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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, resulting in 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 imply that firms with close ties to trust companies that faced runs performed worse in the years following 1907. The results also highlight the important role of J.P. Morgan during the crisis and its aftermath.

1. Introduction

Many economists have drawn parallels between the current financial crisis and the Panic of 1907. Just as the crisis of 2007 originated in runs on the "shadow banking system," a relatively new and unregulated source of lending funded by liabilities that were uninsured, the Panic of 1907 originated in runs on a newly popular form of financial intermediary, trust companies, which faced little regulation and like other banks offered deposits that were not insured. Moreover, the recent financial meltdown became particularly acute following the bankruptcy of Lehman Brothers. Similarly, the Panic of 1907 was deepened by the sudden failure of the Knickerbocker Trust Company, the third-largest institution of its kind in New York City. Finally, the Fed responded to the current crisis by offering extraordinary lending facilities intended to restore liquidity to credit markets. The Fed did not exist is 1907, but the most powerful private banker in the United States at that time, J.P. Morgan, organized a series of emergency loans to securities dealers and to trust companies under pressure that helped stabilize the financial system.

Although the causes of the Panic of 1907 have been the subject of considerable research, the economic consequences of the panic have received surprisingly received little attention. The severe, if short-lived, disruption of credit intermediation and the functioning of the banking system is understood to have caused a deep recession, but little is known about the channels through which the crisis may have been transmitted into the real economy, or whether particular firms or sectors were differentially affected, and if so, why. The paucity of evidence regarding the impact of the panic is due largely to the lack of any consistent data source on the performance of individual firms or bank lending patterns. To address these issues, we construct a firm-level panel dataset with detailed financial information on all NYSE-traded industrials and railroads for the years 1901-1911.

Using these newly collected data on nonfinancial companies and their ties to

financial institutions, this paper presents new evidence on the consequences of the panic of 1907. To identify the firms that may have been differentially affected by the panic, we use the presence of a director of one of the New York trust companies that came under acute pressure during the panic on the firms' boards. One of the unique characteristics of bank-firm relationships in the early twentieth century was that commercial banks and investment banks would often place one of their own directors or partners on their most important clients' boards. By collecting a comprehensive dataset of directors and partners of New York financial institutions, as well as the names of directors of NYSE-traded companies, we can identify many bank-firm ties by the presence of financiers on the boards of nonfinancial firms. We also investigate whether firms with partners of J.P. Morgan & Co. on their board were better able to withstand the crisis. Finally, we provide new insights into the emergency lending measures organized by J.P. Morgan, and the extent to which these were motivated by self-interest.

Our results indicate that firms with a close relationship to one of the trust companies that came under acute pressure during the panic performed worse, in that their overall profitability fell in the years immediately following the panic. In contrast, firms with ties to J.P. Morgan & Company were essentially unaffected by the panic. Moreover, a relationship with J.P. Morgan and Company allowed firms to avoid the effects of the panic *even* if a firm was also connected to a failing trust company. The disruption in access to credit or other negative consequences that resulted from ties to a failing trust were likely more than compensated for by ties to Morgan. Finally, the data on bank-firm ties reveal that Morgan's decision to let the Knickerbocker Trust fail, while working assiduously to arrange for emergency loans to a similar institution, the Trust Company of America, on the very next day, may have been motivated by self-interest. The Trust Company of America had extensive 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 distinct from the monetary channel emphasized by Friedman and Schwartz (1963). Recent contributions to this literature, in the context of the Great Depression, include Ziebarth (2012) and Mladjan (2012), and in the context of more recent crises include Kashyap, Lamont and Stein (1994), Khwaja and Mian (2008), Amiti and Weinstein (2009), and Schnabl (2011). This paper extends that literature to the study of an important crisis, the Panic of 1907, and offers a novel approach to the identification of bank-firm ties that could be utilized in the study of other historical settings.

The results also contribute to the substantial literature on the Panic of 1907 itself. The macroeconomic context and the impact on the banking system 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; Odell and Weidenmier, 2004).[1] This paper extends those earlier contributions by analyzing the microeconomic impact of the crisis, and the consequences of the disruption of the financial system for the real economy.

2. The Panic of 1907

The Panic of 1907 occurred following a series of economic shocks, which precipitated the onset of a recession.[2] The San Francisco earthquake and fire of 1906 had

[1] Strouse (1999), Carosso (1987), and Bruner and Carr (2007) present engaging histories of the panic.
[2] The NBER identifies a business cycle peak at May 1907.

had a profound monetary and financial impact, both domestically and internationally.[3] In late April and May of 1906, nearly $50 million of 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. Faced with a large net gold outflow, the Bank of England raised its discount rate from 4 to 6 percent in order to reverse the flow of gold. The German and French central banks quickly followed by raising their discount rates as well. The Bank of England also acted to halt acceptances of American "finance bills" in London, which were used to finance gold imports. 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 (see Sprague, 1910, p. 241).

