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# The Development of Opacity in U.S. Banking

Gary Gorton†

*An examination of U.S. banking history shows that economically efficient private bank money requires that information-revealing securities markets for bank liabilities be closed. That is, banks are optimally opaque, which is why they are regulated and examined. This Article examines the transition from private bank notes, the predominant form of money before the U.S. Civil War, to demand deposits and shows that financial markets closed endogenously. The opacity of bank money in the recent financial crisis is also discussed.*

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## Introduction

The financial crisis of 2007-2008 has led to widespread calls for “transparency.” Although some observers blame the crisis on a lack of transparency, they fail to recognize that banking is inherently opaque. Were it not, the financial industry would not be profitable. At the same time, it is its opacity that dictates the expansive (and necessary) regulatory regime covering the banking sector. Thus, calls for “transparency” are misguided.

The financial system and some financial instruments are too opaque and complex to support transparency. This may explain why regulators were unaware of the extent of the shadow banking system or the widespread use of

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certain novel financial instruments. This lack of awareness, in the eyes of the aforementioned observers, can be remedied by more transparency, their reasoning being the familiar notion that “sunshine is the best disinfectant.” In fact, the Dodd-Frank Act was in large part motivated by this concern; it mandated many new types of financial disclosure and created an independent office, the Office of Financial Research, which is charged with collecting data in order to inform the newly created Financial Stability Oversight Council.

Those who call for transparency can appeal to economics as well, at least in a very general sense; in many instances, economics implicitly suggests that transparency is a good thing. The theory of complete markets, for example, suggests that opening financial markets is good and closing them is bad. According to the theory, markets are optimal when they are complete, that is, when the existing financial claims are sufficient to construct any conceivable payoff, corresponding to any state of the world (in a world without frictions). Market completeness allows for the efficient hedging of risk, a desirable market characteristic.

Additionally, many observers believe that “market efficiency,” the ability of financial markets to quickly and accurately reflect changes in information, is also desirable. As that theory goes, the existence of informative financial markets allows markets to discipline banks. This mechanism, however, requires full information, which poses several problems. First, with deposit insurance depositors have no incentive to differentiate good banks from bad banks. Even for stock investors, there is little information. As Bartlett writes, “The problem with prevailing bank disclosures . . . is that they are generally limited to aggregated metrics that make it difficult to assess a bank’s credit concentrations, underwriting standards, or portfolio quality. . . . The second factor relates to the complexity of a bank’s investment activities.”<sup>1</sup>

Secrecy—even more so than a lack of transparency—surrounds banks. In fact, much of the financial regulatory infrastructure is precisely intended to make banks opaque to outsiders. Consider a few examples: the results of bank examinations are kept confidential by regulators and borrowing from the discount window is (supposed to be) kept secret; even important “special information” obtained by regulators pertaining to regulatory analysis is often not revealed. Last year, “[t]he Senate report on JPMorgan Chase’s London Whale fiasco revealed that federal regulators secretly downgraded the bank’s management rating last summer—a fact kept from investors and the public...”<sup>2</sup> During the crisis the Federal Reserve System did not reveal which institutions received emergency loans. And so on.

Although at first pass opacity may seem to stand in the way of efficiency, banks are special. At the root of their uniqueness is the fact that banks are

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1. Robert Bartlett, *Making Banks Transparent*, 65 VAND. L. REV. 293, 298-99 (2012).

2. John Carney, *JPMorgan Chase Secretly Downgraded by Bank Regulators*, CNBC, (Mar 20, 2013 12:02 ET), <http://www.cnbc.com/id/100573621#>.

actually *optimally opaque*. Accordingly, in contrast to others who call for transparency, in this paper I argue that banks should be opaque. To support my claim, I examine U.S. financial history and show that the production of private money by banks optimally involves closing informative financial markets where bank liabilities (i.e. debt and equity) are traded. The efficient use of these liabilities as money necessarily entails eliminating informative financial markets, so that they are accepted at par. However, the opacity that allows bank liabilities to be traded at par also makes them uniquely vulnerable to runs. This, I argue, is the rationalization for their regulation. A call for transparent banks is, then, oxymoronic; such an entity would be unable to serve the fundamental functions of a bank.

The output of a bank is its debt, which is used as money. This debt can take the form of demand deposits, private bank notes, sale and repurchase agreements, or other forms of short-term debt. In order to function efficiently as money, this debt must trade at par and maintain its value over time regardless of its location; that is, it must be accepted without any suspicion that it is worth less than its face value. In order for banks to operate efficiently, no information should become available to create such a suspicion and the value of the backing for bank debt must be kept secret. This may explain why banks predominantly lend to households and small businesses, entities for which there is little or no public information. Bank examiners do check banks' portfolios, but their assessments are also kept secret.

As mentioned above, this opacity has a cost: short-term bank debt is vulnerable to bank runs because the backing for the debt is not riskless. A bank run occurs when there is unexpected news of a coming recession or unexpected news of a decline in an important sector of the economy. In the event of a bank run, the holders of bank debt become suspicious about its backing. In most instances, this is the immediate cause of what we would call a financial crisis, which in actuality is an information event occurring when a sufficient number of bank debt holders become so suspicious of its backing that they seek to obtain their cash back en masse. Because the banking system cannot honor these demands all at once, institutions become insolvent. Hence the conundrum: the business of banking inherently requires opacity, but such opacity can result in bank runs. This is why banks are regulated and examined.

To support my thesis that banks are optimally opaque, this Article focuses on a historical example, tracing the historical transition from private bank notes to demand deposits in the United States. Rather than make the above points theoretically, I use U.S. history to show how this phenomenon occurred endogenously all while making the economy more efficient.<sup>3</sup> Although this transition is only one example, it suffices to make the point.

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3. The corresponding theory can be found in Gary Gorton and George Pennacchi, *Financial Intermediaries and Liquidity Creation*, 45 J. OF FIN. 49 (1993); Bengt Holmström, Prof. of Econ. and Mgmt., Dept. of Econ., M.I.T., Discussion of "The Panic of 2007," by Gary Gorton, Remarks at the 2008 Jackson Hole Conference at Federal Reserve Bank of Kansas City (October 14, 2008)

Before the U.S. Civil War, the predominant form of bank liabilities used as money was private bank notes. The federal government did not issue paper currency at that time, but banks issued their own paper currencies. Bank notes traded at a discounted value, revealing information about the issuing banks' backing assets. Additionally, bank equity traded in information-revealing stock markets. Gradually, demand deposits (checking) grew, and after the Civil War the U.S. government eventually imposed a tax on private bank notes, essentially forcing them out of existence.

Below, I describe how the transition from bank notes to demand deposits is instructive about the optimal form of banking and bank money because it involved closing informative bank note and stock markets in which bank liabilities traded and reducing the available information, so that demand deposits could more effectively function as money. This transition occurred endogenously, not as a result of regulation.

Later, I discuss how closing private bank note markets and bank stock markets was possible because a monitoring role developed centering on private bank clearing houses because they produced information about member bank risk, without revealing (most of) that information. During financial crises—essentially bank runs—clearing houses assumed the role of a central bank, acting as a lender-of-last-resort. They managed the information environment, further suppressing information about member banks while at the same time producing information during bank examinations that was kept secret from the public. The clearing houses also issued new liabilities, which were the joint liabilities of the member banks. These two acts—suppressing bank-specific information and issuing joint liabilities—effectively joined the members into a single banking system. Rather than focusing on whether any specific bank was weak, the clearing house, by these two acts, made the only relevant question whether *the banking system* as a whole was insolvent.

