recapitalization.

	Full Company Performance	No Company Performance
<b>Initial equity</b>	<b>-2,303,300</b>	<b>-8,805,800</b>
<b>Initial net worth</b>	<b>-40,477</b>	<b>-6,542,977</b>
<b>Change in Accounts (Liabilities)</b>	<b>-6,076,893</b>	
<u>Balance Sheet Effects</u>		
Change in Equity due to recapitalization	<b>+2,418,438</b>	
Other changes in balance sheet:		
Change in Loans (Assets)		
Holland (performing)	<b>-952,381</b>	
Loan Chamber (performing)	<b>-999,741</b>	
East India Company (no interest)	<b>0</b>	
Change in Coins (Assets)	<b>-1,706,333</b>	
<b>Equity after all changes</b>	<b>-145,590</b>	<b>-6,418,590</b>
<b>Net worth after all changes</b>	<b>1,310,865</b>	<b>-4,962,135</b>

**Table 3.** Recapitalization of April 1791-January 1792 (quantities are bank florins)

*Source: Amsterdam Municipal Archives and authors' calculation.*

### 3.5 Epilogue: 1793-1795

The Bank of Amsterdam's decline does not stop in January in 1792. Unfortunately, the records of the Bank's master account are not available after that date, so we are unable to continue our data reconstruction. The basic story of the Bank's further decline is well known, however, and **Table 4** summarizes that story using fiscal 1793-1795 fiscal yearend (January) data compiled by Van Dillen (1934, 122).

Date	Exchange rate index (1781:1=100)	Agio (percent)	Coin (bank florins)	Reserve Ratio (percent)	Profits and losses (bank florins)
1792:1	94.4	0.84	8,408,441	48	68,696
1793:1	93.9	0.81	13,238,010	60	-27,955
1794:1	90.7	1.91	8,471,075	48	-10,402
1795:1	85.9*	-25.00	2,506,046	21	-155,314

**Table 4:** The Bank of Amsterdam, 1792-1795

\* December 1794 value. Sources: Van Dillen (1934, 122), Gillard (2004), Schneider, Schwarzer, and Schnelzer (1991). 1792 financials are from authors' calculations.

The international strength of the bank florin is gone, and its exchange rate continues to deteriorate. Some metal returns to Amsterdam in late 1792, and Van Dillen (1964, 425) attributes this to an influx of Spanish silver and to continued capital flight from the consequences of the French Revolution. The agio briefly climbs to the two percent range in the second half of 1793 after war breaks out with France, but it returns to negative territory in August 1794. Encumbered coin leaves the Bank and the Republic. The bank florin departs the world stage when the French army reaches Amsterdam in January 1795.

## 4. Discussion

With the benefit of two additional centuries of central banking experience, it is easy to point to reasons for the florin's downfall. The Bank of Amsterdam's policy targets were inflexible and its policy instruments limited. More critically, the Bank lacked "financial strength" (Stella 2005): it was compelled to surrender its entire income to its sponsoring government, the City of Amsterdam, and it undertook large quasi-fiscal actions (support of

the East India Company) without adequate guarantees. Consistent with the experience in many other countries, the Bank's lack of financial strength appears to have been driven primarily by political constraints.

A few numerical facts may be helpful in framing the Bank's situation. There are no national income data for the Netherlands over our period of interest, but a reasonable guess of the size of the Dutch economy at that time is about 131 million bank florins.<sup>22</sup> The size of Bank liabilities in our sample is about 20 million florins or 15 percent of GDP, which is not excessive given the low interest rates inherent in the receipt system (for comparison, the liabilities/GDP ratio for the Federal Reserve was about 17 percent at yearend 2012). Nonperformance of the Bank's credits to the East India Company cause its profitability to be quite low, with an average return on assets of only 0.38 over our sample (versus an average ROA for central banks during the Great Moderation of about 1.5%; see Klüh and Stella 2008). The Bank's negative net worth at the end of the Fourth Anglo-Dutch War comprised about 5 percent of GDP (Figure 6). Unable to retain even its modest profits under its traditional policy commitments, the Bank could not earn its way out of this deep hole.

Could the Republic have absorbed the Bank's losses through fiscal transfers? The answer looks to be yes, although it is also clear that by the 1780s, the Dutch economy was operating at a level of indebtedness that would have made such transfers politically difficult. The Republic had no national debt in the modern sense, but the closest proxy—the debt of the Province of Holland—was already in excess of 350 million current guilders or (roughly) 250 percent of the Republic's GDP by 1783 ('t Hart 1997, 21). It can be nonetheless argued that the Republic had fiscal capacity to spare, as the Republic and Holland combined to send over 70 million guilders in subsidies to the floundering Company from 1781 to 1790 (De Korte 1984, 87). A bailout of the Bank appears feasible.

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<sup>22</sup> De Vries and Van der Woude (1997, 702) place the size of the mid-eighteenth century Dutch economy at about 164 million bank florins. Our "estimate" of GDP conservatively assumes a one-third contraction in the economy due to the lingering effects of the Fourth Anglo-Dutch War.

One political barrier to a bailout was that the Bank was not a national or even provincial entity, but an agency of the City of Amsterdam. The Bank's financial condition was a carefully guarded secret, and over the years the City had kept the Bank's profits for itself. Any proposal that governmental bodies other than the City should now share in the Bank's losses could hardly have generated an enthusiastic reception. Another problem was the source of the Bank's losses, i.e., its holdings of Company debt. Redemption of the Bank's debt holdings through a fiscal transfer, without bailing out other debt holders, would have faced political and perhaps legal roadblocks. And, the ongoing losses by the Company meant there was a staggering amount of such debt, 91 million guilders by 1790 (about two-thirds of GDP), on top of an already substantial government debt load.

A useful standard of comparison is provided by the contemporaneous Bank of England. During our period of interest, the Bank of England was often less liquid than the Bank of Amsterdam (Figure 2). Moreover the bulk of the Bank of England's non-metallic assets consisted mostly of government debt (Clapham 1970, 210), yet its credibility was not called into question. Chartered as a private, for-profit, institution, the Bank of England nonetheless had an explicit mission to manage the finances of the national government. Thus, unlike in Amsterdam, there was a fairly direct line of responsibility from Parliament to the obligations of the Treasury to the liabilities of the central bank. The Bank of Amsterdam was, by contrast, not really supposed to be in the lending business at all. Through its extraordinary wartime quasi-fiscal actions, it had ended up with a large portfolio of nonperforming GSE debt, but without any real political consensus on whose responsibility this was. When the Bank was finally offered fiscal support by the City in 1791, what came was too little and too late.