The New York money market thus entered the fall of 1907 low on gold reserves and vulnerable to shocks. But the structure of the banking system itself magnified this vulnerability. National banks located outside New York City could deposit funds in "central reserve city" banks such as those in New York, which would be counted toward their required reserves. This significantly increased the deposits available to New York City banks, but exposed them to the risk of withdrawals by banks outside of the city in times of crisis.

Another significant source of vulnerability was created by the vast expansion of trust companies in New York. Originally created to serve as fiduciaries, often in connection with life insurance companies, trust companies enjoyed broad financial powers, including the ability to invest in shares of stock and other securities, and to underwrite and distribute securities. Although they were not permitted to issue bank notes, they had the power to receive deposits and make loans, and competed directly with national banks. Incorporated

[3] Odell and Weidenmeir (2004) analyze the economic impact of the San Francisco earthquake.

under permissive state laws, trust companies were not subject to the strict regulations of the National Banking Act. Whereas 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 until 1906, when a 15% requirement was imposed. Moreover, they were permitted to hold a portion of their reserves in various securities (Moen and Tallman, 1992).[4] 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 (Judd, 1907).

The advantages of the trust form were exploited aggressively in New York around the turn of the twentieth century by many new entrants. 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 (from $915.2 million to $1.8 billion) growth in the assets of national banks (Barnett, 1910, p. 235). Over time, trust companies developed a more important role in banking and financial markets, becoming major purchasers of securities and important sources of lending. Trust companies also played an active role in the making of loans for large industrial mergers or consolidations (Moen and Tallman, 1992). Some also became important underwriters of securities and offered customers a wide range of financial services, in a way that began to resemble a "universal bank." Although they rose to prominence quite rapidly, New York's trust companies were not regarded as second-rate institutions. For example, many prominent private bankers, as well as the former U.S. Treasury Secretary Leslie M. Shaw, were among their directors.[5]

[4] A special New York commission on banks found that whereas only 70.3 percent of the assets of national banks earned interest, fully 92.2 percent of those of trust companies earned interest (Barnett, 1910, p. 236).

[5] Shaw resigned from office in March of 1907 and became the President of the relatively new Carnegie Trust Company.

The national banks of New York particularly resented the competition they faced from these less-regulated institutions, and decried the "piratical" tactics they employed to attract deposits, including "absurdly" high rates of interest on demand deposit accounts (Sprague, 1910).[6] The national banks also excluded trust companies from the New York Clearing House (NYCH), a private organization that facilitated clearing and that could provide emergency lending to its members, as well as issue "clearing house certificates" to serve as substitutes for currency in times of crisis. Trust companies were permitted to gain access to the NYCH system by clearing through a member bank, so long as they maintained a minimum level of cash reserves—which nearly all of them found unacceptably high. New York's trust companies rose to prominence so quickly that they had not developed any tradition of coordination or providing mutual aid when the panic arose, and remained outside the one institution that could help facilitate such relationships.

Onset of the Panic

The events of the Panic of 1907 that had the most important consequences for financial markets were the widespread runs on trust companies that began in October. However, these runs were precipitated by events that had little direct connection to any trust company. The events that triggered the panic began with a failed attempt to corner the shares of United Copper Company, a mining company that was financed by a small national bank and a few state banks. Mining entrepreneur Augustus Heinze, along with speculators E. R. Thomas and C. W. Morse, had gained control of a series of small banks, and managed

[6] Concerns about the effects of banks competing for deposits through the interest rates they offer have a long history in the U.S., and ultimately led to the prohibition of interest on demand deposits in the 1933 and 1935 Banking Acts; see Friedman and Schwartz (1963, p. 443-4). Trust company industry publications representing the interests of incumbent trusts admonished new entrants in the industry not to make "undignified" appeals for accounts or be "driven to excess" in competition ("Interest Rates on Deposits," *Trust Companies*, June 1907, p. 400).

to commandeer the resources of these institutions to finance their speculative ventures.[7] The losses created by the failed corner on the shares of United Copper, which was undertaken to attempt a "bear squeeze" on short sellers, were borne by the banks that financed the scheme.[8] 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 NYCH for aid. The NYCH provided a loan to the Mercantile, and publicly pledged to support not only that institution but also the other banks involved in the scandal on the condition that the entire board of directors resign from the Mercantile. The NYCH also required that Morse, Thomas and Heinze resign from all the other clearing banks where they held directorships.[9] The very public support from the NYCH and the change in management relieved the pressure on the Mercantile, although the institution was closed and liquidated the following January.

No trust company was directly involved in the failed United Copper corner. However, Charles Barney, president of Knickerbocker Trust and director of Trust Company of America, two of the largest trust companies in the city, was well-known to have been involved in earlier business dealings with Morse and Heinze. Moreover, Morse, Thomas, and Augustus' brother Arthur Heinz held directorships with other trust companies. The connections between the men at the center of the United Copper speculation and various financial institutions are illustrated in Figure 1.

The scandalous revelations about the uses of the funds of Mercantile National Bank and other banks controlled by Morse, Thomas and the Heinzes raised concerns among depositors about whether these men had also endangered the solvency of the trust

[7] 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).
[8] As an illustration of the manipulations that were possible in financial markets at the time, it is worth emphasizing that 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 through their investments in other banks.
[9] Contemporary newspaper articles detailing these events are compiled in Senate Committee on Banking and Currency (1912).

