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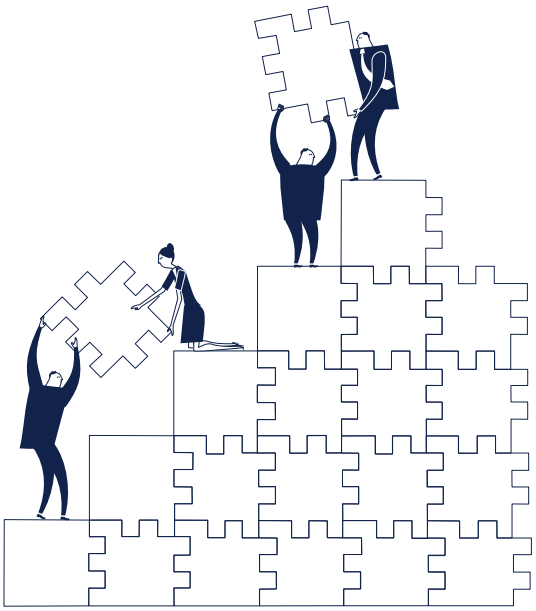

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Investment-Banking Relationships: 1933-2007

Abstract

We study the evolution of investment bank relationships with issuers from 1933–2007. The degree to which issuers conditioned upon prior relationship strength when selecting an investment bank declined steadily after the 1960s. The issuer's probability of selecting a bank with strong relationships with its competitors also declined after the 1970s. In contrast, issuers have placed an increasing emphasis upon the quantity and the quality of their investment bank's connections with other banks. We relate the structural changes in bank/client relationships beginning in the 1970s to technological changes that altered the institutional constraints under which security issuance occurs.

1. Introduction

Securities transactions are the focal point of relationships between investment banks and their corporate clients. Until the middle of the 20th century these relationships were so stable that the small banking partnerships that dominated the industry generally were willing to provide advisory services on the expectation of being awarded future underwriting mandates.[1] With the rise of large, full-service banks, client relationships have become less stable, more fee-for-service oriented, and increasingly subject to concern for conflicts of interest and violations of client trust.[2] In this paper we study the evolution of investment banking relationships from 1933 through 2007 in an attempt better to understand the sources and consequences of this profound change in the structure of capital markets.

Our analysis draws on a hand-collected dataset that includes all public and private underwritten securities transactions over $1 million from 1933–1969. We combine this dataset with post-1970 coverage provided by Securities Data Corporation (SDC) and follow Ljungqvist, Marston, and Wilhelm (2006; 2009) in measuring the state of a client's banking relationships as each bank's dollar share of the client's past securities offerings. We use a similar strategy to measure the state of a bank's relationships within industry groups (4-digit SIC categories). Finally, we use graph-theoretic methods to measure a bank's connectedness with other banks via syndicate participations. We then estimate conditional logit models in which issuers condition the assignment of underwriting mandates on these bank-specific attributes.

The 1933 (Glass-Steagall) Banking Act provides a natural starting point for a long-run analysis of investment-banking relationships because it upset client relationships that rested heavily on commercial banks' ability to underwrite securities offerings and thereby created new opportunities

[1] Eccles and Crane (1988) identify this behavior as a "loose linkage" between fees and service. Ellis (2009, ch.4) identifies the 1955 merger that created Warner Lambert Pharmaceuticals as the first instance in which Goldman Sachs charged a fee for merger advice. Lazard was viewed as a pioneer for developing its fee-based merger advisory business during the 1960s. Morgan Stanley did not create a mergers and acquisitions department until 1972. See Morrison and Wilhelm (2007, pp. 255–259) and Carosso (1970, p. 502) for further discussion.

[2] Goldman Sachs recently attempted a spectacular balancing act by advising both sides of Kinder Morgan's proposed $21 billion acquisition of El Paso Corporation while also holding two board seats and maintaining a $4 billion financial stake in Kinder Morgan. A stockholder appeal for a preliminary injunction elicited a detailed and entertaining analysis of the case from Chancellor Strine of the Delaware Court of Chancery. See "In Re El Paso Corporation Shareholder Litigation," Civil Action No. 6949-CS, February 29, 2012. Goldman's experience is not unique.

for private (investment) banks.[3] The Act was followed in close succession by further regulatory intervention aimed at weakening bank relationships, culminating with an unsuccessful 1947 civil suit filed by the U.S. Justice Department (*U.S. v. Henry S. Morgan et al.*) against 17 investment banks charged with conspiring through their syndicate connections to monopolize the U.S. securities business.

During the early part of the sample period we find that, notwithstanding this regulatory upheaval, issuers deciding whether to (re)engage a bank to manage a transaction placed increasing weight on the strength of their relationship with the bank, and upon the state of the bank's relationships with the issuer's competitors. On the other hand, a bank's syndicate connections had a modest but negative effect on its selection. In other words, during the early part of our sample period, it appears that the influence of bank/client relationships strengthened in the face of regulatory action intended to weaken them and that, contrary to the motivation for *U.S. v. Henry S. Morgan et al.*, strong syndicate connections provided little, if any, competitive advantage.

In contrast, we find that the influence of bank/client relationships began to weaken, and that the importance of syndicate ties began to strengthen, in the 1960s. By the time that commercial banks began to reenter the securities underwriting business, the influence of bank/client relationships had stabilized at a level similar to that observed in the immediate aftermath of the post-Depression regulatory effort. Similarly, issuers responded much less favorably to banks with strong relationships within the issuer's SIC category after the 1970s. On the other hand, by the last decade of the sample period, the increase in a bank's odds of being selected for a one unit increase in our measure of the strength of its syndicate connections was about 8 times larger than its estimated level for the 1960s.

We explain the declining influence of bank/client relationships by first recognizing they rest upon the banks' ability to build and preserve reputations for employing skillful and trustworthy bankers. Morrison and Wilhelm (2004) identify limited organizational scale and relative immobility of human capitalists as being conducive to the building and preservation of this type of institutional reputation. We show that these conditions were met by banking partnerships throughout the

[3]By the end of the 1920s two large commercial banks, Chase National and National City of New York, sponsored over half of all new securities offerings. See Morrison and Wilhelm (2007, p. 210).

early part of our sample period. During the early part of the sample period, bankers generally spent their entire careers with a single, typically quite small, banking partnership. It was not unusual for a banker to be responsible for a specific client relationship for many years or decades. Combining long-term partnership commitments with longstanding client relationships provided bankers with the opportunity to build client trust and the incentive to protect their individual and institutional reputations for having done so.

We document the longevity of individual bankers and their long-term commitments to a single institution by tracking the identity of bank partners annually. We also illustrate bankers' long-term responsibility for specific clients by documenting the number and length of individual bankers' directorships through the first part of our sample period for the 17 defendant banks in *U.S. v. Henry S. Morgan et al.* Our data provide evidence that, starting in the late 1950s and with increasing force through the 1970s, the conditions that contributed to long-lived personal client relationships were eroded. Our bank-choice model indicates that issuers responded negatively to the departure of bank partners during the 1960s and 1970s.

These changes coincided with an unprecedented period of technological and organizational upheaval in the investment banking industry. Computers were introduced to Wall Street around 1960, and immediately started to change the way that investment banks conducted business. These changes culminated in the 1970 decision by the New York Stock Exchange's (NYSE) membership (including virtually all of the major banks) to permit members to operate as public corporations. Morrison and Wilhelm (2008) argue that the technological changes undermined reputation concerns among investment bankers; at precisely the same time, our data reveal that the influence of bank-client relationships began to weaken.

Our industry-level analysis of bank relationships suggests that issuers valued industry expertise throughout the sample period. The substantial decline in the importance of same-industry relationships during the 1980s is consistent with evidence provided by Asker and Ljungqvist (2010) that potential conflicts of interest and leakage of strategic information caused large issuers to avoid engaging banks that also managed transactions for other firms in the same industry.[4] Coupled with

[4]See Bodnaruk, Massa, and Simonov (2009) and Griffin, Shu, and Topaloglu (2012) for mixed evidence on whether client information is exploited for trading purposes.

the simultaneous decline in the influence of bank/client relationships and the negative effect of banker turnover, these results suggest that trust between banks and their clients started to erode in the 1970s and 1980s.

The increasing influence of syndicate connections upon issuer mandates was coincidental with the rise of institutional investing. We suggest that syndicate connections are of greatest interest to issuers when they promote efficiency in information acquisition from (institutional) investors, as in Benveniste and Spindt (1989). Pichler and Wilhelm (2001) argue that the syndicate structure is an efficient mechanism for maintaining the investor relationships that are central to information acquisition. To the extent that trust between banks and their clients was declining during the latter part of the sample period, issuers may also have valued syndicate connections more highly because they created competitive pressure and cross-monitoring opportunities among bankers. Corwin and Schultz (2005) and Morrison and Wilhelm (2007, pp. 80–81) suggest that the syndicate aligns the lead underwriter's incentives with those of the issuer by rewarding co-managers for revealing lead-underwriter malfeasance. Co-managers have incentive to communicate malfeasance if doing so increases the likelihood that they will be selected to manage the issuer's future transactions. Ljungqvist, Marston, and Wilhelm (2009) provide evidence that co-management is indeed a stepping stone to management opportunities.

Our paper contributes to a growing body of work studying how issuers assign underwriting mandates for their securities offerings.[5] Early work by Krigman, Shaw, and Womack (2001), Ljungqvist and Wilhelm (2005), and Chitru, Gatchev, and Spindt (2005) examined why firms switch banks between their initial public offering of equity (IPO) and first subsequent equity offering. Our work is more closely related to that of Ljungqvist, Marston, and Wilhelm (2006; 2009). For the 1993–2002 period, their studies document a strong influence of the state of bank/client relationships on the selection of lead managers and co-managers for both debt and equity issues. Our findings for this period are similar but we show that the effect has diminished since 1970.[6]

[5]See Ljungqvist (2007) and Eckbo, Masulis, and Norli (2007) for reviews of the broader literature on equity offerings.

[6]Yasuda (2005) examines the issuer's bank choice for a sample of *debt* issues brought to market in the United States between January 1, 1993 and August 31, 1997. For our purposes, her central finding is that issuers were more likely to choose banks with which they maintained a *lending* relationship during the early stages of commercial bank entry to debt underwriting covered by her sample period. Yasuda (2007) reports similar findings for the Japanese

Our use of eigenvector centrality to study bank connectedness is motivated by recent work indicating that network connections influence the performance of financial intermediaries.[7] Ljungqvist et. al. (2009) report that strong syndicate connections over the 1993-2002 period weakly strengthened a bank's bid for lead management (and only for debt offerings) but they find stronger evidence of a positive effect on the likelihood of being appointed a co-manager. We also document a positive effect of syndicate connections on lead manager choices during this period, but show that the effect was much stronger during the 2000s. Hochberg, Ljungqvist, and Lu (2007) report that funds run by better-networked venture capital firms perform better than their peers and that their portfolio companies are more likely to gain subsequent financing and achieve a successful exit. Hochberg, Ljungqvist, and Lu (2010) show further that strong local venture capital networks pose a barrier to entry for nonlocal venture capitalists.

Finally, our documentation of weakening client relationships and diminishing institutional commitment among bankers provides a suggestive backdrop for recent theoretical work aimed at better understanding why reputation concerns appear to have become less effective for controlling conflicts of interest within investment banks. Chen, Morrison, and Wilhelm (2013b; 2013a) study the tension between a bank's interest in maintaining a reputation for trustworthy behavior and individual bankers' incentive to signal their ability by taking actions that conflict with their clients' interests. In their models, the technological changes that we associate with weakening client relationships can undermine banks' incentives to curb self-interested behavior within their ranks and give rise to the sort of transactions that have been subject to criticism in the aftermath of the recent financial crisis. The asset securitization market has been a prominent focal point for such criticism. Winton and Yerramilli (2011), Hartman-Glaser (2013), and Griffin, Lowery, and Saretto (2013) all develop models in which reputation concerns can fail to resolve conflicts of interest in this setting.

bond market. Schenone (2004) documents benefits to IPO issuers that select a bank with which they have a lending relationship and Benzoni and Schenone (2010) find no evidence of conflicts of interest in such cases.

[7] See Bonacich (1972) for development of the eigenvector centrality measure and Podolny (1993) for an early application to investment-banking syndicates.