## **5. Conclusion**

The liquidity of fiat money ordinarily allows central banks to operate with minimal levels of equity. This liquidity is dependent on market perceptions, however, and these perceptions can shift rapidly during times of crisis, particularly when central banks engage in unconventional, quasi-fiscal policy actions. During such times, capital injections or other forms of

fiscal backup may be necessary to assure markets that a central bank will not renege on its policy commitments. The analysis above has documented a historically important case where the credibility of a prominent central bank was undermined by a lack of fiscal support.

With full access to the Bank of Amsterdam's accounts, it is easy for modern observers to detect the weaknesses in the Bank's design and operation. These were far from evident to contemporary observers, however. Indeed, in its heyday, the Bank was a much-admired institution, one whose robust functionality had inspired the creation of rival institutions in other nations. To cite one well-known example of the Bank's influence, the original proposal to create the Bank of England (Patterson 1694, 14) states that

[t]he [Bank of England will] giv[e] a profit upon a great part of the running Cash of the Nation, the practice of which will naturally and gradually lower the Interest of Money, as it has done in *Holland, Genoua*, and all other places where *Banks* and Publick Funds are used ... .

To give another example, in a famous 1780 letter Alexander Hamilton argues for the creation of a central bank in the United States (Hamilton 1850, 164):

The Bank of England unites public authority and faith with private credit: and hence we see, what a vast fabric of paper credit is raised on a visionary basis. ... The Bank of Amsterdam is on a similar foundation.

Such admiration was hardly misplaced, for the Bank had proved resilient in previous crises (1672, 1763, and 1772-1773), and anyone betting on the florin's demise in those events would have been disappointed. A closer look shows that this resilience was something of a façade, with the Bank's normally deep liquidity masking an underlying financial vulnerability. This vulnerability became apparent when the unanticipated, extreme circumstances of 1781-1792 pushed the Bank beyond its design limits. And, in the end, history judges central banks on their performance under just such circumstances.

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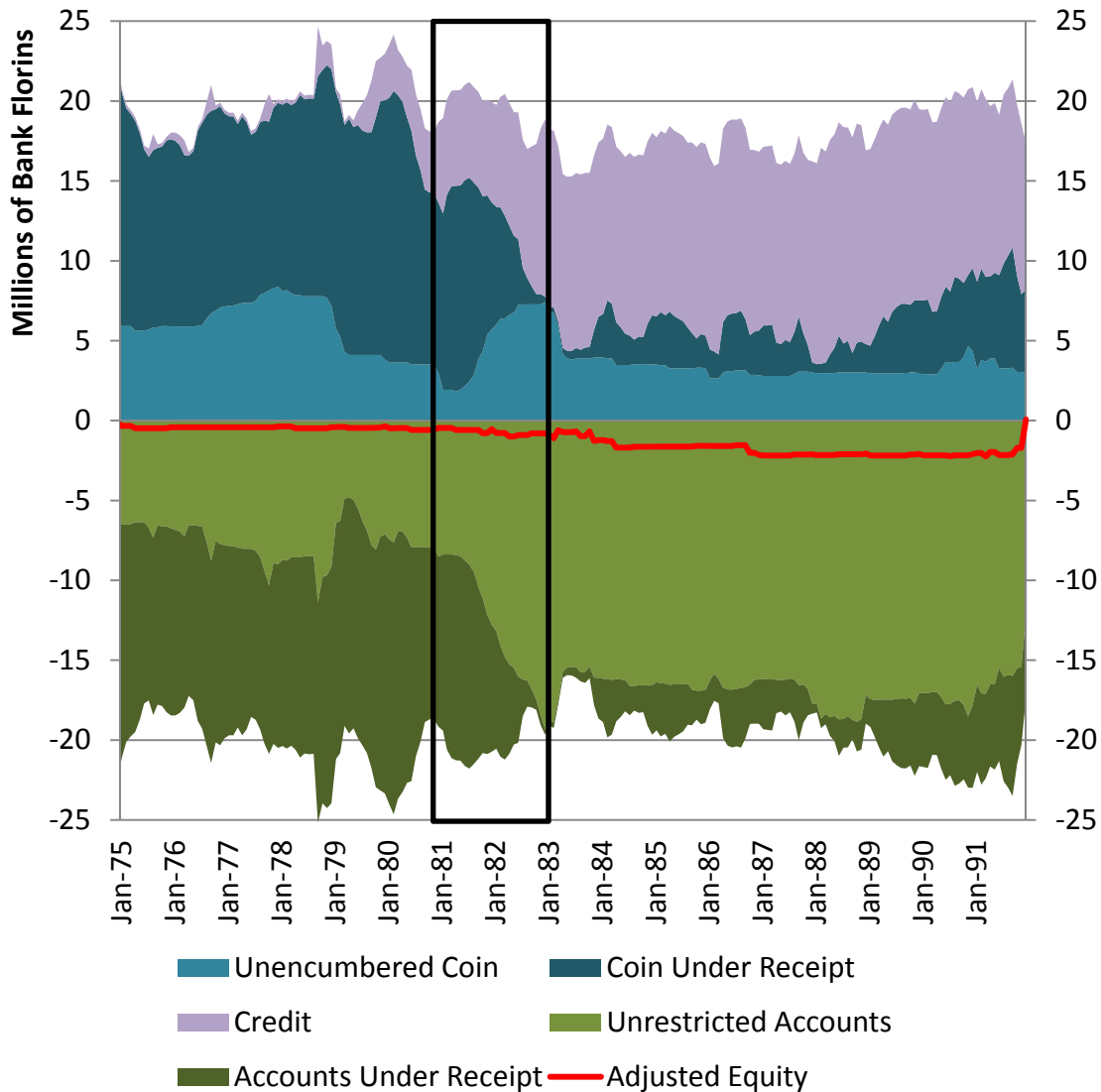