The idea that firms or other nonmarket organizations may be better than markets at allocating resources is hardly new.<sup>4</sup> What is different about banks is that the attendant financial markets must be shut down to produce efficient

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(transcript available at <http://isites.harvard.edu/fs/docs/icb.topic1002789.files/Week%2014%20-%20November%2029%20and%20December%201/Holmstrom-Discussion%20of%20the%20panic%20of%202007.pdf>); Bengt Holmström, Prof. of Econ. and Mgmt., Dept. of Econ., M.I.T., (2011), *The Nature of Liquidity Provision: When Ignorance is Bliss*, Presidential Address at the Econometric Society ASSA Meeting (Jan. 5, 2012) (transcript available at <http://economics.mit.edu/files/7500>); Tri Vi Dang, Gary Gorton, and Bengt Holmström, *Ignorance, Debt and Financial Crises*, (Mar. 11, 2013) (unpublished manuscript), [http://www.columbia.edu/~td2332/Paper\\_Ignorance.pdf](http://www.columbia.edu/~td2332/Paper_Ignorance.pdf); Tri Vi Dang, Gary Gorton, Bengt Holmström and Guillermo Ordonez, *Banks as Secret Keepers*, (NBER Working Paper No. 20255, 2014), <http://www.nber.org/papers/w20255.pdf>. These papers make the case that the optimal transaction medium is debt because debt minimizes the incentive to produce private information which can lead to adverse selection when the private money is used to trade. In order to privately create such money, banks are opaque. While this is socially optimal, it can lead to runs, which is why banks are regulated.

4. See, e.g., Ronald Coase (1937), *The Nature of the Firm*, 4 *ECONOMICA* 486 (1937); OLIVER WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS* (1975); Bengt Holmström, *The Firm as a Subeconomy*, 15 *J. OF L., ECON. & ORG.* 74 (1999).

private money. And this causes private bank clearing houses to assume the role of suppressing information, but also to assume a central bank-like role during financial crises and in non-crisis times. The clearing house is a unique organization; it is not a firm but it is necessary because bank-specific information had to be suppressed in order for banks to produce money. In the large part, the origin of the Federal Reserve System lies in these private bank clearing houses.

In the context of the above ideas, I briefly discuss the financial crisis of 2007-2008. I then move on to discuss what happened during the crisis, focusing on three particular international aspects of the period.

## I. U.S. Banking History

### A. *Private Bank Notes*

It is perhaps easiest to understand bank money by starting with the period of U.S. history when banks issued their own currency, 1837 to 1863, sometimes referred to as the Free Banking Era. This was a period, prior to the U.S. Civil War, during which the U.S. government did not issue paper money. It was also a period in which the use of demand deposits (checking accounts) was growing. I focus on the transition from private bank notes to demand deposits, and the concomitant alterations in the information environment concerning banks.<sup>5</sup>

A private bank note was a perpetual noninterest-bearing liability of a specific private bank. The note holder had the right to go back to the issuing bank at any time and demand redemption in gold or silver. The notes were printed in denominations similar to government money today, e.g., one dollar bills, five dollar bills, etc. During the Free Banking Era, there were around 1,500 different banks' currencies circulating at one time. Since these were the liabilities of private banks, these currencies were not riskless. When they circulated at any distance from the issuing bank—so that returning to redeem the money would take time or incur cost—the notes circulated at a discount.

The bank notes of nearby banks would be redeemable at par. For example, an individual in Boston holding a note of the First Bank of Boston could always go to the bank and ask for gold without bearing any real transportation costs or lost time. The bank was viewed as riskless over very short intervals of time and space. But, outside Boston there would be discounts on the notes' face values, and the discounts increased as the distance from the issuing Boston bank increased. For example, the bank notes of the First Bank of Boston would trade

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5. Not all states passed Free Banking laws, though banks in all states issued private currency. For background on the U.S. Free Banking Era see HUGH ROCKOFF, *THE FREE BANKING ERA: A REEXAMINATION* (1975); Arthur J Rolnick and Warren Weber, *New Evidence on the Free Banking Era*, 73 *AMER. ECON. REV.* 1080 (1983); Arthur J. Rolnick, and Warren Weber, *The Causes of Free Bank Failures*, 14 *J. OF MONETARY ECON.* 267 (1984); Gary Gorton, *Reputation Formation in Early Bank Note Markets*, 104 *J. OF POL. ECON.* 346 (1996); Gary Gorton, *Pricing Free Bank Notes*, 44 *J. OF MONETARY ECON.* 33 (1999).

at a discount from par in New York City; assuming a five percent discount from face value, that same note might only procure \$9.50 worth of goods 215 miles from Boston. The discount might be 10% in North Carolina, 15% in Georgia, and so on.

The discount was determined in informal note secondary markets in which note brokers traded bank notes. Note brokers trading on this market would then provide the price information to a “bank note reporter,” the financial press of the time,<sup>6</sup> which would then record and publish the information. Each large city had at least one bank note reporter, typically published monthly, that would list the discounts on all bank notes circulating in that particular area. For example, the Philadelphia bank note reporter *Van Court's Counterfeit Detector and Bank Note List* covered 3,089 banks in 35 states, territories, and provinces of Canada.<sup>7</sup> In order to transact with a customer, a storekeeper would look up the discount in the local bank note reporter.

Figure 1 shows the discount applied to notes issued by the Bank of Virginia, expressed as a percent of the notes' face value, in Philadelphia over a span of nearly 30 years. Most of the time the discount is low, but there is significant volatility. In the face of such volatility, the bank note reporter's role was to provide market participants with the discount at the time of the transaction. Table 1 further provides a sense of the variation in note discounts by showing the average annual discount applied in Philadelphia to notes issued by Ohioan and South Carolinian banks.<sup>8</sup> As can be seen from the Table, the discounts' mean as well as their standard deviation are both much larger for the notes issued in Ohio than those issued in South Carolina. State banking systems were regulated differently, so the risk could differ even when disregarding distance. Clearly, discounts were more than just a function of distance; they varied over time, sometimes rather dramatically, and standard deviations did not remain constant across intervals.

Although distance was not entirely explanatory, it was important. As the distance from a bank increased, the likelihood that its notes would circulate at the same discount decreased. Typically, notes from very distant locations would not circulate at all. One would not expect to see an active market for the notes of Wyoming banks in Philadelphia, which meant that price information was not published for these banks, which further reduced the chances that an active market would develop. Over time, discounts decreased as technological change occurred, with innovations like the railroad making it significantly easier to return notes to a far-away issuing bank.

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6. WILLIAM DILLISTIN, *BANK NOTE REPORTERS AND COUNTERFEIT DETECTORS*, 1826-1866 at 114 (1949).

7. Gary Gorton, *An Introduction to Van Court's Bank Note Reporter and Counterfeit Detector*, data appendix (July, 1989) (unpublished manuscript) <http://faculty.som.yale.edu/garygorton/documents/Introvan-court.pdf>.

8. *Id.* at appendix.

The bank note market was efficient, at least in the financial economics sense of the term “market efficiency.” Note prices contained and revealed information about the issuing banks. The discounts on notes some distance from the issuing bank accurately reflected the bank’s risk, incorporating into that calculation the fact that it would take time to get to that bank (the effective maturity of the note), during which the bank could fail.<sup>9</sup> Further, the discounts functioned to discipline new banks. The discounts on the notes of new banks were higher than the discounts on the notes of more established banks in the same area, creating an incentive for note holders to go back and demand cash. The higher discount thus rewarded those monitoring new banks.<sup>10</sup> In sum, bank note markets functioned as what we would traditionally consider “efficient” markets: the discounts were informative about bank risk and price information was disseminated widely and often. Banks at the same location competed, and the note market enforced common fundamental risk at these banks.