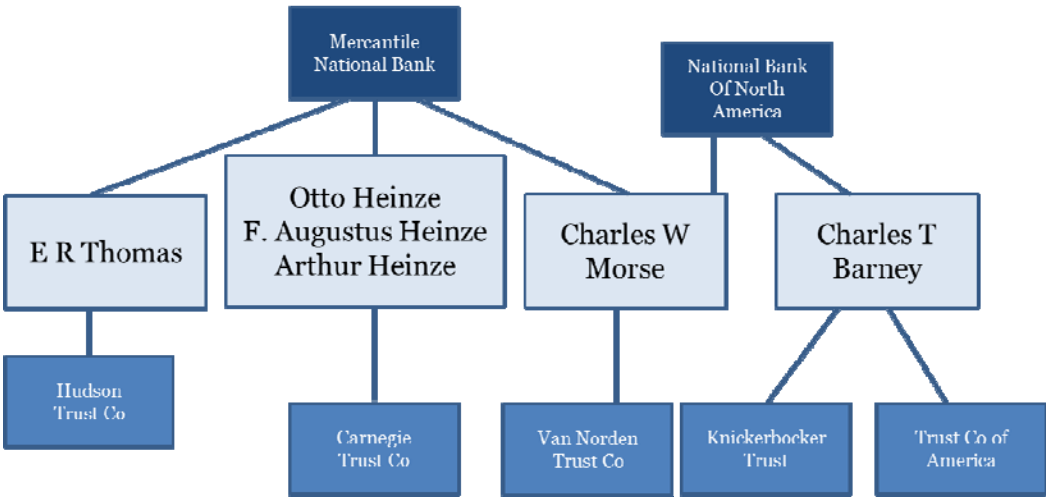

Figure 1: Connections between speculators and trust companies
Lines connecting individuals to financial institutions denote directorships. The institutions at the top of the figure are the national banks that connect the speculators to one another and to Barney; Morse, Thomas and the Heinzes also controlled several other banks, not shown. Data on directorships collected from *Rand McNally Bankers Directory*, 1907.

companies with which they were affiliated. Knickerbocker Trust, which was strongly identified with its president Charles T. Barney and therefore with Morse, began to face heavy withdrawals of deposits following October 16.

Knickerbocker was one of the few trust companies in the city that chose to maintain sufficient reserves to gain access to the NYCH through a member of the clearinghouse, the National Bank of Commerce. When Knickerbocker depositors closed their accounts by depositing checks on those accounts in other banks, the National Bank of Commerce, was initially responsible for those checks. Facing a debit balance at the NYCH of $7 million, and the prospect of even larger debits if more depositors closed their accounts, on October 21 the National Bank of Commerce announced that it would no longer act as Knickerbocker's clearing agent.[10] On that same day, Knickerbocker Trust announced that it had dismissed Charles T. Barney from the office of its Presidency.

These events came as a shock to Knickerbocker's depositors. The loss of the clearing agent implied that the institution's checks would no longer be cashed by other

[10] These events are described in Senate Committee on Banking and Currency (1912, p. 1695).

banks in the city. The dismissal of Barney, even though it was accompanied by assurances that the firm was in sound condition, signaled that Barney may have used some of the firm's resources for illegitimate purposes. A heavy run on the Knickerbocker ensued, and very quickly the run spread to the Trust Company of America, a similar institution where Barney had been a director. Since trust companies held a relatively low proportion of cash reserves to demandable deposits and were not members of the NYCH, the Knickerbocker and the Trust Company of America were particularly vulnerable to liquidity problems in the face of these heavy withdrawals.

Rescues organized by J.P. Morgan

In response to the growing crisis, on October 19 J.P. Morgan began to organize teams of trusted bankers, and charged them with determining whether the financial institutions that came under pressure were solvent.[11] The most powerful and best-connected man in American financial markets, Morgan's own interests were so broad that it could be argued that they coincided with the interests of the markets as a whole.[12] He had, in the past, taken actions that benefited the entire market, for example by bailing out the U.S. Treasury in 1895. During the panic, 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.

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. On Tuesday October 22, with panicked depositors forming long lines outside each of its branches, Knickerbocker paid out $8 million from its teller windows. Morgan's men, who were examining the firm's books all

[11] The story of Morgan's rescue efforts is detailed in Strouse (1999) and Carosso (1987).
[12] Pak and Halgin (2010) explore the social networks behind Morgan's power.

morning, felt unable to determine whether the trust was in fact solvent, and at 12:30 PM Knickerbocker had no choice but to close its doors.

The collapse of Knickerbocker caused the panic to spread, and intensified the runs on other trusts, particularly the Trust Company of America.[13] Other trusts, fearing the possibility of runs, began to call in loans and liquidate assets to build up cash reserves. These efforts severely disrupted stock and bond markets, where securities dealers faced difficulties in financing the holding of their inventories, liquidity vanished, and asset prices fell.

