

Preliminary Draft. Comments Welcome.

The Panic of 1907: JP Morgan, Trust Companies, and the Impact of the Financial Crisis

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Abstract: The outbreak of the Panic of 1907 occurred following a series of scandalous revelations about the investments of some prominent New York financiers, which triggered widespread runs on trust companies throughout New York City. The connections between the trust companies that came under severe strain during the crisis, and their client firms, may have transmitted the financial crisis to nonfinancial companies. Using newly collected data, this paper investigates whether corporations with close ties to trust companies were differentially affected during the panic. The results indicate that firms connected to trust companies that faced severe runs performed worse in the years following 1907. The data also suggest that many of the rescue efforts organized by J.P. Morgan may have been motivated by self-interest.

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1. Introduction

In 1907 the United States experienced one of its most severe financial crises prior to the Great Depression. A panic was triggered by a series of bank runs in New York, and quickly spread throughout the financial system. Over the following year, real GNP declined by 11 percent, industrial production contracted by 16 percent, and the unemployment rate almost doubled (Balke and Gordon, 1986; Davis 2004; Romer, 1983). Although the causes of the Panic of 1907 have been the subject of considerable research, the micro-level consequences of the panic have never been analyzed. In particular, little is known about the channels through which the contraction of financial intermediation may have been transmitted to the real economy, or why particular firms or sectors were differentially affected. Given the extensive debates on the consequences of financial crises, much of which has focused on the Great Depression, this gap in the literature is significant.

Research on the Panic of 1907 has also taken on renewed importance because of its many parallels to the financial crisis of 2007-08. The Panic of 1907 originated with runs on a type of financial intermediary that was mostly outside the payments system, trust companies. Similar to modern “shadow” banks, trust companies grew rapidly and became important financial intermediaries in the years prior to the crisis.¹ Less regulated than commercial banks, trust companies were highly levered, held low cash reserve balances, and issued uninsured liabilities. In addition, they did not have direct access to a lender of last resort because they did not belong to the private clearinghouse association that facilitated partial co-insurance of commercial banks at that time. There are of course many important differences between these two crises. Most significantly the Fed, which was created in 1913, injected an enormous amount of liquidity into financial markets in the recent crisis, whereas the Panic of 1907 was at its core a liquidity crisis, resolved only through a halting series of privately organized rescues and suspensions. In addition, the solvency of many modern financial intermediaries was threatened by the Panic of 2007-08, whereas all of New York’s trust companies were revealed to be solvent in the 1907 crisis. These differences, however, highlight the importance of learning from historical events, in order to understand how markets function

¹ On the rise of trust companies, see Neal (1971) and Moen and Tallman (1992). On the modern shadow banking system, see Gorton and Metrick (2010).

within different institutional contexts.

This paper analyzes the consequences of the Panic of 1907 at the firm level, by studying the effect of relationships with the New York trust companies that came under strain during the crisis on the outcomes of non-financial firms. The paucity of extant research on the impact of the panic is due largely to the lack of data on individual firms or bank lending patterns. An important contribution of this paper is to construct a firm-level panel dataset with detailed financial information on all NYSE-traded industrials and railroads for the years 1900-1911, and establish their connections to major financial institutions. One of the unique characteristics of bank-firm relationships in the early twentieth century was that banks and trust companies would often place their own directors on their clients' boards. By collecting a comprehensive dataset of directors of trust companies, as well as directors of NYSE-traded non-financial corporations, we can identify ties between trust companies and their clients through board interlocks. Using this measure of connections, we investigate whether ties to the trust companies that were most severely affected by the crisis, in the sense that they lost the most deposits, had negative consequences on the performance of non-financial firms.

We posit two main channels through which a connection to a trust company that came under acute pressure may have had negative consequences for non-financial firms. First, ties through the board of directors may have reflected a lending or underwriting relationship, or the provision of other financial services. In this case, non-financial firms may have experienced a negative shock to the supply of external financing or other financial services.² A second possibility is that a relationship with a troubled financial institution may have made other lenders, suppliers, or customers of the firm uneasy about the quality of the firm's own assets or operations. This mechanism may have been important for the Panic of 1907 since the runs on trust companies were partly triggered by associations with individuals involved in a financial scandal. Regardless of the channel, the negative shock to trust companies may have been transmitted to non-financial firms because of the financial frictions they most likely faced. In an environment with relatively little financial disclosure and many new industries and enterprises emerging, asymmetries of information

² For example, theoretical work by Bernanke and Blinder (1988), Bernanke and Gertler (1989), Holmstrom and Tirole (1997), and Stein (1998) show that a financial shock to banks may affect real firm outcomes in the presence of market imperfections for banks and firms.

were likely significant, and building new relationships with alternative financial institutions would have taken time. Thus, both mechanisms suggest that the effects should have been worse for smaller and less “established” firms, with assets whose value was more difficult to ascertain for use as collateral.

Our empirical analysis proceeds in three steps. First, we establish that much of the variation in deposit losses among the New York trust companies at the center of the panic was due to their associations with a handful of men involved in a financial scandal. Since this scandal did not impact any of the trust companies directly, but instead raised fears among households that their deposits *may* have been threatened, this characteristic of the panic helps rule out the possibility of “reverse causation”—that concerns regarding the non-financial client firms of the trusts led to runs. Second, we present an event study of the stock market’s reaction to the onset of the runs, and show that the non-financial companies with ties to at least one of the trust companies most severely affected were discounted more heavily (by about 6.5 percent relative to other firms). Thus, investors already perceived these connections to negatively affect non-financial firms when the runs started. Finally, we analyze whether shocks to trust companies had a differential effect on the performance of firms in the years following the panic. The results indicate that the firms’ profitability and dividends each fell by an amount equivalent to around 10 percent of a standard deviation. Moreover, the average interest rates paid by these firms, measured by their interest expense as a fraction of outstanding debt, rose substantially. Consistent with the notion that credit intermediation suffered following the panic, these effects were largest for smaller firms and for industrials, whose collateral was more difficult to value than that of railroads.

A potential source of concern is that our findings may reflect the selection of particular types of firms into relationships with trust companies. The empirical framework includes firm fixed effects, and therefore controls for time-invariant unobserved characteristics such as firm ‘quality.’ However, selection would remain a problem if the differentially affected trusts were represented on the boards of firms most vulnerable to a shock or recession. In order to address this possibility, we analyze the performance of firms with ties to the trust companies that came under severe strain in 1907 during the recession and financial panic of 1903-04. We find that these firms did not

experience worse outcomes during that earlier crisis, which is supporting evidence that our findings are not the result of a selection effect.

Our paper also sheds light on the private lending arrangements organized by J.P. Morgan that eventually halted the runs on trust companies. Morgan decided against providing an emergency loan to the Knickerbocker Trust, the first trust company to face a deposit run. On the day after Knickerbocker was forced to close its doors, Morgan began to arrange emergency loans to a similar institution experiencing a run, the Trust Company of America. Although Morgan was hailed as the savior of the financial system, these particular decisions may have been motivated by self-interest. Our board-interlock data reveal that The Trust Company of America had ties to many clients of J.P. Morgan & Company, whereas the Knickerbocker Trust did not.

The results of this paper contribute to the growing literature on the channels through which financial crises impact the real economy. Following the work of Bernanke (1983), recent scholarship has emphasized the consequences of the breakdown of financial intermediation during financial crises as an important transmission mechanism independent of the monetary channel emphasized by Friedman and Schwartz (1963). Recent contributions to this literature, in the context of the Great Depression, include Calomiris and Mason (1993), Ziebarth (2012) and Mladjan (2012) and in the context of more recent crises include, Kashyap, Lamont and Stein (1994), Khwaja and Mian (2008), Schnabl (2011) and Amiti and Weinstein (2009). Our findings are also closely related to Fernando, May, and Megginson (2012), who document a negative stock market reaction to the investment banking clients of Lehman Brothers when that firm went bankrupt in 2008.

We also contribute to the growing literature on the Panic of 1907. The causes and macroeconomic context of this crisis have been the focus of a substantial body of research in the years immediately following the crisis (Sprague, 1910; Barnett, 1910) and more recently (Moen and Tallman, 1992, 2000; Odell and Weidenmier, 2004; Hansen 2011; and Rogers and Wilson, 2011).³ This paper extends this literature by analyzing the microeconomic impact of the crisis, and the consequences of the disruption of the financial system for the real economy.

Finally, some of our findings relate to studies of the role of trust in financial markets (Guiso,

³ Strouse (1999), Carosso (1987) and Bruner and Carr (2007) present engaging histories of the panic.

Sapienza and Zingales, 2008) and, in particular, of the effects of impaired reputations of corporate directors. This literature mostly focuses on the consequences of a negative reputational shock on directors' future careers (Agrawal, Jaffe and Karpoff, 1999; Fich and Shivdasani, 2007). In contrast, our results may indicate that a firm may suffer losses when its directors are perceived to be associated with a scandal not directly connected to the firm.

2. Historical Background

The Panic of 1907 occurred following a series of economic shocks, which precipitated the onset of a recession.⁴ The San Francisco earthquake and fire of 1906 had had a profound monetary and financial impact, both domestically and internationally (Odell and Weidenmeir, 2004). Gold flowed into the United States as foreign insurers paid claims on their San Francisco policies; New York financial institutions also faced reduced gold reserves resulting from their own transfers to San Francisco. In response, the Bank of England, followed by the German and French central banks, raised its discount rates in order to reverse the flow of gold. The Bank of England also acted to halt acceptances of American "finance bills," which were used to finance gold imports into the United States. This policy resulted in a significant fall in American securities markets, as the collateral for those bills was sold, and led to significant gold outflows from the United States (Sprague, 1910, p. 241). A relatively weak cotton harvest in 1907 resulted in low export revenues, further aggravating the stress on the financial system (Hanes and Rhode, 2011). The New York money market thus entered the fall of 1907 low on gold reserves and vulnerable to shocks.