While the note market was efficient from the point of view of the note discounts, there was a market failure: the banking system as a whole was not economically efficient. That is, transactions with these notes did not lead to the best allocation of goods and services. The problem was that the costs of transacting with bank notes were high. Sumner explains this in his *History of Banking*<sup>11</sup>:

The bank- note detector did not become divested of its useful but contemptible function until the national bank system was founded [creating government money]. It is difficult for the modern student to realize that there were hundreds of banks whose notes circulated in any given community. The bank- notes were bits of paper recognizable as a species by shape, color, size and engraved work. Any piece of paper which had these came with the prestige of money; the only thing in the shape of money to which the people were accustomed. The person to whom one of them was offered, if unskilled in trade and banking, had little choice but to take it. A merchant turned to his ‘detector.’ He scrutinized the worn and dirty scrap for two or three minutes, regarding it was more probably ‘good’ if it were worn and dirty than if it was clean, because those features were proof of long and successful circulation. He turned it up to the light and looked through it, because it was the custom of the banks to file the notes on slender pins which made holes through them. If there were many such holes the note had been often in bank and its genuineness was ratified. All the delay and trouble of these operations were so much deduction from the character of the notes as current cash. A community forced to do its business in that way had no money. It was deprived of the advantages of money. We would expect that a free, self-governing, and, at times, obstreperous, people would have refused and rejected these notes with scorn, and would have made their circulation impossible, but the American people did not. They treated the system with toleration and

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9. See Gorton, *Pricing Free Bank Notes*, supra note 5, at 33-64.

10. See Gorton, *Reputation Formation*, supra note 5, at 346-97.

11. WILLIAM GRAHAM SUMNER, *HISTORY OF BANKING IN ALL THE LEADING NATIONS* (1896).

respect. A parallel to the state of things which existed, even in New England, will be sought in vain in the history of currency.<sup>12</sup>

These complaints were commonplace during the Free Banking Era. Thus, although the discounts reflected an individual bank's risk, there was a market failure in terms of private banks being able to produce debt that could be used as money without the concomitant disadvantages of bank notes. Bank notes were not an efficient transaction medium.

### *B. The Rise of Demand Deposits*

The demand deposit, more commonly known as the checking account, was a financial innovation that grew enormously during the years before the U.S. Civil War. Checking accounts had several advantages over private bank notes. For example, they paid interest and locally they were accepted at the value the payer denominated (i.e., there was no discount on local checks). Their main disadvantage was that checks not only depended on the financial health of the bank, but the person writing the check also had to have the denominated amount in his or her bank account. Accordingly, a check is considered a "double claim," meaning it is a claim on both a specific bank and a specific person's account. Markets for such specific claims would be very thin; it would be too costly to have an efficient secondary market across any geographical scope in the checks of an individual person at their specific banks. For this reason, checks first grew in urban areas where a person's identity was most easily verified and individuals engaged in repeat transactions. One way to think of the discount initially applied to checks is that it was either zero percent or 100 percent. Out-of-town checks had a 100 percent discount, while local checks had zero percent discount. It took some time for out-of-town checks to become accepted.

The checks written on Bank A would be deposited at Bank B, and Bank B had to present the check to Bank A for payment. With many checks, the process of clearing, in which banks would send messengers to one another to present checks for payment, quickly became extremely cumbersome. As a result, clearing houses were established to allow banks to submit and receive checks from other banks in a single location.

### *C. The Clearing Process*

The first clearing house in the United States was established in New York City in 1853, and such establishments subsequently spread across the nation.<sup>13</sup>

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12. *Id.* at 455.

13. See J. S. GIBBONS, *THE BANKS OF NEW YORK, THEIR DEALERS, THE CLEARINGHOUSE, AND THE PANIC OF 1857* (1859); JAMES CANNON *CLEARINGHOUSES* (1951), REDLICH, FRITZ *THE MOLDING OF AMERICAN BANKING* (1951); Gary Gorton, *Private Bank Clearinghouses and the Origins of Central Banking*, 3 *BUS. REV. FED. RESERVE BANK OF PHILA.* 12 (1984); Gary Gorton,

In the clearing process, imagine that Bank A faces Bank B. At  $t_1$ , Bank A cashes a check written by an individual with an account at Bank B. Until that check is cleared, i.e. until Bank A is compensated for the cash it paid in exchange for the check written from an account at Bank B, Bank A is exposed to the risk that Bank B might fail. This counterparty risk, as we would call it today, meant that the clearing house took on other responsibilities related to monitoring member banks. Clearing houses imposed capital requirements, reserve requirements, interest rate restrictions, ongoing audits, and reporting requirements.<sup>14</sup> In the process of clearing, the clearing house became informed about the state of individual member banks and, in fact, started a bank examination process. The results of examinations were kept secret, but the clearing house did require members to publish balance sheet information weekly in newspapers.<sup>15</sup> As Bolles explained:

The extent of the supervision exercised by this association over its members the public will never know, because it is best that much of it remain secret. The banks thus associated learn more about one another than they ever would if acting entirely alone and examinations are made, and warnings given, of which the public has no knowledge. The direct interest that every bank has in knowing the true condition of every other member is one of the great merits of the system.<sup>16</sup>

The clearing process produced information, as did clearing house member bank examinations, but other than the information that was required to be made public, none was revealed. In other words, because there were no discounts to the face value of demand deposits, and because the information garnered by the clearing house was not made public, information on note discounts was effectively lost to the public. But it was still produced and the clearing house acted on this information. This lack of information was required for checks to be accepted at par between members of the general public. If the two parties understand that neither party has any secret information about the risk of the bank such that the uninformed party is taken advantage of, then the check will trade at par.

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*Clearinghouses and the Origin of Central Banking in the United States*, 45 J. OF ECON. HIST. 277 (1985); Richard Timberlake, *The Central Banking Role of Clearinghouse Associations*, 16 J. OF MONEY, CREDIT AND BANKING 1 (1984); Gary Gorton and Don Mullineaux, *The Joint Production of Confidence: Endogenous Regulation and Nineteenth Century Commercial Bank Clearinghouses*, 19 J. OF MONEY, CREDIT, AND BANKING 458 (1987).

14. CANNON, *supra* note 13.

15. On clearing house bank examinations see ALBERT BOLLES, PRACTICAL BANKING (11th ed. 1903); CANNON, *supra* note 13; Gordon Smith, *Clearing-House Examinations*, 76 BANKERS' MAG. 177 (1908) (describing the government bank examinations as "defective").

16. Bolles, *supra* note 15, at 379.

*D. Bank Stock*

Although Clearing houses replaced bank note markets and kept the information about the risk of individual banks secret, what about bank stock prices? Bank stock prices, which in the Free Banking Era were publicly available in New York City for large banks, should have revealed information about banks' health because, assumingly, the stock prices were efficient. Such information-revealing prices would also reveal information about bank risk and accordingly could have led to discounts on checks or runs on banks. Why did neither occur?

The answer is quite straightforward: banks effectively closed the market for bank stocks by taking actions to ensure that their stock remained illiquid.<sup>17</sup> Goetzmann and Ibbotson collected individual firm stock prices for NYSE stocks over the period 1815-1925. They exhaustively collected stock prices from a variety of sources, covering over 600 companies during the sample period. Their data display an interesting phenomenon, which is portrayed in Figure 3. The figure graphs the total number of companies with actively traded stock in their sample, and the total number of banks in the sample with traded stock. Bank stocks were quite prevalent up to 1872, after which they disappear.