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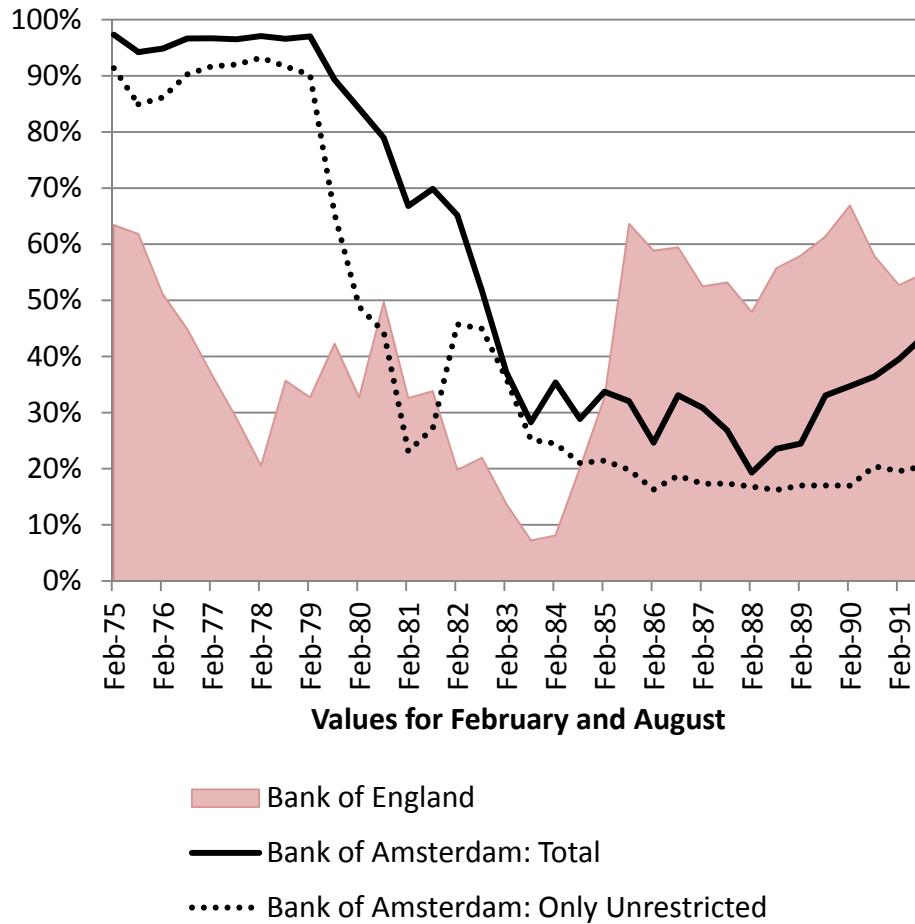
**Figure 1. The Bank of Amsterdam's Assets and Liabilities**



Source: Amsterdam Municipal Archives.

Notes: The Fourth Anglo-Dutch War is highlighted. Note that the top scale applies to the Bank's (negative) equity. Equity is adjusted by treating City loans as subtractions from equity rather than credits.

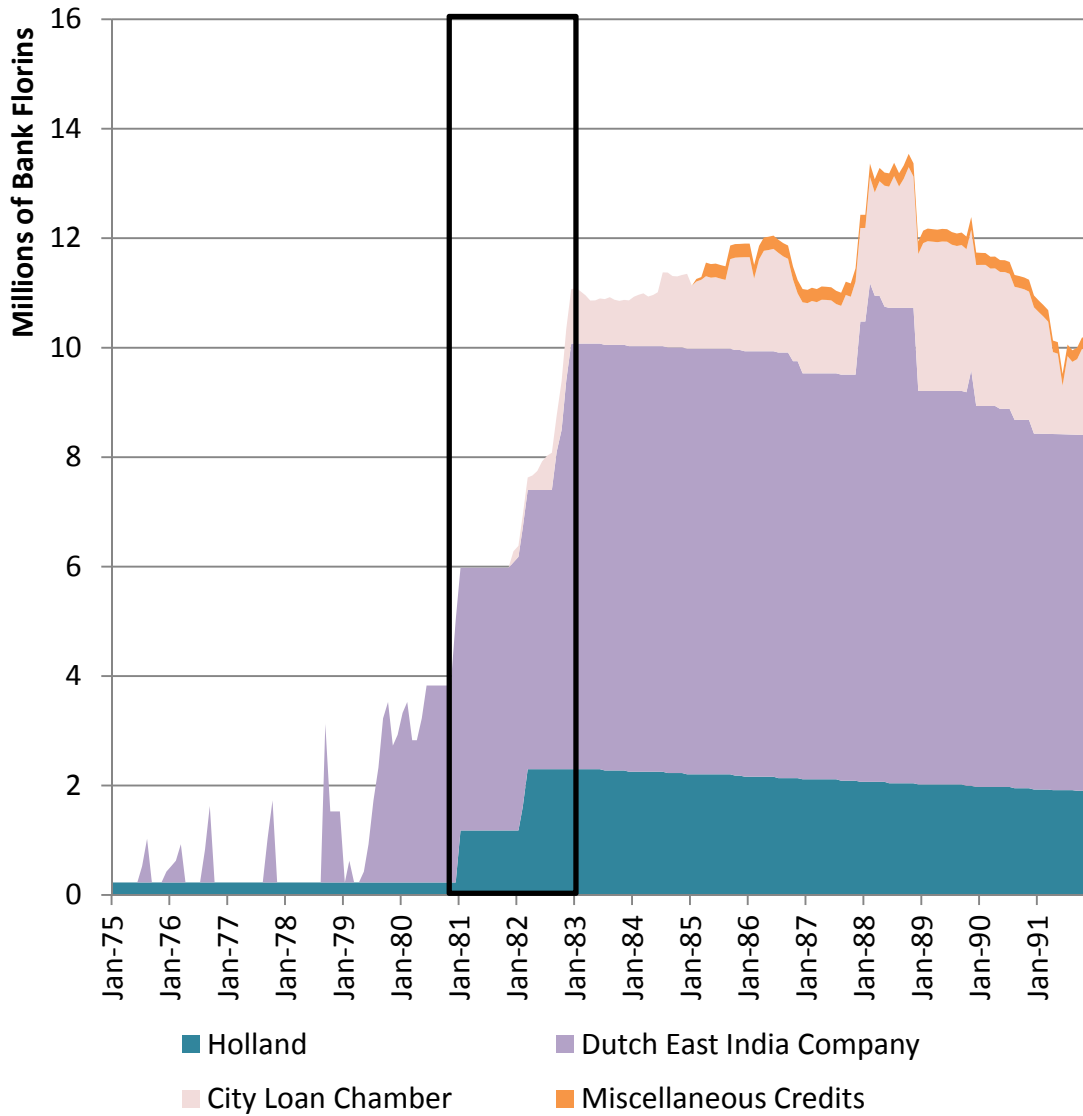
**Figure 2. Reserve Ratios (Precious Metal to Monetary Liabilities)**



Sources: Amsterdam Municipal Archives, and Clapham (1970, 296-7).

Notes: The Bank of England's ratio is bullion over notes in circulation plus accounts. The Bank of Amsterdam's ratios are 1) total coins over total accounts and 2) unrestricted coins over unrestricted accounts. The February and August dates conform to Bank of England observations.

