

**The Cost of Glass Steagall on Corporate Investment:  
Evidence From Bank, Trust Company, and  
Insurance Company Affiliations**

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## **Abstract**

This paper finds that the implementation of the Glass Steagall Act may have increased the cost for corporations of raising external funds for investment spending. Specifically, it detects significant differences in the way financial institutions (commercial banks, trust companies, and insurance companies) influenced corporate investment spending. Investment regressions for a sample of companies affiliated to a financial institution are estimated and compared to the regression results of a control sample. Prior to Glass-Steagall, affiliated companies do not display any sensitivity between investment spending and internal measures of liquidity, whereas the control sample does. After Glass-Steagall, bank and trust-affiliated companies display the same large sensitivity of investment spending to internal measures of liquidity as the control sample. This provides some empirical evidence for the hypothesis that corporate financing was adversely affected by the imposition of the Glass-Steagall Act.

## **I. Introduction**

One of the most spectacular declines in economic activity in U.S. history took place between 1931 and 1933. During the Great Depression, almost one quarter of the labor force faced unemployment, a severe deflation plagued the goods market, and the stock market crash of 1929 precipitated a collapse of financial markets. The Great Depression also saw one the most dramatic bank runs which proved to be a devastating blow to the banking system. The economic and financial calamity of those years prompted a frustrated and dissatisfied Roosevelt administration to seek fast remedies partly by enacting the far-reaching New Deal reforms. One of the most important elements of the New Deal was the Banking Act of 1933, approved shortly after the election of the Roosevelt administration. The Glass-Steagall Act, as this was commonly known, became one of the most influential and far-reaching pieces of legislation on the American financial system. It essentially guaranteed the separation of commercial and investment banking activities, and established the creation of deposit insurance in the banking system.

Congressman Henry B. Steagall and Senator Carter Glass, chief proponents of the separation of commercial from investment banking activities, believed that commercial banking influence in the securities business was very harmful for financial markets and perhaps, albeit indirectly, one the most important reasons underlying the decimation of the financial system. In particular, congressman Steagall questioned the influence that bankers had over the simultaneous management of corporate securities and the public's deposits. He thought this was detrimental for the public, and indeed for the entire

financial system, because it created conflict of interest, encouraged stock manipulation and speculation, and allowed mismanagement of bank assets and liabilities. Steagall state his beliefs explicitly during a discussion in one of the House sessions:

“The big bankers who claimed a monopoly on wisdom and good morals in banking have taken the Federal Reserve System and perverted and debased it. They turned it from service to legitimate business and commerce into a use in the promotion of speculation and international high finance by men who proved unworthy of the trusts reposed in them, and who have been shown to be as ignorant as they were known to be unscrupulous.

These men gathered junk from the four corners of the earth and fed into the banks of this country to the wreck and ruin of thousands of such banks and their innocent depositors...”<sup>1</sup>

Congressional hearings were formed to investigate these allegations in great detail. The Pecora hearings, as they are known, “found” these allegations to be correct and suggested that the culprits of the financial collapse of those days had been, to a great extent, the “crooked” bankers.

Recent research by financial and economic historians has questioned the validity of these allegations. For example, Benston (1990) carefully examines the congressional hearings “evidence” and concludes that the hearings were biased towards finding what Senator Glass firmly believed. The hearings were prepared and structured by congressmen and their aides, witnesses were chosen and interviewed strategically, and the questioning was one-sided, with no chance for rebuttals. To the extent that these hearings distorted public perception, newspapers and magazine articles, and even memoirs, reflected a misguided resentment and frustration against the organization and structure of the banking system.

While Benston's work shows that the Glass-Steagall Act may have been the result of emotional policy-making, White (1986) and Kroszner and Rajan (1994) contend that the problem this Act intended to correct did not exist in the first place. White (1986), for example, points out that only 7.2% of national banks that dealt also in the securities business failed during the 1930-3 period. However, the failure rate of all national banks during the period was 26.3%. Thus, bank involvement in the securities business cannot explain the high failure rate of national banks during that period.

The work of Kroszner and Rajan (1994) and Puri (1994) show that the claim that bankers were abusing their strategic position to market securities of inferior quality to the public is false. They find that the failure rate of bonds placed by a banker affiliate was no higher than that of bonds placed by an investment bank syndicate. Thus, the hypothesis that commercial banks were systematically fooling investors into buying securities of poor quality is not confirmed empirically.

These findings suggest that the Glass-Steagall Act was a misguided policy intended to "fix" a problem that did not exist. If so, its implementation should have had real costs for financial markets. To the best of my knowledge, no one has attempted to measure directly the effect that the Glass-Steagall Act had on the financial system. This is surprising given the amount of debate it has generated over the years. Even the work of Ben Bernanke (1983), an important empirical contribution towards understanding the role of banks in credit markets during the Depression years, does not measure any of the effects of Glass-Steagall on the banking system.

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<sup>1</sup> Congressional Record - House, February 15, 1932, p. 3963

In this paper I attempt to estimate some of these effects by detecting differences in the way banks influenced corporate investment behavior. According to the imperfect capital markets literature, asymmetric information and moral hazard problems increase the cost of raising external funds for long term investment spending. If this is true, then establishing an affiliation with a financial intermediary should have facilitated the access to capital markets. This is because the affiliation would have reduced monitoring costs for the financial intermediary, thereby partially resolving the information and incentives problems between shareholders and managers.

A sizable amount of work, both theoretical and empirical, has formalized and tested these arguments. At the theoretical level, stylized models such as those of Stiglitz and Weiss (1981), Diamond (1984, 1991), Rajan (1992), Webb (1991), and Baliga and Polak (1995) have shown in one way or another that establishing a link with a financial intermediary can potentially reduce the borrowing cost for long term investment. Empirically, Fazzari, Hubbard and Peterson (1988), Hoshi, Kashyap and Scharfstein (1990, 1991), and Calomiris (1995) examine the effect of liquidity on corporate investment. These papers find that firms that would appear to face the greatest problems raising capital externally tend to cut investment most in response to cash flow shortfalls.<sup>2</sup>

In this paper I follow these theoretical and empirical arguments and use them to examine the effects of Glass-Steagall on corporate investment behavior. I do this by examining bank influence on investment spending before and after Glass-Steagall was

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<sup>2</sup> In a recent paper, Kaplan and Zingales (1995) dispute the claim that capital market imperfections are correlated with investment-cash flow sensitivities. Their results however, are subject to many criticisms on both conceptual and empirical grounds. For more on this see Fazzari, Hubbard, and Peterson (1996).

enacted. The empirical findings suggest that the enactment of Glass-Steagall was associated with a substantial reduction of bank involvement in corporate decision-making, and an increase in liquidity constraints for corporations. Prior to Glass-Steagall, companies with strong affiliations to the banking community (bank and trust companies), hardly depended on internal measures of liquidity to finance investment spending. In contrast, those with no affiliation or a very weak one, displayed significant sensitivity between investment spending and internal measures of liquidity. This result disappears entirely after the enactment of Glass Steagall: affiliation to the banking community no longer implied a release from liquidity constraints.

I also examine affiliation to insurance companies to confirm the hypothesis. Since the insurance industry did not undergo the same reforms (at least not during the sample period)<sup>3</sup>, it provides a useful “counterfactual” to the outcome for banking industry. Contrasting these results to those obtained from bank affiliations verifies the hypothesis that Glass-Steagall had costs for corporate investment.

In the following section II, I describe in greater detail the evolution of the Banking Act of 1933 and its implications for the influence of financial intermediaries on corporate decision-making. Section III describes the data used in this study, while section IV presents and discusses the empirical evidence. Section V concludes.