On the afternoon of October 23, Morgan organized a series of 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 Morgan. These loans, as well as further ones 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 failing Trust Company of America.

The run on the Trust Company of America was one of the most severe in U.S. history: the firm paid out more than 70 percent of its nearly $50 million in deposits in just a few weeks. But it never closed, and thanks to the rescues organized by J.P. Morgan and his associates, the only New York City trust company to fail was Knickerbocker.[14] 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

[13] Several studies have assessed the counterfactual history that would have followed robust aid to Knickerbocker that would have kept it from failing; see, for example, Sprague (1910) and Friedman and Schwartz (1963). These histories highlight the important consequences of Morgan's decision not to provide aid to the institution.

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

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 is contrary to a financial 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 "persuade" other financial institutions into taking actions that were privately costly, but beneficial for the markets as a whole.

Morgan cannot be regarded as an entirely disinterested actor in these events. Among the many rescues he organized was that 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 a special dispensation from President Roosevelt guaranteeing 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.

More importantly, 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.[15] 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 with that bank. But more importantly, although Knickerbocker had no apparent ties to any clients of J.P. Morgan, the Trust Company of America did – members of its board served on the boards of several railroads and industrial firms closely associated

[15] Conspiracy theories about Morgan's allies deliberately inducing the panic in order to eliminate competitors or rivals and concentrate control abounded in the following years. McNelis (1968) presents these arguments.

with Morgan.[16] Thus, many of the securities held by the Trust Company of America had likely been underwritten by J.P. Morgan & Company, since the directors of financial institutions often held board seats with firms where they owned large amounts of debt. Morgan's partners may have been concerned about the consequences of liquidating the trust company's holdings of those securities, any stigma that may have been created from the association between their firms and a failed institution, or other negative consequences that may have arisen if the trust company had failed. Thus, it is possible that they were more favorably inclined towards the valuation of those securities as collateral for loans. 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 in response to deteriorating conditions in financial markets.

Consequences of the Panic

The onset of the panic occurred at a time when credit markets were already under great stress, and many borrowers were likely having difficulty in obtaining funds. In the spring of 1907, underwriters of high-quality debt, such as the bonds of municipalities and large railroads, began to experience difficulty in marketing those issues, and interest rates began to rise. Many corporations "of the highest standing" were forced to resort to short-term notes for investments they would normally finance with long-term debt, and other institutions were forced to rely on bank credits to a much greater extent than usual (Sprague, 1910: p. 238).

On October 28, in the face of heavy withdrawals from out-of-town banks, the New York Clearing House issued "clearing house certificates" in order to provide liquidity to its members, and New York's banks soon after partially suspended the convertibility of their

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

deposits into currency. The banks in the rest of the country soon followed, with some receiving legal sanction of their state governments. Full convertibility of deposits was not restored until January 1908. Although this suspension was limited to the of convertibility of deposits, and banks offered their customers substitutes for cash such as clearing house certificates or cashiers' checks, these measures likely made important transactions more difficult. 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 comparable 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 the call dates of August 22 and December 3 (Moen & Tallman, 1992). The contraction in assets was most severe at three trusts – Knickerbocker Trust Company, Trust Company of America, and Lincoln Trust, as these three trusts suffered the most publicized runs by depositors. The assets of other trusts however, also contracted substantially – by $237.8 million, or 23 percent from August to December. During the same period, the loans of national banks actually increased somewhat. New York City trusts did not fully return to their pre-panic volume of loans until April 1909.

Figure 2 shows the percentage change in deposits between August 22, 1907 and December 19, 1907 for all New York City trust companies. The deposit losses ranged from 2.25%, for Fidelity Trust, to 100%, for Knickerbocker Trust Company. Clearly, there were significant differences among the different trusts in the extent to which their deposits, and therefore their loans and other assets, contracted. This variation across trust companies implies that the clients of the various trusts were likely differentially affected by the panic,