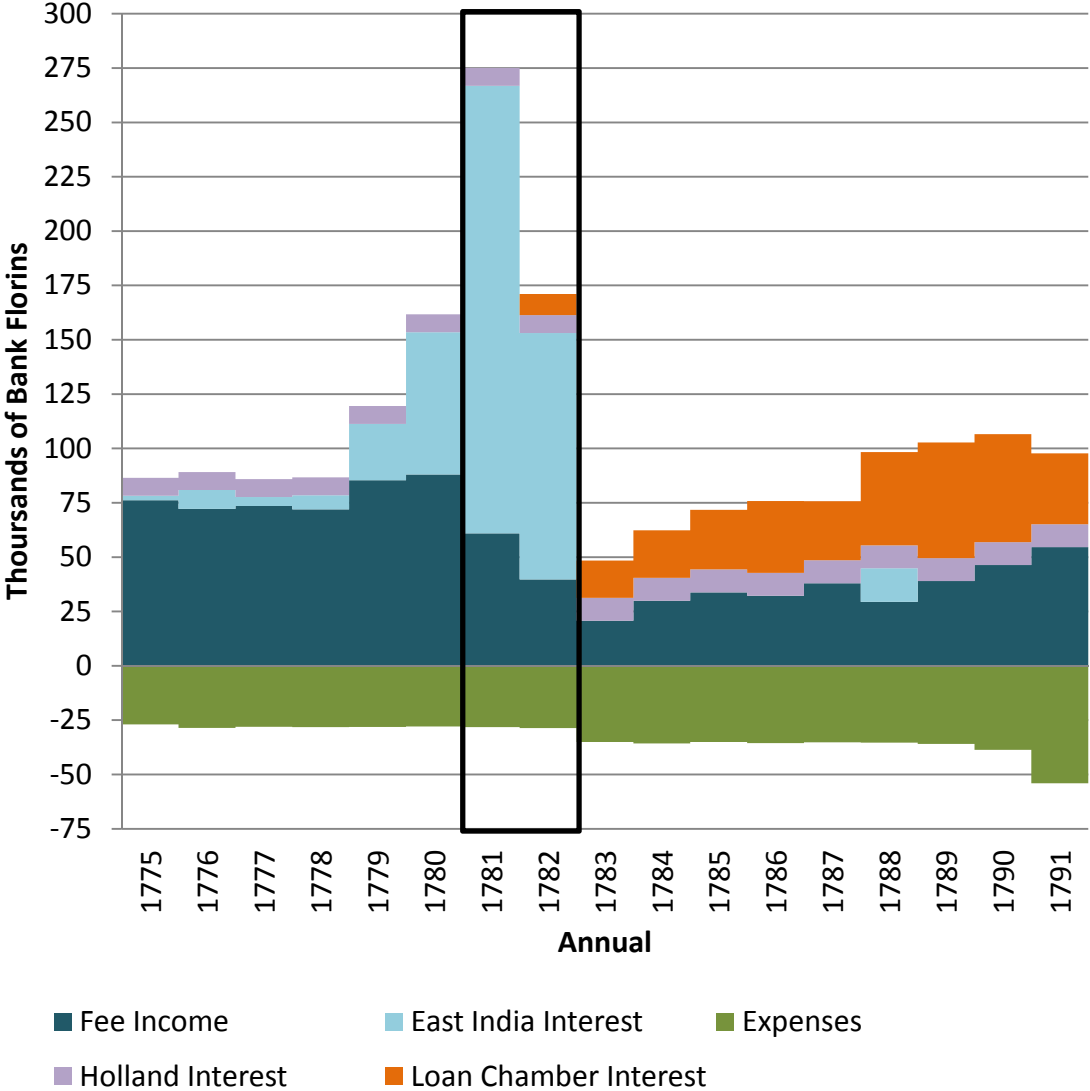
**Figure 3. The Bank of Amsterdam's Loans Outstanding**



Source: Amsterdam Municipal Archives.

Note: The Fourth Anglo-Dutch War is highlighted.

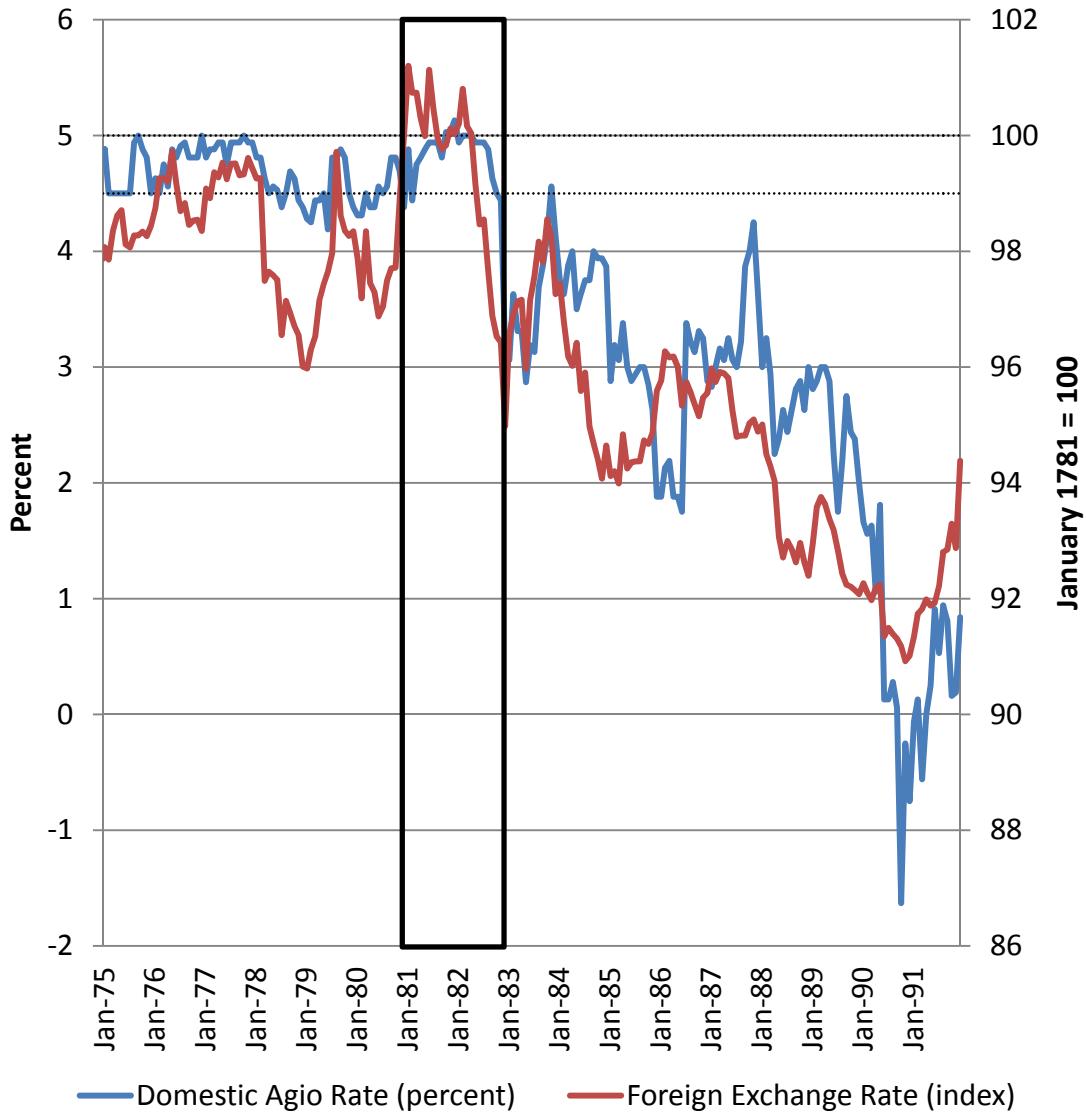
**Figure 4. The Bank of Amsterdam's Income and Expenses**