## **II. The Evolution of the Banking Act of 1933**

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<sup>3</sup> The revelations brought forth during the Armstrong investigations of 1905-06 resulted in major reforms for life insurance companies in New York. Among other things, the resulting laws severely limited life insurance companies ability to own corporate stock and influence directly or indirectly other financial institutions. For an extensive discussion in this issue see Roe (1994).

Establishing a long-term relationship with a financial intermediary was a common practice adopted by many corporations since the turn of the century. Carosso (1970) explains that financial capitalism, as this was called, evolved as the demand for bankers and financiers, who were capable of obtaining funds in short notice, grew, particularly after periods of financial distress. This practice began with railroad companies and after the 1880s it was common in the industrial sector as well.

Several researchers have studied the early stages of financial capitalism in the United States and have concluded in one way or another that this institution was very beneficial for the corporation. It not only reduced borrowing costs and liquidity constraints for affiliated firms, but also increased their market value.<sup>4</sup> In addition, others have found that similar institutions in other countries have also helped corporations to raise external funds to finance long term investment. For example, Calomiris (1995) finds that because the Universal Banking system exploits economies of scale and scope, borrowing costs for German firms are much lower than those in the United States. Becht and Ramirez (1994) estimate investment regression equations in the German mining industry and find that companies affiliated to universal banks depend less on internal measures of liquidity to finance investment spending. Fohlin (1994) finds somewhat similar results, although they are sensitive to different time periods. For Japan, with the *keiretsu* system of bank-company relationships, Hoshi, Kashyap, and Scharfstein (1990,

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<sup>4</sup> The work of De Long (1991) and Ramirez (1995) show that companies affiliated to J.P. Morgan experienced lower liquidity constraints and a market value about 30% higher than other companies. The interpretative works of Sylla (1982) and Smith and Sylla (1993) also confirm this.

1991) show that investment spending is relatively insensitive to liquidity measures for companies with a bank relationship.

Yet almost since its beginning, financial capitalism had critics who viewed the bank-company relationships with suspicion and mistrust. The “Money Trust” investigations of 1912, chaired by Representative Arsene Pujo, was the culmination of a long public debate over the influence that banks and financiers had on corporate decision-making. Progressives such as Louis Brandeis and Pujo himself questioned the influence financiers had on firms, and accused them of exploiting conflict of interest, stock watering, and the creation of financial monopolies.

A first attempt to stop these relationships from developing was made with the enactment of the Clayton Act of 1914 which, among other things, limited interlocking directorates, and forced many financiers to sell a substantial portion of their corporate holdings. This first attempt however, was to some extent thwarted after 1915 because of two important exogenous events. First, bankers and financiers became heavily involved in the financing of war expenditures for the Allies during World War I. The Wilson administration tacitly endorsed the financiers involvement, and thus tolerated their continuing participation in corporate decision-making.<sup>5</sup> Second, after the war was over, the United States enjoyed a generally healthy economic period during the 1920s. A buoyant stock market inspired many to invest in corporate securities, and as a result, confidence in bankers and financiers grew considerably. During this period, bank-company relationships continued to develop.

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<sup>5</sup> For an extensive discussion of the political economy of this period see Chernow (1990).

The stock market crash of 1929 and the subsequent Depression however, re-awakened the mistrust and resentment against bankers and financiers. With no political defenders, the banking community had little choice but to accept this criticism and engage in some damage control. In the end however, congressional hearings were planned and executed, and the Glass-Steagall Act of 1933 was put in place during the Roosevelt administration.

This agenda implemented regulations that for the most part affected only the banking industry; none of the far-reaching financial market reforms approved during the Roosevelt administration affected the insurance industry. This is not to say that the insurance industry did not undergo any reforms at all. As mentioned above, Roe (1994) documents that the Armstrong investigation of 1905 resulted in life insurance companies being banned from owning corporate stock under New York state laws.<sup>6</sup> Many other states adopted similar measures, undermining the ability of the insurance companies to become involved in corporate financing. These severe restrictions on life insurance companies might help to explain why these financial institutions were not a costless substitute for the service commercial banks and trust companies were providing to companies prior to Glass Steagall.

### **III. Data**

#### *A. Company Sample*

A sample of 125 randomly chosen firms was obtained from the New York Stock Exchange trading list. After eliminating companies with data problems (such as a change

in accounting practices, a merger during the sample period, insufficient financial data, etc.) the sample was reduced to 110 firms. A panel data set was constructed using this list for the 1926 - 1929 period with financial and balance sheet data from *The Moody's Manual of Industrials*.

The data collection exercise was repeated for the 1936 - 1939 period for the companies already selected. The idea was to keep a comparable sample across the two periods to minimize potential sources of bias. Of course, not all of the companies in the earlier period survived the Depression years. Twenty of them actually failed or were absorbed before 1936, and hence the sample was reduced to 90 firms.

#### *B. Companies' Bank Affiliations*

Also from *The Moody's Manual of Industrials*, a list of the members of the board of directors was obtained for each company. Using *The Poor's Manual of Directors and Executives* the names on this list were cross-searched for affiliation to a financial institution. An affiliation is identified if a board member was also sitting on the board of a financial institution (a commercial bank, trust company, insurance company, and/or and investment bank.) Admittedly, this definition of affiliation is not perfect.<sup>7 8</sup> There may be many reasons why a “banker” might have ended up in the board of a company - prestige

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<sup>6</sup> They were however, allowed to invest their funds in guaranteed and preferred stock, as well as certain types of bonds. For more details see Halaas (1932) and Edwards (1967).

<sup>7</sup> To be sure, there are other ways to measure the degree of affiliation. For example, a continuous variable such as bank debt could instead be used. Unfortunately, the financial data from *Moody's Manual* is not detailed enough to allow for this type of measurement.

<sup>8</sup> Other researchers including Becht and Ramirez (1994) and Fohlin (1994) have used the board member affiliation definition of a financial relationship in Pre-World War I Germany to study the impact of Universal banks on corporate investment spending.

for the company, for example, might be one of them. However, the real question is whether it serves as a proxy for financial access. In this sense the connection could have been very useful for the company because of the inside knowledge and the direct monitoring the “banker” will have developed. An important question therefore, is whether the “bankers” met often enough other company directors to form a connection? Or whether the “bankers” were involved in any decision making in the company? Given the lack of detailed financial data, this is difficult to determine empirically. However, one can get a sense of what this connection meant for a company by consulting internal company documents (like personal correspondence between bankers who sat on the board of client firms and other members of the board, minutes from board of director meetings, etc.) By doing this, one can gain particular knowledge about how banker directors influenced decision making in their client companies.<sup>9</sup> Although very useful and beneficial, this approach is limited by the actual existence of company documents. There are relatively few companies with extensive detailed information, including personal correspondence and internal financial books, available for public consultation. Thus, particular examples can only be taken as illustrative and suggestive of what these relationships might have actually meant during that period.