2. Historical Background

Because our study of banking relationships cuts across a wide time span, much of which has been subject to limited statistical analysis, we begin with a brief summary of the events that shaped banks' relationships both with their clients and with one another during the early decades of our sample period. Carosso (1970), Medina (1954 [1975]), and Seligman (1982) provide authoritative accounts of events through the first half of the sample period. Morrison and Wilhelm (2007, ch. 7–8) and Morrison and Wilhelm (2008) provide further detail on events during the latter part of the sample period, as well as a discussion of the influence of technological change on the industry.

From 1933 through the early 1950s, investment banks were subject to political and regulatory efforts intended to weaken their ties with clients and with one another. The 1933 Banking Act was signed into law on June 16, 1933 and was followed on June 6, 1934 by the Securities Exchange Act. For our purposes, the Banking Act's separation of deposit collection and lending from securities market activity (to be completed by June 16, 1934) is particularly relevant, because it forced the reorganization of many important banks, thereby potentially upsetting existing banking relationships.

Some prominent banks (e.g., Goldman Sachs, Kuhn Loeb, Lehman) already specialized in securities offerings and were relatively unaffected by the Banking Act. By contrast, in June 1934 J.P. Morgan formally discontinued its investment banking operations, and had effectively left the business when the Banking Act was enacted. It was not until September 16, 1935 that several J.P. Morgan partners (Harold Stanley, Henry S. Morgan, and William Ewing) left the firm to incorporate Morgan Stanley & Co. They were joined by former partners from Drexel & Co. and soon thereafter by two officers from the former securities affiliate of Guaranty Trust. The fact that the founding members of the new firm had considerable experience in the industry (each of the three Morgan men had been a partner for seven years when J.P. Morgan discontinued its investment-banking operations) contributed to the new firm's ability quickly to gain a leading position among underwriters. First Boston and Smith Barney followed similar paths, bringing together senior bankers from several pre-1933 banking organizations (Medina, 1954 [1975]).

Two additional regulatory changes that were directly aimed at upsetting the industry's status

quo soon followed. The 1938 Chandler Act implemented a statute-based approach to bankruptcy reorganization that significantly diminished the value of bank relationships as well as banks' advisory role. The Act was followed by a sharp increase in private placements (especially debt), which further diminished the influence of banks in securities issuance (Morrison and Wilhelm, 2008).[8]

Despite repeated attempts to weaken the ties between issuers and bankers, a 1940 SEC Public Utility Division study noted that six leading New York banks managed 62% of bond issues and 57% of bond, preferred stock and common stock issues between January 1934 and June 1939. Morgan Stanley alone managed 81% of high-grade bond issues, including 70% of high-grade utility bond issues. The study alleged that such concentration reflected "an unwritten code whereby once a banker brings out an issue, the banker is deemed to have a recognized right to all future public issues of that company."[9]

The SEC responded in 1941 by enacting Rule U-50, which mandated competitive bidding (instead of the traditional negotiated underwriting) for the underwriting of utility issues. It was followed in 1944 by the Interstate Commerce Commission's requirement that railroad issues by subject to competitive bidding. The new rules had the desired effect in the sense that they enabled less prominent banks, most importantly Halsey Stuart and Merrill Lynch, to gain ground on the leading banks. To the extent that gains were made by breaking the "unwritten code," they weakened bank-client relationships as we measure them.

U.S. v. Henry S. Morgan et al. posed a major challenge to bank syndicate relationships. The 1947 civil suit, filed under Sections 1 and 2 of the Sherman Act, charged 17 investment banks with "entering into combination, conspiracy and agreements to restrain and monopolize the securities business of the United States [...]", and it identified the underwriting syndicate as a primary vehicle for the alleged abuse of longstanding banking relationships. The opinion rendered by Judge

[8]Carosso (1970, p. 430) argues that "The ability of great corporations to finance themselves and the growth of private placements had diminished significantly the role and influence of investment bankers in the economy." In the extreme, AT&T, for example, sold $150m of $730m of securities issued between 1935 and 1940 without the assistance of investment bankers – i.e., Morgan Stanley (Carosso, 1970, p. 405). Also see Calomiris and Raff (1995, p. 124–132) on the rise of private placements.

[9]"The problem of maintaining arm's length bargaining and competitive conditions in the sale and distribution of securities of registered public utility holding companies and their subsidiaries," Report of the Public Utilities Division, SEC, December 18, 1940. The study is quoted by Seligman (1982, p. 218) in a detailed discussion of the political backdrop for the promulgation of the compulsory bidding rules. Also see Carosso (1970, ch. 20).

Harold Medina in October 1953 (and filed on February 4, 1954) dismissed all charges against the defendants and castigated the government for the weakness of its case.[10] With respect to the syndicate system Medina found "[. . .]no concert of action, no agreement and no conspiracy, integrated over-all or (Medina, 1954 [1975], p. 119).

The investment syndicate's distribution function in 1940s had changed significantly from the start of the century. Banks' securities distribution operations were quite small in the 1900s, and they were concentrated on the East Coast. As a result, underwriting syndicates routinely remained in place for a year or more, as syndicate members travelled to peddle syndicates to individual investors. (Medina, 1954 [1975], pp. 22-23). Distribution improved as retail brokerage networks expanded (e.g., Perkins (1999, p. 219)) and by the late 1940s syndicate contracts usually were written for 15-30 days (Medina, 1954 [1975], p. 43).

The 1940s also witnessed the early stages of changes in the investor community that would reshape both syndicate and client relationships. Institutional ownership of U.S. equities outstanding doubled from 7% to 14% between 1945 and 1960 (Federal Reserve Flow of Funds, L. 213). Mutual fund assets grew from $448 million to $3.5 billion between 1940 and 1952, while pension fund assets grew from $3 billion in 1947 to $18 billion in 1955. As their assets grew rapidly during the 1940s, life-insurance companies became dominant investors in the burgeoning market for private placements, to the point of crowding out investment banks by investing in direct placements.[11]

By the 1950s, The NYSE's daily trading volume averaged about 2.2 million shares on open interest of 5.6 billion shares. Average daily trading volume stood at about 3 million shares in 1960; it then nearly quadrupled by 1970, and then quadrupled again by 1980 (Morrison and Wilhelm, 2007, pp. 232-233). The evolution of block trading provides a more direct account of the influence of institutional trading. In 1965, the NYSE reported 2,171 block trades accounting for about 3% of reported volume. By 1972 the number of block trades had grown about 15 times to 31,207 trades (18.5% of volume) and then tripled by 1979 (97,509 transactions, 26.5% of volume).

[10]The case did not go to trial until November 28, 1950 and it concluded on May 19, 1953. In the interim, counsel for the government and defendant banks produced, in the words of Judge Medina, "truckloads of documents[. . .] The precise number of the hundreds of thousands of documents[. . .] will probably never be known." (Medina, 1954 [1975], p. 213).

[11]See Kemmerer (1952), Carosso (1970, pp. 499-501), and Sobel (1986, p. 64).

In spite of fixed commission rates (which were abolished in May, 1975), the rapid increase in trading volume proved a life-threatening burden for many investment banks. The physical exchange of stock certificates was necessary to close transactions, and back office capacity was challenged by the paperwork required to manage the flood of new business. Although fixed commissions prevented price competition, early adopters of nascent batch-processing computer technology, such as Merrill Lynch, gained a competitive edge in the back office that ultimately proved to be decisive. By the late 1960s the industry was in the midst of a back-office crisis stemming from the inability of many firms to close transactions in a timely manner. Morrison and Wilhelm (2007, pp. 235-236) observe that "[l]osses associated with 'too much business' led approximately 160 NYSE member firms either to merge with competitors or to dissolve their operations."

Among the firms that survived, Merrill Lynch, Goldman Sachs, and Salomon Brothers were noteworthy for having strengthened their investor relationships by investing heavily in block trading and arbitrage services (*New York Times,* July 17, 1971). With other firms claiming that they were forced to decline institutional business for want of capital to fund investments in technology, the NYSE membership decided in 1970 to permit member firms to operate as public corporations. Investment banks went public in two waves (Morrison and Wilhelm, 2008). Most banks with substantial retail brokerage operations had gone public or combined with a public firm by the end of the 1970s. By 1987, among the major wholesale banks, only Goldman Sachs and Lazard remained private partnerships.

As we note above, mergers and acquisitions advisory work evolved into a significant fee-for-service business during the 1960s and 1970s. The 1978 Bankruptcy Code reversed the provisions in the 1938 Chandler Act that prevented banks from taking an active role in corporate reorganization. The confluence of fee-for-service advisory operations, the new bankruptcy code, the development of the market for junk bonds, and the leveraged buyout helped to fuel 172 successful hostile takeovers and a total of 35,000 completed mergers in the U.S between 1976 and 1990 (Morrison and Wilhelm, 2007, pp. 251-262). Hostile takeovers were viewed from the outset as an affront to client relationships.[12]

[12]See Armour and Skeel (2007). John Whitehead justified Goldman's policy of not working for hostile bidders during this period "partly as a matter of business ethics, but primarily as a matter of business judgment" (Ellis, 2009,

At the same time as client relationships were placed under stress by banks' advisory work for hostile bidders, the SEC, in March 1982, implemented Rule 415, which provided for shelf registration of securities offerings, with the explicit intention "to produce a decline in the market power of bankers in their relationship with issuers." (Calomiris and Raff, 1995, p. 121). Bhagat, Marr, and Thompson (1985) suggest that shelf registration had the potential to intensify competition among underwriters by reducing the costs of informal competitive bidding for underwriting mandates. An initial flurry of activity in the market suggested that it may have had the desired effect. From March, 1982 through May, 1983 there were 508 shelf registrations worth a total of $79.3 billion. About 25% of equity offerings between 1982 and 1983 appearing in the sample studied by Denis (1991) were shelf registered.

On March 18, 1987 the Federal Reserve Board approved Chase Manhattan's application to underwrite and deal in commercial paper in a commercial finance subsidiary. Approval of similar applications from Citicorp, J.P. Morgan, and Bankers Trust followed soon thereafter. It was not until January 18, 1989 that commercial banks gained approval for limited underwriting of corporate debt. As of September 1990 only J. P. Morgan (11), Citibank (14), Chemical Bank (17), Bankers Trust (19), and First Chicago (20) ranked among the top 20 debt underwriters. The Fed did not grant equity underwriting powers to commercial banks until September 1990 (Benveniste, Singh, and Wilhelm, 1993). The 1933 Banking Act was repealed in 1999 by the Gramm-Leach-Bliley Act.

Figure A.1 in the appendix summarizes the key events of this Section.

3. Data

Details of securities offerings between 1933 and 1969 are obtained from two sources. Counsel for several defendants in *United States v. Henry S. Morgan, et al* assembled details of all underwritten issues of $\$1,000,000$ or more from July 26, 1933 to December 31, 1949.[13] The records

p. 271).

[13] *United States v. Henry S. Morgan, et al., doing business as Morgan Stanley & Co.; et al, (Civil Action No. 43-757),* United States District Court for the Southern District of New York. Additional information related to the case is drawn either from the *Corrected Opinion of Judge Harold R. Medina* or from the Harold R. Medina Papers housed at the Mudd Library, Princeton University.

were subsequently published in 1951 as *Issuer Summaries*.[14] Data for 1950s and 1960s deals were collected from the *Investment Dealers' Digest*.[15] The Appendix provides a detailed description of the data and collection process for the 1933-1969 period. Data for issues between 1970 and 2007 were taken from the Thomson Reuters SDC database. To maintain continuity with the pre-1970 data, we exclude foreign exchange-listed issues, foreign-traded issues, and issues listed by non-US incorporated entities. SDC provides incomplete records for issues between 1970 and 1979. For example, there is no private placements data for this period; SDC was unable to provide more complete data.

The full sample dataset (1933–2007) contains 287,332 transactions. To ensure consistency with the related literature, we exclude issues by financial institutions (SIC codes 6000–6999), government and public bodies (SIC codes 9000–9999), agricultural and natural resources companies (SIC codes 0–1499), electric, gas, and sanitary services companies (SIC codes 4900–4999), pipelines other than natural gas (SIC codes 4611–4619), and the United States Postal Service (SIC code 4311). We also excluded deals whose industry was recorded as falling into one of these categories.[16]

For the post-1969 period, for which we had more complete information, we made some additional exclusions. Deals for which the underwriter is recorded as "No Underwriter" or "Not Available" are excluded; so were issues by funds, depositaries, leveraged buyout deals, issues by limited partnerships, rights issues, unit issues, regulation S issues, World Bank issues, and self-funded issues.