Source: Amsterdam Municipal Archives.

Note: The Fourth Anglo-Dutch War is highlighted.

**Figure 5. The Bank Florin Agio and Exchange Rate**

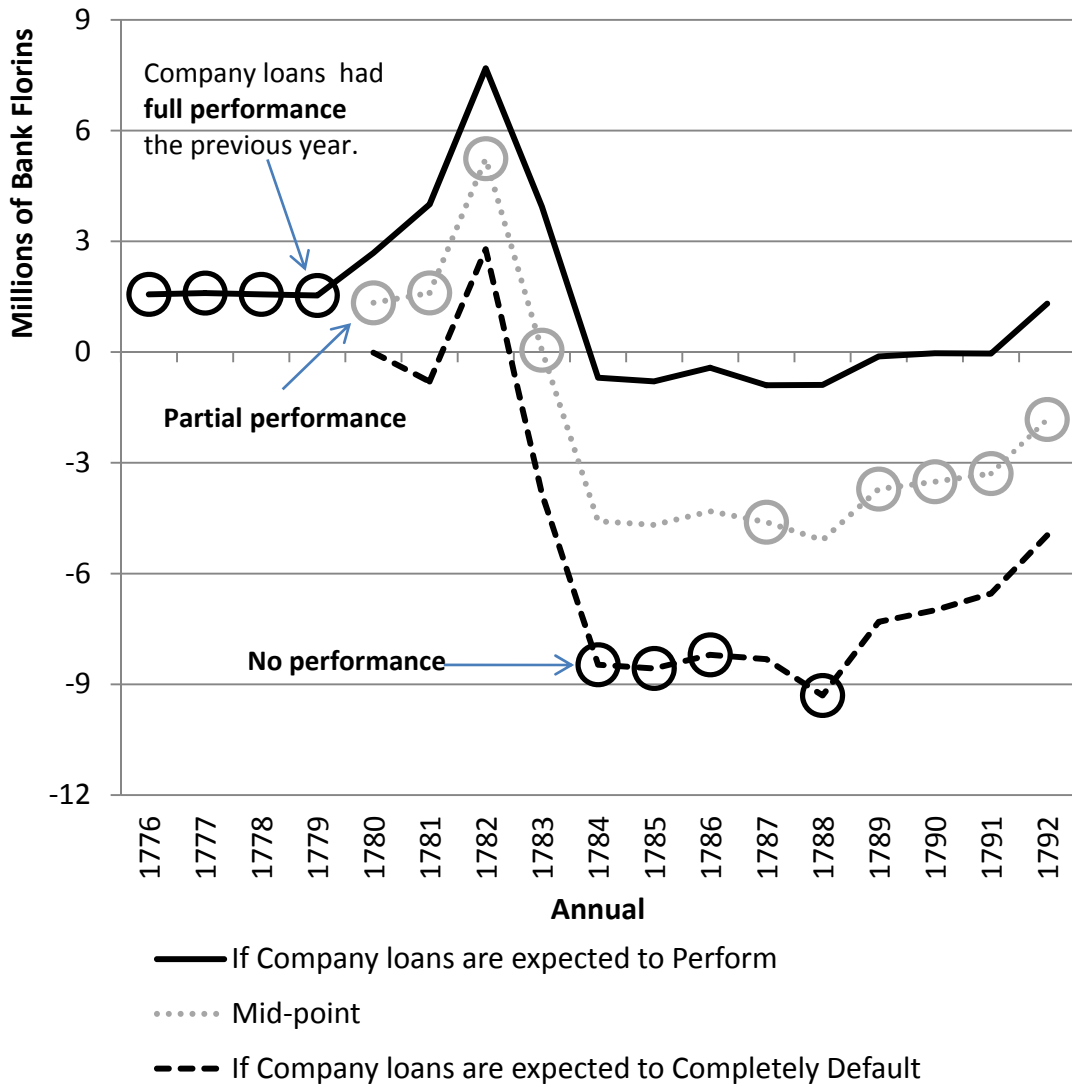


Sources: Gillard (2004) and Schneider, Schwarzer, and Schnelzer (1991).

Note: The Fourth Anglo-Dutch War is highlighted. The agio's traditional trading range is horizontally highlighted at 5 and 4.5 percent.



**Figure 6. The Bank of Amsterdam's Net Worth by Scenario**



Source: Amsterdam Municipal Archives and authors' calculation.

Notes: Partial performance defined as extending maturities (1780-1783), partial interest (1783), no interest paid (1787, 1789-1792).

## Data Appendix for “Death of a Reserve Currency”

The 1780s brought a diversity of new types of lending. The Bank’s accounting becomes complicated. This appendix sets out our reconstruction what happened and how the Bank accounted for it.

### Table of Contents

- I. Bank of Amsterdam Lending in the 1780s
- II. Bank “Rekeningen 1783”
- III. Accounting for Open Market Operations

#### I. Bank of Amsterdam Lending in the 1780s

Table 1 lists Bank of Amsterdam lending from 1780 through 1791. The three borrowers were the Dutch East India Company (Company), the City of Amsterdam (City), and the Municipal Loan Chamber (Chamber). Some loans are single payments while others are serial payments within a fiscal year (ending in mid-January). Sometimes the intended interest rate and maturity are derived actual loan repayments.