Consultation of the private papers of bankers and financiers like Winthrop W. Aldrich (Chase National Bank, Equitable Trust); Thomas W. Lamont (J.P. Morgan & Co., Bankers Trust); and John Jacob Raskob (Phoenix & Chatham National Bank,

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<sup>9</sup> A “banker director” in this context refers to an individual who simultaneously sit on the board of directors of a financial institution and a company in the sample. In many cases this individual was not, strictly speaking, a banker. To determine the approximate proportion that were, I randomly selected 75 names of

Seaboard National Bank, Bankers Trust) reveal that the “banker’s” influence in corporate affairs was quite extensive. These directors were not only present in most of the board of directors meetings, they were active participants in the decision making of the companies they represented. The voluminous correspondence between these bankers and other members of the board attest to the closeness of these relationships. A significant portion of the correspondence consists of invitations and reminders about company meetings, dinners, and even social events. Some letters even reveal quite explicitly how an interlocking directorship serves as a measure of a close affiliation. For Mr. Aldrich, the relationship between Chase and the Fifth-Third Union Trust company was “very close and satisfactory. In fact, Mr. Schmidlapp, one of our vice-presidents, is also a director of that company.”<sup>10</sup>

Relationships of this nature seem to have been important for obtaining funds as well. For instance in another letter Mr. Aldrich indicated reservations about an already approved loan to the Standard Oil Company of New York after Mr. Howard E. Cole, who shared directorships with the Standard Oil Company and Equitable Trust, resigned from his post at Standard Oil.

“You will remember that [Mr. Cole] came around and made a loan with us about a month ago, and at the time of course he did not tell me he was planning to retire as an officer of the New York Company.”<sup>11</sup>

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company directors with an affiliation to a financial institution. For about 2/3 of them, the *Poor's Register of Directors and Executives* lists a bank or another financial institution as their primary affiliation.

<sup>10</sup> Letter from Mr. Aldrich to Mr. T.M. Debevoise dated June 30, 1930. Winthrop W. Aldrich Manuscripts collection, Harvard University, Baker Library Historical Collections. Quote reprinted with permission.

<sup>11</sup> Letter dated February 5, 1931 from Winthrop W. Aldrich to A.H. Wiggin. Winthrop W. Aldrich Manuscript collection, Harvard University, Baker Library Historical Collections. Quote reprinted with permission

This type of affiliation also gave bankers an information advantage which was often crucial for these companies. For example, when the United Light and Power Co. (and a few other utility companies) was planning to initiate a lawsuit against the newly formed Securities and Exchange Commission, it made use of Mr. Charles S. McCain (who sat on the board of Chase and the United Light) to obtain a bank loan large enough to furnish ample funds while the company was undergoing the lawsuit.<sup>12</sup> From the contents of the letter, it was apparent the company expected to face severe restrictions in obtaining external funds while the lawsuit was in progress, and turn to Mr. McCain for help in alleviating these expected financial constraints.

### *C. Distribution of Affiliations*

This section shows how Glass-Steagall may have affected the actual number of bank-firm affiliations. Figures I through IV present the distribution of affiliations for each category (commercial banks, insurance companies, trust companies, and investment banks) and for each period (1926-29 and 1936-39). The first thing to note is the shift to the left in the distribution of affiliations to commercial banks for the second period (1936-39), indicating a marked reduction in the average number of affiliations. The same phenomenon occurs in the distribution of affiliation to trust companies and to investment banks, but not to insurance companies. The drop in the average number of affiliations for commercial banks and trust companies is unlikely to be explained by bank failure rates alone. Using White's (1986) figures, only 7.2% of national banks with securities affiliates failed during this period. Because Glass-Steagall separated commercial and investment

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<sup>12</sup> Letter dated December 4, 1935 from Mr. McCain to Mr. Aldrich. Winthrop W. Aldrich Manuscript

banking activities, many banker directors who sat on the board of securities affiliates of commercial banks were forced to resign from these posts. Since the insurance industry did not experience the dramatic reforms the banking industry did during this period, it is not surprising that we do not observe the same shift in the distribution. This shift becomes all the more significant when one notices that the average number of directors per company does not change from the 1929 sample to the 1939 sample. This figure for the 1929 sample is 10.4 and for 1939, 10.1. However, this shift is only a suggestive indication of the extent to which the Banking Act of 1933 may have affected the quantity of firm-bank relationships. Because of the sudden decline in the prestige of the banking system and the general distrust the public held for bankers, the reduction in the number of affiliations might also reflect a reaction by the bankers to become more detached from corporations. In the empirical results section I address in greater detail how Glass-Steagall may have affected the qualitative aspects of the bank-firm relationship.

#### *D. Summary Statistics*

Once affiliations to financial institutions were identified, the sample was split into those companies with a strong affiliation to a bank (defined as companies in the top 50th percentile of the sample in terms number of bank affiliations) and companies with a weak affiliation to a bank(s) (those in the bottom half of the sample in terms of the number of affiliations). At the outset, it might seem suspicious to split the sample in half, but the idea behind it is twofold. First, as noted above, there might be many reasons why a banker sits on the board of a company, and not all of them imply easier access to external

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collection.

funds. However, one would expect that a large number of affiliations increases the probability that at least one of them provides the financial services the company needs. Thus, the probability of being less liquidity constrained may increase with the number of affiliations. Secondly, the intention was to gain degrees of freedom and not to create a bias in favor of the null hypothesis. In fact, if anything, this way of splitting the sample might introduce a bias *against* the null hypothesis because there is no control for the “quality” of the affiliation (in the sense of power, prestige and/or influence of the particular “banker” director). If quality makes a difference, then companies with a low number of high quality banker could be free of liquidity constraints (even though they would be considered not affiliated).

Table II presents a summary of the descriptive statistics of the split sample for both periods. The two groups of firms have a similar set of characteristics for both periods. For the 1929 sample, for example, affiliated firms report lower average investment expenditures and lower cash flow (proportional to initial capital stock).<sup>13</sup> These figures are much lower for the 1936-39 period, in particular for investment spending, although still comparable between the groups. This is not very surprising as the level of economic activity during the 1936-39 period was still relatively low.

The 1926-29 period saw one of the highest growth rates in terms of output, and this is reflected in the gross sales statistic. For each dollar of plant and equipment, both groups report over \$2.00 in sales.<sup>14</sup> A significant drop in the 1936-39 period is similarly a

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<sup>13</sup> Investment is defined as the change in the gross value of depreciable assets (obtained from the balance sheets). Free cash flow is defined as the after-tax income plus depreciation allowances.

<sup>14</sup> Sales figures were obtained from the income statements.

reflection of the economic conditions of the period. The table also presents the value of  $q$ , a proxy for Tobin's  $q$  (the market value of the firm relative to its replacement cost). Here  $q$  is defined as the market value of common equity stock plus the book value of debt and preferred stock divided by the book value of total assets. While this only an approximation, it is useful when comparing different groups in the sample. For the 1926-29 period, the affiliated sample display a level of  $q$  24% higher than that of the control sample. For the 1936-39 sample, however, this statistic is virtually the same for the two groups. Although only suggestive, this relative decline in the value of  $q$  for the affiliated sample is consistent with the premise of this paper. This finding was first reported and discussed in Ramirez and De Long (1995).

Table II also indicates that non-affiliated companies tend to report lower levels of long term debt relative to capital stock. However, these differences are not statistically significant due to the relatively large variance. The liquid asset variable is marginally higher for the non-affiliated sample during the first period. For the second period, however, the reverse is true. Neither of these differences is statistically significant.

It is important to notice that the average size of the affiliated firm is roughly the same as that for the non-affiliated firm for the first period.<sup>15</sup> This ensures that the regression estimates presented in the following section are not being driven by differences in size.<sup>16 17</sup> In the second period, however, Table II indicates that the average

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<sup>15</sup> I use capital stock (K) as a measure of size. Capital stock is defined as the stock of depreciable assets, and is taken directly from the balance sheets.

<sup>16</sup> The standard deviation for the non-affiliated group is larger, indicating that there are companies at the tail ends of the distribution. (The larger ones are Lago Oil and Praire Pipe Lines. The smaller ones are Vicks Chemical and Checker Cab Manufacturing ). Eliminating them from the regressions did not affect the empirical results.

firm in the affiliated sample is almost twice as large as the average non-affiliated firm. The bias that this might cause in the regression estimates, however, works *against* the hypothesis being tested in this study. Thus, failing to reject the null under this scenario guarantees the same result with more comparable average sample sizes.