Stock illiquidity was accomplished by maintaining a low number of issued shares, keeping the price of a single share very high. Shares remained out of the reach of most investors and bank stock ownership remained concentrated. According to Loeser:

“For a long time the stocks of these institutions [bank, trust, and insurance companies], particularly the leading ones, were looked upon as ‘rich men’s investments.’ . . . In other instances there was a high degree of concentration of shareholdings among family groups and groups of business associates and other with allied interests.”<sup>18</sup>

Banks recognized that fluctuations in stock prices, in particular declines in a stock price, could lead to bank runs because the informative price could reveal that the backing assets had declined in value. As Stevenson put it:

No bank can long exist without a complete trust on the part of the depositors. If stories which affect the bank's standing and character seem to be a part of the speculative tactics, should they grow, which may cause panic, then it is incumbent that those in the management of large banks see to it, as far as in their power to, and prevent the dealing of bank stocks and their quotations on the stock exchanges of the country.<sup>19</sup>

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17. William Goetzmann, Roger Ibbotson and Liang Peng, *A New Historical Database for the NYSE 1815-1925: Performance and Predictability*, 4 J. OF FIN. MARKETS 1 (2001).

18. JOHN LOESER, *THE OVER-THE-COUNTER SECURITIES MARKET* 158 (1940).

19. Charles Stevenson, *Speculation in Bank Stocks*, 81 BANKERS' MAG. 337, 341 (1910).

Also Loeser noted:

Within the past decade, with one exception, leading banks with issues listed in New York had their issues removed from listing. Many banks in other cities also delisted their securities. The reason generally given for this voluntary delisting was that the banks were apprehensive that the publicity which might be given to prices declines of their issues on the exchanges might be misconstrued by the public and might affect the confidence of depositors adversely.<sup>20</sup>

The transition to demand deposits entailed making *bank stocks* illiquid, so that their prices would be uninformative. O'Sullivan stated that: "For the most part, bank stocks were not widely traded."<sup>21</sup>

The Federal Reserve System was founded in 1914 with the express purpose of preventing banking panics. Indeed, it did prevent a panic in 1920.<sup>22</sup> For a brief period in the 1920s, the following banks were listed on the New York Stock Exchange:

Bank of America, 1927-1928  
Bank Manhattan, 1927-1928  
Bank of New York, 1927-1929  
Chase National Bank, 1927-1928  
Chatham Phoenix National Bank, 1927-1928  
Chemical National Bank, 1927-1928  
Commerce Guardian Trust & Savings Bank, 1927-1929  
Continental Bank, 1927-1930  
Corn Exchange National Bank, 1927-1954  
Farmers Loan & Trust, 1927-1928  
Hanover National Bank, 1927-1929  
National City, 1927-1928  
National Park, 1927-1929

However, the banks quickly delisted after a few years. The Corn Exchange is the only bank that remained listed after January 1930.

The lack of information about banks persisted, even after deposit insurance was adopted in 1934. In 1964 the U.S. House of Representatives

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20. Loeser, *supra* note 18, at 160-61

21. Mary O'Sullivan, *The Expansion of the U.S. Stock Market, 1885-1930: Historical Facts and Theoretical Fashions*, 8 ENTERPRISE & SOC. 489, 517 (2007).

22. Gary Gorton, *Banking Panics and Business Cycles*, 40 OXFORD ECON. PAPERS, 751 (1988); Gary Gorton and Andrew Metrick, *The Federal Reserve and Panic Prevention: The Role of Financial Regulation and Lender of Last Resort*, 27 J. OF ECON. PERSPECTIVES 45 (2013).

commissioned a study on the issue of bank opacity as it related to bank equity holders. The committee noted that:

Stockholders of banks in many cases receive little or no information concerning the financial results of their bank's operations. Less than 50 percent of all banks publish annual reports. Of those who publish annual reports, 29 percent do not reveal the size of their valuation reserves. Before-tax earnings are not disclosed by 36 percent of all banks and after tax earnings are not disclosed by 34 percent of all banks.<sup>23</sup>

The report contained Table 2 below, which shows the number of shares traded in 1962 and the number of shares outstanding. Surprisingly, the number of shares traded monotonically declines in number of shares outstanding. In other words, larger banks with more shares outstanding have the lowest number of shares traded. The total annual trading volume of bank shares on the New York Stock Exchange is shown in Figure 4. Until the early 1960s bank stock did not actively trade.

In the transition from bank notes to demand deposits two information-revealing markets closed: the market for bank notes which set the discounts and bank stock markets. Closing information-revealing markets that would reveal bank risk was economically efficient because bank liabilities could then be accepted at par, avoiding the transaction costs associated with bank notes. However, this does not mean that information should not be produced to distinguish good banks from bad ones, only that it is the job of the bank regulators to process this information.

Demand deposits were the "shadow banking" system of the National Banking Era, 1863-1914. It was thought that panics would end once the government entered the business of paper currency during the Civil War. But, panics still led to runs when people suspected inadequate backing of the checking accounts. Economists and regulators were not sure of the extent to which checks were used as a transaction medium, and panics persisted until the advent of deposit insurance.

## II. Clearing Houses and Pre-Fed Financial Crises

Before the Federal Reserve came into existence, financial crises were managed by the private bank clearing houses, which acted as lenders-of-last-resort. To be clear, a financial crisis is just a bank run; it occurs when demand deposit holders no longer wish to hold a bank's short term debt and instead want their cash back. Frequently, the debt holders want their cash in hand

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23. SUBCOMM. ON DOMESTIC FIN., H. COMM. ON BANKING AND CURRENCY, 88TH CONG., THE MARKET FOR BANK STOCK (Subcomm. Print 1964)

because they believe a coming recession threatens the financial health of the bank.<sup>24</sup>

Before the Fed, bank opacity prevented note holders from distinguishing which banks were weak and which were strong enough to weather an impending recession.<sup>25</sup> Hence, all banks were run on indiscriminately. Because this happened to the entire banking system at the same time, banks could not possibly honor the demands for cash. Because their assets—mostly loans—could not be sold, there was no way to raise the cash needed to repay depositors in the short-term. Should such a crisis occur, the entire banking system would become insolvent because the debt holders' contractual right to ask for cash could not possibly be honored.

The first act of the clearing house when a crisis started was to cut off the publication of bank-specific information, usually followed by suspension of check convertibility. In other words, banks would refuse to pay cash to redeem checks.<sup>26</sup> During normal times, the clearing house required members to publish balance sheet information; newspapers published these numbers weekly. This bank-specific information might identify the weaker banks, which would then be subject to runs. To stop the desire to run on the banks, the clearing house had to convince bank debt holders that the member banks were solvent, and that the bank's assets were illiquid but it was not in default. This required management of the information environment in two very specific ways. First, a securities market had to be *created* to reveal information about the solvency of all member banks jointly.<sup>27</sup> Such a market would ideally encompass the entire banking system. Secondly, the clearing house needed to convince the public that certain banks, those subject to persisting rumors of weakness, were, in fact, solvent.

The clearing house also had to address the illiquidity problem. After suspension occurred, the clearinghouse issued "clearing house loan certificates," a new form of private money that could be used in the clearing process instead of cash.<sup>28</sup> Loan certificates were the joint liability of clearing house members. In other words, the banks banded together formally by assuming this joint liability. The prospect of this happening meant that in normal times the member banks had an incentive to monitor each other.<sup>29</sup>

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24. Gorton, *supra* note 22, at 751-81.

25. Gary Gorton, *Bank Suspension of Convertibility*, 15 J. OF MONETARY ECON. 177 (1985).

26. This was always illegal but never enforced. GARY GORTON, *MISUNDERSTANDING FINANCIAL CRISES* (2012).

27. The New York clearing house members were the largest banks in the country and held most of the banking system's reserves, so the solvency of the New York Clearing House was effectively the solvency of the banking system.

28. Clearing house loan certificates were not permanent. They would all be retired at the end of the crisis.

29. Gary Gorton and Lixin Huang, *Banking Panics and Endogenous Coalition Formation*, 53 J. OF MONETARY ECON. 1613 (2006).