Table 1. Bank Lending in the 1780s

<u>Borrower</u>	<u>Fiscal Year</u>	<u>Principal in bank florin</u>	<u>Form of Principal lent</u>	<u>interest rate</u>	<u>Maturity</u>	<u>Secured by</u>
Company	1780	4,800,000	account	4%	≤ one year	Anticipations
Company	1782	300,000	account	3%	≤ one year	Anticipations
Company	1782	126,286	capital	0%	unclear	
Company	1787	991,150	coins	0%	≤ one year	
Company	1787	2,478	capital	0%	≤ one year	
Company	1788	700,000	account	3%	≤ one year	
Company	1789	400,000	account	0%	≤ one year	
Company	1782	2,550,000	account	0%	33 years	Company bond
City	1780	118,000	coins	0%	perpetual	
City	1781	952,381	coins	0%	40 years	Holland bond
City	1781	200,000	coins	0%	perpetual	
City	1782	1,119,048	coins	0.25%	49 years	Holland bond
City	1782	200,000	account	2.50%	≤ one year	
City	1783	1,200,000	account	2.50%	≤ one year	
City	1784	404,762	coins	0%	perpetual	
City	1786	478,952	coins	0%	perpetual	
City	1789	60,000	coins	0%	perpetual	
Chamber	1782	28,571	account	0%	perpetual	
Chamber	1782	990,000	account	2%	variable	Chamber loans
Chamber	1783	304,000	account	2%	variable	Chamber loans
Chamber	1783	74,757	coins	2%	variable	Chamber loans
Chamber	1784	776,000	account	2%	variable	Chamber loans
Chamber	1785	806,500	account	2%	variable	Chamber loans
Chamber	1786	722,500	account	2%	variable	Chamber loans
Chamber	1787	739,600	account	2%	variable	Chamber loans
Chamber	1788	1,537,500	account	2%	variable	Chamber loans
Chamber	1789	413,000	account	2%	variable	Chamber loans
Chamber	1790	258,000	account	2%	variable	Chamber loans
Chamber	1791	1,016,500	account	2%	variable	Chamber loans
Surinam?	1785	247,619	coins	0%	unclear	Surinam?

A. Traditional Lending before 1781.

Table 2 shows an example of the balance sheet effects of each of these traditional lending activities.

Table 2. Examples of Balance Sheet Effects of Traditional Bank Lending circa 1780

<u>Interest from Holland Annuity: each year 1775-1792</u>			
	ASSETS	EQUITY	
Coins from Holland	+8,260	+8,260	Income
	+8,260	+8,260	
<u>1780 Loan to City: Bank's Accounting</u>			
	ASSETS		
Coin to the City	-118,000		
City obligation	+118,000		
	+0	+0	
<u>1780 Loan to City: Adjusted Accounting</u>			
	ASSETS	EQUITY	
Coin to the City	-118,000	-118,000	Capital reduction
	-118,000	-118,000	
<u>Loan to Company</u>			
	ASSETS		LIABILITIES
		6 April 1775	
Anticipation	+100,000	+100,000	Accounts
		24 April 1775	
Principal repaid	-100,000	-100,000	Accounts
		-150	Accounts for interest
		+150	EQUITY
	-100,000	-100,000	Income

1. To the Province of Holland

The Bank held a perpetual annuity owed by Holland with a principal of 227,264:6:8 bf paying 8,260 bf in coin per year. Interest arrives in Koper Kas, so it does not appear in the Account Ledgers or in the Cash Book. As a result, we have no date, so we ascribe the payment to the last day of the fiscal year. The Bank treats this interest as income and this principal as an asset. We do also for calculating net worth.

2. To the Treasury of the City of Amsterdam (the City).

The Bank lends to the City when the City Treasury takes coin from the Bank other than of the dividend of the Bank's operating profit from the previous year. This prevents the Bank from recording a negative equity position. The City can eventually decrease this principal by having the Bank write it down. Treasury loans do not pay interest. The Bank treats this

principal as an asset. We do not. Our “adjusted equity” of the Bank treats these loans as capital losses when they are made rather than when they are formally written down.

3. To the Dutch East India Company (the Company).

The Bank routinely made loans to the Company. These loans, called anticipations, were secured by the revenue from fleets that usually returned to Holland late in the year. Anticipations were usually repaid within a year. The Bank treats this interest as income and this principal as an asset. We do also for calculating net worth.

B. New Lending to the City secured by Holland in 1781

In February 1781, the Bank lends 952,380.95 bf in coin (1,000,000 cg at a 5% agio) to the City treasury, and the City then lends the coin to the Province of Holland for a Holland and West Friesland obligation paying 2.5% (23,809.55 bf: 25,000 cg) per year. The Bank does not charge the City interest. The City pledges to use the obligation’s interest to amortize the loan in 40 annual installments (5077/38). The Bank’s accounting treats this annual payment as principal reduction and not as income.

Also, each year, the City creates an additional loan asset and special capital item varyingly named: “an addition for the treasury held among us (van Dillen 1925, 790),” and “kept among us for the redemption (*aflossing*) of capital (van Dillen 1925, 791)” using our translation. The advantage of this cumbersome process is unclear, but it did keep the total principal of the loan on the Bank’s books even as the original loan’s principal is incrementally reduced. Table 3 shows how this loan and its amortization affected the Bank’s balance sheet.

Table 3. Balance Sheet Effects of the 1781 Loan

		<u>Origination: February 1781</u>	
	ASSETS		
Unrestricted coins paid to the City	-952,381		
Loan secured by Holland bond	+952,381		
	+0		+0
		<u>Amortization: Each year 1782 to 1791</u>	
	ASSETS		EQUITY
Unrestricted coins paid to the Bank*	+23,810		
Reduction of loan principal	-23,810		
Increase in City loan principal	+23,810	+23,810	Non-income equity
	+23,810	+23,810	

\*Replaced by a credit in 1782 (see Section E below).

Note that we do not write-off this loan, as we do typical City loans, for they did have an amortization schedule.

C. New Lending to the Municipal Loan Chamber (*Stads Beleen Kamer*) starting in 1782

In January 1782, the Bank opened a lending window for the Municipal Loan Chamber (Chamber). The Chamber acts as a holding account for diverse City lending. To lend, the Bank created account balances for the Chamber except for one loan on July 2, 1783 that was in coin. The Bank charged the Chamber 2% interest on borrowed balances. The Chamber repaid principal and interest with account. The Chamber continuously borrows and repays the Bank through our sample period. Table 4 shows how the Bank accounted for sample transactions of this facility. The total amount lent this way is reported by year in Table 1.