#### IV. Empirical Results

##### A. Regression specification

The regression specification is the same as that used in Ramirez (1995), where I compare investment regressions for companies affiliated to the House of Morgan to those from a control sample. This canonical specification is, in turn, taken from the work of Hoshi, Kashyap, and Scharfstein (1990, 1991). Gross investment (normalized by the stock of capital at the beginning of the period) is regressed on several liquidity variables, as well as  $q$  and gross sales. Although the motivation for this regression is set out in Hoshi, Kashyap and Scharfstein (1990, 1991), I shall briefly review the general idea behind it.

The regression specification takes the following form:

$$\frac{I_t}{K_{t-1}} = a_0 + a_1 \frac{CASH_t}{K_{t-1}} + a_2 \frac{LIQUID_{t-1}}{K_{t-1}} + a_3 q_{t-1} + a_4 \frac{SALES_{t-1}}{K_{t-1}} + e_t \quad (1)$$

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<sup>17</sup> For the 1929 sample a difference in means test fails to reject the hypothesis of equal averages across the two groups. This is not surprising in light of Goldsmith's (1958) findings: "[P]robably the share of financial intermediaries in total external financing is somewhat higher (outside of railroads and public utilities) for small than for large corporations." (p. 218)

The dependent variable is investment ( $I_t$ ) as a proportion of initial capital stock ( $K_{t-1}$ ).

The independent variables are: free cash flow ( $CASH_t$ ) relative to initial capital stock; the stock of liquid assets ( $LIQUID_{t-1}$ ) relative to initial capital stock; average Tobin's  $q$  ( $q_t$ );<sup>18</sup> and lastly, gross sales ( $SALES_{t-1}$ ), also normalized by initial capital stock.

One must be very careful in interpreting the effect of free cash flow on investment expenditures. As Hoshi, Kashyap and Scharfstein (1990, 1991) point out, cash flow variables could be proxying for other factors, in particular, expected future profitability. For this reason, Tobin's  $q$  must also be included in the regression to control for any information that the cash flow variable might be carrying about future profitability. One potential problem that I might have is mismeasurement of  $q$ . However, the point of this regression is to compare the cash flow coefficients of the two sets of firms. This difference should be unbiased as long as the mismeasurement is the same for both sets.

The variable, gross sales, is also included in the regression to control for accelerator effects on investment, and to eliminate the possibility that cash flow might be proxying for higher sales in the affiliated sample. Similarly, Hoshi, Kashyap and Scharfstein (1990, 1991) argue that some investment is financed by exchanging liquid assets such as cash and marketable securities. To allow for this possibility, I also included as an independent variable the stock of liquid assets normalized by the stock of depreciable assets at the beginning of the period. These are the securities that can be exchanged for cash to finance investment expenditures. Equation (1) is estimated using

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<sup>18</sup>  $q$  is estimated as the market value of common stock equity (number of outstanding common shares times its market price) plus the book value of debt and preferred stock divided by the book value of total assets.

ordinary least squares with fixed effects (firm and year dummies were included in each regression).<sup>19</sup>

### *B. Liquidity Results*

The main results are presented in Tables III through VI. Table III shows regression estimates for commercial bank affiliation. The first two columns report the baseline results for the affiliated and non-affiliated groups respectively for the 1926-29 sample. The coefficient for cash flow for the affiliated group is negative, whereas it is positive and statistically significant for the non-affiliated group. This result changes dramatically for the second period (1936-39): the cash flow coefficient increases in magnitude and statistical significance for the affiliated group, while for the non-affiliated group the cash flow coefficient does not increase.<sup>20</sup>

Table III indicates that while the cash flow coefficient increases from the first to the second period for the bank-affiliated group, it declines for the non-bank-affiliated group. That the cash flow coefficient increases for the bank-affiliated group but not for the non-affiliated one is the main point of the paper. However, the low cash flow coefficient for the non-affiliated companies in the second period is puzzling since it indicates that these companies were less liquidity constrained.

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<sup>19</sup> Robust estimation techniques were used to test the stability of the regression estimates. The results did not change significantly.

<sup>20</sup> The t-statistic for the difference in the cash flow coefficient for regressions in the first period is 3.04; for regressions in the second period (1936-39) the t-statistic is 3.00 (before controlling for insurance company affiliation) and 0.10 (after controlling for insurance company affiliation).

To search for an explanation, I considered the possibility that affiliation to an insurance company could have affected these companies instead. Table VI, which presents the results for insurance company affiliations, indicates that the only time cash flow matters is when a company is not insurance-affiliated in the second period. (Regression E, Table VI.) The table indicates, therefore, that affiliation to an insurance company in the second period was easing liquidity constraints. To test whether the low cash flow coefficient for the low-bank-affiliation group in the second period (Regression D, Table III) was the result of affiliation to insurers, I controlled for them in Regression E, Table III. As the results indicate, the cash flow coefficient is high and statistically significant, confirming the suspicion I had about insurance affiliation driving the cash flow result in regression D, table III.

The regressions in Table III also reveal that the other variables are not significant determinants of investment spending. For example, the liquid asset coefficient is small and almost always estimated very imprecisely. This is not surprising given that many companies often aggregate cash, marketable, and other securities (which may include long-term holdings) under one item in their balance sheets.

Although the gross sales coefficient is consistently a good explanatory variable in the regressions, the difference between the coefficients for the affiliated and non-affiliated groups is not very significant (in a statistical sense). For  $q$ , there is no difference between the coefficients of the two groups (for either period), although there is a marked increase in its importance (from the first to the second period). Thus, for both set of firms

(affiliated and non-affiliated), investment is much more responsive to  $q$  during the second period.

Table IV presents the investment regression results for affiliation to trust companies. These results are very similar to those obtained for commercial bank affiliations. For the trust-affiliated group, the cash flow coefficient increases in magnitude from the first to the second period; for the non-affiliated group it does not. For the other estimated coefficients similar results can be observed: differences between the liquid assets coefficient, and between the gross sales coefficients are not statistically significant. Just as in the bank-affiliated regression results, there is no significant difference between the  $q$  coefficients for groups.

There are two explanations for these similar results. First, there is a relatively high correlation between being affiliated to a commercial bank and being affiliated to a trust company, especially for the first period ( 0.73 and 0.44 for the first and second periods respectively. See Table VII for more details.) This is not surprising since most commercial banks typically handled trust investments and even had trust company affiliates. Secondly, the Banking Act reforms affected commercial banks and trust companies in very similar ways. Inasmuch as trust companies remained affiliated to the commercial bank sector, they too had to comply with the newly instituted reforms.

Table V presents regression results for investment bank affiliations. Here the results are estimated very imprecisely. For the 1926-29 period for example, companies affiliated to an investment bank display lower sensitivity of investment spending to cash flow than non-affiliated companies. However, the difference is not statistically

significant. This is attributable to the low degree of freedom for the investment bank affiliated set of firms.<sup>21</sup> For the 1936-39 period, there is a statistically insignificant increase in the cash flow coefficient for the affiliated group, and a decrease for the non-affiliated group. Thus, while these results seem to be consistent, at least in magnitude, with the hypothesis, they are not precise enough for a more definite conclusion.

The results for insurance company affiliation are presented in Table VI. Here the pattern observed for commercial bank and trust company affiliation is not repeated. The cash flow coefficient does not increase for the affiliated group, whereas it displays a significant increment for the non-affiliated group. For the 1936-39 period, the results indicate that companies not affiliated to an insurance company are much more likely to suffer significant liquidity constraints as both the cash flow coefficient and the liquid assets coefficient increase in magnitude and statistical significance.