Individual member banks would apply to a clearing house committee for loan certificates, offering collateral from their balance sheets and the clearing house went to great lengths to protect the identity of banks that borrowed loan certificates. Preventing leaks concerning the loan certificate borrowings of individual clearing house members was important for preventing signs of weakness at banks with large borrowings.<sup>30</sup>

By issuing loan certificates, the clearing house could buy bank assets and economize on the use of cash in the clearing process (where the certificates were accepted as cash) so that cash could be handed out to depositors. Later, clearing house loan certificates were issued directly to the public.<sup>31</sup> Additionally, certified checks—checks not dependent on any single account—circulated as cash, and banks accepted them as cash in the clearing process. Further, the checks were stamped “Only Payable Through the Clearing House.” This meant that they were the joint liability of the clearing house, rather than of a single bank. A times, these checks circulated as a hand-to-hand currency.

Importantly, by agreeing that certified checks were acceptable as money, the clearing house created a market in these checks. The currency premium on these checks—the excess that needed to be paid to receive a dollar of cash—was reported in newspapers. In effect, an informative financial market was created where the risk of clearing house failure was priced by the application of the currency premium.

Figure 5 shows the high and low currency premiums during the Panic of 1873. The high was five percent, meaning that \$1.05 of certified checks was needed to buy a dollar of cash. The Figure also shows a decline in the currency premium, which led to the end of the crisis. If information suggested the clearing house was solvent, it would be impounded in the price so the premium would go down. When there was no longer a premium on checks issued by the clearing house, the conversion of regular checks into currency resumed.

During a crisis, the clearing house would send special examination teams to study the health of certain specific banks that were the subject of rumors. In the case of a special examination during suspension, the results of the examination were publicized with a certificate of financial health issued by the Clearing House Committee. These certificates would be issued even if privately the Clearing House Committee had reservations about the bank’s solvency. The certificates issued by the Committee simply stated that the specific bank was solvent; no detailed information was released. In fact, the detailed results of clearing house examinations were never made public, even in normal times, although bailouts of member banks were public. There were thirteen special

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30. This was later the underpinning of the Federal Reserve’s discount window when the central bank was established in 1914. Discount window borrowing was to be kept secret.

31. Gorton, *Private Bank Clearinghouses*, *supra* note 13, at 3-12.

examinations conducted during the five panics of the National Banking Era, 1863-1914.<sup>32</sup>

During the National Banking Era, the New York Clearing House had around sixty members, the largest banks in the country. In the five major panics (1873, 1884, 1890, 1893, 1907) a total of five members failed.

A clearing house, or a clearing system, is a necessary component of a financial system that uses checks as money. Clearing houses replaced the bank note market, and bank stocks stopped trading as well. There was no information leakage and so checks traded at their face value. During a bank run, the clearing house first suppressed all bank-specific information, so individual banks would not face runs. A market, however, did materialize—a market for claims on the clearing house. The prices of these claims revealed information about the banking system.

The opacity of banks was endogenously created in order for checks to trade at par. The vulnerability of banks to runs meant that the clearing house had to take a central bank-like role as a lender-of-last-resort. This role entailed managing the information environment during a crisis. This delicate task meant preventing the revelation of some information while producing and revealing other information. Notably, “transparency” was never the goal, nor would it have been advisable.

### III. The Financial Crisis of 2007-2008

The response of the central bank and the government to the financial crisis of 2007-2008 was reminiscent of previous responses in the 19th century. The crisis was an information event, and the information environment had to be managed, most particularly by suppressing some information, hiding some information, and producing and announcing other information.

With the advent of deposit insurance in 1934, depositors had no incentives to produce information about their banks. Deposit insurance guarantees opacity in the sense that no market participants writing checks need worry about the risk of the bank issuing the deposits. Checks are accepted without a second thought (about the solvency of the bank). The government’s bank examiners look after the banks and the results of their examinations are kept secret.

Banking systems, however, evolve and so do the forms of bank money. Market economies are not static. Just as checks came to replace private bank notes, new forms of bank money have appeared to supplement or even replace checking. Indeed, the issue of bank opacity has arisen again with the growth of the “shadow banking system,” which refers to a large market in which

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32. Gary Gorton and Ellis Talman, *How Did Banking Panics End?* (Apr. 1, 2014) (unpublished manuscript), <http://economics.rutgers.edu/dmdocuments/GaryGorton.pdf>

uninsured short-term bank debt plays a role similar to demand deposits, except that the depositors are large institutions.<sup>33</sup>

In the modern era bank money has expanded to include sale and repurchase agreements (“repo”) and asset-backed commercial paper (ABCP). These forms of bank debt are issued by financial intermediaries that are not regulated as commercial banks. ABCP was issued by special purpose vehicles that used the proceeds of issuing the paper to buy asset-backed securities (ABS), which are bonds backed by portfolios of loans, mortgages, auto loans, credit card receivables, etc.<sup>34</sup> Similarly, sale and repurchase agreements (“repo”) often used ABS as collateral.

Repo is a form of bank money, which has grown to rival the size of the market for demand deposits. This growth is not surprising given how much the world has changed. In particular, institutional investors, pension funds, asset managers, and sovereign wealth funds now dominate global financial markets. Large non-financial firms hold enormous amounts of cash. For these entities there is no insured checking account large enough to accommodate the size of their desired deposits. To meet their demand for a short-term store of value that is safe and that earns interest, the repo market grew enormously.

In a repo, a depositor (lender) deposits money with a dealer bank, usually overnight, and receives interest. To ensure the safety of these deposits, the loan is backed by collateral in the form of bonds (with a market value equal to the amount lent). The depositor takes possession of the bonds. The bonds might be U.S. Treasury bonds; before the crisis, however, there was a shortage of this form of collateral and much of repo was backed by privately-produced debt, namely, asset-backed securities.

In traditional banking, the bank offers, say, three percent interest to depositors and lends the money to a home-buyer at six percent. The bank earns the spread, six percent minus three percent. In repo, the depositor is offered three percent, and takes collateral of, for example, a mortgage-backed security which earns six percent. The six percent goes to the bank, so the bank earns the same spread of six minus three. Furthermore, the two systems are intimately related because the traditional bank no longer holds the mortgage on its balance sheet. It ends up being financed in the capital markets when it is securitized: turned into a bond which is backed by a portfolio of mortgages. In short, repo ends up financing traditional bank loans. The point is that “shadow banking” is genuine banking, and not some aberration.

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33. See generally GARY GORTON, *SLAPPED BY THE INVISIBLE HAND: THE PANIC OF 2007* (2010); GARY GORTON, *MISUNDERSTANDING FINANCIAL CRISES* (2012); Gary Gorton & Andrew Metrick, *Securitized Banking and the Run on Repo*, 104 J. FIN. ECON. 425 (2012); GARY GORTON & ANDREW METRICK, *Securitization*, in 2 HANDBOOK OF THE ECONOMICS OF FINANCE 1 (George Constantinides et al. eds., 2012).

34. *Id.*; see also GARY GORTON & NICHOLAS S. SOULELES, *Special Purpose Vehicles and Securitization*, in *THE RISKS OF FINANCIAL INSTITUTIONS* (Rene Stulz & Mark Carey eds., 2006).

ABCP is similar to repo, although ABCP is often one to four day maturity and repo is usually overnight. These liabilities serve as a kind of money for large institutions. The short maturity is essential in order for depositors to have flexible access to their cash. In order for this to function as money the backing collateral must be opaque, as discussed above. For this purpose ABSs are ideal. ABSs consist of layers of bonds ordered by seniority (called “tranches”) linked to the same large portfolios of loans.<sup>35</sup> The loan portfolios are homogeneous: for example they are all auto loans or all prime mortgages. Asset classes are never mixed in a portfolio. Also, and importantly, ABSs have no traded equity. The equity component of the transaction is held by the originator. ABSs are complicated, opaque, and it is not profitable in normal times to perform credit analysis on them. Since ABSs have no traded equity, no information is revealed through credit analysis.