Table 4. Example of Balance Sheet Accounting of Routine Chamber Borrowing

ASSETS		LIABILITIES	
	11 February, 1783		
New Chamber debt	+20,500	+20,500	Accounts
	4 March, 1783		
Chamber repayment	-20,000	-20,000	Accounts
	18 January, 1784 (end of fiscal year)		
		-41.6	Accounts
		+41.6	EQUITY
		{383.8 due on 20,500 for 11 months, 18 days LESS 342.2 owed on 20,000 for 10 months, 8 days}	Net income
	+500	+500	

D. New Lending to the City secured by Holland in 1782

In March/April 1782, the Bank made a new, two-part loan to the City of Amsterdam. The Bank gave the City 1,175,000 cg (1,119,047.65 bf) in coins that the City then lent to Holland. The City also credited Holland for that year's interest due (23,809.55 bf or 25,000 cg) on the 1781 Holland obligation. In return, Holland gave the city a new 1.2 million cg (1,142,857.15 bf) obligation paying 2.5% (30,000 cg or 28,571.45 bf) per year. The Bank loan to the city paid no interest.

The Bank loan to the City and the resulting 1782 Holland obligation then get caught up in the new Municipal Loan Chamber. The City assigned the 1782 obligation as the anchoring asset of the new Loan Chamber, so, each year, interest of 28,571.45 bf passed from Holland, through the Bank, to the Chamber. At the same time, the City recycled 80 percent of that 1782 Holland obligation (814,285.7

bf or 960,000 cg) back to the Bank. The resulting flow of interest back to the Bank (22,857 bf per year) was used to amortize the initial Bank loan to the City. Each year, the City also had the Chamber pay the Bank 0.25 percent of this 80 percent (2,285 bf) as if the Chamber had taken the coin and had to renew an enormous receipt.

Table 5. Balance Sheet Accounting for the 1782 Loan to the City

		<u>Origination: March and April 1782</u>	
ASSETS			
Unrestricted coins paid to the City	-1,119,048		
Loan secured by Holland bond	+1,119,048		
	+0		+0
<u>Amortization and Chamber Reconciliation: Each year 1783-1791</u>			
ASSETS		LIABILITIES	
Unrestricted coins paid to the Bank	+28,571	+28,571	Accounts due to the Chamber
Reduction of loan principal	-22,857	-22,857	Accounts due from the Chamber (2.5% of 814,286)
		-2,285	Accounts due from the Chamber (.25% of 814,286)
			EQUITY
		+2,285	Income
	+5,714	+5,714	

Note that we do not write-off this loan, as we do typical City loans, for they did have an amortization schedule.

#### E. Amortization and Reconciliation in 1782

In 1782, the Bank was not paid the coin from the 1781 Holland bond (23,810), yet it still conducted the scheduled 1781 loan amortization. At the same time, the Bank also initiated the first Chamber reconciliation process, yet the City would not begin paying coin from the 1782 Holland bond (28,571) and would not begin amortizing the 1782 bank loan (22,857) until the next year. Table 5 gives the collection of balance sheet adjustments the Bank executed to produce a total liability-side increase of 29,524. This is the combined liability-side amortization and reconciliation adjustments from Table 3 and Table 5.

To bring the asset side into balance, the Bank made two accounting moves. It created a credit for 28,571. The credit was treated as if it was incoming coins: the credit resided in the Bank's coin room (*specie kamer*) accounts and was treated as a permanent part of the Bank's total metal stock.

The bank also increased the principal of the 1782 loan by 953. In 1783, amortization in 1783 proceeded from this increased level.

Table 6. Balance Sheet Effects of the 1782 Credits

ASSETS		LIABILITIES	
Reduction of 1781 loan principal	-23,810	+28,571	Accounts due to the Chamber
Increase in City loan principal	+23,810	-22,857	Accounts due from the Chamber (2.5% of 814,286)
Credit	+28,571	-2,285	Accounts due from the Chamber (.25% of 814,286)
Added to 1782 Loan principal	+953		
		+23,810	EQUITY
		+2,285	Non-income equity
			Income
	+29,524	+29,524	

#### F. New Lending to the Dutch East India Company

##### 1. Anticipations

Table 7 reports annual Company borrowing using anticipations. From 1775 through 1778, the longest maturity of any anticipation was 4 months. 1779, however, saw increased borrowing, and 1.7 million of that was not repaid for over a year. 1780 saw more heavy borrowing that was not repaid at all. It was, instead, restructured in late 1782. We categorize the Company's anticipations as in partial performance in the years 1779-1782, for principal and interest payments were delayed.



Table 7. Company Anticipation Performance

Fiscal year	New anticipations in millions of bank florin	Principal was	Longest maturity in months	Interest paid	Performance
1775	1.0	repaid	4	at maturity	Full
1776	2.2	repaid	4	at maturity	Full
1777	1.5	repaid	2	at maturity	Full
1778	2.9	repaid	4	at maturity	Full
1779	4.7	repaid	14	at maturity	Partial
1780	4.8	restructured	33	January 1782, October 1782	Partial
1781	none				
1782	0.3	restructured	8	October 1782	Partial

2. Restructuring of 1782

In early 1782, the Company was in negotiations with creditors holding anticipations. During this period, the Bank lent the Company an additional 300,000. Why, we cannot say. The final proposal was to convert anticipations paying 3 percent into long-term obligations paying 3 percent but also backed by province of Holland. To participate, however, creditors had to lend an additional 50 percent. The City accepted these terms. Whether as a testament to its desperation or the social cohesiveness of Dutch institutions, we cannot say. From October 1782 through January 1783, the Bank lent the Company 2,550,000 in bank florin accounts. By the end of the fiscal year in mid-January 1783, the Company debt secured on obligations stood at 7,650,000.

At the end of 1782, the Bank also added 126,285.7 to the Company's tab. We suspect that this is accrued interest.

3. Evergreen

For the years 1783-1785, the Company debt remains frozen: or "evergreen". The Company makes not payments. The Bank accrues no interest.

We categorize these years as non-performance.

4. Amortization: 1786-1792

Starting in 1786, the Company begins to make its annual interest payment of 229,500. It misses this payment in 1787, but it makes up for it in 1788. Instead of booking this as interest income, the Bank treats it as an amortization payment.

We categorize this as partial performance caused by the City. This follows from the view that the Company owed the Bank both principal and interest. In this, the Company debt differs from the Bank loans to the City secured by Holland bonds despite both sets of debts

having similar accounting effects of amortization with no interest. Because the 1781 and 1782 loans were to the City, any repayment was an improvement, so the City's no-interest, re-amortization commitment improved on the typical terms of nothing. For Company debt, however, no interest meant incomplete performance.

Why do we interpret the Company loans differently?

- At loan origination, the Bank gave money directly to the Company. For the other loans, the Bank gave the money directly to the City rather than Holland.
- Repayments to the Bank came directly from the Company while the other repayments came from the City.
- When the Bank lent to the Company on anticipations, it clearly expected the principal to be repaid at 3 percent. When the Bank "lent" to the City, it did not expect interest or even principal. For the 1781 loan, the Bank had a special volume that set out the schedule of amortization payments from the City and that recorded the actual payments.
- When the City recapitalized the Bank in 1791, it wrote down the 1781 and 1782 loans secured by the Holland obligations, but it did not write down any of the Company debts.