The 1936-39 results for the insurance affiliated group mimic the 1926-29 results for bank and trust company affiliations. In other words, insurance companies seem to have been replacing the important service banks and trust companies were providing for companies before Glass Steagall. Insurers, however, were not an adequate substitute for what was previously done by banks. Perhaps partly because of severe state restrictions after the 1905 Armstrong reforms, insurance companies provided funds to companies through private placements of debt. In fact, this form of debt rose very rapidly during the

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<sup>21</sup> Investment banks comprise only about 7% of the financial institutions to which the entire sample is affiliated.

late 1930s.<sup>22</sup> But unlike bank debt and equity financing, private placements were very senior obligations often accompanied with restrictive debt ratios to protect the seniority of the debt instrument. Clearly, the information and control requirements of this type of debt were very limited. Thus, the monitoring role that banks were previously performing may have been lost during this transformation period.

To a large extent, this is what the regressions in the tables reflect. Taking the 1936-39 insurance-affiliated regression results as the benchmark, the fact that the bank-affiliated (and the trust company-affiliated) groups display signs of being liquidity constrained implies that the banks' role in potentially solving asymmetric information problems had been significantly undermined. For these financial intermediaries it was no longer possible to assist their client corporations in securing external funds for long-term investment expenditures. Instead, the regressions imply that they adopted a much more passive role when it came to corporate financing.

### *C. Discussion*

The discussion of affiliations raises a very important issue as far as firm choice for affiliation is concerned. The fact that we observe some companies some companies being strongly affiliated while others are at best weakly so, implies that affiliation entails some cost. This cost, while potentially important, is not explicitly modeled here. However, in light of Diamond's (1991) model, it is possible to argue that both young, inexperienced companies with little or no reputation, as well as mature companies that

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<sup>22</sup> From 1934 to 1937, private placements accounted for 12% of total corporate offerings. By 1951 it accounted for 44%. Life insurance companies were the predominant purchasers, accounting for more than 90% in 1947. See Calomiris and Ramirez (1996, p. 157) for more details.

have not done well would want to attach themselves to a financial institution and incur these monitoring costs. The affiliation benefits them in at least two ways -- as a source of funds for investment spending, and as a positive signal to financial markets. In a dynamic model, Webb (1991) argues that long-term affiliation might also work as a signalling device to separate high-quality borrowers from low-quality ones.

Because the sample is taken from two very different time periods, it is necessary to discuss how this difference may influence the results. The 1926-29 period was one of extraordinary boom, and the 1936-39 period, one of extraordinary economic crisis. Under these circumstances, one would expect that unattached firms during the boom years (1926-29 sample) would find it easier to obtain external financing than during the second period of economic distress (1936-39). This of course would imply that the relative benefit from becoming attached to a bank would have increased from the first to the second period. In other words, the difference between the cash flow coefficients for the affiliated and the non-affiliated sample should have increased. The empirical results, however, show the complete reverse. Thus, it is unlikely that the different time periods can account for the observed empirical results.

Another important issue is how the collapse of the banking system might influence the empirical results. More specifically, one might argue that the failure of the banking system could have affected the affiliated sample disproportionately more, and hence the liquidity results merely reflect this outcome. Further investigation however, reveals that this story is unlikely to explain the liquidity results. I looked at the distribution of bank affiliation for the firms that collapsed or disappeared from the sample

during the Depression years, with the idea that if companies affiliated to banks during the first period made a mistake in doing so, then the collapse of the banking system would also have affected the failure rate of the affiliated sample disproportionately more. I found that only five of the 20 companies that disappeared from the sample were affiliated to banks. Thus, it seems hard to argue that the collapse of the banking system may have been responsible for the observed change in the cash flow coefficients for the affiliated group, when the failure rate for this group was, if anything, lower than that for the non-affiliated group.

## **V. Concluding Remarks**

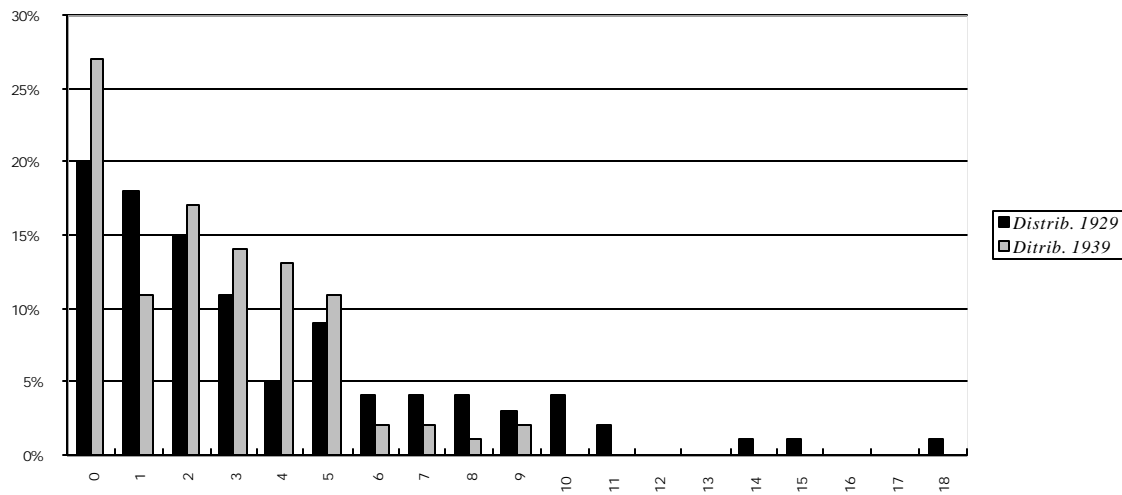
The enactment of the Glass Steagall Act forced a large institutional change in the banking industry and the entire financial system. The Progressives saw this as a good change -- one whose benefits clearly outweighed its costs. Under this view, the Roosevelt administration came to power and “fixed” a broken financial system. By separating investment and commercial banking and disallowing banks from using their funds to finance corporate security offerings and flotations, conflicts of interest were eliminated, speculation reduced, and the public was generally better off. A second view claims that the Roosevelt administration reforms essentially broke a working financial system. It introduced inefficient costs to the banking industry and thus, adversely affected the financial system.

The results in this paper give the second claim some empirical validity. Prior to Glass-Steagall, corporate investment spending was shown to be sensitive cash flow only for companies not strongly affiliated to a financial institution. Affiliated companies

displayed no sensitivity of investment spending to cash flow. After Glass-Steagall, the sensitivity of investment to cash flow increases in magnitude and importance for the bank-affiliated group, but not for the control group. To the extent that the banking sector's ability to assist companies in their financing was undermined, corporate investment suffered. This study however, is not rich enough to allow for more general conclusions. Thus, further research in this area is necessary to determine the economy-wide effects of the Glass Steagall Act.