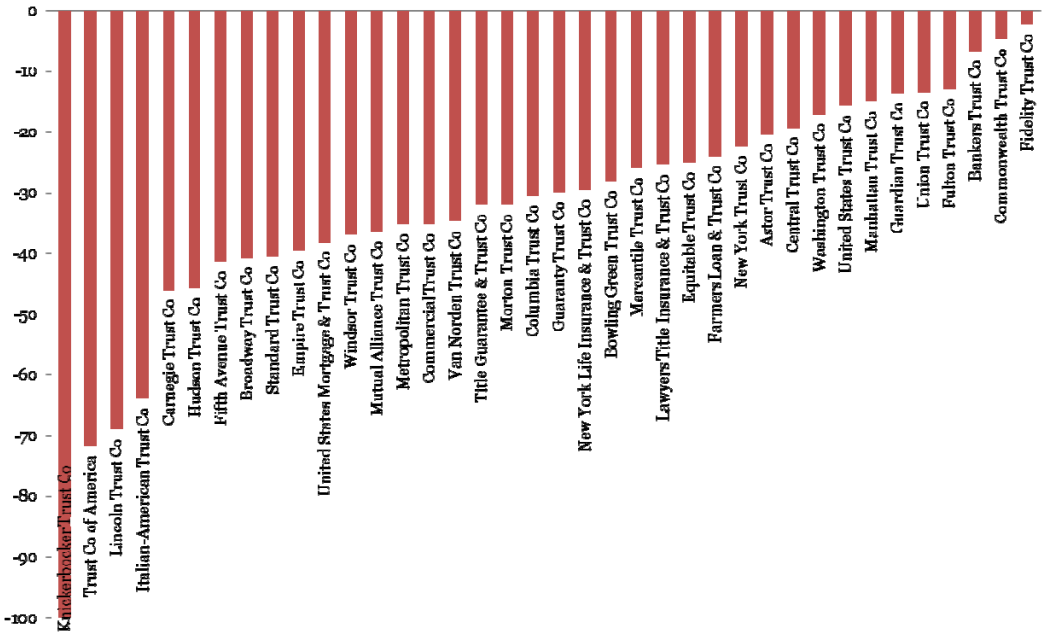

Figure 2: Deposit losses at New York City trust companies, in percent
Percentage change in deposits between August 22, 1907 and December 19, 1907, from *Annual Report of the Superintendent of Banks*.

depending on the trusts with which they had relationships. We will use this variation in the empirical analysis that follows.

3. Data

Board data and financial ties

We identify the connection between a trust company and a nonfinancial firm by the presence of a director of the trust on the board of directors of the nonfinancial 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*. To identify directors of trusts, we also obtained lists of directors of commercial banks and trust companies from the *Rand McNally Bankers' Directory*. Finally, we collected the names of partners of prominent investment banking houses from stock exchange directories.

Cross-referencing the names of bankers with those of corporate directors enables us to create a detailed dataset on the presence of trust company directors on the 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 concern that arises in this procedure is that matching on names may lead to erroneous matches. Particularly worrisome is that we may overestimate the degree of interlocking across non-financials and financial 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 lists the directors of a substantial number of banks and nonfinancial companies around 1912, is available. Our matching procedure to produces a nearly identical outcome to the Pujo report.[17]

Table 1 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.[18] Moreover, the extraordinarily high rate at which these interlocks occurred indicates that trust companies were indeed very prominent in banking and financial markets prior to the panic, as well as in the governance of many large enterprises.

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[17] 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.

[18] We are currently working on separately identifying these cases by using the names of managers and officers of nonfinancial firms as listed in the *Moody's Manuals*.

Table 1: Trust company representation on firm boards, 1907

	Mean	SD	Min	Max
A. Railroads				
Board Characteristics				
Board Size	12.32	3.07	4	26
Trust company representation on board				
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				
Board Characteristics				
Board Size	12.53	4.56	3	28
Trust company representation on board				
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

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, and NYSE-traded firms. Directors of these trust companies held 39 board seats with NYSE-traded firms, including many prominent railroads and industrials.

Accounting Data

As no comprehensive dataset of accounting data exists for early twentieth century firms, we have collected such a dataset for this paper. We constructed a dataset for all NYSE-traded industrial companies and railroad companies 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, we collected

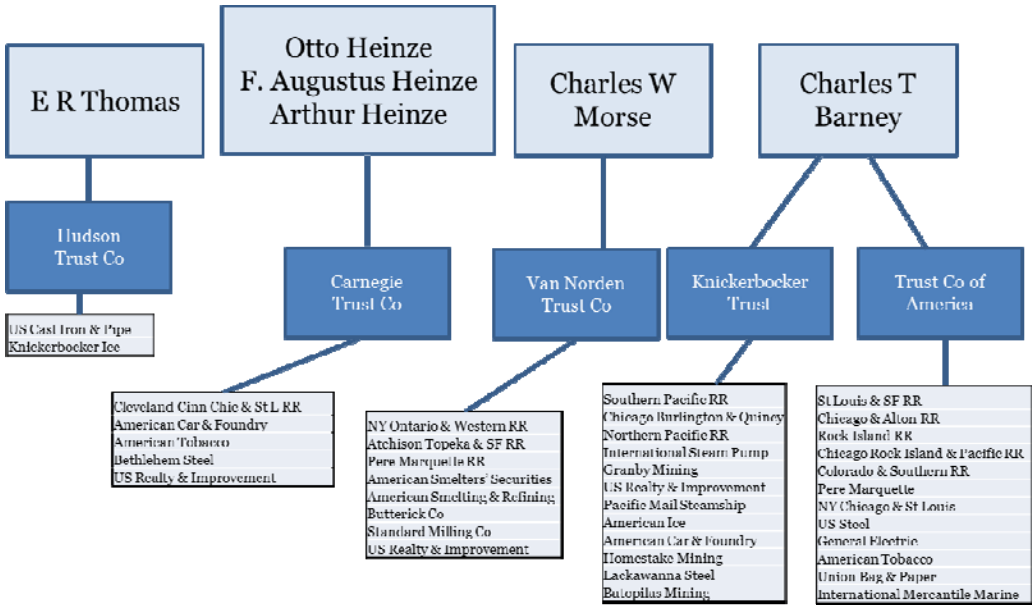

Figure 3: Connections between trust companies and nonfinancial firms
Lines connecting individuals to financial institutions denote directorships. Data on directorships collected from *Rand McNally Bankers Directory*, 1907, and *Moody's Manual of Railroads and Corporation Securities*, 1907.

financial information for each available year from 1900 to 1911. These financial statements allow us to construct a panel dataset containing information on firm size, leverage, and various measures of profitability.