Finally, we include only straight equity issues that are classified as common, ordinary, cumulative, or capital shares. We retain only those preferred deals that are identified in the source data as cumulative, convertible, capital, or certificate. We exclude floating, indexed, reset, serial, and

[14]Sullivan & Cromwell, *Issuer summaries; security issues in the United States, July 26, 1933 to December 31, 1949. Prepared by counsel for defendants in United States v. Henry S. Morgan, et al., doing business as Morgan Stanley & Co.; et al.* (Baker Old Class JS.065 U571h). For further discussion of the data and its collection, see the appendix to *Corrected Opinion of Judge Harold R. Medina*.

[15]Investment Dealers' Digest, Corporate Financing, 1950-1960, 1961; Investment Dealers' Digest, Corporate Financing, 1960-1969.

[16]Specifically, we excluded deals whose industry was recorded as "Other Finance," "REIT," "Real Estate," "Investment Bank," "S&L/Thrift," "Investment Fund," "Mortgage Bank," "Agriculture," "Fedl Credit Agcy," "Gas Distribution," "Natural Resource," "Oil/Gas Pipeline," or "Water Supply."

variable coupon debt issues, and retain other debt deals only if they are classified as bonds, debentures, notes, or certificates, and if they have a maturity of at least two years. These exclusions trim the sample to 63,302 transactions.

Table I provides an overview of the banking landscape from the perspective of this subsample by reporting the top 30 banks by market share for the 1933-1969 and 1970-2007 periods. Concentration levels increased markedly between these periods. The top 30 banks measured by proceeds held about 84% of market share during the first half of the sample and about 91% during the second half. The top 5 (10) banks accounted for 40% (61%) of proceeds during the first half of the sample and about 50% (75%) during the second half.[17]

3.1. The Issuer's Bank Choice Set

Our econometric analysis involves the estimation of bank choice models for 7 time periods that, with the exception of the first, correspond to decades. The issuer's choice set for a given transaction includes the top 30 banks ranked by the dollar volume of transactions for which they served as the lead manager *during the decade in which the transaction took place*. This means that transactions managed by banks outside of the top 30 in a given decade are excluded from the analysis.[18] We use the 1933-1942 time window to seed the relationship measure described in the following section. Finally, we retain only those transactions for which the issuer's SIC code is available. Taken together, these restrictions yield a final sample of 33,577 transactions for use in the econometric analysis.

Table II reports the distribution of transactions in total and by type across the estimation periods. The number of transactions in an estimation period ranges from a minimum of 842 for the 1943-1949 sample to a maximum of 12,574 for 1990-1999 sample. Debt issues substantially outnumber equity (and preferred) issues in every estimation period. Over the entire sample period,

[17]This table is not used as a basis for our relationship analysis and, in order to make trends of the type discussed in this paragraph clear, it does not reflect the lifeline mappings discussed in the next section. Hence, for example, Bank of America deals are illustrated independently of Merrill Lynch deals, even though both are assigned to the same lifeline in our relationship analyses.

[18]The Appendix includes a list of the 30 banks that appear in each decade's choice set and their market share during the decade.

debt, equity, and preferred issues accounted for 64%, 31%, and 5% of the sample of transactions. We also report the number and fraction of transactions with an issuer for whom no other issue during the 10 years preceding the year of the transaction at hand was managed by a bank in that issuer's choice set. In the full sample, the percentage of transactions carried out by issuers that had no prior relationship with a bank in its choice set ranged from 73% during the 1943-1949 estimation period to 21% during the 1950-1959 estimation period. Issuers without a prior relationship were most common between 1970 and 1989. As we show later, this was a period of considerable upheaval in bank/client relationships. Generally, equity issuers were less likely than debt issuers to have dealt with a bank in their choice set during the preceding ten years. We explain how the state of a banking relationship is measured for estimation purposes in the next section.

The relatively small number of observations for the 1970-1979 period reflects the previously mentioned absence of private placement coverage by SDC during this decade. This could bias our results if issuers systematically approach the selection of an underwriter differently for private placements than for other transactions. With respect to the relationship strength variable, there is considerable anecdotal evidence that the sharp increase in private placements following the 1938 Chandler Act's implementation of a statute-based approach to bankruptcy reorganization diminished the influence of banks in securities issuance.[19] If the same is true for the 1970s, the exclusion of private placements should bias our results toward greater issuer dependence on its relationship with a prospective bank than would be the case if private transactions were included in the analysis. But any such bias would then lend weight to our conclusion that the extent to which issuers conditioned their bank selection on the strength of a prior relationship declined during the 1970s.

4. Investment-Bank Relationships

The first challenge in measuring the state of banking relationships at a given time stems from the frequency of name changes and mergers involving both banks and issuers throughout the sample period. If we were to base our analysis upon the names that banks had when a deal was brought to market, it would be impossible to track the fortunes of many major banks through the entire pe-

[19] See Skeel (2001) for a detailed account of the Chandler Act and its influence on the industry.

riod considered. We avoid this problem by defining a bank's *lifeline*.

We follow Ljungqvist, Marston, and Wilhelm (2006; 2009) in defining a bank's lifeline at a particular date to comprise the names of all of the institutions that were merged into, or that were acquired by, the bank prior to that date. The bank's lifeline ends either when it fails, or when it is absorbed into another bank. Each lifeline is given a name, which we use in place of the specific name of a bank whenever it is used in our analysis as a member of the lifeline.

Merrill Lynch, for example, acquired Goodbody in 1970 and White, Weld in 1978. Each acquired firm's lifeline terminates with the acquisition and its underwriting relationship history is merged with Merrill's. It is impossible to avoid the exercise of judgment in creating the lifeline for a bank, as it is necessary to decide whenever two banks combine, through merger or acquisition, which bank's lifeline terminates. When the combined entity takes the name of one of the banks this choice is easy; on other occasions, we assigned the combined institution to the lifeline that we believe to represent the more significant investment banking house. For example, after 2008 we assign Bank of America Merrill Lynch to the "Merrill Lynch" lifeline. Using a similar strategy, we assign clients and their underwriting histories with sample banks to corporate families when sample firms merge.

4.1. Measuring Bank-Client Relationships

We measure the state of relationships between banks and clients over 10-year rolling measurement windows, beginning with data from 1933. In the econometric analysis we use a relationship strength index in which for any bank and any issuer, the relationship strength is calculated on a particular date D as follows. First, we calculate the total dollar quantity Q of proceeds raised by any firm in the issuer's corporate family during the preceding ten years. Second, the total amount A lead managed for the firm's corporate family by a member of the bank's date D lifeline is computed. The strength of the relationship between the bank and the company at date D is defined to be the ratio of A to Q. In our analysis we use relationship strength measures calculated using data for all deals between the bank and the company as well as separate measures for debt and equity deals.

Table III provides an overview of client relationships for the top 30 banks by market share for the periods 1933-1969 and 1970-2007. The table reports the number of clients for which each bank managed securities offerings, the percentage of its clients with which it had an exclusive relationship, and the fraction of all of its clients' transactions by value for which the bank was the lead manager. Proceeds from transactions with multiple bookrunners are apportioned equally among the bookrunners.[20] Table III reveals a shift from the 1933-69 market, in which it was normal for a single bank to underwrite a large fraction, and in many cases all, of an issuer's securities offerings, to the 1970–2000 world, in which underwriting relationships were far less exclusive. During the first half of the sample period, 53% of all client relationships among the top 30 banks were exclusive—the bank *managed every deal* that the issuer brought to market. This figure dropped to "only" 34% during the second half of the sample period. The larger change occurred in the banks' share of the proceeds raised by both clients with which it maintained an exclusive relationship and those with which it did not. The decline from about 39% to 16% reflects, in no small part, large-scale "poaching" of active issuers by commercial banks during the 1990s and 2000s. This effect is most evident among relative latecomers such as UBS, which ranked 16th by market share over the 1970-2007 period but accounted for only about 7% of proceeds raised during this period by issuers for which it managed deals.

Figure 1 provides a different perspective on this change by reporting average relationship strengths on an annual basis for Goldman Sachs, Merrill Lynch, and Morgan Stanley as well as for the 30 banks that appear in the choice set facing issuers in a given year in our econometric analysis. Goldman and Morgan Stanley managed deals accounting for nearly 90% of proceeds raised by their clients through the 1960s (and later in the case of Goldman). By contrast, during the early part of the sample period Merrill accounted for less than 80% of proceeds raised by firms for which it managed a deal in the preceding 10 years. This is likely a reflection of the fact that Merrill remained primarily a retail-oriented firm with a modest underwriting presence. But over time the firm's retail brokerage network attracted syndicate invitations and, ultimately, lead-

[20] We use the terms "lead underwriter," "lead manager," and "bookrunner" interchangeably and distinguish them from co-manager with equal apportionment of proceeds. The presence of co-managers and multiple bookrunners is largely a post-1990 phenomenon. Ljungqvist, Marston, and Wilhelm (2009) provide evidence of co-management serving as a stepping-stone to lead-management opportunities.

management opportunities. By 1970 the three firms maintained similarly exclusive relationships with their clients and followed a similar path of declining exclusivity through the remainder of the sample period. By 2009, the average relationship strength among clients for all three banks, as well as the average among the top 30 banks by market share from 2000-2009, was slightly above 50%.

4.2. Measuring Bank Relationships within Industry Groups

In addition to treating issuers as conditioning their bank choice on the state of their relationship with each bank in the choice set, we allow for the possibility that issuers condition on whether banks have relationships with their competitors. Asker and Ljungqvist (2010) find that issuers avoid banks that work with their competitors out of concern that strategic information might leak. Alternatively, it is conceivable that some banks maintain industry-specific expertise that is attractive to issuers within that industry.

We use the following strategy to design measures of each bank's breadth and depth of activity within an industry group. For each year and bank in the issuer's choice set during the year of a given transaction, we measure the state of the bank's relationships with all recent issuers in 4-digit SIC categories. We use a 10-year rolling window to identify all transactions for each bank in the issuer's choice set in a given year. These transactions are then sorted by the issuer's 4-digit SIC code. Within each SIC code category, we identify banks that managed one or more transactions with more than one firm during the 10-year window. For these banks, we measure the relationship strength variable described above for each firm in the SIC category with which the bank worked during the window and the number of firms with which the bank worked. The relationship strength measures are averaged to create an annual measure of the state of a bank's relationships within the SIC category. For banks that managed deals for one or fewer firms within the SIC category during the 10-year window, both the firm count variable and the average relationship strength variable within the SIC category take a zero value.

Using a 5-year rolling window, Asker and Ljungqvist (2010) show that the fraction of banks with multiple equity (debt) issuance relationships with the three largest firms within an SIC cate-

gory rarely exceeds 5% (10%) over the 1975-2003 period. Extended to the 10 largest firms in an SIC category, the fraction of banks with multiple equity relationships rises above 10% only after 2001. Similarly, the fraction of banks with multiple debt relationships does not exceed 20% before 2001.

Our approach casts a wider net by considering all issuers within an SIC category. Figure 2 reveals that after 1980 the fraction of banks with multiple equity relationships exceeded 15% (peaking at 37% in 2001) and often exceeded the fraction of banks with multiple debt relationships. More striking from our perspective is the sharp decline through the 1960s in the relative frequency of banks with multiple relationships within an SIC category. Prior to 1960, the fraction of banks with multiple relationships across issue types hovered between 18 and 20%.[21] The pre-1960 peak was not surpassed until 1985.

4.3. Measuring Relationships Among Banks

A substantial body of research suggests that issuers condition their bank choice on the quality of the bank's pricing and distribution services, the quality of analyst coverage that it can deliver, and its market-making capacity. Throughout the sample period, the underwriting (and selling) syndicate played a central role in the delivery of these services. Given the importance of the syndicate, we treat issuers as conditioning on the degree and quality of a bank's connections to other banks. We quantify the state of a bank's relationships with other banks using techniques from graph theory.[22] We regard two banks as being connected in a particular time window if one bank invites another to be a co-manager in a syndicate for which it is the lead manager. This defines a network of relationships for a 5-year, rolling time window. We then calculate annually for each bank in the choice set a standard measure of network connectedness called eigenvector

[21] The low relative frequency of multiple equity relationships during this period is, in part, a reflection of the low frequency of equity issuance within many SIC categories that more frequently yielded a single bank appearing in the SIC category dealing with a single issuer. For the 1944–1969 period, breaking the sample into year/SIC code pairs for which the number of banks with at least one relationship within the SIC category is less than 5 or greater than or equal to 5, yields 8% (28%) of banks in the former (latter) category with multiple relationships. For the 1970-2007 period, year/SIC code pairs with fewer than (greater than or equal to) 5 banks with one or more relationships average about 9% (41%) with multiple relationships.