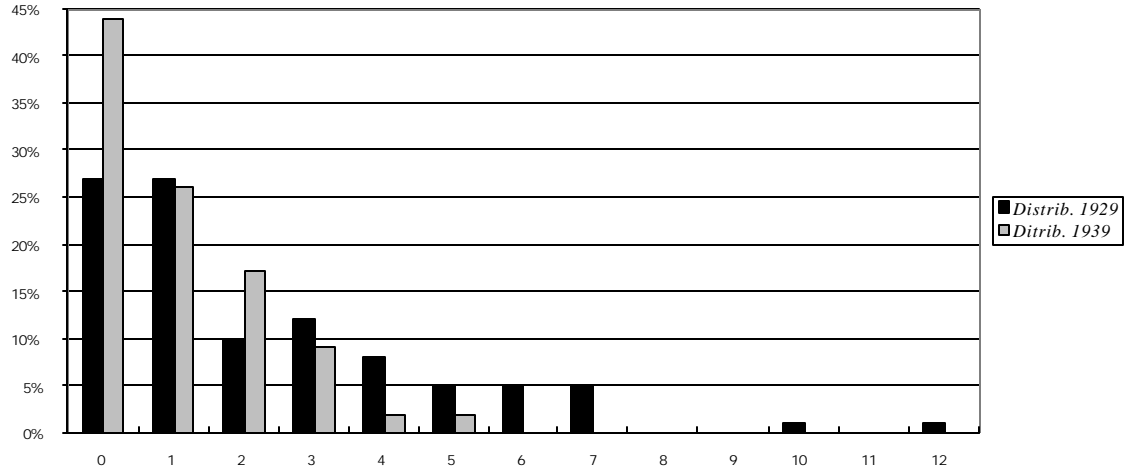
**Figure I**

**Distribution of Banker Representation: 1929 vs. 1939**



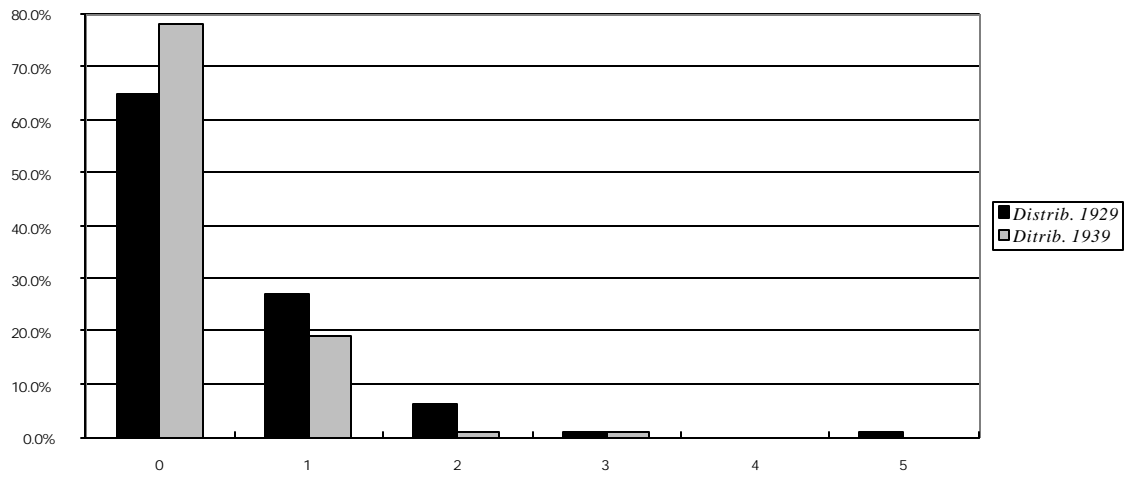
**Figure II**

**Distribution of Affiliations to Trust Companies**



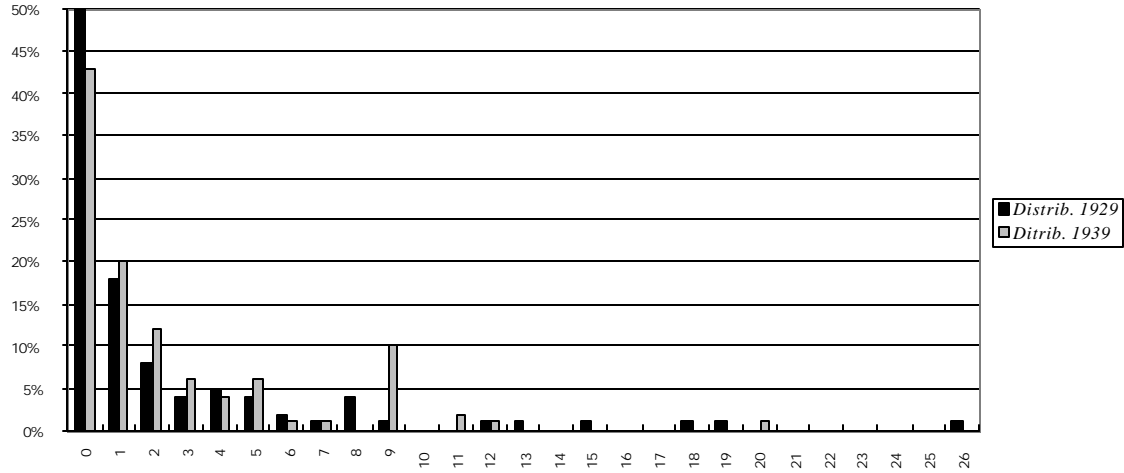
**Figure III**

**Distribution of Affiliation to Investment Bank**



**Figure IV**

**Distribution of Affiliation to Insurance Companie**



**Table I**  
**Average Number of Affiliations by Type of Financial Institution**

This table presents the average number of affiliations per company by type of financial institution. The number in italics under each average is the standard deviation. The Difference test column presents the results of performing a simple difference in means test. Statistically significant (95% confidence level) results are indicated with an asterisk.

<i>Type of Institution</i>	<i>Average 1926- 1929</i>	<i>Average 1936-1939</i>	<i>Difference Test</i>
Commercial Banks	3.46 <i>3.62</i>	2.48 <i>2.22</i>	2.35*
Insurance Cos.	2.28 <i>4.32</i>	1.95 <i>3.18</i>	0.63
Trust Cos.	2.20 <i>2.37</i>	1.05 <i>1.23</i>	4.41*
Investment Banks	0.470 <i>0.780</i>	0.274 <i>0.525</i>	2.39*
Number of Directors	10.4 <i>4.04</i>	10.1 <i>3.91</i>	0.61
Number of Cos.	113	93	

**Table II**  
**Summary Statistics for 1926-29 and 1936-39**

This table presents descriptive statistics for the following variables. The figures presented are averages and standard deviations (in italics), both calculated for all firms and all years. *Affiliated Cos.* are companies with strong banker director representation. *Number of firms* is the total number of firms included in each category. *K*: initial capital stock; *I/K*: gross investment as a proportion of initial capital stock; *Cash/K*: free cash flow as a proportion of initial capital stock; *Sales/K*: gross sales as a proportion of initial capital stock; *q*: market value of equity plus book value of debt and preferred stock divided by book value of total assets; *Liquid/K*: stock of liquid assets as a proportion of initial capital stock; and *Debt/K*: book value of long-term obligations as a proportion of initial capital stock.