At that time, New York's banking system had also experienced an important structural change, in the form of the rapid growth of trust companies. In the ten years ending in 1907, trust company assets in New York State had grown 244 percent (from \$396.7 million to \$1.364 billion) in comparison to a 97 percent growth (from \$915.2 million to \$1.8 billion) in the assets of national banks (Barnett, 1910, p. 235). The impressive growth of these institutions can be explained by the advantages of the trust form. Originally created to serve as fiduciaries, trust companies enjoyed

⁴ The NBER identifies a business cycle peak at May 1907.

broad powers, including the ability to hold corporate equity and debt, and to underwrite and distribute securities (Smith, 1928; Neal 1971). Although they were not permitted to issue bank notes, they could make loans, and competed with national banks for deposits.⁸ Incorporated under permissive state laws, trust companies were not subject to the strict regulations of the National Banking Act, and often specialized in providing financing for corporate investments and acquisitions. One observer noted that the industry's profits were "derived largely from the skill of their officers in financing important combinations and aiding in the creation of new enterprises" (Conant 1904, p. 223). By the onset of the panic, trust companies played major role in banking and financial markets: They provided lending and underwriting services, were major purchasers of securities, and acted as financial agents for corporations.¹¹ Many prominent private bankers, as well as former U.S. Treasury Secretaries, were among the directors of these enterprises, which enhanced their reputations.¹²

The rapid proliferation of trust companies may have contributed to the vulnerability of the financial system to crises. Whereas the national banks located in New York City were required to hold reserves equivalent to 25% of their deposits in specie, New York's trust companies faced no minimum reserve requirement at all until 1906.¹³ In 1906, a 15% reserve requirement was imposed, but trust companies were required to hold only one third of it in cash.¹⁴ The national banks also effectively excluded trust companies from the New York Clearing House Association (NYCHA), a

⁸ Some state banking laws forbade trust companies from discounting commercial paper, in an effort to protect the market share of banks. However, trust companies had the power to *purchase* commercial paper, so the effect of the law was merely to change their accounting procedures. See Berryman (1907).

¹¹ As financial agents, trust companies held deposits, negotiated loans, served as trustees for bonds, acted as registrar for securities, facilitated dividend and interest payments, etc. Contemporary observers noted that firms selected well-known New York trust companies as financial agents "because of the added confidence thus obtainable for the security issues of the corporation" (Smith, 1928, p. 355).

¹² Treasury Secretary Leslie M. Shaw resigned from office in March of 1907 and became the President of the relatively new Carnegie Trust Company; former Secretary Lyman J. Gage was also a director of a trust company; former Vice President of the United States Levi P. Morton was president of Morton Trust Company. Partners of investment banks such as Kuhn Loeb & Company, and J.P. Morgan & Company, sat on the boards of several New York trust companies.

¹³ Advocates for New York's trust companies argued that their deposits came primarily from households, whereas the deposits in the national banks in the city were to a much greater extent from other banks, and therefore subject to much greater seasonal fluctuations—making a lower level of reserves appropriate for trusts (Judd, 1907).

¹⁴ Trust companies had previously deposited funds with national banks for the purposes of maintaining a reserve, and the withdrawals they made in order to comply with the new reserve requirement weakened the reserve position of those banks in early 1907, which may have contributed to the fragility of the financial system at the time of the panic (Smith, 1928).

private organization that facilitated clearing and that could provide emergency lending to its members in times of crisis (Gorton, 1985). Trust companies were permitted to gain access to the NYCHA by clearing through a member bank, but only if they maintained a minimum level of cash reserves, which most found unacceptably high.¹⁵ When the panic arose, there was no established mechanism to facilitate cooperation among New York's trust companies, or to provide loans to a trust company that faced a liquidity problem.¹⁶

Onset of the Panic

The events of the Panic of 1907 that had the most severe consequences for financial markets were the widespread runs on trust companies that began in October. Importantly, these runs were precipitated by events that had no direct connection to any trust company. Instead, they were triggered by a failed attempt to corner the shares of United Copper Company, a mining concern, which resulted in significant losses for the speculators involved. Historical accounts suggest that the runs on trust companies were driven by depositors' fears that these institutions may have suffered losses in the speculation, which were later proven unfounded.¹⁷ This characteristic of the crisis is especially important for establishing an effect of the financial panic on the outcomes of non-financial firms, as it suggests that the runs were not related to revelations about the quality of the trust companies' corporate clients. In this section, we provide a brief account of the onset of the crisis, and present an econometric analysis of the determinants of the different trust companies' deposit losses during the panic.

Mining entrepreneur Augustus Heinze, along with speculators E. R. Thomas and Charles W. Morse, were at the center of the failed speculation. These individuals had gained control of a series

¹⁵ In 1903, the NYCHA adopted the rule that trust companies clearing through its members would have to maintain a cash reserve of 10% to 15% after 1 June 1904 (Judd, 1907). At the time trust companies faced no legal reserve requirement at all. Of the 26 trust companies that cleared through NYCHA members, all but two ended their clearing relationships when the rule was imposed (Kilburn, 1904).

¹⁶ In the aftermath of the crisis, Trust Company insiders mentioned that there was intense "pressure for cooperative action" and that the "lack of organized cohesion" between banks and trusts made the situation much more difficult (*Trust Companies*, November 1907, p. 751.)

¹⁷ Knickerbocker Trust, the only New York trust company that actually closed, had one loan of \$200,000 to one of the speculators (Hanna, 1931) out of total assets of around \$73 million as of June 1907. All New York trust companies were later on revealed to have been solvent during the panic.

of small banks and used some portion of their resources to finance their ventures.¹⁸ These banks suffered losses when the attempt to corner the shares of United Copper, which was undertaken to engineer a “bear squeeze,” failed spectacularly.¹⁹ On October 16, a run began on the Mercantile National Bank, which was under the control of Heinze, Morse and Thomas, who appealed to the NYCHA for aid. The NYCHA provided a loan to Mercantile, and publicly pledged to support the other member banks connected to those men as well. As a condition for this aid, the NYCHA required the resignation of the entire board of directors of Mercantile, and demanded that Morse, Thomas and Heinze resign from all other clearing banks where they held directorships.²⁰ The very public support from the NYCHA and the change in management ended the run on Mercantile, although it was liquidated the following January. It is possible that the expulsions of these individuals from New York’s banking industry contributed to the perception that they had embezzled funds or committed fraud.

No trust company was directly involved in the failed United Copper corner. However, the well-known financier Charles T. Barney, president of Knickerbocker Trust and director of Trust Company of America, two of the largest trust companies in the city, was known to have been involved in earlier business dealings with Morse, and held a board seat with the National Bank of North America, controlled by Morse. Moreover, Morse, Thomas, and Augustus’ brother Arthur Heinz held directorships with other trust companies. The business connections among these individuals, and the board seats they held, were widely reported in the press.²¹ The losses and runs suffered by the Mercantile National Bank and other banks controlled by Morse, Thomas and the Heinzes likely raised concerns among depositors about whether these men had also endangered the solvency of the trust companies with which they or their associates were affiliated.

¹⁸ The story of Heinze’s exploits in mining, his transition into banking, and the failed speculation in shares of United Copper is presented in McNelis (1968).

¹⁹ Illustrating the manipulations that were possible in financial markets at the time, the failed speculation in the shares of United Copper was undertaken in secret by the founders and controlling shareholders of the company, using loans from banks they controlled indirectly, through their investments in other banks.

²⁰ Contemporary newspaper articles detailing these events are compiled in Senate Committee on Banking and Currency (1912).

²¹ See, for example, “New Banking Group Headed by the Heinzes,” 21 January 1907, *New York Times*; and “C.W. Morse Quits the Banking Field,” 20 October 1907 *New York Times*. These connections were public knowledge at that time since trust companies’ ads soliciting deposits usually listed the names of their directors.

The connections between the men at the center of the United Copper speculation and various financial institutions are illustrated in Figure 1. Morse, Thomas, Barney and the Heinzes held seats on the boards of five trust companies; we identify these institutions as having a *direct* connection to these men. However, those five trust companies were, in turn, closely associated with three other trust companies, because they had at least two directors in common with those three firms.²² These three trust companies are therefore identified as having an *indirect* connection to Morse, Thomas, Barney and the Heinzes. The degree to which the different trust companies were associated with those men may have influenced the intensity of the runs they faced during the panic, and we formally test this hypothesis below.

The runs on trust companies began silently around October 16, when Knickerbocker Trust started to face heavy withdrawals. Knickerbocker was one of the few trust companies that chose to maintain sufficient reserves to gain access to the NYCHA through a member of the clearinghouse, National Bank of Commerce. When Knickerbocker depositors began to withdraw their funds by depositing checks on their accounts in other banks, the National Bank of Commerce was responsible for those checks. Facing a debit balance at the NYCHA of \$7 million and the prospect of even larger debits, on October 21 the National Bank of Commerce announced that it would no longer act as Knickerbocker's clearing agent.²³ On that same day, Knickerbocker Trust announced that it had dismissed Charles T. Barney from the office of its Presidency, because of his "personal position in the directorate of certain institutions recently under criticism," and "in particular because of his connection with Mr. Morse."²⁴

These events came as a shock to Knickerbocker's depositors. The end of the clearing relationship meant that other banks would no longer cash the trust company's checks and, more importantly, that the NYCHA would not aid Knickerbocker if the firm encountered liquidity

²² In addition, the trust companies with Morse, Thomas, Barney and the Heinzes on their boards had only one director in common with an additional three trust companies. We focus on trust companies with at least two directors in common to capture stronger connections. The empirical analysis below is robust to the inclusion of a variable that separately identifies trust companies with only one link to these men.

²³ These events are described in Senate Committee on Banking and Currency (1912, p. 1695). The National Bank of Commerce apparently appealed for aid for Knickerbocker from the NYCHA, but was denied (Wicker, 2000).

²⁴ *The Sun* [NY], 22 October 1907, p. 1.

problems.²⁵ The dismissal of Barney, even though it was accompanied by assurances that the firm was in sound condition, may have created the impression that Barney had done something improper or used the funds of Knickerbocker to help finance the speculative schemes of Morse. A severe run on the Knickerbocker ensued, and the firm could not withstand the heavy withdrawals without receiving external assistance. It never did, and on October 22, Knickerbocker was forced to close its doors.