[22] All of our network calculations were performed using the Stanford Network Analysis Platform (SNAP, available from http://snap.stanford.edu/), a C++ library for performing network and graph-theoretic calculations.

centrality (*EVC*).[23] Eigenvector centrality accounts both for the number of relationships that a bank has, and for the quality of those relationships. Hence, a bank that is networked to bulge-bracket investment banks is regarded as more connected than a bank whose network comprises smaller, less-significant players. The formal definition of this measure appears in the Appendix.

Figures 3 plots *EVC* (normalized to lie between 0 and 100) against the total underwriting proceeds managed by every bank in our database for the 1950-1955 and 2000-2005 time periods. In both cases, we label some of the points that correspond to particularly significant banks. The most striking feature of Figure 3 is that very profitable and reputable banks in the middle of the twentieth century were not necessarily closely connected to their peers. Morgan Stanley generated the highest underwriting proceeds over this period yet it maintained few connections with other well-placed firms. Indeed, the firm was noted for its unwillingness to share business.[24] Halsey, Stuart & Co. also had a low EVC and high underwriting proceeds over this period. However, it was very different to Morgan Stanley in the sense that it was an aggressive bidder for competitive tenders, by which it hoped to destroy existing bank-client relationships (Chernow, 1990, pp. 506, 623) and, as shown in Table III, it maintained relatively weak relationships with its clients. In contrast, Morgan Stanley was a strong defender of traditional, negotiation-based modes of doing business during this period and its client relationships were among the strongest.[25] Morgan Stanley's low connectedness appears to reflect a strong reputation and an excellent client network, while Halsey, Stuart's low connectedness was evidence of the opposite qualities. By the end of the sample period, there is a much stronger positive relation between *EVC* and underwriting market share. Moreover, the major commercial banks, in spite of having entered the securities markets relatively recently, were well-connected with their peers.

[23] *EVC* is calculated for the 30 banks in the choice set using all transactions and banks during the rolling time window. In other words, *EVC* does not measure connectedness strictly among the 30 banks in the choice set. Instead it measures connectedess with all banks that participated in a transaction carried out within the time window.

[24] As late as the 1970s, Morgan Stanley was seen as lacking distribution capacity and thus, in this respect, dependent on other, usually less prestigious, syndicate members. The firm diluted the power of individual members by working with "up to two hundred firms" in its syndicates (Chernow, 1990, p. 624).

[25] See, for example, "Open clash seen in underwriting," Howard W. Calkins, *New York Times*, 7 September 1941.

4.4. Summary Statistics for Bank Relationship Variables

For estimation purposes, both the client relationship strength variables and *EVC* have been normalized to a 0-100 scale. Table IV reports summary statistics for these variables by time period and conditional on whether or not the bank was selected from the issuer's choice set. For example, during the 1943-1949 period the client's mean relationship strength with the bank it chose to manage its transaction was 32.79. In other words, on average, banks selected to manage transactions during this time period had management responsibility for about 33% of the issuer's proceeds from transactions executed during the ten years preceding the transaction at hand. By contrast, banks within the choice set that were not selected to manage a transaction accounted for about 1% of the issuer's proceeds during the preceding ten years. The difference in means is statistically significant at the 1% level. The difference in means increased during the 1950-1959 period and then decreased every period thereafter. In every period the difference in means is statistically significant.

Table IV also reveals that banks selected to manage deals generally maintained (statistically) stronger relationships with other firms in the issuer's 4-digit SIC category. This is consistent with issuers valuing industry-specific expertise. However, the absolute difference in this measure between banks that were chosen and those that were not is smaller during the latter part of the sample period. This pattern is broadly consistent with the argument advanced by Asker and Ljungqvist (2010). Moreover, it suggests that the increasing frequency of banks with multiple relationships within an SIC category documented in Figure 2 rests on a preponderance of relatively weak (non-exclusive) relationships.

On average, banks selected by issuers were better connected with their peers across the entire sample period. In absolute terms, differences in *EVC* across banks selected by the issuer and those that were not are considerably smaller than for the relationship variables but they remain statistically significant. In further contrast, the mean levels for *EVC* for both bank types are relatively stable through time.

We also report the mean rank (by market share for the decade at hand) within the issuer's choice set for the two bank types. On average, issuers selected higher-ranking banks (with lower mean rank values) and this pattern strengthened through time. Finally, the lower panel of Table

IV provides summary statistics for two transaction-specific attributes: the dollar value of the transaction and the number of transactions carried out by the issuer since 1933. The latter is intended as a measure of the issuer's activity level in the capital markets. These variables, along with an indicator variable identifying equity issues, will appear in two specifications of the econometric model described in the next section.

5. Estimation of the Bank Choice Model

We use the McFadden (1973) conditional logit framework to model the issuer's bank choice. The issuer's choice set contains $J = 30$ (unordered) alternative banks, representing the top 30 banks ranked by proceeds raised in offerings completed during the decade in which the issuer's transaction takes place.

The issuer's bank choice follows an additive random utility model which specifies utility for transaction i as:

$$u_i = X_i\beta + (z_iA)' + \xi_i,$$

where β is a $p \times 1$ vector of alternative (bank)-specific regression coefficients, A is a $q \times J$ matrix of case (transaction)-specific coefficients, and the elements of the $J \times 1$ error vector ξ_i are independent Type I extreme-value random variables. Each transaction i yields a set of observations $X^*_{ij} = (X_i, z_i)$ where X_i is a matrix of bank-specific attribute vectors for each of the J banks in the choice set and z_i is a 1 *x* q vector of transaction-specific (bank invariant) attributes. Defining $\beta^* = (\beta, A)$ and $y_{ij} = 1$ if the *ith* issuer selects bank j with attribute vector X^*_{ij} (and 0 otherwise), the model's choice probabilities satisfy[26]

$$\Pr(y_i = 1 \,|X_i, z_i) = \frac{\exp\left(X^*_{ij}\beta^*\right)}{\exp\left(\sum_{j=1}^{J}(X^*_{ij}\beta^*\right)}.$$

[26]Note that the conditional logit model admits the possibility of more than one alternative being selected for a given transaction. This occurs in instances where the issuer selects multiple banks to co-manage its transaction. The presence of multiple bookrunners arose only during the last two estimation periods and, even during the 1990s, this was a feature of only 3% of sample transactions. During the final estimation period (2000-2007) 32% of sample transactions had multiple bookrunners.

Our primary interest is in the influence of the bank-specific attributes X_i on the issuer's bank choice. These attributes include (*i*) the state of a bank's relationship with the issuer (*RelStr*), (*ii*) the state of the bank's relationships with other firms in the issuer's SIC category (*RelStrSIC*), and (*iii*) the state of the bank's relationship with other banks (*EVC*). Each attribute varies across banks. *RelStr* and *RelStrSIC* generally vary across transactions but *EVC* does not. *RelStr* does not vary across transactions for issuers with exclusive banking relationships that carry out more than one transaction during the estimation period.

We estimate three model specifications. We begin with a simple conditional logit specification (*CLogit*) that includes only bank-specific attributes. We also estimate conditional logit (*ASCLogit*) and nested logit (*NLogit*) specifications that includes both bank-specific and transaction-specific attributes. In the *NLogit* specification banks in the choice set are assigned to one of three groups.[27] There is no obviously "correct" nesting structure in our setting. Banks can differ from one another along a number of dimensions including their institutional and retail investor networks, capitalization, and industry- and product-specific expertise. Ideally, a bank group would comprise close substitutes with one another that are distinct from banks in other groups. The nested logit results reported in the next section are based on groups defined by the top 5 banks ranked by proceeds, the next 15 banks and the final 10. These groupings roughly correspond with the industry characterization proposed by Hayes (1979) around the midpoint of our sample period: a "special bracket" comprising 5-6 banks, a "major bracket" comprising 14-16 banks, with the remainder making up a "submajor" bracket. Returning to Table I, we see for the 1970-2007 period that this nesting structure places about 50% of market share by proceeds with the top 5 banks, about 37% in the second group of 15 banks, and about 4% in the last group of 10 banks. Recognizing that there remains a degree of arbitrariness in our grouping strategy, we have experimented with other groupings. Although we do not report results for alternative groupings, our conclusions are not sensitive to the alternatives with which we have experimented.

[27]The specification names correspond with the *Stata* functions (*clogit*, *asclogit*, *nlogit*) used in their estimation. In contrast to the expression for the conditional logit choice probabilities given above, the nested logit choice probabilities are equal to the product of the probability of selecting a group and the probability of selecting a bank conditional on having selected the bank's group. The nested logit specification reduces to the conditional logit model under the assumption of independent and identically distributed errors. See Cameron and Trivedi (2008, ch.15) for further details.

The (*ASCLogit*) and (*NLogit*) specifications reported in the next section include three transaction-specific attributes: an indicator for whether the transaction is an equity issue; the log of the dollar value of the transaction; and the number of previous transactions brought to market by the issuer measured from the beginning of the sample period (1933). In the (*ASCLogit*) specification each transaction-specific attribute gives rise to 29 bank-specific parameter estimates with the 30th bank's parameter estimate normalized to zero. In the (*NLogit*) specification transaction-specific parameters are estimated for the top 5 and next 15 bank groups with the bottom 10 bank group providing the base for comparison. The results are not sensitive to the inclusion of additional transaction-specific attributes that were available for the entire sample period.

Assuming independent and identically distributed errors in the conditional logit framework yields the independence of irrelevant alternatives (IIA) property that the odds ratio for a given pair of alternatives is independent of the characteristics of other alternatives. In practice, the assumption may be violated when members of the choice set are close substitutes for one another as quite plausibly could be the case among at least some of the banks in our choice sets. In fact, tests for violations of the IIA assumption [see Hausman and McFadden (1984)] reveal this to be the case. The nested logit specification addresses this problem by permitting error correlation within groups while treating errors across groups as independent.

6. Estimation Results

Table V presents results for three specifications of the bank choice model for each of the 7 estimation periods. It is evident that the alternative specifications yield qualitatively similar results. As we noted in the preceding section, tests for independent and identically distributed errors reject the independence of irrelevant alternatives assumption. Thus we focus our discussion of the results on the *NLogit* specification. We report estimated coefficients (with standard errors in parentheses) for each bank-specific attribute. The signs of the coefficients for these attributes can be directly interpreted to indicate the effect of a change in the attribute on the probability of a bank being selected by the issuer. For the sake of brevity, we do not report coefficients for transaction-specific attributes but rather discuss their implications in the text below.

Because the three model specifications are nested, the reported log-likelihood values, which can reach a maximum of zero, generally would be directly comparable across estimation periods. Focusing on the first three periods, we see that the *ASCLogit* specification provides the best fit. This is not surprising given the greater flexibility afforded by the specification. Both likelihood ratio and Akaike information criterion tests generally favor the more complex specification at a 0.05 significance level. During the last four estimation periods there are transactions for which the issuer selects more than one bank. Stata's *NLogit* routine excludes these transactions from the estimation sample. The number of excluded transactions ranges from 5 during the 1970s to 1,797 (32% of the total) during the 2000s. As a consequence of these exclusions the goodness of fit is not directly comparable across model specifications during these estimation periods. However, it is clear from the χ^2 test statistics that each specification in every estimation period provides a very good fit to the data. Consistent with these test statistics, the (unreported) average predicted probabilities for individual banks generally correspond closely with their sample probabilities.

The influence of a bank's relationship with an issuer (*RelStr*) on its choice probability is positive and statistically significant during each of the seven estimation periods. The influence of relationship strength on issuer decisions reached its height during the 1960s and then declined thereafter. The estimated coefficients for *RelStrSIC* indicate that the state of a bank's relationships with other firms within the issuer's 4-digit SIC category had a more modest (but statistically significant) positive influence on the issuer's bank choice through the entire sample period. But the coefficient declined in value by over 50% from the 1970s to the 1980s. By contrast, the influence of a bank's syndicate relationships (*EVC*) on its choice probability was negative and statistically significant through the 1950s. Issuers began to respond positively to this attribute during the 1960s. Issuer sensitivity to this attribute increased sharply during the 1970s and then again during the 2000-2007 period.