Unfortunately, the quality of financial reports varied considerably across firms due to the lack of financial disclosure requirements or formal accounting standards 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 enterprises. The accounting statements of the railroads, particularly beginning in 1905, are therefore of relatively high quality and reasonably consistent across firms. The industrials, however, are altogether a different matter. Although the NYSE required its 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.[19] In particular, relatively few industrial firms presented detailed income statements, and many merely reported "net income." In our empirical analysis, we therefore focus on profitability ratios where net income, something we generally do observe, is the numerator.

Table 2 presents the definitions and summary statistics for the accounting variables of interest. As the first few rows of the table make clear, the NYSE-traded railroads and industrial companies were very large enterprises, some of the largest in the United States. The average value of the total assets of railroads was about $197 million and for industrial companies, it was about $79 million. 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 indicator 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 with long-term debt, as their leverage ratio was about 0.13. The larger borrowing capacity of railroads may be partly explained by their excellent collateral. Finally, two measures of profitability, the return on assets and return on equity, are presented in Table 2. Whereas the return on assets measures the overall profitability of a firm's operations, the return on equity measures the rate of return earned by the firm's investors, 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.

In the empirical analysis that follows, we investigate whether firms with ties to the worst-affected trust companies suffered differentially after the panic. We define the "worst-

[19] Sivakumar and Waymire (1993), and Barton and Waymire (2004) analyze the content of early financial statements. Firms that did not trade on the NYSE mostly made no information available. Thus we restrict our sample to NYSE-traded firms.

Table 2: 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
Short-term debt	Notes payable/Assets	0.009	0.019	0	0.12
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
Short-term debt	Notes payable/Assets	0.010	0.024	0	0.14

affected" trusts as those among the top 25% in deposit losses. (In Figure 2, this corresponds to the trust companies that lost at least as much of their deposits as Broadway Trust Co.) Our results are robust to focusing on only the top 10% in deposit losses.

How did firms with at least one director from our "affected trust" category compare to those that did not? Table 3 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. However, one would expect the same correlation if trusts were more likely to seek 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.

Table 3: Characteristics of industrials 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
Physical Characteristics			
Log assets	17.757	18.561	0.000
Debt and liquidity			
Book leverage ratio	0.339	0.471	0.000
Short-term liabilities ratio	0.029	0.031	0.234
Performance			
Return on assets	0.041	0.027	0.000
Return on equity	0.073	0.072	0.000

4. Empirical Specifications and Results

Even if the connections between trust companies and nonfinancial firms were established to help nonfinancial 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 its usual source of credit.

An additional, indirect channel though which connections to a failing financial institution may have affected a firm's access to credit is through the firm's reputation. If a firm was linked to a trust company that came under financial strain or collapsed, other potential lenders or investors, having imperfect information about the soundness of the non-financial company and the quality of the trust company's investments, may have associated the firm's prospects with that of its bankers. A good reputation of a banker or a trust company representative may have provided significant weight in the valuation of a company and boosted investor confidence early in the twentieth century, since outside investors had

extremely little access to firms' financial information at that time. Thus, a sudden negative shock to the banker's reputation would likely have affected his client company's reputation. From an investor's standpoint, this may have increased the perceived risk of financing the firm's projects. With a poor economic outlook during and after a major banking panic, banks and other financial intermediaries likely become highly risk-averse and may have refused financing to a company with associations to financially troubled institutions. Thus, in addition to a disruption to the firm's financial channels through its affiliated trust company, the firm may also experience difficulties in finding alternative sources of finance.

Both of these considerations suggest that firms with ties to trusts that came under particularly acute strain during the panic suffered differentially in the years immediately following the panic. Moreover, those firms that had the collateral whose value was most easily verified, or those firms that were regarded in the era before securities ratings as being in the "highest standing" should have suffered far less than others, even if they had a relationship with an acutely affected trust company.

One important concern in this analysis, however, is that "bad trusts" may have simply been associated with "bad firms," or firms that were particularly vulnerable to a liquidity crunch. That is, it is possible that any correlation observed between the performance of an affected trust and a nonfinancial firm may simply have been due to selection and not *caused* by the trust's financial troubles. We will employ an approach that focuses on the differential performance of firms in the post-panic period, relative to the pre-panic period. Thus the overall weak performance of any negatively selected firms will not influence the estimates, so if "bad firms" are to blame, this will not affect our estimates. Moreover, it should be noted that many of the firms affiliated with our affected trusts were also affiliated with J.P. Morgan & Company, which makes negative selection seem unlikely. However, our approach will not enable us to rule out the possibility that the firms were

somehow vulnerable to the shock independent of their overall performance.