Panic quickly spread as “wild rumors circulated” regarding the financial condition of other trust companies.²⁶ These rumors often focused on possible connections between trust companies and the men at the center of the failed corner scheme; the chairman of the Trust Company of America went so far as to issue a public statement that his “company had no business relations, directly or indirectly, with Charles W. Morse, as the rumors had intimated.”²⁷ Within a few days, all of the trust companies where Thomas, the Henizes, or Morse held directorships announced their resignations.²⁸ By October 23, runs had spread to the Trust Company of America and Lincoln Trust, and several other trust companies also faced heavy deposit withdrawals.²⁹ To address the fears of depositors, some trust companies stated that they had no connection to the men associated with the scandal in their advertising.³⁰ All trust companies began to call in loans and liquidate assets to build up their cash reserves.

The total losses of deposits of the 38 trust companies in New York City between August 22 and December 19 of 1907 are depicted in Figure 2.³¹ All of the trusts either directly or indirectly associated with Morse, the Heinzes, Thomas, or Barney lost substantial amounts of their deposits, although several others with no apparent direct or indirect connection to these men did as well. It is

²⁵ Moen and Tallman (2000) explore the significance of the trust companies’ isolation from the NYCHA.

²⁶ *Evening World* [NY], 23 October 1907. Several studies have assessed the counterfactual history that would have followed if aid to Knickerbocker had prevented it from failing; see, for example, Sprague (1910) and Friedman and Schwartz (1963).

²⁷ John E. Borne, quoted in *New York Times*, 23 October 1907.

²⁸ *New York Times*, 20 October, 22 October, and 23 October, 1907.

²⁹ *Evening World* [NY], 23 October 1907, p. 1-2.

³⁰ For example, Bankers Trust’s ad in the *New York Times* from 25 October 1907 lists its directors and their affiliation, and then says “Particular attention is called to the personal character and strength of the company’s directors,” and the Columbia Trust’s ad from the *New York Tribune* from 24 October states in boldface that the company is “Independent of the Control of Any Single Interest,” a likely reference to Morse’s near-total control of several financial institutions.

³¹ Since the Superintendent of Banks collected this data quarterly, we use the report dates closest to the panic.

worth noting that the size of the different trusts prior to the crisis, measured as their total assets as of June 1907, was generally uncorrelated with the percentage decline in deposits.

Table 1 analyzes the determinants of the percentage change in each New York trust company's deposits between August and December of 1907. In column (1), we regress the change in deposits on indicator variables for whether the trusts were directly or indirectly connected to Morse, the Heinzes, Thomas or Barney, as defined in Figure 1. Each variable has large negative effects and they jointly account for about 40 percent of the variation in the dependent variable. Relative to a trust company with no connection to the men at the center of the scandal, one with an indirect connection experienced a loss in deposits that was about 22 percent larger. The loss for a trust company with a direct connection was even greater, as their deposits declined almost by 34 percent more than for trusts not associated to the scandal.

These results suggest that associations with the scandal triggered the runs on the trusts companies, but it is also possible that they may have been driven by differences in the financial solidity of the trust companies at the time of the crisis. In column (2), we add several balance sheet ratios calculated from the trust companies' financial statements of June 1907—measures of net worth, cash reserves relative to deposits, the percentage of their assets invested in securities, and their overall size—as well as the log of the age of the trust.³² The estimated correlations with these variables generally have the expected signs, with the firms' net worth and cash holdings having particularly large and positive magnitudes, suggesting that more solvent trusts faced fewer withdrawals of deposits. Controlling for these characteristics in the regression, however, does not diminish the size of the estimated effect of the two indicator variables for association with the tainted bankers.

The available balance sheet information does not capture differences in the depositor clienteles of the trust companies. Hansen (2011) notes that New York's trust companies were divided between those located in the vicinity of Wall Street, which generally received large deposits

³² Trust company advertisements nearly always listed the firms' paid-in capital and surplus (net worth), so this information was easily available to depositors. More detailed balance sheet information was collected by the New York Superintendent of Banks on a quarterly basis and republished in trade publications such as *Trust Companies* magazine or *Bankers Magazine*, making it generally accessible as well.

from corporations and institutions, and those located in uptown Manhattan, which more aggressively solicited deposits from individuals. He argues that the uptown firms experienced greater deposit losses in the panic because small individual depositors were more likely to participate in runs. In order to address this possibility, in column (3) we include an indicator variable for whether the trust company had an uptown headquarters.³³ The results indicate that the uptown firms did indeed lose a greater proportion of their deposits, largely confirming Hansen's argument. But importantly, controlling for an uptown location does not substantially diminish the size of the estimated effect of the indicator variables for the strength of the connection with the men associated with the United Copper corner. Interestingly, the uptown variable does diminish the estimated effect of some of the balance sheet measures, indicating that the effects estimated in column (2) may have resulted partly from correlation between the financial solidity of trust companies and their type of depositor clientele. In sum, our results indicate that the deposit losses can be regarded in large measure as a response to an association with men involved in a scandal, and thus minimize concerns of reverse causality for the empirical analysis that follows.

Rescues organized by J.P. Morgan

In response to the growing crisis, on October 19 J.P. Morgan began to organize teams of bankers he trusted, and charged them with determining the solvency of the financial institutions that came under pressure.³⁴ The most powerful and best-connected man in American financial markets, Morgan's own interests and influence were quite far reaching.³⁵ He had previously organized interventions that benefitted markets generally, for example by providing emergency lending to the U.S. Treasury and intervening in foreign exchange markets in 1895 to keep the Dollar on the gold standard. During the Panic of 1907, Morgan coordinated a series of rescues of trust companies, securities dealers, and the City of New York that were instrumental in resolving the financial crisis.

³³ We obtain headquarter locations from Hansen (2011, Figure 1). It should be noted that the distinction between uptown and downtown trusts is somewhat unclear in some cases because at least a few companies headquartered uptown such as Knickerbocker had downtown branches, and downtown trusts such as U.S. Mortgage and Trust had uptown branches.

³⁴ The story of Morgan's rescue efforts is detailed in Strouse (1999), Carosso (1987), and Bruner and Carr (2007).

³⁵ Pak and Halgin (2010) explore the social networks behind Morgan's power.

The first institution to appeal to Morgan for aid was Knickerbocker Trust. On Monday October 21, Morgan committed to provide aid the following day only if it was determined that the institution was solvent.³⁷ On October 22, with panicked depositors forming long lines outside of its branches, Knickerbocker paid out all of its \$8 million in cash. Morgan's men, who examined Knickerbocker's books throughout the morning, said they were unable to determine whether the trust was in fact solvent. Therefore no aid was provided, and at 12:30 PM Knickerbocker had no choice but to close its doors. The receivers appointed to take over Knickerbocker later determined that the institution was in fact solvent, and its depositors received the amounts owed them in full, although over a period of several months.³⁸

On the afternoon of October 23, Morgan organized emergency loans to the Trust Company of America, after a series of dramatic scenes in which its securities were rushed to Morgan's offices and evaluated as collateral for loans from the large commercial banks closely associated with him. These loans, as well as others that Morgan organized the following week, enabled this institution to stay open. On the night of Sunday November 3, Morgan hosted a meeting of nearly all the city's trust company presidents in his library, famously locking them inside until they collectively pledged \$25 million for the aid of the Trust Company of America and other failing trust companies.

The run on the Trust Company of America was one of the most severe up to that point in American history: the firm paid out more than \$34 million in deposits in just a few weeks. But it never closed, and thanks to the various rescues organized by J.P. Morgan and his associates, the only New York City trust company to fail was Knickerbocker.³⁹ Morgan's ability to organize these rescues was a consequence of his firm's resources and credibility, which enabled him to stand behind the emergency loans provided by institutions like National City Bank to the Trust Company of America based solely on his men's assessment of their collateral. But it also resulted from his power and influence within financial markets. In times of panic, it may be contrary to a financial

³⁷ Knickerbocker's board told the press that other trust companies had agreed to provide \$10 million in "guarantees," and it was rumored that J.P. Morgan had also agreed to provide aid (*New York Tribune*, 22 October 1907, pg. 1). No aid was actually provided.

³⁸ Hanna (1931) provides a complete account of Knickerbocker's assets at the time it went into receivership, and of the funds made available to its depositors.

³⁹ Several state banks, and some trust companies in Brooklyn, also closed. See Williams (1909).

institution's narrow self-interest to extend a loan to a failing competitor, even if it is in that institution's interest for the panic to be halted. Morgan's power enabled him to "dragoon" other financial institutions into taking actions that were privately costly, but beneficial for the markets as a whole (Sprague, 1910).⁴⁰

Morgan cannot be regarded as an entirely disinterested actor in these events. Among the many rescues he organized was a rescue of the investment bank Moore & Schley, which had used a large block of stock in the Tennessee Coal & Iron Railway as collateral for loans which it suddenly needed to repay. Morgan helped arrange for U.S. Steel, a firm he had helped create and a competitor of Tennessee Coal & Iron, to purchase that block of its stock. Morgan's associates even received assurances from President Roosevelt that the transaction would not be held in violation of antitrust laws. This transaction averted a crisis on the NYSE, but it also benefitted U.S. Steel and, therefore, J.P. Morgan.

Morgan's decision to allow Knickerbocker Trust to fail, while working assiduously to save the Trust Company of America, may also have been motivated by self-interest.⁴¹ Morgan himself was a director of the National Bank of Commerce, the institution that stopped clearing for Knickerbocker, so he could have intervened on behalf of Knickerbocker.⁴² However, our board interlock data suggest that Knickerbocker had few ties to clients of J.P. Morgan, whereas the directors of Trust Company of America served on the boards of several railroads and industrial firms closely associated with Morgan.⁴³ Thus, it is likely that J.P. Morgan & Company underwrote many

⁴⁰ Treasury secretary Cortelyou made a series of large deposits in national banks in New York, partly in coordination with Morgan, which ultimately helped finance the loans to trust companies.

⁴¹ Conspiracy theories of Morgan's allies deliberately inducing the panic in order to eliminate competitors or rivals and concentrate control abounded in the following years. For example, Upton Sinclair's novel *The Moneychangers* tells the story of a banker like Morgan who engineers a panic that begins with the "Gotham Trust Company" and the "Trust Company of the Republic," and then acts to contain the damage. Late in the story, the narrator notes, "could there be any more tragic irony than this, that the man – who of all men had been responsible for this terrible calamity, should be heralded before the whole country as the one who averted it?" (1908, p. 304).