Opacity is what makes asset-backed securities ideal for the collateral backing asset-backed commercial paper and repo. Indeed, shadow banking consists of repo and ABCP backed by bonds linked to portfolios of loans. This is real banking: loans are financed by deposits (repo), of institutional investors who have a demand for this kind of interest-earning, short-term, saving. This bank money works because the ABS is opaque. Like the older banking system, shadow banking is vulnerable to runs, just as the older banking system was prior to deposit insurance.

#### *A. What Happened During The Crisis?*

The financial crisis of 2007-2008 was a bank run on repo and ABCP. Depositors began to worry about the ABS backing their loans and refused to renew their loans. Unlike the bank runs of the nineteenth century and the Great Depression, this run was not visible unless you were on a trading floor. During a bank run banks must raise cash to meet withdrawal requests. No one will lend to them in the crisis and they end up having to sell securities, causing bond prices to plummet. Bond markets and ABS markets, however, are over-the-counter, and the plummeting prices were not widely observed. Outsider observers saw the effects of the run: large banks could not raise enough money and verged on insolvency. Federal Reserve Chairman Ben Bernanke, in his Financial Crisis Inquiry Commission testimony, noted that of the “13 . . . most important financial institutions in the United States, 12 were at the risk of failure within a period of a week or two”.<sup>36</sup>

All market economies have faced the problem of bank runs, although some countries have avoided the problem for long periods of time. Every government that has faced a bank run so far has found a way to keep from

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35. *Id.*

36. *Causes of the Recent Financial and Economic Crisis: Hearing Before the Fin. Crisis Inquiry Comm.*, 111th Cong. (2010) (statement of Ben Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys.), <http://www.federalreserve.gov/newsevents/testimony/bernanke20100902a.htm>.

liquidating its banking system. There have been bailouts, nationalizations, blanket guarantees, and so on. All of these mechanisms are fundamentally different ways of dispelling the suspicions of depositors. The government, by virtue of its taxing power, can (usually) do what the private sector cannot—eliminate suspicions about the collateral backing private money.

### *B. Overcoming Stigma*

I now focus on some aspects of the recent financial crisis that relate to the information environment. I highlight the information issues faced by the government and show that the policy goal was to suppress information.

The first issue concerns “stigma.” Stigma refers to the negative effects that accrue to a bank when information about the bank’s borrowing from the discount window is made public. This is perceived to be a sign of weakness, potentially leading to a run on that bank. Fed Chairman Bernanke: “Many banks . . . were evidently concerned that if they borrowed from the discount window, and that fact somehow became known to market participants, they would be perceived as weak and, consequently, might come under further pressure from creditors. To address this so-called stigma problem, the Federal Reserve created a new discount window program, the Term Auction Facility (TAF).”<sup>37</sup>

Stigma has historically been a problem for policy-makers. In the pre-Federal Reserve period the clearing houses kept secret how many loan certificates each member borrowed. This secrecy was continued by the Federal Reserve with respect to the discount window. Unfortunately, information inevitably leaks out and banks are thus reluctant to use the discount window.

To overcome this problem during the crisis the Federal Reserve designed special lending programs that were based on auctions. The Term Auction Facility (TAF) and other programs obscured which banks were trying to borrow by keeping secret which banks were bidding, how much they were bidding, how much they wanted, and which banks ultimately received funds. This information was kept secret and since the auction was a coordination mechanism—getting a large number of banks to come to borrow at once—no single bank was stigmatized as weak. Armantier, Ghysels, Sarkar, and Shrader studied TAF and found that “banks were willing to pay an average premium of at least 37 basis points (and 150 basis points after Lehman’s bankruptcy) to borrow from the Term Auction Facility rather than from the discount window.”<sup>38</sup>

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37. *Federal Reserve’s Exit Strategy: Hearing Before the Comm. on Fin. Services*, 111th Cong. (2010) (statement of Ben Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys.) <http://www.federalreserve.gov/newsevents/testimony/bernanke20100210a.pdf>.

38. OLIVIER ARMANTIER ET AL., DISCOUNT WINDOW STIGMA DURING THE 2007-2008 FINANCIAL CRISIS, N.Y. FEDERAL RESERVE BANK STAFF REPORT NO. 483 (2011), [http://www.newyorkfed.org/research/staff\\_reports/sr483.pdf](http://www.newyorkfed.org/research/staff_reports/sr483.pdf).

Lending to institutions through the Troubled Asset Relief Program (TARP) was also kept secret.<sup>39</sup> The special lending programs set up by the Fed during the financial crisis, like the clearing house loan certificates, required secrecy so that individual banks would not be singled out by the market.

### *C. Banning Short Sales of Bank Stocks*

Wouldn't stock market prices reveal which banks were weak? The market did indeed reveal which banks were weaker, but not by how much.<sup>40</sup> The Federal Reserve undertook "stress tests" to determine how much capital was needed by each bank. The stress tests (Supervisory Capital Assessment Program, SCAP) were introduced in February 2009. Ten of the 19 largest bank holding companies that underwent the SCAP were required to raise equity capital by \$75 billion in total. Peristiani, Morgan and Savino studied the market response to the announcement; it was positive for banks that were required to raise equity. There was no stock price response (abnormal return) for banks that were not required to raise equity.<sup>41</sup>

The SCAP was the only instance where the Federal Reserve produced information and announced it during the crisis. But the Fed only announced how much capital each bank would need. SCAP was essentially the modern counterpart to the clearing houses' special examinations of members during crises. In both cases, the details of the examinations were not announced—only a conclusion was announced.

Finally, informative stock prices were viewed as a problem during the financial crisis. In 2008 the U.S. Securities and Exchange Commission (SEC) (and, in England, the Financial Services Authority) banned short sales of the stock of seventeen large financial firms and also Fannie Mae and Freddie Mac. At the time the SEC wrote:

False rumors can lead to a loss of confidence in our markets. Such loss of confidence can lead to panic selling, which may be further exacerbated by "naked" short selling. As a result, the prices of securities may artificially and unnecessarily decline well below the price level that would have resulted from the normal price discovery process. If significant financial institutions are involved, this chain of events can threaten disruption of our markets.<sup>42</sup>

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39. Pub. L. No. 110-343 (establishing the Troubled Asset Relief Program (TARP) for the purpose of enabling the Treasury to purchase and guarantee of "troubled assets").

40. STAVROS PERISTIAN ET AL., THE INFORMATION VALUE OF THE STRESS TEST AND BANK OPACITY, N. Y. FEDERAL RESERVE BANK STAFF REPORT NO. 460 (2010).

41. *Id.*

42. Emergency Order Pursuant to Section 12(k)(2) of the Securities Exchange Act of 1934 Taking Temporary Action To Respond to Market Developments, Exchange Act Release No. 58166, 73 Fed. Reg. 42,379 (July 15, 2008), <http://www.sec.gov/rules/other/2008/34-58166.pdf>.

Later, in September 2008, the SEC temporarily prohibited short selling of the stocks of approximately 800 financial firms, required institutional money managers to report short sales and short positions in certain securities. The SEC also eased restrictions on the ability of issuers to repurchase their securities.<sup>43</sup>

The short sales bans were attempts to suppress bank-specific information. The academic studies to date show that the short sale bans reduced market liquidity and hindered price discovery, exactly what the bans were intended to do.<sup>44</sup> The academics, however, view short sales bans as misguided. In the context of the financial crisis, it appears to have been an attempt to cut off information about specific banks, and to keep the runs from concentrating on the weak banks. Until the early 1960's bank stocks were already endogenously illiquid and so there could not be short sales. During financial crises then there was no need to ban short sales. In the recent crisis though, the information-revealing feature of stock markets were viewed as a problem by the SEC. Information that would have revealed weaker banks could have led to runs on those banks. To prevent such runs the SEC cut off information to the market.