<i>Statistic</i>	<i>Affiliated Cos.</i> <i>1929</i>	<i>Non Affiliated</i> <i>Cos. 1929</i>	<i>Affiliated Cos.</i> <i>1939</i>	<i>Non-Affiliated</i> <i>Cos. 1939</i>
Number of Firms	59	54	51	42
I/K	0.07 <i>0.11</i>	0.12 <i>0.18</i>	0.03 <i>0.09</i>	0.02 <i>0.14</i>
Cash/K	0.19 <i>0.25</i>	0.29 <i>0.62</i>	0.16 <i>0.31</i>	0.19 <i>0.36</i>
Sales/K	2.25 <i>2.44</i>	2.72 <i>3.94</i>	1.72 <i>1.36</i>	2.15 <i>2.00</i>
q	2.21 <i>2.98</i>	1.78 <i>2.07</i>	1.44 <i>1.04</i>	1.46 <i>0.85</i>
Liquid/K	0.15 <i>0.25</i>	0.20 <i>0.39</i>	0.38 <i>0.82</i>	0.23 <i>0.25</i>
Debt/Total Assets	0.45 <i>0.63</i>	0.41 <i>0.86</i>	0.07 <i>0.11</i>	0.10 <i>0.22</i>
K	13,410,170 <i>11,664,000</i>	10,762,290 <i>18,486,020</i>	22,405,990 <i>24,404,410</i>	11,438,810 <i>14,705,020</i>

**Table III**  
**Investment Regression Equations for Bank Affiliation**

The dependent variable is gross investment relative to capital stock at the beginning of the period. Cash flow, liquid securities and gross sales are also normalized by the stock of capital at the beginning of the period. The regressions include yearly dummies and firm dummies. Standard errors are included in italics. CASH/K: free cash flow as a proportion of initial capital stock; SALES/K: beginning of the period gross sales as a proportion of initial capital stock; q: beginning of the period market value of common equity plus book value of debt and preferred stock divided by the book value of total assets; and LIQUID/K: beginning of the period stock of liquid assets as a proportion of initial capital stock. An (\*) indicates regression results after controlling for insurance company affiliation.

	(A) <i>1926-29 Affiliated</i>	(B) <i>1926-29 Non- affiliated</i>	(C) <i>1936-39 Affiliated</i>	(D) <i>1936-39 Non- affiliated</i>	(E) <i>1936-39 Non- affiliated*</i>
CASH/K	-0.255 <i>0.126</i>	0.214 <i>0.089</i>	0.321 <i>0.087</i>	-0.066 <i>0.095</i>	0.306 <i>0.112</i>
LIQUID/K	0.077 <i>0.084</i>	-0.067 <i>0.078</i>	-0.049 <i>0.109</i>	0.079 <i>0.050</i>	0.066 <i>0.063</i>
q	-0.003 <i>0.004</i>	0.006 <i>0.017</i>	0.039 <i>0.014</i>	0.046 <i>0.017</i>	0.011 <i>0.026</i>
SALES/K	0.096 <i>0.038</i>	0.059 <i>0.034</i>	0.087 <i>0.031</i>	0.046 <i>0.020</i>	0.047 <i>0.019</i>
Adjusted R2	0.222	0.118	0.348	0.158	0.338
Degrees of Freedom	56	72	77	102	37

**Table IV**  
**Investment Regression Equations for Trust Company Affiliation**

The dependent variable is gross investment relative to capital stock at the beginning of the period. Cash flow, liquid securities and gross sales are also normalized by the stock of capital at the beginning of the period. The regressions include yearly dummies and firm dummies. Standard errors are included in italics. CASH/K: free cash flow as a proportion of initial capital stock; SALES/K: beginning of the period gross sales as a proportion of initial capital stock; q: beginning of the period market value of common equity plus book value of debt and preferred stock divided by the book value of total assets; and LIQUID/K: beginning of the period stock of liquid assets as a proportion of initial capital stock. An (\*) indicates regression results after controlling for insurance company affiliation.

	(A) <i>1926-29 Affiliated</i>	(B) <i>1926-29 Non- affiliated</i>	(C) <i>1936-39 Affiliated</i>	(D) <i>1936-39 Non- affiliated</i>	(E) <i>1936-39 Non- affiliated*</i>
CASH/K	-0.375 <i>0.146</i>	0.151 <i>0.062</i>	0.243 <i>0.088</i>	-0.078 <i>0.098</i>	0.347 <i>0.111</i>
LIQUID/K	0.072 <i>0.084</i>	-0.005 <i>0.038</i>	-0.086 <i>0.108</i>	0.068 <i>0.037</i>	0.048 <i>0.056</i>
q	-0.004 <i>0.005</i>	0.000 <i>0.014</i>	0.051 <i>0.013</i>	0.031 <i>0.021</i>	0.002 <i>0.022</i>
SALES/K	0.108 <i>0.048</i>	0.042 <i>0.024</i>	0.054 <i>0.031</i>	0.061 <i>0.015</i>	0.055 <i>0.017</i>
Adjusted R2	0.213	0.117	0.257	0.227	0.457
Degrees of Freedom	58	72	101	81	34

**Table V****Investment Regression Equations for Investment Bank Affiliation**

The dependent variable is gross investment relative to capital stock at the beginning of the period. Cash flow, liquid securities and gross sales are also normalized by the stock of capital at the beginning of the period. The regressions include yearly dummies and firm dummies. Standard errors are included in italics. CASH/K: free cash flow as a proportion of initial capital stock; SALES/K: beginning of the period gross sales as a proportion of initial capital stock; q: beginning of the period market value of common equity plus book value of debt and preferred stock divided by the book value of total assets; and LIQUID/K: beginning of the period stock of liquid assets as a proportion of initial capital stock.

	(A) <i>1926-29 Affiliated</i>	(B) <i>1926-29 Non- affiliated</i>	(C) <i>1936-39 Affiliated</i>	(D) <i>1936-39 Non- affiliated</i>
CASH/K	-0.103 <i>0.210</i>	0.105 <i>0.089</i>	0.182 <i>0.278</i>	0.063 <i>0.067</i>
LIQUID/K	-0.035 <i>0.088</i>	0.024 <i>0.040</i>	0.058 <i>0.177</i>	0.046 <i>0.030</i>
q	0.002 <i>0.014</i>	-0.001 <i>0.006</i>	0.015 <i>0.034</i>	0.048 <i>0.013</i>
SALES/K	0.084 <i>0.049</i>	0.051 <i>0.023</i>	0.049 <i>0.062</i>	0.043 <i>0.013</i>
Adjusted R2	0.107	0.090	0.049	0.213
Degrees of Freedom	27	103	24	167

**Table VI****Investment Regression Equations for Insurance Company Affiliation**

The dependent variable is gross investment relative to capital stock at the beginning of the period. Cash flow, liquid securities and gross sales are also normalized by the stock of capital at the beginning of the period. The regressions include yearly dummies and firm dummies. Standard errors are included in italics. CASH/K: free cash flow as a proportion of initial capital stock; SALES/K: beginning of the period gross sales as a proportion of initial capital stock; q: beginning of the period market value of common equity plus book value of debt and preferred stock divided by the book value of total assets; and LIQUID/K: beginning of the period stock of liquid assets as a proportion of initial capital stock. An (\*) indicates regression results after controlling for commercial bank affiliation.

	(A) <i>1926-29 Affiliated</i>	(B) <i>1926-29 Non- affiliated</i>	(C) <i>1926-29 Non- affiliated*</i>	(D) <i>1936-39 Affiliated</i>	(E) <i>1936-39 Non- affiliated</i>
CASH/K	-0.021 <i>0.149</i>	0.023 <i>0.076</i>	0.198 <i>0.210</i>	-0.035 <i>0.095</i>	0.216 <i>0.078</i>
LIQUID/K	-0.028 <i>0.062</i>	0.094 <i>0.059</i>	-0.060 <i>0.212</i>	-0.027 <i>0.066</i>	0.233 <i>0.070</i>
q	0.011 <i>0.017</i>	0.000 <i>0.006</i>	0.039 <i>0.072</i>	0.063 <i>0.015</i>	0.010 <i>0.015</i>
SALES/K	0.045 <i>0.029</i>	0.106 <i>0.036</i>	0.034 <i>0.098</i>	0.094 <i>0.037</i>	0.039 <i>0.014</i>
Adjusted R2	0.108	0.121	0.078	0.206	0.368
Degrees of Freedom	62	71	27	110	75

**Table VII**  
**Correlation Matrix of Affiliations**

This table presents simple correlations among affiliations to different types of financial institutions. The top part presents the correlations for the 1926-29 period; the bottom part presents the correlations for the 1936-39 period.