⁴² Given the magnitude of the National Bank of Commerce's debit balance at the NYCHA, this would have effectively required a loan to that institution (or Knickerbocker) from the NYCHA or from other large commercial banks, something difficult to arrange. Moreover, Hansen (2011) points out that in June 1907 clearing agents' claims to the deposits kept with them by the financial institutions they cleared for were stripped of their seniority, which would have increased the losses faced by the National Bank of Commerce if they had continued to clear for Knickerbocker.

⁴³ These included the Pere Marquette Railroad, the New York Chicago & St. Louis Railroad, U.S. Steel, General Electric, and International Mercantile Marine.

of the securities held by the Trust Company of America. Morgan's partners may have been concerned about the consequences of liquidating the trust company's holdings of those securities, or any other negative consequences that may have resulted from the association between their firms and a failed institution, thereby making them more favorably inclined towards the valuation of those securities as collateral for loans. Indeed, Morgan's associates publicly announced they would provide support for the Trust Company of America well before they were able to determine whether it was solvent, whereas aid to Knickerbocker was made contingent on establishing that trust's solvency.⁴⁴ On the other hand, Morgan may simply have miscalculated the consequences of permitting Knickerbocker to fail, and acted to save the Trust Company of America the next day in response to deteriorating conditions in banking markets.

Consequences of the Panic

On October 26, in the face of heavy withdrawals from out-of-town banks, the New York Clearing House issued "clearing house loan certificates" in order to provide liquidity to its members, and New York's banks soon after suspended the convertibility of their deposits into currency. The banks in the rest of the country soon followed, with some receiving legal sanction of their state governments. By early November, the trust companies in New York apparently began making payments via certified checks payable at the NYCHA, rather than in cash.⁴⁵ Full convertibility of deposits by the nation's banks was not restored until January 1908. The suspension likely made important transactions more difficult (see James, McAndrews and Weiman, 2011). On the other hand, the suspension likely halted the spread of the banking panic and averted a total collapse of the banking system, as in 1930-33 (Friedman and Schwartz, 1968).

The contraction of lending that occurred during the panic in New York was heavily concentrated within trust companies. Prior to the panic, the aggregate volume of New York trust company loans was similar to that of New York's national banks. However, during the panic total loans at trust companies contracted by \$247.6 million, or 37 percent, between August and December

⁴⁴ On the night of 22 October, J.P. Morgan & Co. partner George W. Perkins told reporters that a syndicate of lenders would aid the Trust Company of America (Strouse, 1999, p. 577).

⁴⁵ *New York Tribune*, 1 November 1907, p. 1.

(Moen & Tallman, 1992). During the same period, the loans of national banks in New York fell by only 2 percent. Contemporary observers noted the consequences: “It is obvious that every trust company is protecting itself to the full extent of its powers, and the small borrowers, however solvent, necessarily suffer at such a time.”⁴⁶

The panic occurred at a time when credit markets were already under stress, and produced a significant overall contraction in liquidity. Yet the crisis was most severe for New York’s trust companies, and for a handful of those in particular. To determine the effect of the crisis on non-financial firms, we use an empirical strategy that exploits the variation in the deposit losses among trust companies, which was largely driven by factors unrelated to the performance of the trusts’ client firms.

3. Data

Board data and ties to financial firms

We identify the connections between a trust company and a non-financial firm by the presence of a director of the trust on the board of the non-financial firm. To observe these relationships, we collected the names of all directors and managers of all NYSE-listed industrials and railroads as reported in *Moody’s Manuals* over several years around the panic. To identify directors of trusts, we obtained lists of directors of commercial banks and trust companies from the *Rand McNally Bankers’ Directory*.

Cross-referencing the names of bankers with those of corporate directors enables us to identify the presence of trust company directors on boards of non-financial firms. We match the names of corporate directors to those of bankers based on last name, first name, second initial, and suffix. A valid concern is that matching on names may lead to erroneous matches. This procedure may overestimate the degree of interlocking across institutions if, for example, two different people with the same name held a directorship in an industrial company and a trust company. However, we have implemented this same procedure for subsequent years when sources such as the *Pujo Committee Report*, which identified the interlocks of directors of a substantial number of banks and

⁴⁶ *Wall Street Journal*, 24 October 1907, p. 4.

non-financial companies around 1912, is available. Our matching procedure produces a nearly identical outcome to the Pujo report.⁴⁷

Table 2 displays summary statistics for the data on trust company connections to firm boards in 1907. From our 77 NYSE-traded railroads, 84% had at least one trust company representative on its board. From our sample of 109 industrial companies, 70% had a trust company representative among its directors. The prevalence of trust company directors among the directors of non-financials may to some extent reflect the desire of trusts to form alliances with important firms—that is, for the trust to invite an industrialist or a railroad manager to serve on its own board. But a substantial number of these cases were more likely the trust company directors serving on the non-financial's board. Moreover, the extraordinarily high rate at which these interlocks occurred indicates that trust companies were indeed very prominent prior to the panic.

An important feature of our data is that it allows us to identify the connections between specific trust companies and non-financials at the firm level through board linkages. Figure 3 illustrates the connections between the five trust companies identified as most prominently connected to the scandal of Heinze, Morse, and Barney's failed cornering scheme (those directly connected to the scandal in Figure 1), and NYSE-traded firms. Directors of these trust companies held 39 board seats with NYSE-traded firms, including many prominent railroads and industrials.

Stock Price Data

The standard datasets of stock prices, such as CRSP, do not cover the earliest decades of the twentieth century. For all firms in our sample, we use the *New York Times* to collect the closing prices of common shares traded on the NYSE at the end of each week from the end of August 1907 to December 1907.

Accounting Data

No readily available dataset of accounting information exists for early twentieth century

⁴⁷ We are also working on verifying the accuracy of our most important matches (and non-matches) using the *Directory of Directors in New York*, a source that identifies the directorships held by prominent New Yorkers.

firms. For this paper, we constructed a comprehensive dataset for all NYSE-traded industrial companies and railroads from *Moody's Manuals of Railroads and Corporation Securities*, which presents firm-level data for a large number of publicly traded corporations based on their annual reports. For each firm in our sample, we search for financial information for each available year from 1900 to 1911. Except when explicitly stated, we restrict most of our analysis to the period 1903-1911, when accounting information is available for most of the firms in our sample. One difficult issue is that the dates of firms' fiscal year-ends varied greatly. We assign data from fiscal years that ended in any month prior to July to the previous calendar year.⁴⁸

Unfortunately, the quality of financial reports varied considerably across firms due to the lack of financial disclosure requirements during these early years of the twentieth century. Railroads were the first federally-regulated enterprises, and the Interstate Commerce Commission required detailed financial disclosures from these firms. Since 1905, the financial statements of the railroads are of relatively high quality and reasonably consistent across firms. The industrials, however, are altogether a different matter. Although the NYSE required listed firms to produce financial statements, it did not specify the contents of the required statements, and many firms took great license in their interpretation of the requirement.⁴⁹ For example, relatively few industrial firms presented detailed income statements, and many merely reported "net income."⁵⁰ In our empirical analysis, we therefore focus on profitability ratios where net income, something we generally do observe, is the numerator.

Our panel dataset contains information on firm size, leverage, and various measures of profitability. Table 3 presents the definitions and summary statistics for the 181 firms with accounting data for any year between 1903 and 1911. The NYSE-traded railroads and industrial companies were very large enterprises, some of the largest in the United States. The average value of

⁴⁸ For example, for a firm whose fiscal year ran from June 1902 to June 1903, we would assign their accounting data to the calendar year 1902. But for a firm whose fiscal year ran from October 1902 to October 1903, we would assign that data to the calendar year 1903.

⁴⁹ Firms that did not trade on the NYSE mostly made no information available. Thus we restrict our sample to NYSE-traded firms. For these firms, we only include their data if the firm provided both a balance sheet and an income statement for a given year.

⁵⁰ Sivakumar and Waymire (1993), and Barton and Waymire (2004) analyze the content of early financial statements.

the total assets was about \$197 million for railroads and about \$79 million for industrial companies. Railroad companies were much larger on average than industrial companies, which were less well-established and generally considered riskier enterprises.

The firms' leverage ratios provide an indication of the proportion of the company's assets that are financed through long-term debt. The book-value leverage ratio of railroads was 0.45. Industrials, in contrast, financed much less of their activities, about 13 percent on average, with long-term debt. The larger borrowing capacity of railroads may be partly explained by a large fraction of collateralizable assets. Finally, two measures of profitability, the return on assets and return on equity, are presented in Table 3. Whereas the return on assets measures the overall profitability of a firm's operations, the return on equity measures the accounting-based rate of return earned by the firm's equity holders, which incorporates the effect of the firm's leverage. The return on assets for railroads and industrials was fairly similar, around 5 percent, but the return on equity of the railroads was higher, reflecting their higher leverage.

Connections to the Worst-Affected Trust Companies

Our empirical analysis investigates whether firms with ties to the worst-affected trust companies suffered differentially during and after the panic. We define the "worst-affected" trusts as those among the top 25% in deposit losses. This corresponds to the trust companies that lost at least as much of their deposits as Standard Trust Company in Figure 2.

How did firms with at least one director from our "affected trust" category compare to those that did not? Table 4 presents the characteristics of the firms in the dataset with and without affected trusts in 1907 over all the years of the sample. Firms with directors from affected trusts were considerably larger and more leveraged. This is consistent with a relationship with a trust company helping firms to obtain access to financing and grow, or with trust companies seeking to be on boards of larger and more established firms. In terms of performance measures, firms with the directors of affected trusts were less profitable in terms of their return on assets, perhaps reflecting their greater size, but fairly similar in terms of return on equity. At least based on these observable

characteristics, these correlations indicate that the more affected trusts were not connected to weaker or worse-quality firms.

As a preliminary indication of the significance of the crisis for the clients of the most hard-hit trusts, Figure 4 presents the average number of board seats held by these trusts on NYSE-traded railroads and industrials for 1907-1911. In 1907, these institutions held on average 0.9 seats on each railroad and 0.6 seats on each industrial, a remarkable indication of their prominence in corporate finance. However, these numbers fell dramatically over the ensuing years. In contrast, the number of seats held by major New York commercial banks rose slightly for both industrials and railroads over the same period. Evidently many of the clients of the trusts that suffered disproportionately during the crisis found it necessary to sever their relationships with those trusts, and establish new relationships with other institutions.