Turning to the transaction-specific coefficients estimated for the top 5 and middle 15 bank nests, we find that equity issuers generally are less likely to select a bank from these two groups relative to the bottom 10 banks after controlling for bank-specific and other transaction-specific attributes. Unconditionally, the bottom 10 banks are less likely to be selected to lead any type of deal but their

share of equity deals generally is larger than for either debt or preferred deals. In contrast, relative to the bottom 10 banks, the top 5 and middle 15 banks are more likely to be selected for larger deals and for deals brought to market by more active issuers.

Figure 4 provides a graphical summary of the 95% confidence intervals for the estimated coefficients from both the *ASCLogit* and *NLogit* specifications. For the *ASCLogit* specification we conduct χ^2 tests of differences in individual coefficients across decades and we indicate in the figure instances in which the null of equality of coefficients across decades is rejected.[28] Figure 4 indicates that the declining influence of relationship strength on issuer decisions documented in Table V is statistically significant. The coefficient for *RelStr* estimated for the 1970s is statistically different from the 1960s coefficient at the 1% level in the *ASCLogit* specification. Similarly, there is little overlap in the confidence intervals for the *NLogit RelStr* coefficients from the 1960s and 1970s. It is less clear that the change from the 1970s to the 1980s is statistically significant, but the difference between the 1970s and 1990s clearly is significant.[29] We provide further evidence and an interpretation of this time pattern in the following section. Similarly, the results for *RelStrSIC* suggest a significant long-run decline in the influence of the state of a bank's relationships with a client's potential competitors with the exception of a temporary increase during the 1970s.

The pronounced increase in *EVC's* influence over time is consistent with both issuers benefiting from the rise of institutional investing and potential incentive conflicts. Concentrated ownership by institutional investors provides greater scope for internalizing the net benefits of costly information production. Pichler and Wilhelm (2001) argue that syndicates benefit issuers by enabling cross-monitoring among bankers that promotes efficiency in the acquisition of investor information

[28] We use *Stata's suest* ("seemingly unrelated estimation") routine to carry out the test. *Stata's NLogit* routine does not provide a similar test and we have been unable to devise one that would suit our purpose. The problem can be understood by recognizing that the *suest* routine combines parameter estimates and associated covariance matrices into one parameter vector and simultaneous covariance matrix of the sandwich/robust type (see http://www.stata.com/manuals13/rsuest.pdf). But it does not admit the estimated nest-selection probabilities obtained for the *NLogit* specification. It is possible to simultaneously estimate separate coefficients for each decade in a single nested logit and test for differences but this requires imposing an equality constraint on the nest probabilities across decades. This constraint yields different parameter estimates from those reported in Table V and a poorer model fit as indicated by the log likelihood for the regression.

[29] Given that commercial banks began to enter debt underwriting in 1987, we examined whether early entry into securities underwriting influenced the results for the 1980-1989 period by reestimating the *NLogit* specification excluding the years 1987-1989. This specification yielded results that were not meaningfully different with respect to these bank attributes from those reported in Table V for the full 1980-1989 estimation period.

(e.g., Benveniste and Spindt (1989) and Sherman and Titman (2002)). This potential for cross-monitoring may also have served to dampen a growing threat of banker malfeasance as bank/client relationships weakened (e.g., Corwin and Schultz (2005) and Morrison and Wilhelm (2008)). Finally, the sharp increase in the influence of *EVC* during the 2000-2007 period corresponds with increased interest among issuers for using the syndicate to obtain wider analyst coverage and greater market-making capacity (Corwin and Schultz, 2005) and for preserving concurrent lending relationships as commercial banks gained entry to securities underwriting (Drucker and Puri, 2005).

A rough measure of the economic significance of the estimated coefficients is gained by exponentiating the coefficients to obtain an estimated odds ratio. For bank-specific attributes, the odds ratio reflects the change in the issuer's odds of selecting a given bank in the choice set for a 1 unit change in the bank attribute. If, for example, we consider *RelStr* during the 1943-49 estimation period, the estimated coefficient of 0.0296 implies an odds ratio of 1.0273. Keeping in mind that *RelStr* is the normalized dollar share of the client's proceeds raised during the preceding decade, this implies that the issuer's odds of selecting a given bank in the choice set increase by about 2.7% for a 1 percentage point increase in *RelStr*. This is nearly three times the effect of a 1 percentage point increase in *RelStrSIC*. The estimated coefficient of -0.0118 for *EVC* during the first estimation period yields an odds ratio of 0.988. In other words, a one unit change in *EVC* decreases the odds of selecting a given bank by about 1%. Unfortunately the scale of *EVC* does not have any direct economic interpretation. However, the absolute magnitude of the increase in the coefficient for *EVC* over the entire sample period suggests a nontrivial change in issuer behavior.

The summary statistics in Table IV provide further information useful in understanding the economic scale of the effects of bank attributes on issuer decisions. Among banks that were selected to manage transactions, *RelStr* had a mean value of 32.79% with standard deviation of 40.71% for the 1943-1949 estimation period. This suggests that among selected bank, the odds of being selected by the issuer would increase by about 110% (2.7×40.71), or roughly double, for a 1 standard deviation increase in the strength of the bank's relationship with the issuer (predicted probabilities range from about 2-8% during this estimation period). As we turn our attention to changes across periods, it is useful to note that both the underlying coefficients (and odds ratios) for *RelStr* and

the standard deviation of the client relationship strength among selected banks declined after 1970. Judged from the same perspective, the economic significance of *RelStrSIC* and *EVC* appears more modest although unit changes in *EVC* do not have a direct economic interpretation.

Banks that were not selected by an issuer generally had no relationship with the issuer during the decade preceding the transaction. For an issuer that raises new capital relatively infrequently, selecting a bank with which it previously had no relationship results in a relatively large value for *RelStr* going forward and a potentially large decline in *RelStr* for the bank(s) that it selected in the past. For example, a firm that did two deals of the same size with two different banks would maintain a value for *RelStr* of 50% with each bank. If the firm selected a new bank to lead a subsequent deal of the same size, the new bank's *RelStr* value would rise by 33 percentage points. Simultaneously, the two banks with which the firm dealt in the past would each suffer nearly a 17 percentage point decline in *RelStr*.

We shed further light on the economic significance of the state of the bank/client relationship by examining choice probability elasticities with respect to *RelStr*. For each transaction i during an estimation period, the elasticity with respect to *RelStr* for bank j is

$$Elas_i = \frac{\partial \hat{p}_{ij}}{\partial RelStr_{ij}} \times \frac{RelStr_j}{\hat{p}_{ij}},$$

where $\hat{p}_{ij}$ is the predicted probability of the issuer selecting bank j for transaction i and $RelStr_{ij}$ is bank j's relationship strength with the issuer.[30] Figure 5 plots elasticities against against their corresponding value of *RelStr* for each estimation period. In each panel we pool elasticities from all transactions (and banks) during the estimation period. For example, the sample for the 1943-1949 estimation period included 842 transactions. For each transaction we obtain an elasticity for each of the 30 banks in the choice set. Each of the 30 elasticities for each transaction are then plotted against the bank's measure of *RelStr* for the issuing firm. For a given transaction, most banks in the choice set have no prior relationship with the issuing firm. By definition, the elasticity of their choice probability with respect to *RelStr* is zero, so that the scatterplots are anchored at the

[30] See Cameron and Trivedi (2008, p. 492). The partial derivative can either be calculated numerically or by making use of the fact that

$$\frac{\partial \hat{p}_{ij}}{\partial RelStr_j} = \hat{p}_{ij} \times (1 - \hat{p}_{ij}) \times \hat{\beta}_{RelStr}.$$

origin.

Several patterns emerge across the seven estimation periods. First, the scatterplot of elasticities is concave in every period. From 1943-1969, for both low and high levels of *RelStr* the concentration of data points indicates that choice probabilities are inelastic (< 1.0) with respect to *RelStr* and elastic (> 1.0) for intermediate levels of *RelStr*; issuers were relatively insensitive to a small change in *RelStr* for banks with which they had very weak or very strong relationships. This is consistent with the high level of relationship exclusivity observed in the data. A well-established relationship was not easily contested. From 1970-1999, there is a much greater frequency of choice probability elasticities greater than 1.0 among bank/client pairs with intermediate to high levels of *RelStr*. As issuer's conditioned less heavily on *RelStr*, existing relationships were more open to challenge from competitors.

With the exception of the 1960-1969 estimation period, there is an apparent separation among elasticities for a given value of *RelStr* that corresponds roughly with the nesting structure in the nested logit. Especially from 1970 forward, elasticities for a given level of *RelStr* are lowest among the top 5 banks and greatest among the bottom 10 banks. After 1980 the elasticities for the top 5 banks generally cluster around 1.0 or slightly above for values of *RelStr* greater than 50. Over the same range, the next 15 banks maintain a modest degree of concavity with elasticities less than 1.0 appearing only during the 2000-2007 period. By the 2000-2007 period there is little observable difference between the top 5 and next 15 banks. The bottom 10 banks exhibit a positive slope over this range but for a wide distribution with a minimum near 1.0 in cases where *RelStr* = 100.

Figure 6 shows choice probability elasticities with respect to *EVC*. The general message corresponds with the observation above that the economic significance of *EVC* is modest relative to that of *RelStr*. Only during the final estimation period do we observe elasticities greater than 1 (in absolute value). With the exception of a small number of observations associated with relatively high values for *EVC* during the 1970-1979 estimation period, choice probabilities are highly inelastic with respect to *EVC*. Although the influence of *EVC* on issuer decisions is statistically significant, the effect is weak. By contrast, during the final estimation period for values of *EVC* exceeding 5 on the 100 point scale, there are many instances in which choice probabilities are highly elastic.

In summary, a comparison of figure 5 with figure 6 reveals that with the exception of the final estimation period, issuers were far more sensitive to the state of their relationship with a bank than to the bank's connectedness with other banks.[31] On the other hand, client concern for the state of the banking relationship declined substantially after 1970. In the following section we shed further light on this pattern by examining changes in the underpinnings of banking relationships and how they interacted with technological changes that gained force during the 1960s.

7. The Declining Influence of Bank/Client Relationships

The advisory relationship between a bank and its clients involves a considerable degree of judgment and client willingness to share strategic information with its banker. The client is at a disadvantage in judging both the ability of the banker and his willingness to place the client's interests first. Even if clients can imperfectly judge performance, court verification of contractual performance is limited. As a consequence, the advisory relationship depends heavily on the banker maintaining a reputation for both an ability to deliver high-quality service and for managing conflicts of interest to the client's satisfaction (see Chen, Morrison, and Wilhelm (2013a; 2013b)).

Client relationships and the trust on which they rest stem from interactions between individual bankers and client representatives. During the early part of our sample period, bankers generally spent their entire careers with a single, typically quite small, banking partnership. For example, Goldman Sachs had 5 partners in 1934. *On average*, members of this cohort spent 37 years as partners in the firm.[32] None of these partners held a similarly influential position with a competitor over the course of their careers. Goldman was not exceptional with respect to the longevity and loyalty of its partners during the early part of our sample period.

Nor was it unusual for a banker to be responsible for a specific client relationship for many years. These long-term personal commitments often involved serving on the client's board of directors. Table VI provides a summary of board service from 1935 through 1949 for the 17

[31] Similar to the case for *EVC*, choice probabilities generally were inelastic with respect to *RelStrSIC* during each estimation period.

[32] All data related to the size and composition of banking partnerships were obtained from member firm directories maintained in the archives of the New York Stock Exchange.

defendant banks in *U.S. v. Henry S. Morgan et al.* The defendants provided the court with lists of individual bankers, the firms for which they served as directors, and the length of service in that capacity. Most of the banks simply listed service over the 1935-1949 period and, in most instances, identified directorships that began prior to 1935 without providing a date. Goldman Sachs and Lehman Brothers reported the starting dates for directorships that began prior to 1935. Lehman's report also covered service through year-end 1951. We describe these reporting details to emphasize that the figures for the length of service are conservative.

Collectively, the 17 banks identified 83 bankers who served as a director for 162 client firms Clearly, Goldman and Lehman, with 34 and 53 directorships, were exceptional but all of the banks had partners who served as directors for client firms. The significance of this role across banks is best reflected in the average length of service as a director. Of the 17 banks, 10 averaged at least 10 years of service across their directorships. The average length of service across all of the banks was 13 years and 56 (of 162) directorships equaled or, more likely, far exceeded 15 years. These figures actually obscure the influence exercised by a number of the most prominent bankers. Because they generally identified the starting point for directorships that began before 1930, the records provided by Goldman and Lehman are the most revealing. Focusing once again on Goldman Sachs, Sidney Weinberg served as a director for 14 client firms for an average of 16 years with 6 directorships having exceeded 20 years by the end of the reporting period. H.S. Bowers and Walter Sachs each averaged over 20 years in their directorships and each served two clients for over 30 years. Lehman's experience was comparable to Goldman's.