<b>1926-29 Matrix</b>			
	<i>Banks</i>	<i>Trust companies</i>	<i>Investment banks</i>
<i>Banks</i>	1.00	0.73	0.28
<i>Trust companies</i>	0.73	1.00	0.31
<i>Investment banks</i>	0.28	0.31	1.00
<i>Insurance co.</i>	0.47	0.43	0.17

<b>1936-39 Matrix</b>			
	<i>Banks</i>	<i>Trust companies</i>	<i>Investment banks</i>
<i>Banks</i>	1.00	0.44	0.01
<i>Trust companies</i>	0.44	1.00	0.05
<i>Investment banks</i>	0.01	0.05	1.00
<i>Insurance co.</i>	0.43	0.29	0.01

## References

- Baliga, Sandeep and Ben Polak, 1995, Bank Versus Bonds: A Simple Theory of Comparative Financial Institutions, Cowles Foundation Discussion Paper No. 1100, Cowles Foundation, Yale University.
- Becht, Marco and Carlos D. Ramirez, 1993, Financial capitalism in pre-World War I Germany: The role of the universal banks in the financing of German mining companies, 1906-1912, Working Paper, European University Institute.
- Benston, George J., 1990, *The Separation of Commercial and Investment Banking, The Glass-Steagall Act Revisited and Reconsidered*, (Oxford University Press, New York).
- Bernanke, Ben S., 1983, Non-monetary effects of the financial crisis in the propagation of the Great Depression, *American Economic Review* 79, 14-31.
- Calomiris, Charles, 1995, The cost of rejecting Universal Banking: American finance in the German mirror, 1870-1914, in Naomi R. Lamoreaux and Daniel M.G. Raff, eds.: *Coordination and Information: Historical Perspectives on the Organization of Enterprise* (University of Chicago Press)
- Calomiris, Charles and Daniel M.G. Raff, 1996, The evolution of market structure, information, and spreads in American investment banking, in Michael Bordo and Richard Sylla, eds.: *Anglo-American Finance Systems: Institutions and Markets in the 20th Century* (Irwin Publishers)
- Calomiris, Charles and Carlos D. Ramirez, 1995, The evolution of American corporate finance, in Carl Kaysen, ed.: *The American Corporation: A Second Look* (Oxford University Press)
- Carosso, Vincent P., 1970, *Investment Banking in America: A History* (Harvard University Press, Cambridge, MA).
- Chandler, Alfred D., 1977, *The Visible Hand: The Managerial Revolution in American*

- Business* (Harvard University Press, Cambridge, MA).
- Chernow, Ron, 1990, *The House of Morgan* (Atlantic Monthly Press, Boston, MA)
- De Long, J. Bradford, 1991, Did J.P. Morgan's men add value? An economist's perspective on financial capitalism, in Peter Temin, ed.: *Inside the Business Enterprise: Historical Perspectives on the Use of Information* (University of Chicago Press, Chicago, IL).
- Dhawan, Juhi, 1994, Was universal banking prevented by regulation? The U.S. experience prior to the Glass-Steagall Act, *Brown University Working Paper*.
- Diamond, Douglas, 1984, Financial intermediation and delegated monitoring, *Review of Economic Studies* 51, 393-414
- Diamond, Douglas, 1991, Monitoring and reputation: The choice between bank loans and directly placed debt, *Journal of Political Economy* 99, 689-721.
- Dooley, P.C., 1969, The interlocking directorate, *American Economic Review* 59, 314-323.
- Edwards, George W., 1967, *The Evolution of Finance Capitalism* (Augustus M. Kelley, Reprints, New York)
- Fazzari, Steven, R. Glenn Hubbard and B. Petersen, 1988, Financing constraints and corporate investment, *Brookings Papers on Economic Activity* 1, 141-195.
- Fazzari, Steven, R. Glenn Hubbard and B. Petersen, 1996, Financing constraints and corporate investment: response to Kaplan and Zingales, *National Bureau of Economic Research Working Paper No. 5462*
- Fohlin, Caroline M., 1994, Relationship banking and firm liquidity constraints: evidence from the heyday of the German universal banks, *California Institute of Technology Social Science Working Paper 913*.
- Goldsmith, Raymond W., 1958, *Financial Intermediaries in the American Economy*

- since 1900*. (Princeton University Press, Princeton, NJ)
- Hoshi, Takeo, Anil Kashyap and David Scharfstein, 1990, Bank monitoring and investment: Evidence from the changing structure of Japanese corporate banking relationships, in R. Glenn Hubbard, ed.: *Asymmetric Information, Corporate Finance, and Investment* (University of Chicago Press, Chicago, IL).
- Hoshi, Takeo, Anil Kashyap and David Scharfstein, 1991, Corporate structure, liquidity, and investment: Evidence from Japanese industrial groups, *Quarterly Journal of Economics* 106, 33-60.
- Hsiao, Cheng, 1986, *Analysis of Panel Data* (Cambridge University Press, Cambridge, U.K.)
- Johnston, J., 1984, *Econometric Methods* (McGraw-Hill Book Company, New York, NY).
- Kaplan, Steven N., and Luigi Zingales, 1995, Do financing constraints explain why investment is correlated with cash flow? *National Bureau of Economic Research Working Paper No. 5267*
- Kroszner, Randall S. and Raghuram G. Rajan, 1995, Organization structure and credibility: Evidence from commercial bank securities activities before the Glass-Steagall Act *National Bureau of Economic Research Working Paper No. 5256*
- Kroszner, Randall S. and Raghuram G. Rajan, 1994, Is the Glass-Steagall Act justified? A study of the U.S. experience with universal banking before 1933, *American Economic Review* 84, 810-832.
- Puri, Manju, 1994, The long-term default performance of bank underwritten securities issues, *Journal of Banking and Finance*
- Rajan, Raghuram, 1992, Insiders and outsiders: the choice between informed and arm's length debt, *Journal of Finance* 47, 1367-1400.

- Ramirez, Carlos D., 1995, Did J.P. Morgan's men add liquidity? corporate investment, cash flow, and financial structure at the turn of the twentieth century, *Journal of Finance* 50, 661-678.
- Ramirez, Carlos D., and J. Bradford De Long, 1995, Bank influence and firm performance: the impact of depression-era financial markets reforms, in Michael Bordo and Richard Sylla, eds.: *Anglo-American Finance Systems: Institutions and Markets in the 20th Century* (Irwin Publishers)
- Roe, Mark J., 1994, *Strong Managers, Weak Owners*. (Princeton University Press, Princeton, NJ)
- Stiglitz, Joseph and Andrew Weiss, 1981, Credit rationing in markets with imperfect information, *American Economic Review* 71, 393-410.
- Smith, George D., and Richard Sylla, 1993, The transformation of financial capitalism: an essay on the history of American capital markets, *Financial Markets, Institutions, and Instruments* 2, 1-61.
- Sylla, Richard, 1982, American banks and the finance of industry, 1880-1920: Perspectives on the visible hand, in V.I. Bovykin, ed.: *Transformation of Bank Structures in the Industrial Period* (8th International Economic History Congress, Budapest, Hungary).
- Webb, David, 1991, Long-Term Financial Contracts Can Mitigate the Adverse Selection Problem in Project Financing, *International Economic Review* 32, 305-320.
- White, Eugene, 1986, Before the Glass-Steagall Act: an analysis of the investment banking activities of national banks, *Explorations in Economic History* 23, 33-55.