4. The effect of the panic on non-financial firms

If the connections between trust companies and non-financial firms were established to help non-financial firms gain access to external financing, they may have played an important role in transmitting the crisis to those firms. A firm that relied on financial institutions that suffered considerable losses from the crisis, as many trust companies did, would likely have been cut off from one of its usual sources of credit or other types of financial services. Alternatively, a firm that was affiliated with a trust company that became associated with a financial scandal may have seen its own reputation, and access to credit, suffer as a result.

Before proceeding with the analysis, it should be noted that the effects of an affiliation with an affected trust during the panic were likely to be quite heterogeneous. Firms with substantial collateral that was easy to value, or with well-established reputations that were regarded as being of the “highest standing,” should have suffered less than other firms. This implies that the sample of firms in this paper, those with shares traded on the NYSE, were among those firms *least* likely to suffer as a result of the shock to the trust companies, since they were among the largest and best-established enterprises in the United States. We therefore expect any results we obtain to be biased

downward in magnitude relative to those that would be obtained in an analysis of less-elite firms. However, as there was considerable variation in the size and reputation of the firms listed on the NYSE, leading to heterogeneous effects within the firms in our sample.

Results: Stock Market Outcomes

We begin by analyzing changes in the stock prices of NYSE-listed firms around the onset of the panic. If traders in these markets perceived that the connections between non-financial firms and trust companies were important, and that the losses of deposits and reputations at the trust companies would adversely impact their clients, the stock prices of firms tied to those trust companies should have fallen relative to other firms when the runs on trust companies began. To investigate this empirically, we employ an event study methodology.

In particular, for each firm i we calculate the abnormal capital appreciation on common stock relative to the market following the market-adjusted-return model (Campbell, Lo and MacKinlay, 1997) as:

$$r_{it} = R_{it} - R_{mt}$$

where $R_{it} = Price_{it}/Price_{i,t-1}$, and R_{mt} is the actual stock appreciation on the market, measured by all stocks included in our sample.⁵¹ We then calculate the individual cumulative abnormal appreciation for each firm for a window of weeks $[-k, k]$ centered around the onset of the panic by adding the abnormal capital appreciation over those weeks.⁵²

$$CAA_i = \sum_{t=-k}^{t=k} r_{it}$$

It is important to note that securities markets were rather illiquid early in the twentieth century relative to the present. In a given week, we observe the capital appreciation for 37 percent of the

⁵¹ We present results using the equal-weighted market capital appreciation. However, our regression estimates are exactly the same, except for the constant term, when using a market-weighted or a price-weighted index, or simply using the unadjusted individual returns.

⁵² Our strategy diverges from the standard event study methodology in two main ways. First, we focus on capital appreciation rather than in income returns to abstract from dividend payments. We do not anticipate this restriction to alter our results since few firms paid out dividends within our window of analysis. Second, the standard methodology calculates abnormal returns as the difference between the actual return and a predicted return obtained from a market model. Our strategy is equivalent under the assumption that $\alpha=0$ and $\beta=1$ for every share. Estimating a market model requires collecting weekly prices for an extended period of time other than the panic. We are in the process of relaxing both assumptions.

117 railroads and industrial firms for which we have balance sheet information and we observe the level of assets in 1906. Thus, our ability to cumulate abnormal capital gains based only on observed prices would be rather limited. Instead, we assume no price changes in weeks for which prices are missing (that is, we set the capital appreciation R_{it} to 1), but we restrict the analysis to the cumulative abnormal appreciation of those firms were at least one capital appreciation R_{it} was actually observed during the event window $[-k, k]$.⁵³

Using these data, we estimate:

$$CAA_i = \alpha + \beta_0 Affectedtrust_i + \beta_1 Affectedtrust \times logassets06_i + \beta_2 logassets06_i + \delta X_i + \varepsilon_i$$

where *Affectedtrust* is an indicator equal to one for firms with a director from one of the trusts among the top 25 percent in deposit losses, and *logassets06* is the log level of assets at the end of the firm's fiscal year in 1906. If the presence of a director from an affected trust company on a firm's board were detrimental because of disruptions in access to credit and/or harm to its reputation, then we would expect to find a negative overall effect on the returns paid by the firm's shares. But as we expect the effects to be heterogeneous, the interaction with the log of assets in 1906 allows us to study differential effects of connections to affected trusts for firms that were small or large (prior to the onset of the panic). We expect to find that firms connected to affected trusts had lower returns during the panic ($\beta_0 < 0$), but that the effect was more severe for smaller firms ($\beta_1 > 0$). Depending on the size of the event window (k), we observe stock prices for 61 to 69 firms with sufficient frequency for inclusion in the sample. About 53 percent of the firms in the event study have an affiliation with one of the worst-affected trusts. For this sample, the mean value of the log of firm assets in 1906 is 18.54, the 25th percentile is 17.81, and the 75th percentile is 19.25.

Table 5 presents results for selected event windows centered on Friday October 25th, 1907, around the run on Knickerbocker Trust. For perspective, from the beginning of October through late November, the market fell approximately 25 percent. The results in column (1) suggest that the panic had a significant differential effect on the returns of firms connected to affected trusts in the

⁵³ Our results are robust (although less precise) when we focus only on the most liquid shares that are less subject to our imputation.

week surrounding the onset of the panic. For an affected firm of average size, the decline in cumulative capital appreciation on the week around the panic was $-0.065 (= -1.526 + [0.0788 \times 18.54])$, equivalent to about half of a standard deviation in cumulative stock gains. As expected, the magnitude of the effect was heterogeneous and related to the initial size of firms. A firm in the 75th percentile of the assets distribution experienced no consequence on its stock prices due to connections with affected trusts, whereas a firm at the 25th percentile experienced very large negative returns (-0.156). Finally, the effects seem to have been fairly persistent over broader windows surrounding the onset of the panic, as shown in columns (2) and (3). Our findings are robust to using Oct 18th, 1907 as the event date.

These results indicate that especially smaller firms connected to affected trusts saw their stock prices fall differentially during the panic. Since our strategy compares the cross-sectional differences in capital appreciation, our findings thus far cannot rule out the possibility that this negative correlation was not specific to the financial crisis—perhaps these firms generally performed worse. As a “placebo” test, we replicate our analysis using an event date as early in advance of the panic as our price data allows. As shown in column (4), we find no statistical differences in the cumulative abnormal appreciation around September 13th, 1907, and the magnitudes of the estimated coefficients, both for the “Affected trust” dummy variable and for its interaction with initial firm size, are much smaller than during the panic. These results are quite reassuring as they suggest that firms connected to affected trusts did not have lower capital appreciation in general relative to the non-connected firms.⁵⁴

Results: Firm Performance

We further study the transmission of the panic to the real economy by analyzing whether connections to affected trusts had a differential effect on the performance on non-financial firms in the years following the panic. For this study, we use our panel dataset from 1903 to 1911 which

⁵⁴ We obtain similar, albeit less robust, results when performing a placebo at the end of our weekly price data, in December of 1907. However, these results are potentially more affected by any enduring consequences of the financial crisis.

contains about 120 firms with accounting information both before and after the panic.⁵⁵ In particular, we estimate:

$$\begin{aligned} \pi_{it} = & \alpha_i + \gamma_t + \lambda_1 \text{Affectedtrust}_i \times \text{postpanic}_t + \\ & + \lambda_2 \text{Affectedtrust}_i \times \text{postpanic}_t \times \text{logassets06}_i + \delta \mathbf{X}_{it} + \varepsilon_{it} \end{aligned}$$

where π_{it} is one of the measures of performance of interest for firm i during year t ; α_i and γ_t are firm and year fixed effects that control for time-invariant firm unobserved characteristics and for overall macroeconomic conditions; \mathbf{X}_{ijt} is a vector of time-varying firm characteristics, such as log assets; and $\text{Affectedtrust}_i \times \text{postpanic}_t$ is an indicator equal to one for all years for firms with a director of a trust that was differentially affected during the panic on its board multiplied by an indicator for the years 1907 and later; and $\text{Affectedtrust}_i \times \text{postpanic}_t \times \text{logassets06}_i$ is that same indicator multiplied by the log value of the firm's assets in 1906, before the crisis. In this framework the differential effect on firm performance of having an affiliation with an affected trust in 1907 for the years during and after the financial crisis is $(\lambda_1 + \lambda_2 \text{logassets06}_i)$. If the effect is concentrated among smaller firms, which may have been perceived as riskier, then we would expect $\lambda_1 < 0$, and $\lambda_2 > 0$. Of the 120 firms in the sample, 57 have affiliations with the worst-affected trusts. The mean value of the log of firm assets in 1906 is 18.09, the 25th percentile is 17.09, and the 75th percentile is 18.86.

Before proceeding to the regressions, Figure 5 presents the annual differences between firms with and without affected trusts on their board in 1907 for return on assets and return on equity, in the upper panel, and firms' dividend rates and interest rates, in the lower panel. Quite reassuringly, the profitability and dividend measures do not exhibit a negative trend, and the interest rate does not show a positive trend, in the years prior to the panic. Thus, it is unlikely that any estimated effect could result from preexisting differential trends between firms with and without ties to affected trusts. The upper panel shows that profitability for firms affiliated with affected trusts was rising in the years prior to the panic relative to other firms, and then collapsed in 1907 and 1908, before

⁵⁵ The actual number of firms varies slightly across specifications since the accounting information is missing for some variables of interest.

recovering somewhat in 1909 and 1910. The lower panel of the figure provides some insight into how these firms responded to this fall in profitability. The dividend rate of firms affiliated with affected trusts had been rising relative to other firms, but was cut sharply in 1908 and remained low in 1909 before recovering in 1910. In addition, the interest rates paid by firms affiliated with affected trusts relative to other firms increased substantially between 1906 and 1908, a sign that these firms resorted to more expensive sources of credit.

Turning to the regressions, we first study the effects of connections with the severely affected trusts on profitability. Table 6 presents these results using return on assets and return on equity. All of the standard errors presented in the table are clustered at the firm level, in order to address potential problems of autocorrelation in residuals. Consistent with the notion that credit intermediation suffered in the wake of the panic, all of the specifications indicate a negative effect on profitability that was greater for smaller firms. In columns (1) and (4), the estimated difference-in-differences for firms affiliated with affected trusts in the wake of the panic is about -0.003 and -0.009 for firms with the median level of assets, and -0.007 and -0.014 for firms at the 25th percentile of assets. The effects for the smaller firms are equivalent to around 20 percent of a standard deviation in those variables.