So, the Company's obligation to the Bank was for principal and interest, and the Bank only got principal. Of course, from the Company's perspective, the debt is in performance paying 3 percent interest with no amortization. The difference is the City forcing the Bank to treat the Company debt like the earlier City loans backed by Holland obligations. Again, we characterize this curious situation, from the Bank's perspective, as partial performance caused by the City.

#### 5. New Lending: 1787-1789.

In January 1788, the Company resumes new borrowing from the Bank. The Company borrows 991,150 in Spanish dollar coins from the Bank for one year. This loan is unusual because, normally, the Company borrows accounts. Also, these coins were encumbered (held under receipt). To free the coins, the necessary receipts are acquired (we assume without coercion). The Company also borrows the 2.5 basis points (2,477.875) needed to execute the receipt options. This loan is repaid with accounts and no interest.

In March 1788, the Company borrows 700,000 in accounts. This is repaid by June 1789 with interest of 3 percent.

Finally, in December 1789, the Company borrows 400,000 in accounts. This is repaid the next month with no interest.

#### G. New Loans to the City

Besides collecting the previous year's operating profit as a seigniorage dividend (908,249 over our sample), the City also frequently took extra money from the Bank and booked it as a loan. At

Table 8 reports, the City borrowed 4,733,143 over the decade. Traditionally, such loans were accounting placeholders, and 1.2 million took that form: the city took coin, paid no interest, and returned no principle. Our adjustment of the Bank’s balance sheet treats these loans as takings.

Table 8. City takings and repayments from 1780 through 1791.

		Dividends	Loans	Recapitalization
Taken	Coin	-908,249	-3,333,143	-1,973,196
	Account		-1,400,000	
Repaid	Coin		471,429	85,714
	Account		800,000	6,076,893
<u>Net by Category</u>		<u>-908,249</u>	<u>-3,461,714</u>	<u>4,189,411</u>
Total Net Taken		-180,551		

The 1780s, however, introduced exceptions. In 1781 and 1782, the City set up amortization schedules using Holland bonds to repay 2 million in loan over four decades. We do not write-off these loans. We treat them as performing, zero-interest, amortizing debts. Also, in 1783, the City repaid 800,000 (with interest) of a 1.4 million line of credit. We treat the remaining 600,000 as takings.

Even with these exceptions, the City loans took a net 3.5 million over the decade, over three times dividend takings. The recapitalization of 1791 offset this net taking. In effect, the City returned what it had taken since 1780.

In March-May 1785, the Bank lent 247,619.05 bf in metal to the City in the name of Surinam. The principal was sporadically reduced to 210,476.20 by the end of 1791 when the principal is written off. The nature of this loan is unclear, so we do not write it off in 1785, and we do not include it in the restructuring. Doing either would not change our overall findings.

II. Bank "Rekeningen 1783"

Van Dillen 1925, page 872, does not include a profit and loss reckoning for fiscal year 1782 because the summary table is missing from the 1782 cash book (AMA 5077/1409). We have reconstructed it table 9. Our information could not distinguish between expenses and sakjesgeld. Sakjesgeld averaged about 600 florin per year in our sample, so one could adjust sakjesgeld up (and expenses down) for such an amount.

Table 9. Changes in Balance Sheet Equity for Fiscal Year 1782  
(17 January 1783 in bank florin)

EQUITY	
<u>Profit and Loss</u>	
+29,476.15	Receipt Fees
+8,260	Interest on old Holland Obligation
+113,408.3	Interest from East India Company
+2,285	0.25% from Loan Chamber
+9,676	Interest from Loan Chamber
+10,225.5	Partygeld
0	Sakjesgeld?
-1,702.375	Courant geld operations
-28,652	Expenses?
142,976.625	Total Net Profit
<u>Other Equity Actions</u>	
-20,000	City Loan Write-down
-238,492.6	To Treasury
-212,000	To Treasury
+85,714.3	From Treasury
+23,809.55	City Obligation
+126,285.7	Credit for missed interest
-91,706.425	Total Change in Equity

### III. Accounting for Open Market Operations

When conducting open market operations in current guilder coins, the Bank of Amsterdam transacted in sacks of 600 guilder coins (6,366 grams at 91.7 percent fine at full ordinance: Dehing 1998, 76). The Bank booked these at 571.43 bank florin using an internal agio of 1.05 percent.

The Bank, however, did not buy or sell at that agio. When the Bank purchased coin, it booked the transaction as if it was at a 5 percent agio and then the Bank reimbursed the seller (out of the Bank's stock of change called *restant*) the difference between the Bank's internal 5 percent and the actual rate used for the purchase. Table 10 gives an example from January 30, 1778. The Bank purchased 42,000 current guilders (70 sacks of 600 coins each) at an agio of 4 7/8. Instead of creating 40,047.7 bank florins, the seller got 40,000 bank florins in account and 50 coins worth 47.62 bank florins.

Table 10. Example of Balance Sheet Accounting of Open Market Operations

ASSETS		LIABILITIES	
<u>Purchase at 4 7/8: 30 January 1778</u>			
42,000 coins	+40,000	+40,000	Accounts
50 coins from Bank	-47.62	-47.62	EQUITY Loss on purchase
	+39,952.38	+39,952.38	
<u>Sale at 4 5/8: 11 February 1778</u>			
ASSETS		LIABILITIES	
42,000 coins	-40,000	-40,000	Accounts
150 coins to Bank	+142.86	+142.86	EQUITY Gain on sale
	-39,857.14	-39,857.14	
+100 unrestricted coins	+95.24	+95.24	Profit

When the Bank sold coin, it booked the transaction as if it was at a 5 percent agio and then the buyer reimbursed the Bank (into the Bank's stock of change called *restant*) the difference between the Bank's internal 5 percent and the actual rate used for the sale. Table 10 gives an example from February 11, 1778. The Bank sold 40,000 bank florin at an agio of 4 5/8. Instead of handing out 41,850 guilders coins, the Bank handed out 42,000 (70 sacks of 600 coins each) and collected back 150 coins. The Bank booked the 150 coins at 142.86 bank florin.

In effect, the Bank paid a discount on purchases and received a premium on sales. The premium rate exceeded the discount rate if the sale agio was less than the purchase agio. The

Bank could make a profit if it bought guilders at a low price (high agio) and later sold them at a high price (low agio). In the Table 10 example, the Bank clears 95.24 bank florins (100 coins).