Note that to the extent that the short sales bans were successful, investors traded stocks at the wrong prices. Some investors got gains they would not otherwise have gotten, and their trading partners got losses that they would not otherwise have gotten. But, this was—implicitly—viewed as the price for avoiding liquidating the banking system.

#### *D. The Overlooked Problems*

Lack of transparency certainly played a role in the crisis. The very vulnerability of banks lies in the fact that they are subject to bank runs.

When we observe a phenomenon such as bank runs happening over and over again in market economies throughout history, there is a root problem, a common structural problem, and an inherent problem. The problem is the vulnerability of bank money. The vulnerability comes from the need for opacity for money to function. Historically, with various forms of money facing runs, the same complaints of complexity and a lack of transparency are heard over and over again.

There was another problem, however, that should not be confused with the opacity that I have been speaking about. Regulators, academics, the media, and the public did not understand how the U.S. financial system had evolved and did not observe the actual runs. As mentioned above, the evolution of the

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43. Emergency Order Pursuant to Section 12(k)(2) of the Securities Exchange Act of 1934 Taking Temporary Action To Respond to Market Developments, Exchange Act Release No. 58592, 73 Fed. Reg. 55,169 (Sept. 18, 2008), <http://www.sec.gov/rules/other/2008/34-58592.pdf>; Amendment To Emergency Order Taking Temporary Action To Respond To Market Developments, Securities Exchange Act No. 58591A 73 Fed. Reg. 55,557 (Sept. 21, 2008), <http://www.sec.gov/rules/other/2008/34-58591a.pdf>.

44. See, e.g., Alessandro Beber & Marco Pagano, *Short-Selling Bans Around the World: Evidence from the 2007-09 Crisis*, 58 J. OF FIN. 343 (2013).

financial system was driven by a number of factors. Over the last thirty years or so there has been a rise in institutional investors and a concurrent decline in the fraction of households that directly hold securities. The fact that regulators, academics, the media, and the public were unaware of the developments in the U.S. banking system and did not see the run is not the same as a “lack of transparency.” The inability to see what was going on was not due to a lack of transparency. It is an intellectual problem. It was a failure to understand the evolution of the financial system and a failure to understand the vulnerability of bank money. A lack of understanding of financial history and bank money is at the root of this failure.<sup>45</sup> Most people did not know where to look, or indeed, that it was worth looking at. They simply assumed that the United States would never experience a systemic crisis again.

There is clearly a measurement problem. Our forms of measurement—National Income Accounting, the Federal Reserve’s Flow of Funds data set, Generally Accepted Accounting Practice, bank Call Report data—are all important but incomplete in a world with derivative securities and off-balance sheet vehicles. This problem requires augmenting these systems with a system of national risk and liquidity accounting, as proposed by Brunnermeier, Gorton and Krishnamurthy<sup>46</sup> and Bai, Krishnamurthy and Weymuller.<sup>47</sup>

## Conclusion

The desirability of opacity in banking does not mean that no information should be produced. Banks need to be transparent to the regulators, but that information must be kept confidential. This puts the burden on the clearing house and later on bank regulators. Opacity can create systemic risk. But in the modern era, systemic risk is created when regulators are unaware of what information they should be producing.

Regulators must be able to distinguish good banks from bad banks. And as financial systems evolve, they must make every effort to keep abreast of this evolution.

In order for their debt to be used as money, banks must be inherently opaque. This opacity developed during the 19th century; it entailed shutting down informative markets for bank liabilities (bank notes and bank stock), and internalizing that information into the clearing house, which kept the information secret. This is not unlike the modern era in which bank

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45. See GARY GORTON, MISUNDERSTANDING FINANCIAL CRISES.(2012).

46. See MARKUS BRUNNERMEIER, GARY GORTON, & ARVIND KRISHNAMURTHY , *Liquidity Mismatch Measurement*, in RISK TOPOGRAPHY: SYSTEMIC RISK AND MACRO MODELING (Markus Brunnermeier and Arvind Krishnamurthy eds., 2012); MARKUS BRUNNERMEIER, GARY GORTON, & ARVIND KRISHNAMURTHY, *Risk Topography*, in NATIONAL BUREAU OF ECONOMIC RESEARCH MACROECONOMICS ANNUAL (2011).

47. Jennie Bai, Arvind Krishnamurthy & Charles-Henri Weymuller, *Measuring Liquidity Mismatch in the Banking Sector* (Oct., 2013) (unpublished manuscript) , [https://www.clevelandfed.org/events/2013/financial\\_stability/pdf/paper-bai-empirical\\_lmi\\_v31.pdf](https://www.clevelandfed.org/events/2013/financial_stability/pdf/paper-bai-empirical_lmi_v31.pdf).

examination results are known only by the government, and discount window borrowing from the Fed is supposed to be secret.

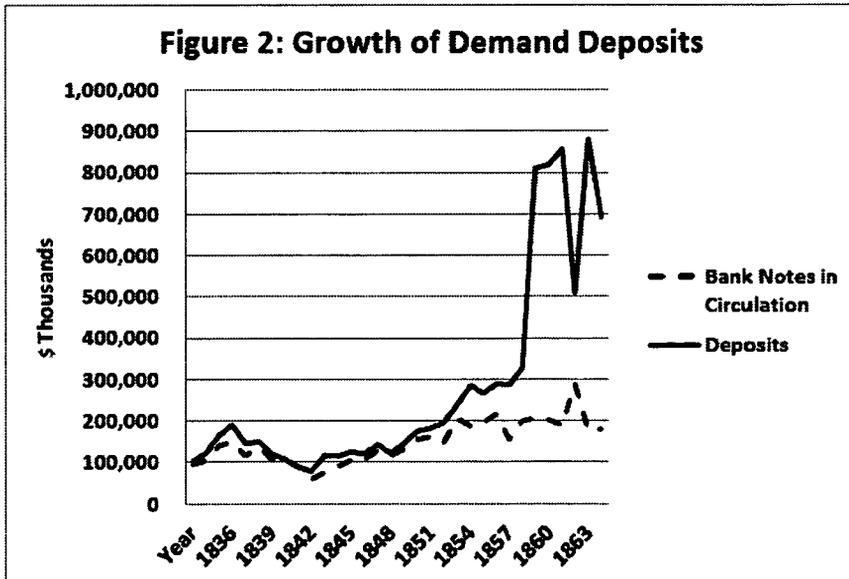
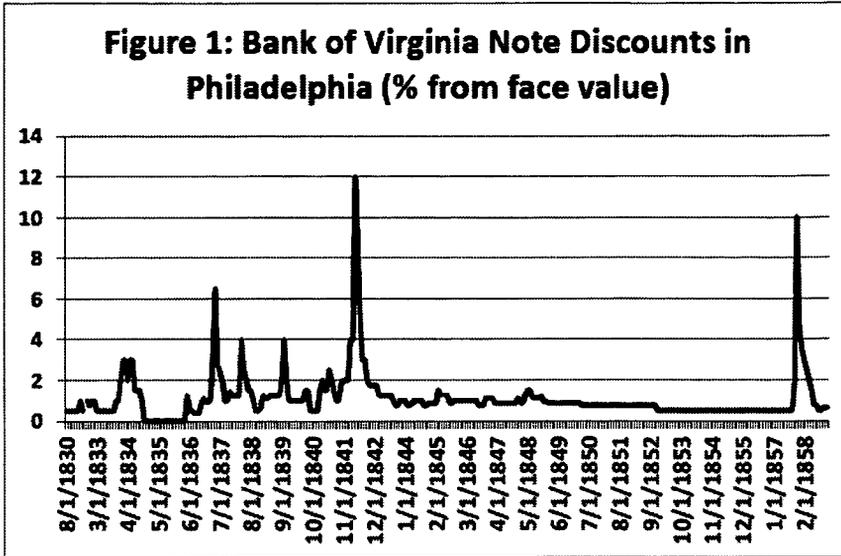
During financial crises bank coalitions (clearing houses) and central banks have always carefully managed the bank information environment. During crises policies have been aimed at preventing bank runs on individual banks, based on information about specific banks. The financial system can unravel serially if banks are sequentially run on. In general, bank-specific information is suppressed, thereby forcing attention to the question of the solvency of the entire banking system.