Coupling longstanding client relationships with long-term partnership commitments provided bankers with the opportunity to build client trust and an incentive to protect their individual and institutional reputations for having done so. The results summarized in Figure 4 indicate that the efforts to weaken bank/client relationships during the early part of our sample period may have modestly diminished their influence on issuer's decisions during the 1950s. But the preceding discussion sheds light on why the state of the banking relationship remained the most important determinant of the issuer's bank choice and increasingly so through the 1960s.[33]

[33]The apparent "domination and control" of issuers via directorships was an important element of the Justice Department's case. However, upon reviewing the records, Judge Medina dismissed this argument. It is worth noting

So why did the influence of bank/client relationships decline in our bank choice model beginning in the 1970s? Morrison and Wilhelm (2004) identify limited organizational scale and relative immobility among human capitalists as being conducive to building human capital and preserving institutional reputation. These conditions were met by banking partnerships throughout the early part of our sample period. But as we noted earlier, beginning around 1960 the investment-banking industry entered a period of unprecedented technological and organizational upheaval that culminated in 1970 with the New York Stock Exchange's (NYSE) membership (including virtually all of the major banks) agreeing to permit members to operate as public corporations. With the exception of Goldman and Lazard, all of the major investment banks went public, either by IPO or acquisition, over the next two decades. With the change in organizational structure the investment banks entered a period of rapid growth in the scale of their operations and capitalization.

In Figure 7 we document this change by plotting the time path of the number of partners for 8 banks for which we have tracked partner identity annually through 1989. The sample includes both banks with strong retail networks (Dean Witter, E.F. Hutton, Merrill Lynch, Smith Barney) and those that were more focused in wholesale institutional operations (Goldman Sachs, Lehman Brothers, Morgan Stanley, Salomon Brothers).[34] The growth paths of these banking partnerships tracked one another quite closely through the mid-1950s and with the exception of Merrill Lynch they were quite similar in size. Merrill's much larger number of partners reflects a 1941 merger with Fenner & Beane that nearly doubled the size of the firm's retail brokerage network (Perkins, 1999, p. 167).

The growth paths of Merrill, Dean Witter, and E.F. Hutton steepened and began to diverge from the others in the late 1950s and they also were among the first banks to go public [Merrill in 1971 and Dean Witter and E.F. Hutton in 1972]. The remaining banks in this group, with the exception of Goldman Sachs, went public or were acquired by a publicly-held firm during the 1980s (Morrison and Wilhelm, 2008, Table I). Alongside the early public offerings, industry observers

that there were a number of transactions for which a bank with a representative on the issuer's board was not selected to manage the transaction.

[34]For most of these and other NYSE member firms for which we have gathered data, there is a close mapping of pre-IPO partners into the identities of post-IPO senior officers, at least through the 1980s. In Figure 7, we report the annual number of partners for each bank through 1989 or until there was a meaningful change in their reporting convention.

began to comment for the first time on banker mobility and client account switching.[35] Morrison and Wilhelm (2008) argue that these changes began to undermine reputation concerns among investment banks at precisely the time that we observe the influence of bank/client relationships beginning to weaken.

Although we cannot connect individual bankers with specific client relationships or directorships during this period, we can use the partner data for the 8-bank subsample to observe how the potential for long-term personal interaction changed alongside the influence of bank/client relationships.[36] Figures 8 and 9 summarize two measures of change in the level of partner experience through time. Figure 8 shows a 3-year moving average of the percentage change in partner tenure averaged across the subsample of 8 banks. Partner tenure is the number of years a banker has served as a partner entering a given year. This measure is then averaged across partners within the bank. We report a 3-year moving average of the percentage change to smooth the effect of discreteness in the length of partnership agreements that generally determined when old partners left and new ones were appointed (e.g., Goldman Sachs renewed its partnership agreement on a 2-year cycle). With the exception of the early 1940s when many bank partners were leaving to join the war effort, average partner tenure increased through 1958. By the late 1950s, we begin to see signs of bankers having shorter tenures with a single firm. In 1956 when Goldman added 3 new partners to the existing 13-man partnership, the average partner in this group ultimately served 26 years as a partner over the course of his career – down 11 years from the 1934 cohort described above.

The measure of experience reported in Figure 8 can be misleading because average tenure can decline even when a core of senior partners remains stable simply as a consequence of the arrival of new partners. Hayes (1971, p. 147) notes that following the great depression investment banks did relatively little hiring before the early 1960s. But subsequently, banks collectively faced

[35] See Thackray (1971) and Thackray (1972).

[36] But for a point of comparison to the pre-1950 board participation among investment bankers, see Guner, Malmendier, and Tate (2008). For their sample period of 1988-2001, they examine 282 firms for 2,910 firm-years. In this sample a director from an investment bank appears in 16% of the firm-years. The sample contains 5,378 director-years of which 1.7% are accounted for by investment bankers. Across all directors in the sample, the average tenure is 9 years.

the burden of replacing a generation of retiring bankers.[37] But Figure 7 also illustrates substantial growth in the size of banking partnerships, especially among those with significant retail brokerage operations.

Figure 9 isolates the loss of experience by measuring the total number of years lost by departure of a partner (or senior officer post-IPO) as a percentage of the total number of years served by remaining partners. With the exception of the early war years, these 8 banks averaged a loss of partner experience of between 2% and 4% per year until the late 1950s. Thereafter, the (moving) average loss began to rise rapidly and it peaked in 1972 at 14% of the experience base of the remaining partners. Returning to the experience of Goldman Sachs, in 1984, 17 partners with 226 years of partnership tenure (a 13 year average per partner) retired from the firm. A 25-member cohort of new partners joined 64 remaining partners leaving the firm with an average partner tenure of 7 years.

In Table VII we report results from re-estimating the *NLogit* specification of the bank choice model including these two measures of annual change in partner experience. *Tenure* is the individual bank measure of the percentage change in the 3-year moving average partner tenure used to obtain Figure 8. *Experience* is the 3-year moving average of the annual percentage loss of partner years.[38] The coefficients for *RelStr* and *RelStrSIC* are similar in magnitude to the *NLogit* results reported in Table V with the exception that the coefficients for *RelStr* for the 1950-1959 estimation period are substantially larger. The coefficients for *EVC* also are similar to the results reported in Table V with the exception of the 1980-1989 estimation period where issuer sensitivity to syndicate connections is much stronger among the subsample banks.

Keeping in mind that we cannot link individual partners to specific client relationships, *Tenure*

[37] As we discuss below, this generational turnover yielded a new breed of banker. Morrison and Wilhelm (2008, p. 341) note that only 8% of Harvard's MBA class of 1965 accepted jobs in investment banking while 21% did so in 1969 and 29% in 1989.

[38] E.F Hutton does not appear in the top 30 banks by market share during the first three estimation periods and so does not enter the analysis until the 1970-1979 estimation period. Similarly, Dean Witter does not enter the analysis for 1943-1949. Although we argued above that declining tenure/experience among bankers would undermine client relationships, as we measure the state of a relationship, we do not expect there to a be a causal relation between *Tenure* or *Experience* and *RelStr*. *RelStr* is intended to proxy for the state of a client relationship at the time of the transaction in question but it does not reflect changes since the client's last transaction. Since relatively few transactions take place in close proximity to the issuer's preceding transaction, much could change in the state of the relationship. Generally, there is little overlap in the measurement of *Tenure* or *Experience* with the issuer's last transaction.

and *Experience* are intended to proxy for damage to a relationship caused by the departure of a key banker. From this perspective we expect *Tenure* to be directly related and *Experience* inversely related to a bank's selection probability. The coefficients estimated for *Tenure* are statistically different from zero in each estimation period but have the predicted positive sign only in the 1960-1969 and 1970-1979 estimation periods. *Experience* carries the predicted negative sign during the 1940s, 1960s, and 1970s and the effect is statistically significant during 1970-1979 period. Thus our predictions for the effects of *Tenure* and *Experience* best correspond with perhaps the period of greatest upheaval in the industry.[39]

The signs on the coefficients for *Tenure* and *Experience* during the 1940s, 1950s, and 1980s suggest that clients viewed banker turnover positively. There were at least two forces at work that that may help to explain these results. First, during the 1940s and 1950s, banking partnerships remained small and bankers were immobile. These are conditions that Morrison and Wilhelm (2004) identify as central to successful intergenerational transfer of tacit assets such as client relationships. Coupled with the relative stability of the sample partnerships reflected in Figures 8 and 9, partner turnover may have posed a minimal threat to the relationship.

Second, our reasoning thus far assumes that senior bankers' human capital was worth preserving. But technological changes that began to gather force around mid century devalued the soft skills of long-serving bankers over time, at least relative to the hard skills of the new generation of business-school-trained bankers mentioned earlier. Even during the 1950s when " relationship banking ... didn't require an enormous amount of financial ingenuity" (Chernow, 1990, p. 513), there were signs that client advisory service demands would soon grow more complex.[40] By the late 1970s, the attraction of partnership stability diminished with the maturation of the new generation of bankers whose weaker "old-school tie" loyalties (Hayes, 1971, p. 148) contributed to weakening client relationships. At the same time, corporate clients began to benefit from the rapid

[39]In contrast to *RelStr*, choice probabilities are generally inelastic with respect to both *Tenure* and *Experience*. Thus, while the effects associated with these variables are statistically significant, their economic effects are relatively modest.

[40]Chernow (1990, p. 508) identified the 1954 proxy contest for control of the New York Central Railroad "prefigur[ing] the takeover wars of a generation later." Lazard's Andre Meyer ["universally hailed as the one true genius in the investment-banking profession" (Reich, 1983, p. 15)]) was quick to recognize the opportunity and instrumental in creating the fee-for-service M&A advisory role during the 1960s.

pace of financial innovation. Thus the benefits associated with senior bankers making way for replacements whose skills better served clients' changing needs may have outweighed any remaining client benefit from partnership stability.

8. Conclusion

In this paper we show that over the last half of the 20th century, issuers grew less concerned for the state of their relationship with a bank in deciding whether to grant it an underwriting mandate. At the same time, issuer's placed more emphasis on a bank's connectedness with other banks as evidenced by syndicate participations, especially from 2000-2007. We associate these patterns with structural changes in financial markets around mid-century that undermined bank/client relationships and required banks to develop new capacity in response to the rise of institutional investors. We also show that issuer's favored banks with industry-specific expertise as evidenced by the strength of the bank's relationships with firms within the issuer's SIC category. This effect is much smaller than the other two and it declined substantially post-1980.

Investment-banking advisory services are experience goods and the transactions for which they are delivered require clients to share a good deal of strategic information with their banker. In this setting a bank's reputation for trustworthy behavior can give rise to a strong (relatively exclusive) client relationship. We argue that our evidence is consistent with structural changes in financial markets weakening reputation concerns among banks and, as a consequence, issuers' perception of the value of an existing bank relationship. The weakening of the influence of bank relationships on issuer decisions was greatest immediately following the NYSE's decision to permit public ownership of member firms, a decision that was triggered by the confluence of new technology and a sharp increase in (institutional) trading activity. At the same time, turnover among key bankers increased and we show that this had a negative bearing on issuers' bank choices independent of our measure of the state of a bank's relationship with the issuer.

We argue that the rise of institutional investors also helps to explain the growing influence of syndicate connections by placing a premium on banks' (syndicates') capacity for reaping benefits for issuers from institutions' greater incentives for (costly) information production. However, syn-

dicate connections gained their greatest influence over issuers' bank choices during the last two decades, well after institutional investors gained a dominant role in the marketplace. We suggest that this too could be a reflection of diminishing confidence in banks as co-management provides issuers with a means to better monitor the behavior of their lead bank.

Historically, investment bankers spoke of their reputation for placing clients' interests first as their primary asset. The prevalence of longstanding and relatively exclusive client relationships suggests that clients perceived their bank behaving as if this were so. To the extent that this was true, policymakers could lean more heavily on market forces to enforce good behavior. Recent events have caused many market observers to question banks' concerns for their reputation and instances of behavior that conflicts with client interests certainly appear to occur with greater frequency. Our study suggests that the seeds for this change in financial markets were planted and took root decades ago. A deeper understanding of the forces that sustained and undermined reputation concerns among investment banks over the last half century might improve policy responses to future structural change in financial markets.