Another possibility worth exploring is that it could have been the case that the client firms of the affected trusts experienced difficulties before their trusts did, and effectively caused the trusts to come under pressure (reverse causation). As many of the trusts arguably faced contagion, with depositors responding to information from other trusts or revelations about the associations of one of their many directors, the possibility of causation flowing from the non-financial firms to the trust companies seems unlikely.

Our basic specification to estimate the effect of this impact on firm performance is:

$$\pi_{ijt} = \alpha_i + \gamma_t + \delta_{jt} + \lambda Affectedtrust_i \times Post\text{-}panic_t + \beta \mathbf{X}_{ijt} + \varepsilon_{ijt} \qquad (1)$$

where π_{ijt} is one of the measures of performance of interest for firm *i* in industry *j* (either railroad or industrial) during year *t*; α_i and γ_t are firm and time fixed effects that account for any firm-specific factors and for macroeconomic shocks; δ_{jt} is a series of industry-by-year fixed effects (to account for the annual differences between railroads and industrials); $\mathbf{X}_{ijt}$ is a vector of time-varying firm characteristics, such as log assets; and Affectedtrust$_i$ × post-panic$_t$ 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. In this framework, λ is the differential effect on firm performance of having a trust company representative of an affected trust on its board in 1907 for the years during and after the financial crisis. If the presence of a trust company representative on a board were detrimental because of large-scale losses by the trust company and/or harm to its reputation, then we would expect to find a negative effect ($\lambda < 0$) on firm performance.

We also investigate whether the collateral of firms influenced the effects of their affiliations with differentially affected trusts during and after the panic, we will estimate λ

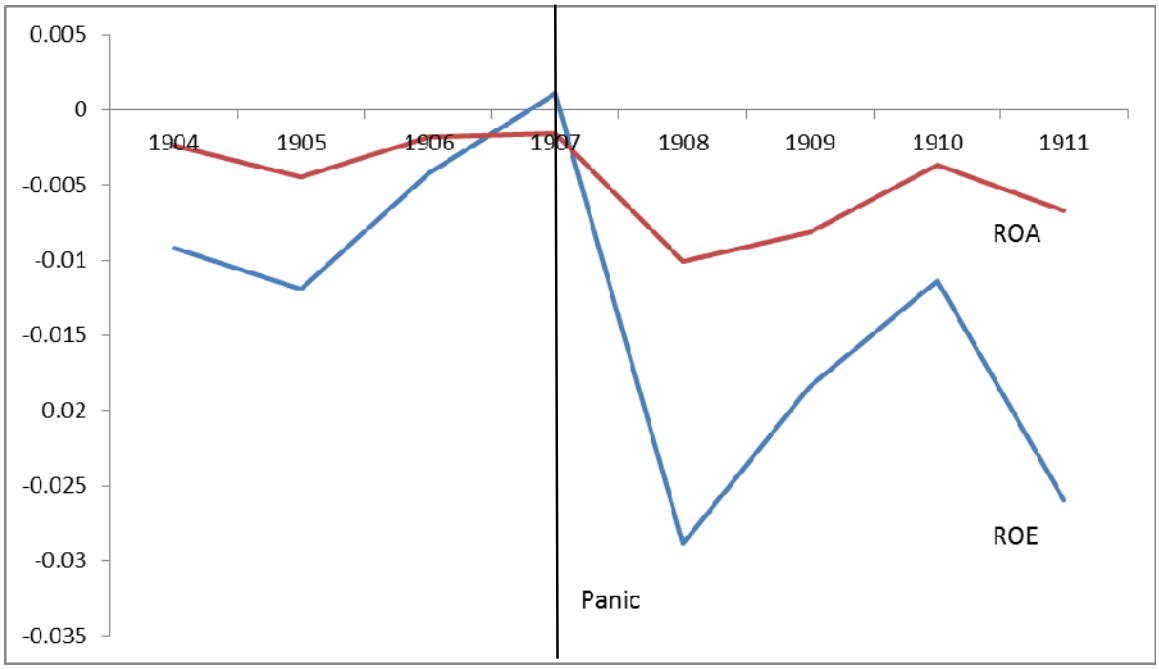

Figure 4: Annual estimated differences between firms with and without affected trusts
Each line plots the annual difference between firms with and without affected trusts on their board in 1907, as estimated in a regression that controls for firm fixed effects.

separately for railroads and for industrials. Finally, we gauge the value of ties to J.P. Morgan & Company by estimating a version of equation (1) that also includes an indicator for an affiliation with that firm, as well as an interaction between an affiliation with Morgan *and* an affiliation with an affected trust.