Recently, the problem of bank runs emerged again. The new forms of bank money—repo and asset-backed commercial paper—have many of the same features of traditional demand deposits. The same problems as in the 19th century have reemerged, and the Federal Reserve and the government have rediscovered the modern equivalents to historical policies: overcoming stigma, introducing stress tests, and trying to suppress information-revealing markets.

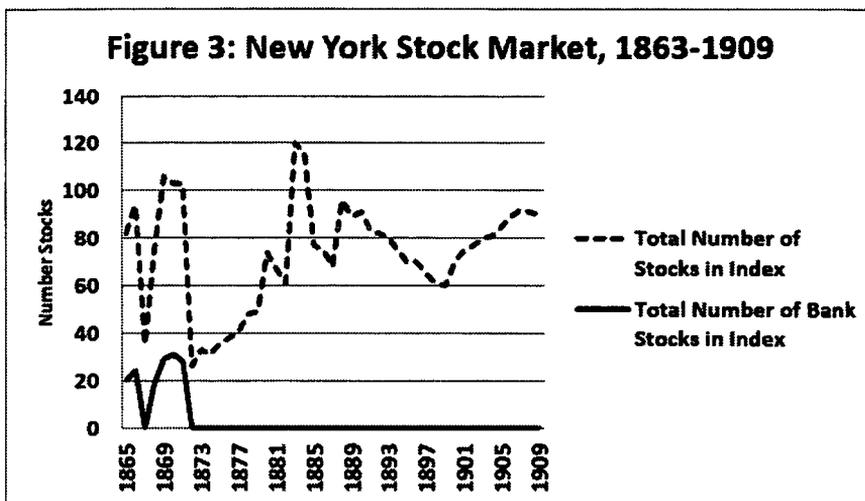
## The Development of Opacity

Year	Ohio			South Carolina		
	Discount	Deviation	Number Of Banks	Discount	Deviation	Number of Banks
1839	4.18	1.33	38	3.57	1.65	11
1840	4.76	1.55	42	0.34	0.83	12
1841	7.45	3.44	40	1.27	0.91	12
1842	14.18	13.32	34	2.54	1.49	12
1843	14.4	20.18	36	1.81	0.59	12
1844	10.49	16.96	35	0.94	0.25	12
1845	8.97	14.24	35	1.26	0.21	12
1846	7.68	13.97	40	1.35	0.33	13
1847	8.26	18.23	39	1.00	0.37	13
1848	9.18	19.01	44	1.78	0.96	15
1849	12.16	23.23	44	1.17	0.63	15
1850	12.84	24.17	44	0.85	0.26	14
1851	12.4	23.96	43	0.84	0.33	14
1852	6.16	17.91	30	0.87	0.26	14
1853	2.63	10.27	39	0.75	0.11	16
1854	1.86	0.86	37	0.96	0.19	17
1855	3.08	8.18	37	1.08	0.35	18
1856	2.64	8.21	38	0.83	0.11	18
1857	5.69	12.12	38	1.97	2.65	19
1858	6.5	16.33	36	1.63	1.12	20

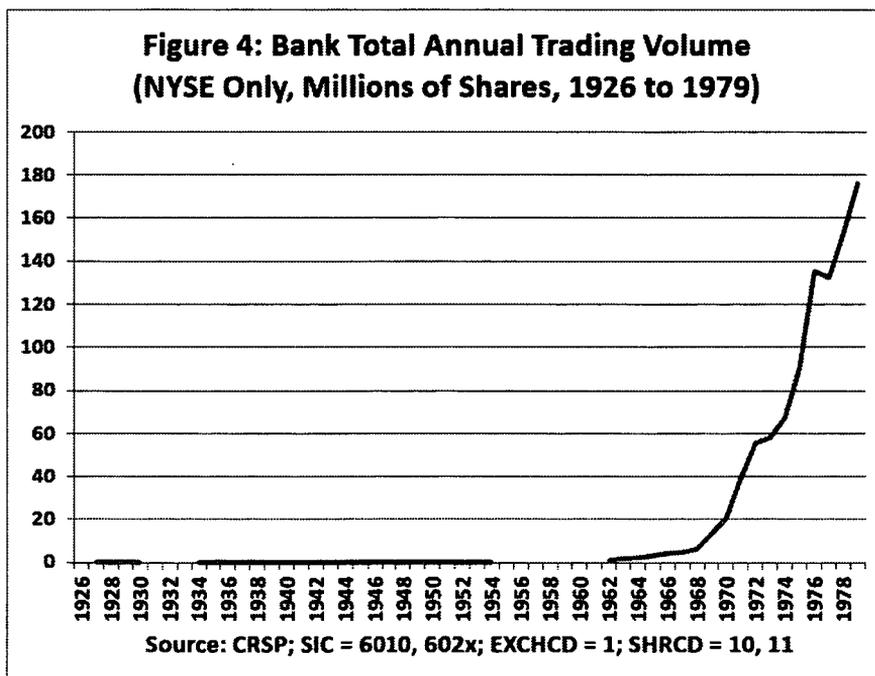
Shares Traded	Number of Outstanding Shares							Total
	0 to 10,000	10,000 to 50,000	50,000 to 100,000	100,000 to 500,000	500,000 to 1m	1m to 5m	Over 5m	
Less than 1,000	51,684	15,816	1,372	384	98	120	40	69,514
1,001 to 50,000	719	4,288	2,288	2,837	217	30	--	10,379
50,001 to 100,000	--	--	28	177	242	19	--	466
100,001 to 500,000	10	--	--	74	166	299	--	549
500,001 to 1,000,000	--	--	--	--	--	60	30	90
More than 1,000,000	--	--	--	--	--	--	60	60
Total	52,413	20,104	3,668	3,472	723	600	130	81,110

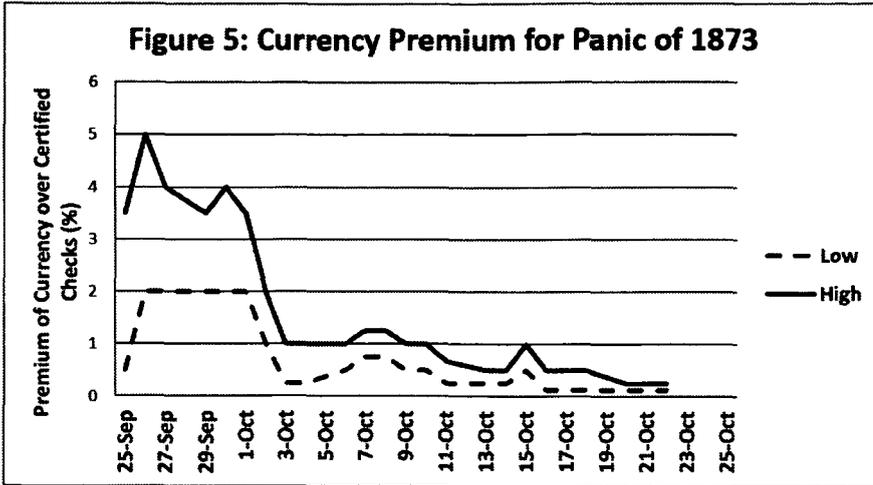


Source: Historical Statistics of the United States 1789-1945 (1949), p. 263-4



Source: Goetzmann, Ibbotson and Peng (2001).





Source: Commercial & Financial Chronicle.