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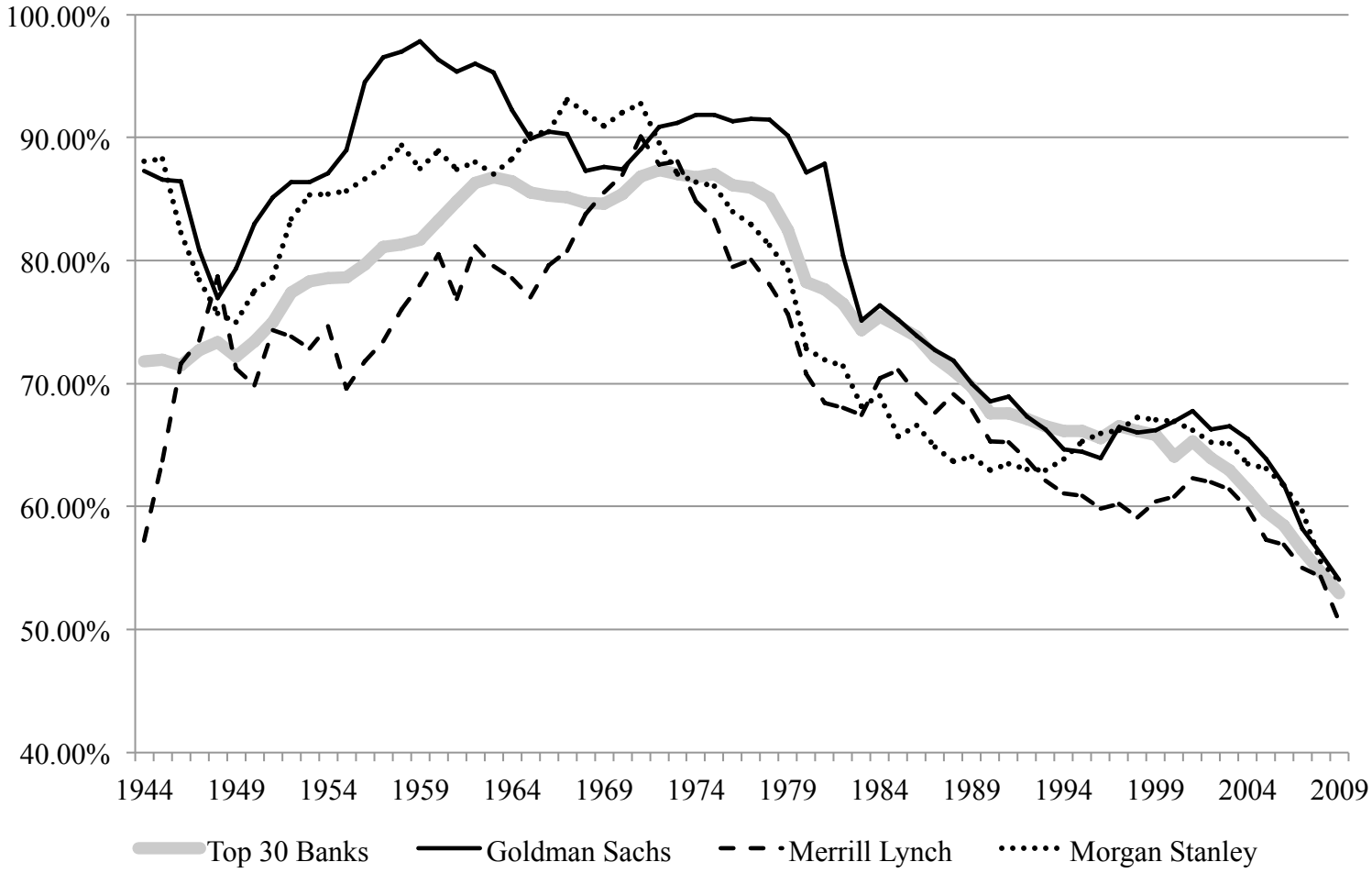

Figure 1. Bank-Firm Relationship Exclusivity. The figure reports an annual measure of a bank's average relationship strength among firms for which the bank managed a deal during the preceding 10 years. Relationship strength is the bank's share of proceeds raised by a firm during the 10-year rolling window. The average relationship strength among the top 30 banks is calculated using the average relationship strength for each of the 30 banks in the issuer's choice set for a given year used in the econometric analysis.

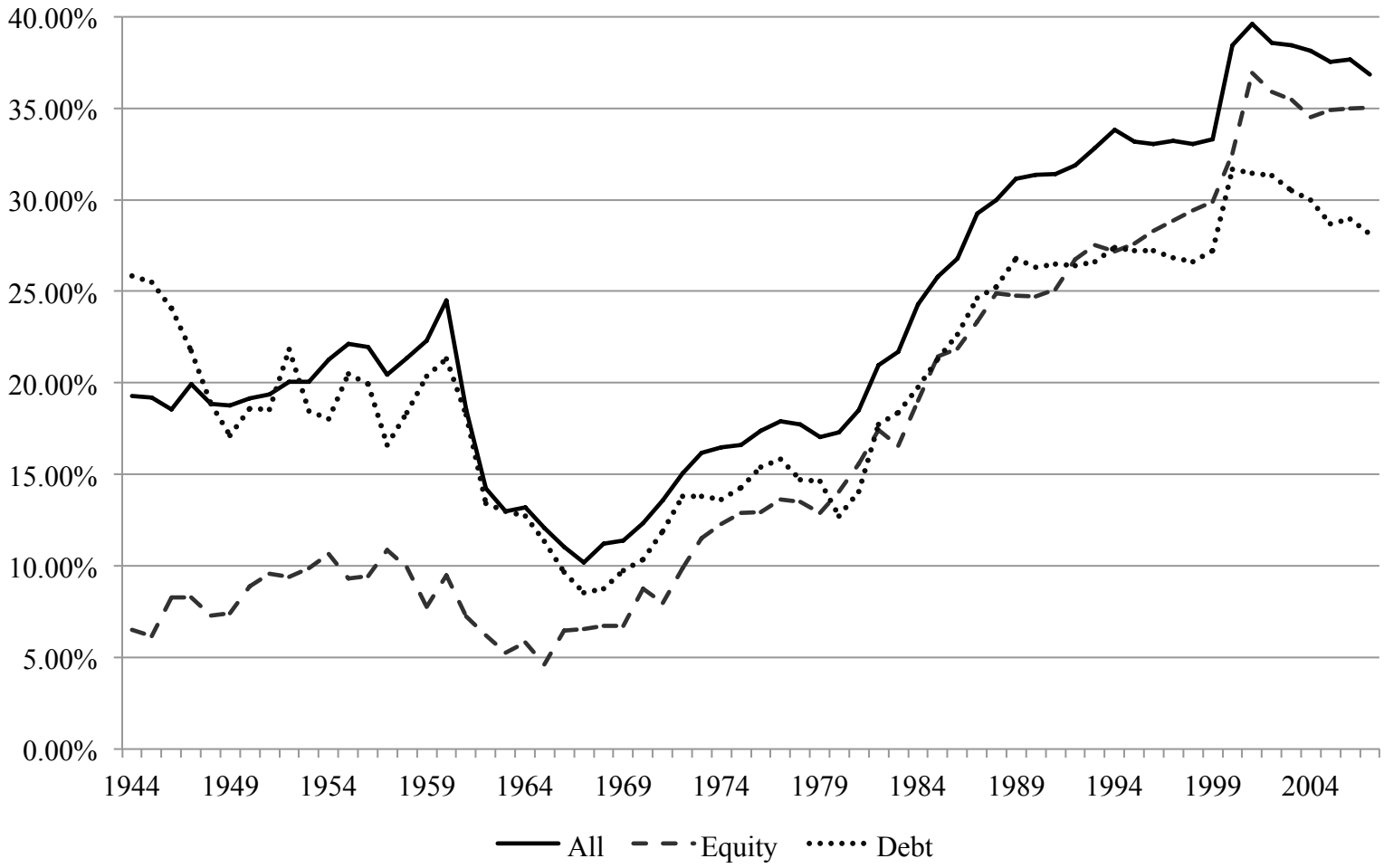

Figure 2. Exclusivity of Bank-Firm Relationships within SIC Categories. The figure reports the fraction of banks with multiple clients within a four-digit SIC category, conditional on a bank having at least one client in the industry category. A bank is identified as having a client in an SIC category in a given year if it managed at least one deal for the client during the preceding 10 years. Equity and debt relationships are reported separately. "All" includes preferred stock deals in addition to debt and equity.

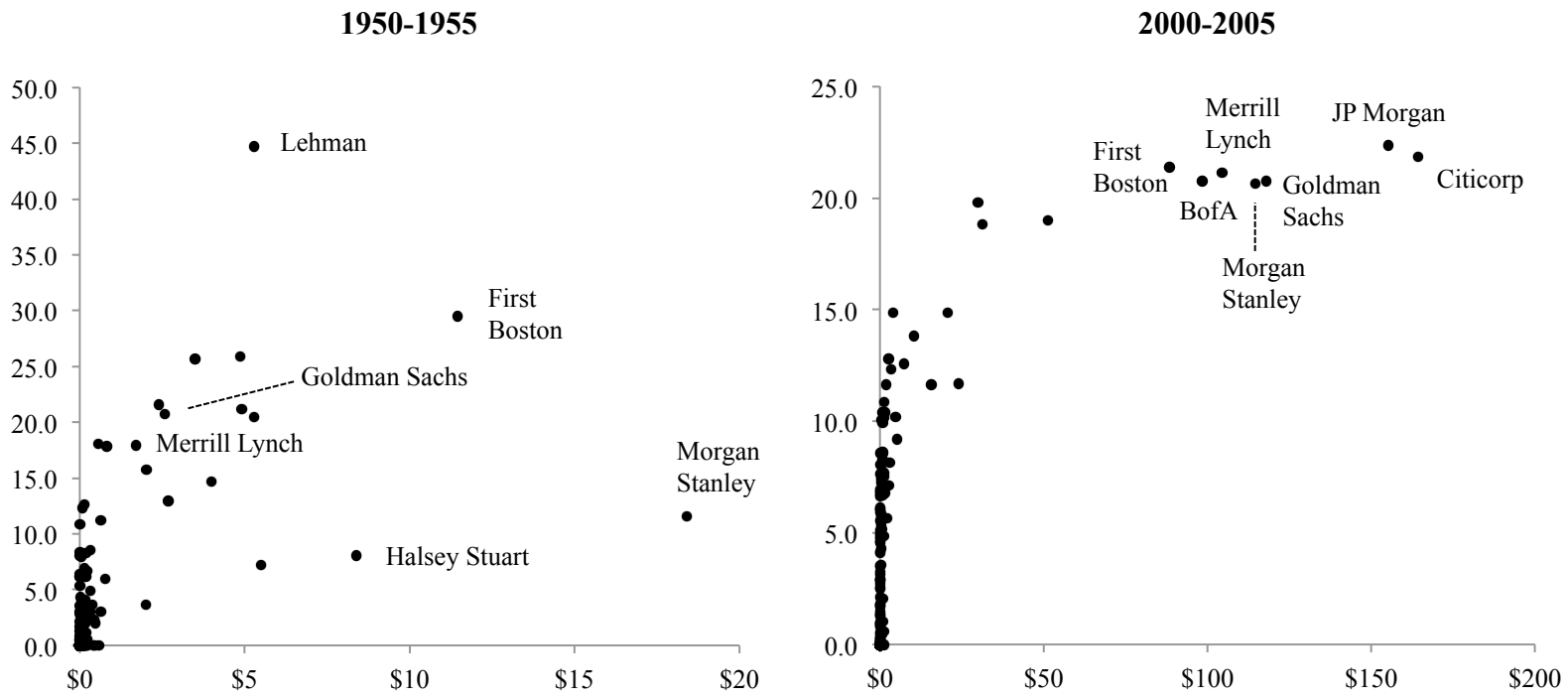

Figure 3. Relationship between EVC and Underwriting Volume. The figure plots banks' eigenvector centrality (EVC) against their underwriting volume for the time periods 1950-1955 and 2000-2005. Underwriting volume is the total proceeds managed by the bank ($m) during the time period. EVC is measured for each bank using syndicate data for every transaction during the 5-year time period and normalized to a 0-100 scale.