Before proceeding to the regressions, Figure 4 presents the annual differences between firms with and without affected trusts on their board in 1907 for return on assets and return on equity. Quite reassuringly, neither line has any apparent trend in the years prior to the panic, indicating that the firms affiliated with affected trusts were not worsening in their performance relative to other firms over time. Thus, it is unlikely that the results from our empirical exercise could be due simply to differential time trends between firms with and without ties to affected trusts. The time path of these data also indicate that the differences between these firms were largest in 1908 and then recovered gradually over

Table 4: Regressions, return on assets
Mean = 0.036, SD = 0.041

	(1)	(2)	(3)
Affected trust x post-1907	-0.00770**	-0.00885**	
	(0.00389)	(0.00396)	
Affiliated with Morgan x post-1907		-0.00605	
		(0.00400)	
Affected trust x Affiliated with Morgan x post-1907		0.00871*	
		(0.00455)	
Affected trust x Railroad x post-1907			-0.000277
			(0.00315)
Affected trust x Industrial x post-1907			-0.00805
			(0.00556)
Log(assets)	0.00649	0.00611	0.00598
	(0.0167)	(0.0169)	(0.0168)
Constant	-0.0551	-0.0482	-0.0458
	(0.295)	(0.297)	(0.296)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Observations	1,018	1,018	1,018
R-squared	0.774	0.773	0.774

Standard errors, adjusted for clustering on firms, in parentheses.

1909 and 1910, before falling off again in 1911. This is consistent with the firms differentially affected by the panic gradually recovering as the economy improved.

We first study the effects of connections with trusts on the profitability of nonfinancial firms. Table 4 presents these results using return on assets to measure profitability. In column (1) of Table 4, the estimated difference-in-differences for firms affiliated with affected trusts in the wake of the panic is about -0.008, equivalent to nearly twenty percent of a standard deviation, and statistically significant.[20] Firms affiliated with more affected trust companies performed worse following the panic. In column (2), the value of affiliation with J.P. Morgan is also investigated. The estimates in the second row imply that firms affiliated with Morgan did no worse relative to other firms after the crisis. However, the estimates in the third row show that firms with both an affiliation with Morgan and with a differentially affected trust did substantially better than those with only

[20] Results for regressions for return on equity, not reported, are substantially the same.

an affiliation with an affected trust. Evidently an affiliation with Morgan compensated these firms for the losses or disruptions they faced from their relationship with a failing trust company. Finally, column (3) presents regressions in which the effect of affiliation with an affected trust is estimated separately for railroads and for industrials. Consistent with riskier firms suffering to a greater extent, the effect is far larger for industrials, although our data are too noisy to estimate this effect precisely.

The differential impact of affected trusts on the performance of associated nonfinancial firms is an indication that the constraints on financial firms had real economic effects. However, our findings raise the question of why firms affiliated with failing trust companies fared worse during the crisis. One possibility is that firms had to forego new investments or lost sales because their access to financing declined. It could be that they faced greater financing costs if they resorted to expensive substitutes for their usual sources of credit. Finally, the decline in profitability could be instead the result if a negative demand shock that was spuriously correlated with their affiliation with an affected trust company. While the first two channels are suggestive of a financial shocks transmitting to the real economy, the latter mechanism is not.

A financial shock may affect the balance sheet of a firm in different ways; there are no straightforward predictions to take to the data. One might imagine, for example, that the leverage of constrained firms should fall. But if constrained firms have a roughly constant amount of long-term debt, and experiences losses from their operations which cause their surplus (shareholders' equity) to fall, then their leverage ratio will actually increase. Contemporary observers reported that firms often resorted to short-term borrowing when they would have preferred to have borrowed long term. Although a severely constrained firm might have difficulty obtaining short-term credit (meaning that they would not be able to obtain short-term credit), it is likely that the maturity structure of many borrowers might

Table 5: Regressions, short-term debt ratio
Mean = 0.031, SD = 0.027

	(1)
Affected trust x post-1907	0.0109*
	(0.00649)
Log(assets)	0.0395*
	(0.0221)
Constant	-0.690*
	(0.389)
Firm fixed effects	Yes
Year fixed effects	Yes
Industry-year fixed effects	Yes
Observations	1,009
R-squared	0.265

Standard errors, adjusted for clustering on firms, in parentheses.

shift towards short-term debt. Thus as a preliminary indication that the effects we observe are obtained from financial effects rather than demand effects, we examine firms' short-term debt.

The results, presented in Table 5, indicate that the use of short-term borrowing did indeed increase following the crisis for firms affiliated with a differentially affected trust. The estimated effect is 0.01, nearly half of a standard deviation. Although it is not possible to judge the extent to which this influenced firms' profitability (if at all), this is consistent with firms resorting to more costly, short-term forms of credit during the crisis. At a minimum, it is difficult to ascribe this change in debt maturity to a demand shock.

5. Conclusion

The panic of 1907 was one of the most severe financial crises prior to the Great Depression. This paper investigates 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 the NYSE 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 fall relative to other firms in the years following the panic. Some suggestive evidence confirming that the fall in profitability occurred due to financial constraints was found with the fall in short-term liabilities that these firms experienced.

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. Moreover, the importance of ties to Morgan was confirmed in the empirical analysis, which indicated that firms affiliated with a failing trust did not suffer in the aftermath of the panic if they also had a pre-existing relationship with J.P. Morgan and Company.

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