Columns (2) and (5) include additional controls for firm characteristics that may have influenced their degree of vulnerability to a shock, which are interacted with a post-panic indicator. These include whether or not a director from one of New York's four largest commercial banks was on the firm's board, the firm's degree of leverage, and the percentage of the firm's assets represented by cash.⁵⁶ The inclusion of all of these variables only marginally affects the main coefficients of interest. The major bank variable has a small positive coefficient that is very imprecisely estimated; perhaps as an indication that more levered firms were likely to have better collateral, the effect of leverage on profitability is positive and significant for ROA, and perhaps as an indication that riskier firms held more cash in anticipation of their future needs, the cash ratio is negative and significant

⁵⁶ These major commercial banks include National City Bank, National Hanover Bank, First National Bank, and National Bank of Commerce. The first two of these had assets of around \$200 million, and the second two had assets around \$100 million. These were the largest banks in the city by far, and dominated the NYCHA and banking generally.

for ROE. Finally, in columns (3) and (6) a time trend interacted with affiliations with affected trusts is added in order to ensure that the results obtained are not simply due to differential trends between firms with and without these affiliations; this has little effect.

We next estimate regressions with similar specifications for firms' average interest rates on their debt, and their dividend rates. These results are reported in Table 7. All of the results are qualitatively similar to those presented above for firms' profitability. The estimated coefficients in columns (1) and (4) of the table imply that the difference-in-differences for firms affiliated with affected trusts in the wake of the panic is an increase in interest rates of about 0.003 and a decrease in dividend rates of -0.006 for firms with the median level of assets. For firms at the 25th percentile of assets, these values become 0.004 (or 40 basis points) and -0.009, respectively. The effects for the firms at the 25th percentile are equivalent to around 40 percent of a standard deviation in for the interest rate, and 20 percent of a standard deviation for dividend rates. Even though we are focusing on a positively selected sample, the smaller firms within the sample did indeed suffer relative to other firms if they had an affiliation with one of the differentially affected trust companies.

Robustness of the Results

The results presented above indicate that the smaller firms affiliated with affected trusts suffered differentially in the years following the Panic of 1907. An alternative way to differentiate among firms, which corresponds well to the firm characteristics relevant to the Bernanke (1983) notion of credit intermediation, is to distinguish between railroads and industrials. With their extensive land holdings, track, and rolling stock, railroads had excellent collateral whose value was relatively easy to establish. In contrast, the assets of many industrial firms were more likely to include intangibles such as patents, and the physical capital of firms in some industries such as electrical supplies was much harder to value. We would therefore expect an industrial firm with an affiliation with an affected trust to be affected much more severely than a railroad following the panic.

Table 8 presents regressions that estimate a specification where the usual *Affectedtrust* \times *post-panic* variable is interacted with an indicator for railroads, and an indicator for

industrials. Regressions for profitability, interest rates, and dividend rates are presented in the table. Consistent with the notion that firms with riskier collateral should suffer differentially following the panic, the results indicate that industrials performed worse than railroads for every measure of performance.

One additional issue of concern regarding the results presented above is that they may be due to a particular kind of selection: firms that were especially vulnerable to the crisis for reasons other than their financial connections may have selected into relationships with the trust companies that were adversely affected by the panic. If, for example, firms that pursued aggressive financing strategies or undertook risky investments formed affiliations with trust companies that were faced the most severe runs, then the estimates obtained in the regressions above would have reflected this selection effect.

It should be noted that the vast majority of firms in our sample had an affiliation with a trust company. Therefore, if the most severe runs struck some trust companies because of a quasi-random shock—that one of their directors became caught up in a scandal, or that some of their directors also sat on the boards of other trust companies that were associated with a scandal—then the affiliation with one of the worst-affected trusts may also be regarded as the outcome of a quasi-random process.

Nonetheless, we can also test for the vulnerability of our affiliated firms directly. In particular, we can use the experience of an earlier recession and financial panic. In 1903 and 1904, the United States experienced a prolonged recession that included a financial panic concentrated in 1903.⁵⁷ The 1903 crisis saw a sustained decline in securities prices, and led to a significant contraction in credit markets; “even the best railways and municipalities found it difficult to borrow on their accustomed terms” (Mitchell, 1913: p. 67). Although the recession was not as severe as the one that followed the Panic of 1907, and did not result in widespread bank failures, it did produce substantial numbers of commercial failures.⁵⁸ It certainly constituted a shock to securities markets

⁵⁷ The NBER dates a peak in September 1902, and a trough in August 1904. The financial crisis in 1903 was given the moniker “The Rich Man’s Panic.”

⁵⁸ Friedman and Schwartz (1963: p. 151-52) note that Treasury Secretary Shaw made “unprecedented efforts” to bring relief to banks, significantly increasing government deposits and waiving reserve requirements.

and a significant decline in demand.⁵⁹ If the firms affiliated with affected trusts in 1907 were fundamentally similar four years prior to that shock, in the sense that the degree of their vulnerability to shocks was roughly the same, and if the panic and recession that occurred can be considered reasonably similar to the panic of 1907, then the experience of firms that were affiliated with affected trusts during the years 1903-04 should provide a test of whether they are indeed a differentially vulnerable group of firms.

We test this hypothesis using data from 1900-06. In particular, we investigate whether the firms that had affiliations with affected trusts in 1907 performed differentially worse in the years 1903 and 1904, and whether any such effects were heterogeneous and related to firm size. To perform this difference-in-difference analysis, we use accounting data from 1900 to 1902 for the pre-period. We estimate a regression of the same form as those above, only with the dates of the different variables changed:

$$\pi_{it} = \alpha_i + \gamma_t + \lambda_1 Affectedtrust_i \times 1903/04_t + \\ + \lambda_2 Affectedtrust_i \times 1903/04_t \times logassets04_i + \delta X_{it} + \varepsilon_{it}$$

where now the differential effect of affiliation with an affected trust during the recession is equal to $(\lambda_1 + \lambda_2 logassets04_t)$ ⁶⁰

The results, reported in Table 9, indicate that the firms affiliated with affected trusts did not perform differentially worse in the 1903-04 recession. The estimates for ROA and ROE in columns (1) and (2) are much smaller in absolute value than those reported in Table 6 and are not statistically significant. In addition, the point estimates for λ_1 and λ_2 are positive and negative, respectively – the opposite pattern found for the 1907 panic. For a firm at the 25th percentile in log assets, the effect on their ROA and ROE is negative but only about one-third and one-fifth the size of the effect in 1907, respectively. In column (3), where the dividend rate is estimated, the estimates even become marginally significant, but still have the opposite signs than in the 1907 crisis, and the effect for a

⁵⁹ Romer (1999) presents evidence on the relative magnitude of the output loss associated with this recession.

⁶⁰ Ideally we would like to use the value of assets in 1902, which would not reflect any changes that occurred during the recession. However, we only observe the value of assets for 38 firms in 1902, whereas we observe them for 90 firms in 1904, which creates a much larger sample. Results using the smaller sample with the 1902 log assets interaction are substantially unchanged.

small firm is an increase in the dividend rate of 0.2 percent. Finally, again for a small firm, the interest rate on their debt actually fell by 0.2 percent. Any interpretation of the results of this paper based on the vulnerability of the firms affiliated with affected trusts in 1907 must confront the fact that these firms did not perform differentially worse in the 1903-04 panic and recession, and moreover the smaller firms within this group, which did relatively worse after the 1907 panic, did relatively better during 1903-04. Thus, we view this as suggestive evidence that the shock to the financial sector during the Panic of 1907 transmitted to nonfinancial firms and had real consequences for individual firms.

5. Conclusion

The panic of 1907 was one of the most severe financial crises prior to the Great Depression. This paper has investigated the effects of the panic by focusing on a particular channel through which the financial crisis may have been transmitted to the real economy: the affiliations between the trust companies that came under tremendous pressure, and their client firms. In the early twentieth century, financial institutions such as trust companies commonly placed one of their directors on the boards of the firms with whom they had strong ties; this very public affiliation between the trust and the firm helped cement this tie. Trust companies were major lenders, holders of securities, and providers of fiduciary services for corporations. The corporations affiliated with trust companies that failed likely faced a differential financial shock during the panic.

Using newly collected panel data on the performance of NYSE-traded firms, and the ties between trust companies and those firms, we used a difference-in-differences estimation strategy to investigate this effect. The results indicated that firms affiliated with affected trusts saw their profitability and dividends fall relative to other firms in the years following the panic. Some evidence confirming that the fall in profitability occurred due to financial constraints was found with the rise in interest rates these firms experienced. Evidence from securities markets also indicated that in the weeks surrounding the panic, the share prices of small firms closely affiliated with the affected trust companies fell by more than the shares of other firms.

The results also indicate the important role played by J.P. Morgan in the financial system generally, and in corporate finance in particular. Morgan had helped to organize a series of rescues of trust companies, through his power and influence with other financial institutions. But his actions were not those of a disinterested actor, and in particular were focused on a trust company with close ties to several of his own firm's clients. But the panic was precipitated in part by decisions to cut off certain speculators and institutions from aid from the New York Clearinghouse and its members, where Morgan and his associates had considerable influence. Morgan and his associates did take on some elements of the role of central bankers, but clearly not all of them.

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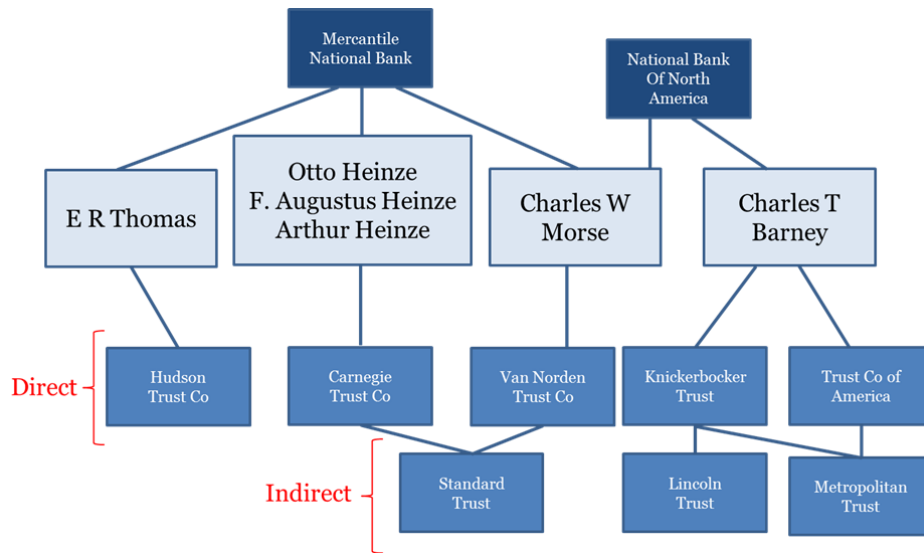


Figure 1: Connections between speculators and trust companies

Lines connecting individuals to financial institutions denote directorships. The institutions at the top of the figure are the national banks that connect the speculators to one another and to Barney; Morse, Thomas and the Heinzes also controlled several other banks, not shown. The group of trusts denoted as having an indirect connection to the speculation was defined as those with at least two directors in common with those that had a direct connection. Data on directorships collected from *Rand McNally Bankers Directory, 1907*.

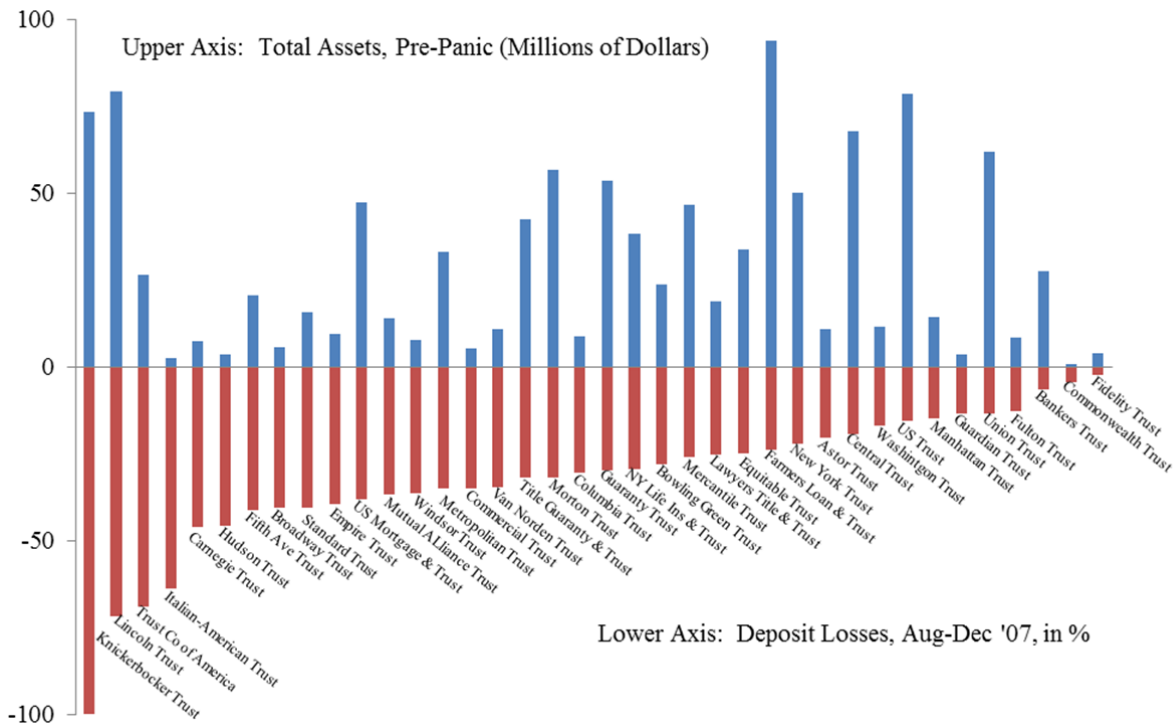


Figure 2: Assets and deposit losses at New York City trust companies

Upper axis: total assets, June 1907, in millions. Lower axis: percentage change in deposits between August 22, 1907 and December 19, 1907, in percent. Data reported to the NY Superintendent of Banks.

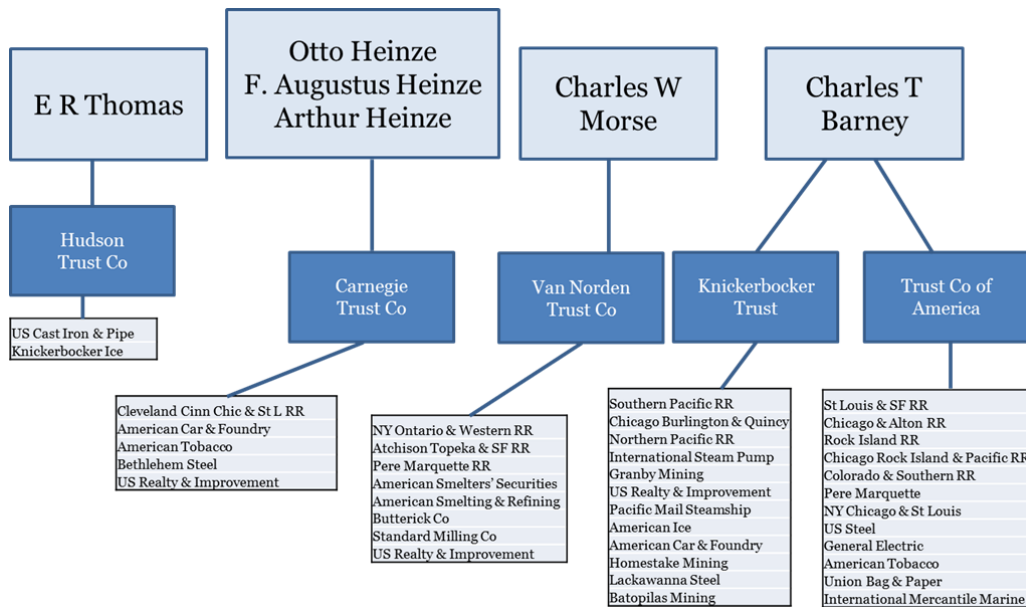


Figure 3: Connections between trust companies and nonfinancial firms

Lines connecting individuals to financial institutions denote directorships. Data on directorships collected from *Rand McNally Bankers Directory*, 1907, and *Moody's Manual of Railroads and Corporation Securities*, 1907.

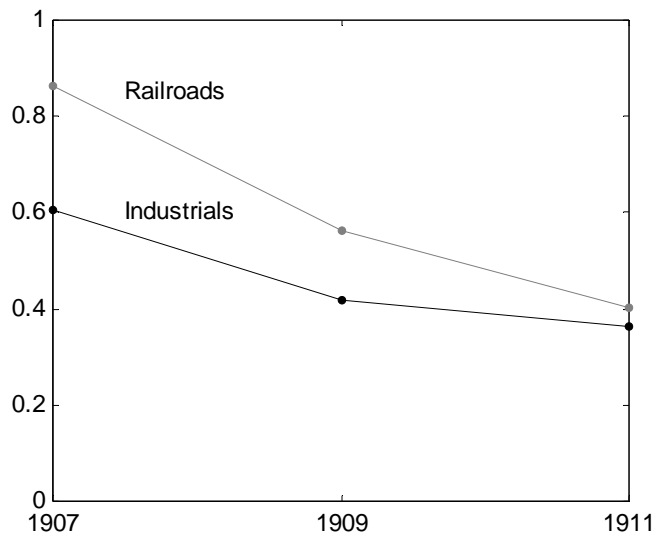


Figure 4: Board seats held by differentially affected trusts, 1907-1911

Average number of seats held by differentially affected trusts across all railroads and industrials. Data are averages per firm; the number 0.6 for 1907 for industrials implies that on average these trusts held 0.6 seats with each industrial firm. Data on directorships collected from *Rand McNally Bankers Directory*, 1907-11, and *Moody's Manual of Railroads and Corporation Securities*, 1907-11.

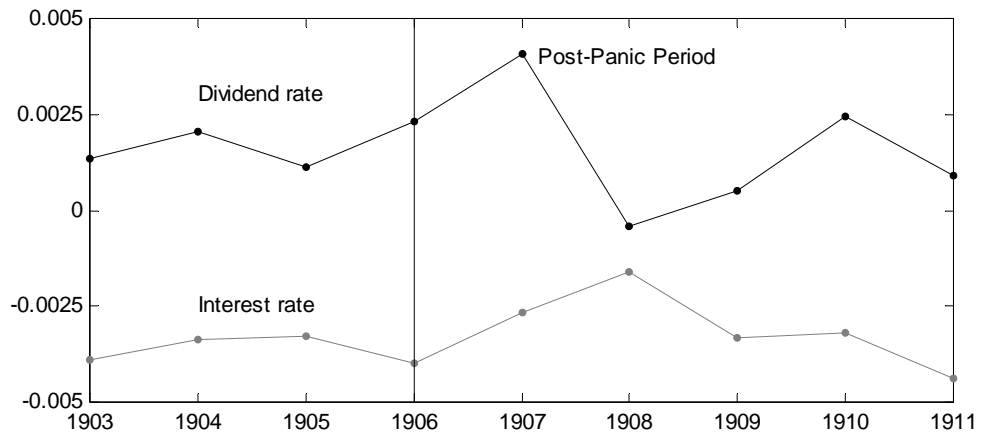
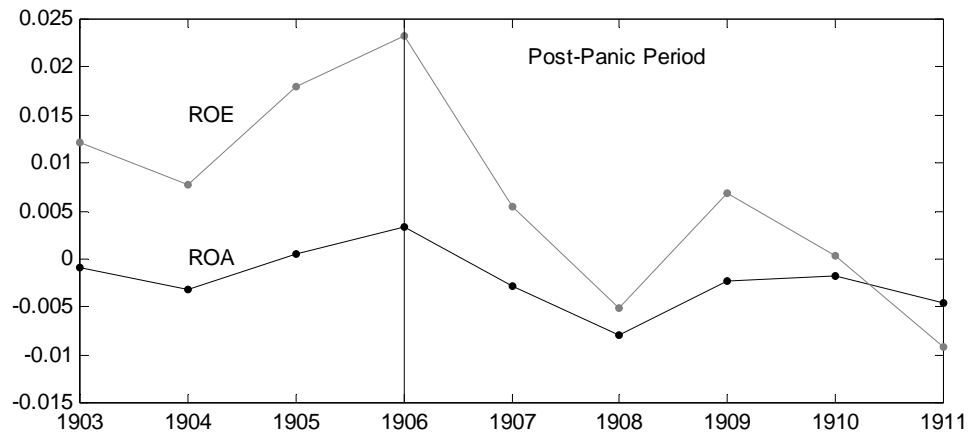


Figure 5: Annual estimated differences between firms with and without affected trusts
 Each line plots the annual difference between firms with and without affected trusts on their board in 1907, as estimated in a regression that controls for firm fixed effects.

Table 1: Regressions:
Percent Change in Deposits, August-December 1907
(Mean = -0.32, SD = 0.20)

	(1)	(2)	(3)
Direct Connection	-0.338*** (0.113)	-0.378*** (0.104)	-0.347*** (0.0757)
Indirect Connection	-0.223** (0.0927)	-0.219** (0.0877)	-0.203*** (0.0528)
Net Worth / Assets		0.475** (0.184)	0.219 (0.208)
Cash / Checkable Deposits		4.517* (2.217)	3.991 (2.612)
Stock and Bond Investments / Assets		0.270 (0.166)	0.139 (0.134)
Log(Total Assets)		0.0154 (0.0383)	-0.0261 (0.0342)
Log(Firm Age)		-0.0249 (0.0318)	-0.0129 (0.0261)
Uptown Headquarters			-0.168** (0.0700)
Constant	-0.259*** (0.0244)	-0.810 (0.667)	0.00322 (0.631)
Observations	38	38	38
R-squared	0.406	0.576	0.676

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 2: Trust company representation on firm boards, 1907

	Mean	SD	Min	Max
A. Railroads				
<i>Board Characteristics</i>				
Board Size	12.32	3.07	4	26
<i>Trust company representation on board</i>				
At least one trust company representative on board	0.84	--	0	1
Seats held by trust company representative	4.22	2.76	0	12
Number of different trust companies represented	5.63	3.98	0	14
B. Industrials				
<i>Board Characteristics</i>				
Board Size	12.53	4.56	3	28
<i>Trust company representation on board</i>				
At least one trust company representative on board	0.70	--	0	1
Seats held by trust company representative	2.48	2.45	0	14
Number of different trust companies represented	2.98	2.95	0	15

Table 3:
Definitions and summary statistics, accounting variables

Variable	Definition	Mean	SD	Min	Max
A. Railroads					
Assets	Total assets	196,859,711	181,115,021	5,598,323	869,643,066
Leverage ratio	Long-term debt/ assets	0.454	0.155	0	0.771
Return on assets	Net income/assets	0.046	0.02	0	0.16
Return on equity	Net income/shareholders' equity	0.144	0.08	0	0.48
B. Industrials					
Assets	Total assets	78,941,765	218,261,937	2,162,651	1,821,965,555
Leverage ratio	Long-term debt/ assets	0.132	0.14	0	0.62
Return on assets	Net income/assets	0.051	0.04	-0.024	0.23
Return on equity	Net income/shareholders' equity	0.091	0.07	-0.056	0.38

Table 4:
Characteristics of non-financials with and without affected trusts,
All firm-years, 1902-1911

	No affected trust director on board in 1907	Affected trust director on board in 1907	p-value, difference
<i>Physical Characteristics</i>			
Log assets	17.757	18.561	0.000
<i>Debt and liquidity</i>			
Book leverage ratio	0.339	0.471	0.000
Short-term liabilities ratio	0.029	0.031	0.234
<i>Performance</i>			
Return on assets	0.041	0.027	0.000
Return on equity	0.073	0.072	0.000

Table 5:
Stock Market Event Study

Event window:	Event date on Oct 25th, 1907			Event date on Sept 13 th , 1907
	k=1	k=1	k=6	k=1
	(1)	(2)	(3)	(5)
Affected trust	-1.526*	-1.727*	-1.351+	-0.143
	(0.600)	(0.728)	(0.680)	(0.409)
Affected trust×logassets06	0.0788*	0.0891*	0.0704+	0.00756
	(0.0317)	(0.0384)	(0.0361)	(0.0221)
Logassets06	-0.0456	-0.0527	-0.0618*	-0.0143
	(0.0283)	(0.0327)	(0.0277)	(0.0220)
Railroad	0.100*	0.0970*	0.112**	0.0592*
	(0.0392)	(0.0437)	(0.0410)	(0.0292)
Constant	0.830	0.998+	1.159*	0.227
	(0.510)	(0.591)	(0.502)	(0.393)
Observations	61	62	69	59
R-squared	0.297	0.241	0.155	0.100

Robust standard errors in parentheses. **, *, and + indicate significance at the 1, 5 and 10 percent level, respectively. The dependent variable in each column is the cumulative abnormal capital appreciation from k-weeks prior to the event date to k-weeks after the event date for each firm with at least one non-missing capital appreciation over the event window.

Table 6:
Regressions, firm profitability

	ROA			ROE		
	Mean: .033, SD: .031			Mean: .072, SD: .052		
	(1)	(2)	(3)	(4)	(5)	(6)
Trust×post-panic	-0.0864** (0.0257)	-0.0702** (0.0261)	-0.0714** (0.0261)	-0.128* (0.0551)	-0.121* (0.0540)	-0.115* (0.0546)
Trust×post-panic×logassets06	0.00457** (0.00135)	0.00358* (0.00138)	0.00358* (0.00138)	0.00658* (0.00293)	0.00600* (0.00289)	0.00601* (0.00289)
Major bank×post-panic		0.000261 (0.00282)	0.000272 (0.00283)		0.000734 (0.00600)	0.000664 (0.00600)
Leverage06×post-panic		0.0133+ (0.00697)	0.0133+ (0.00698)		0.0114 (0.0136)	0.0114 (0.0136)
(Cash/assets)06×post-panic		-0.0225 (0.0324)	-0.0220 (0.0327)		-0.102+ (0.0558)	-0.104+ (0.0565)
Trust×time trend			0.000298 (0.000727)			-0.00129 (0.00143)
Log(assets)	-0.00676 (0.00654)	-0.00602 (0.00697)	-0.00613 (0.00700)	0.0286+ (0.0147)	0.0328* (0.0154)	0.0332* (0.0155)
Constant	0.158 (0.119)	0.142 (0.127)	0.143 (0.126)	-0.451+ (0.270)	-0.527+ (0.281)	-0.531+ (0.283)
Observations	974	974	974	959	959	959
R-squared	0.852	0.854	0.854	0.799	0.800	0.801
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors, adjusted for clustering on firms, in parentheses

** p<0.01, * p<0.05, + p<0.1

Table 7:
Regressions: Interest rates, dividend rates

	Interest rate			Dividend rate		
	Mean: .047, SD: .010			Mean: .033, SD: .041		
	(1)	(2)	(3)	(4)	(5)	(6)
Trust×post-panic	0.0298*	0.0381*	0.0381*	-0.0779*	-0.0865*	-0.0802*
	(0.0143)	(0.0180)	(0.0182)	(0.0343)	(0.0364)	(0.0361)
Trust×post-panic×logassets06	-0.00148+	-0.00194+	-0.00194*	0.00398*	0.00451*	0.00453*
	(0.000767)	(0.000985)	(0.000978)	(0.00186)	(0.00196)	(0.00197)
Major bank×post-panic		0.00009	0.00009		0.00265	0.00253
		(0.00198)	(0.00199)		(0.00382)	(0.00379)
Leverage06×post-panic		0.00502	0.00502		-0.0111	-0.0110
		(0.00628)	(0.00630)		(0.00949)	(0.00949)
(Cash/assets)06×post-panic		0.0239	0.0239		0.0732	0.0699
		(0.0317)	(0.0316)		(0.0898)	(0.0905)
Affected trust×time trend			-0.00009			-0.00155
			(0.000456)			(0.00104)
Log(assets)	-0.00252	-0.00390	-0.00390	0.0111	0.00787	0.00888
	(0.00433)	(0.00441)	(0.00436)	(0.0101)	(0.0105)	(0.0104)
Constant	0.0935	0.117	0.116	-0.165	-0.106	-0.119
	(0.0803)	(0.0808)	(0.0803)	(0.184)	(0.192)	(0.191)
Observations	668	668	668	968	968	968
R-squared	0.699	0.700	0.700	0.876	0.878	0.879
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors, adjusted for clustering on firms, in parentheses

** p<0.01, * p<0.05, + p<0.1

**Table 8:
Regressions, Industrials vs. Railroads**

	ROA (1)	ROE (2)	Interest rate (3)	Dividend rate (4)
Affected trust×post-panic×Industrial	-0.0120** (0.00441)	-0.0279** (0.00777)	0.00538* (0.00214)	-0.0118** (0.00407)
Affected trust×post-panic×Railroad	0.00312 (0.00241)	0.00288 (0.00509)	0.00130 (0.00183)	-0.000811 (0.00397)
Log(assets)	-0.00739 (0.00632)	0.0260+ (0.0138)	-0.00298 (0.00431)	0.0113 (0.00987)
Constant	0.170 (0.115)	-0.403 (0.253)	0.102 (0.0799)	-0.167 (0.180)
Observations	974	959	668	968
R-squared	0.855	0.805	0.699	0.877
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Robust standard errors, adjusted for clustering on firms, in parentheses

** p<0.01, * p<0.05, + p<0.1

**Table 9:
Regressions, 1903-04 Recession**

	(1) ROA	(2) ROE	(3) Dividend rate	(4) Interest rate
Affected trust in 1907 × 1903-04	0.00900 (0.0466)	0.0577 (0.117)	0.0479+ (0.0254)	-0.0445 (0.0275)
Affected trust in 1907 × 1903-04 × logassets'04	-0.000660 (0.00244)	-0.00345 (0.00612)	-0.00265* (0.00133)	0.00244 (0.00149)
logassets	-0.0402 (0.0258)	-0.0267 (0.0343)	0.000300 (0.0127)	-0.00573+ (0.00311)
Constant	0.758 (0.469)	0.553 (0.625)	0.0198 (0.231)	0.152* (0.0580)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	362	362	359	236
R-squared	0.902	0.853	0.898	0.880

Robust standard errors, adjusted for clustering on firms, in parentheses

** p<0.01, * p<0.05, + p<0.1