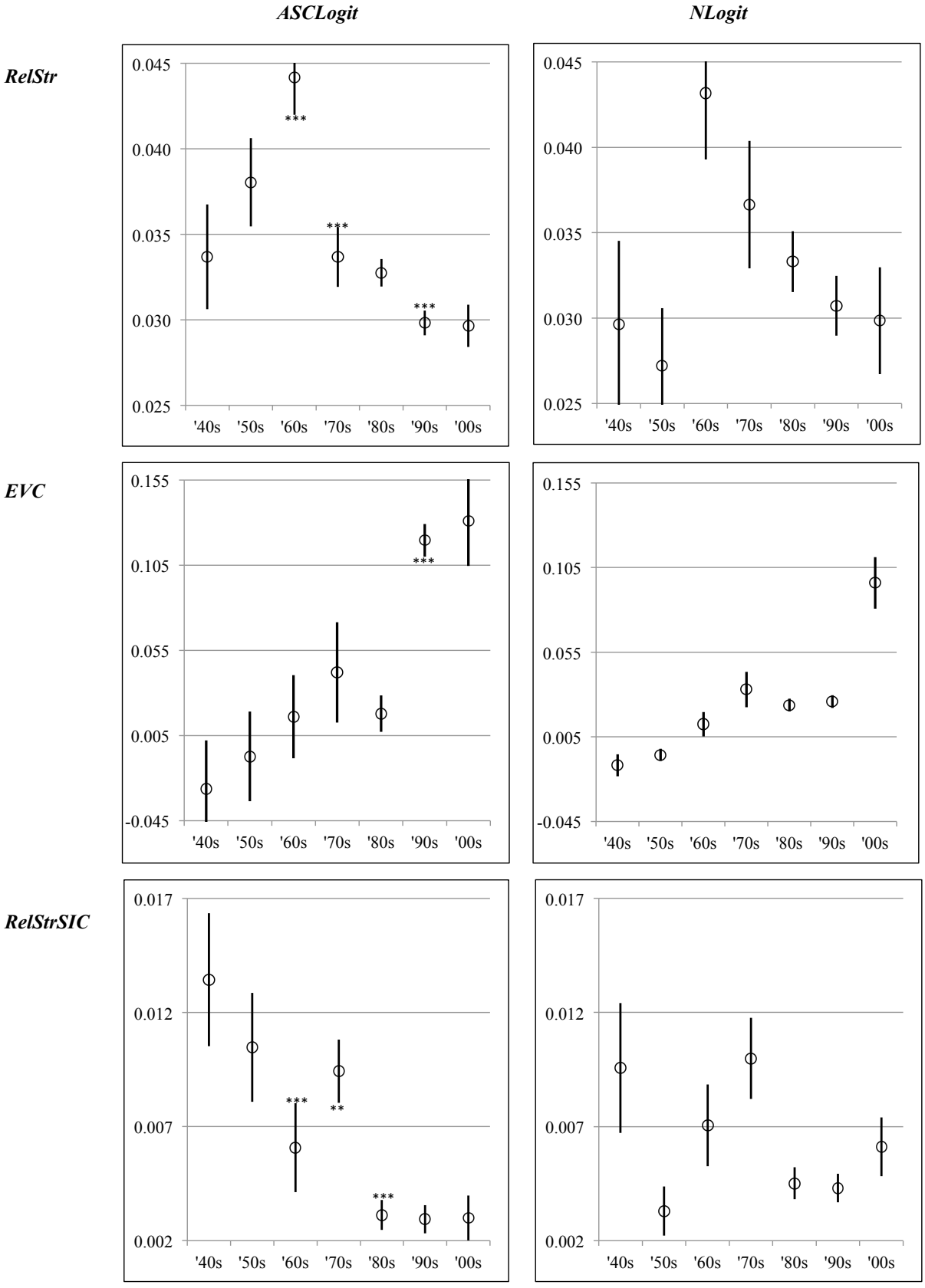

Figure 4. Estimated Coefficients and Confidence Intervals. This figure plots the estimated coefficients and confidence intervals for bank-specific attributes from the *ASCLogit* and *Nlogit* specifications of the bank choice model reported in Table V. For the *ASCLogit* results *** and ** indicate that the coefficient estimate is statistically different from the preceding decade's coefficient at the 1% and 5% levels.

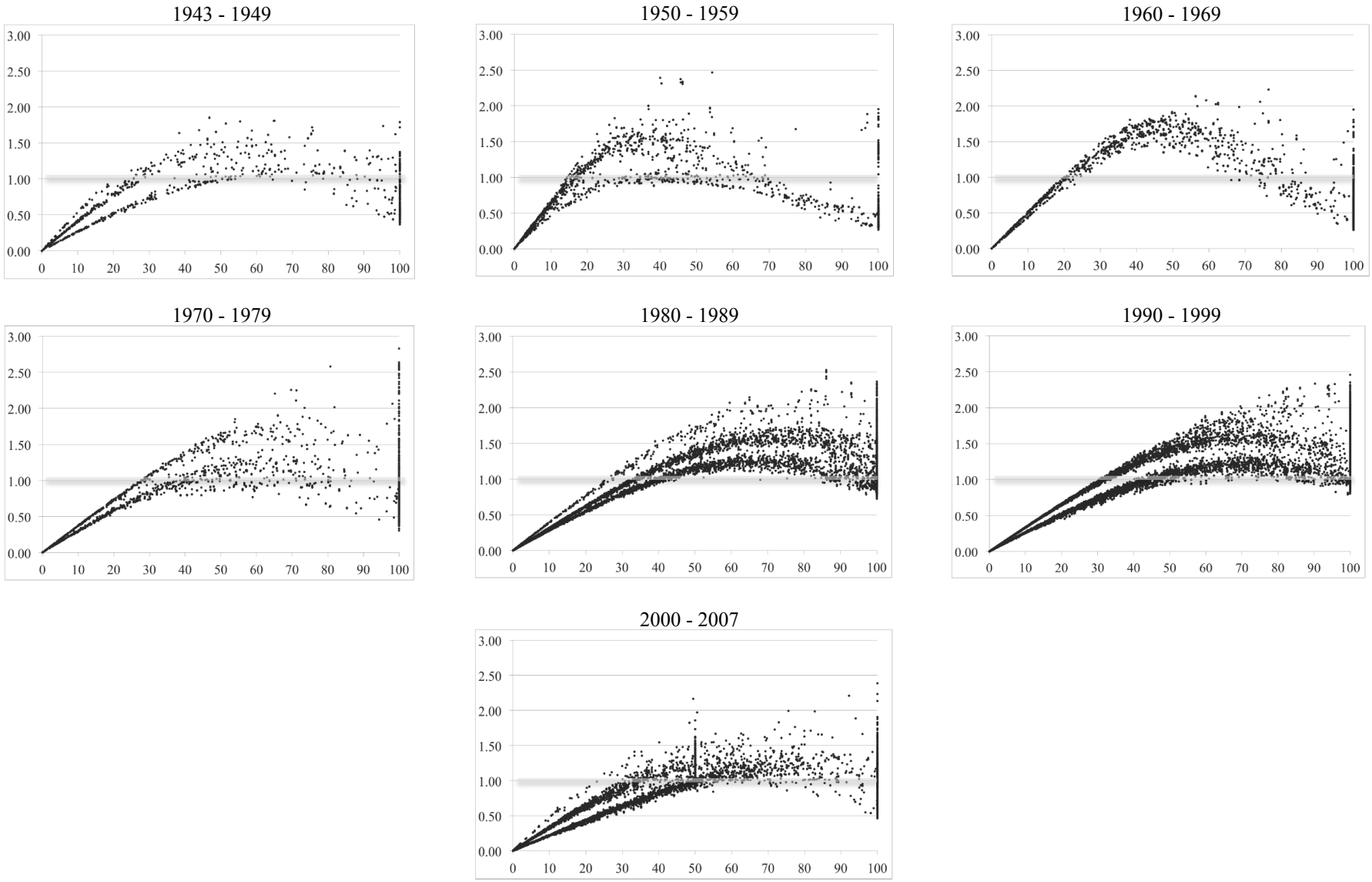

Figure 5. Choice Probability Elasticities With Respect To *RelStr*. During each estimation period we calculate choice probability elasticities with respect to *RelStr* for each bank in the choice set for each transaction. Elasticities are pooled across transactions and banks and then plotted against *RelStr* which ranges in value from 0-100.

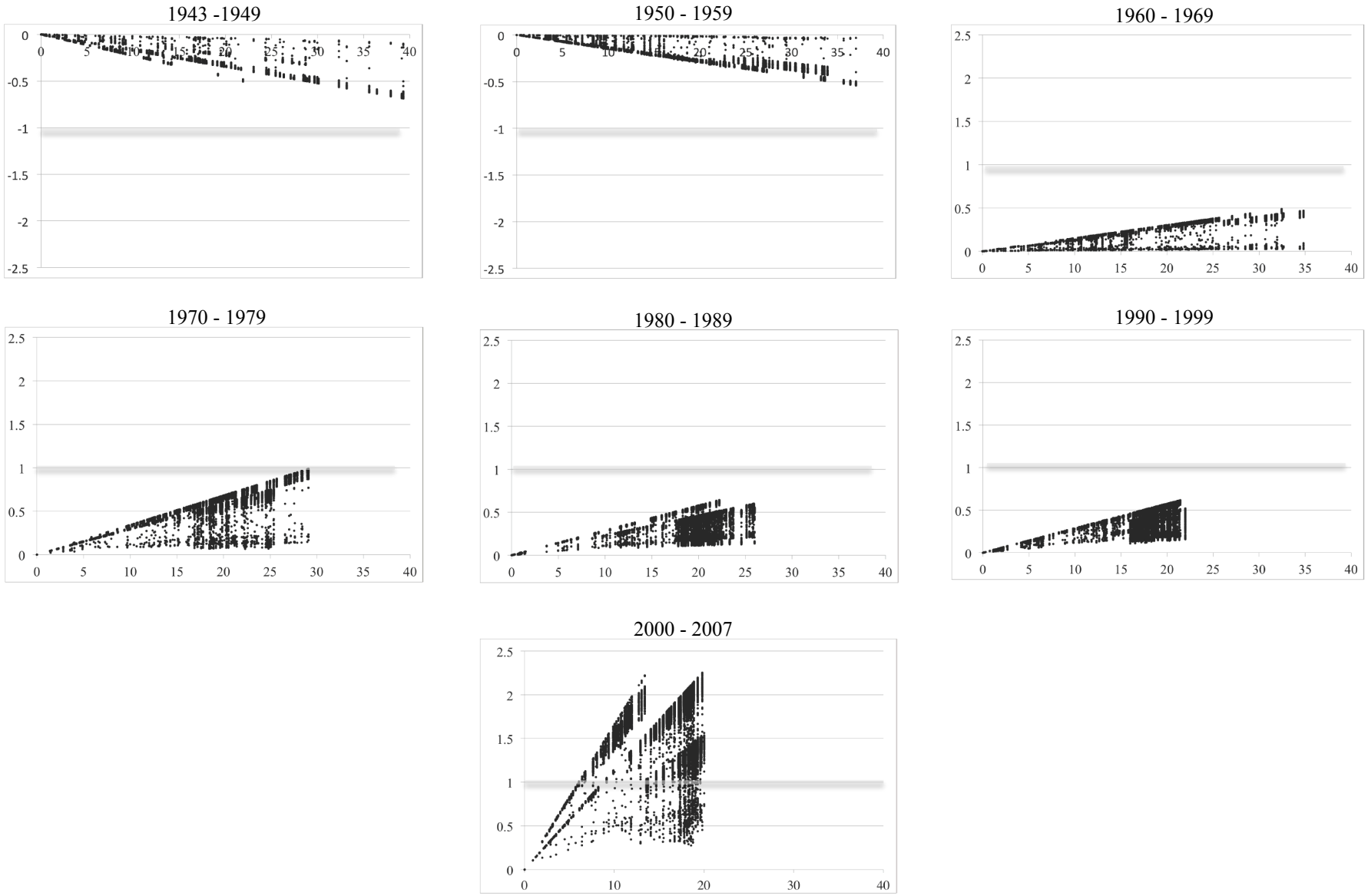

Figure 6. Choice Probability Elasticities With Respect To *EVC*. During each estimation period we calculate choice probability elasticities with respect to *EVC* for each bank in the choice set for each transaction. Elasticities are pooled across transactions and banks and then plotted against *EVC* which ranges in value from 0-100.

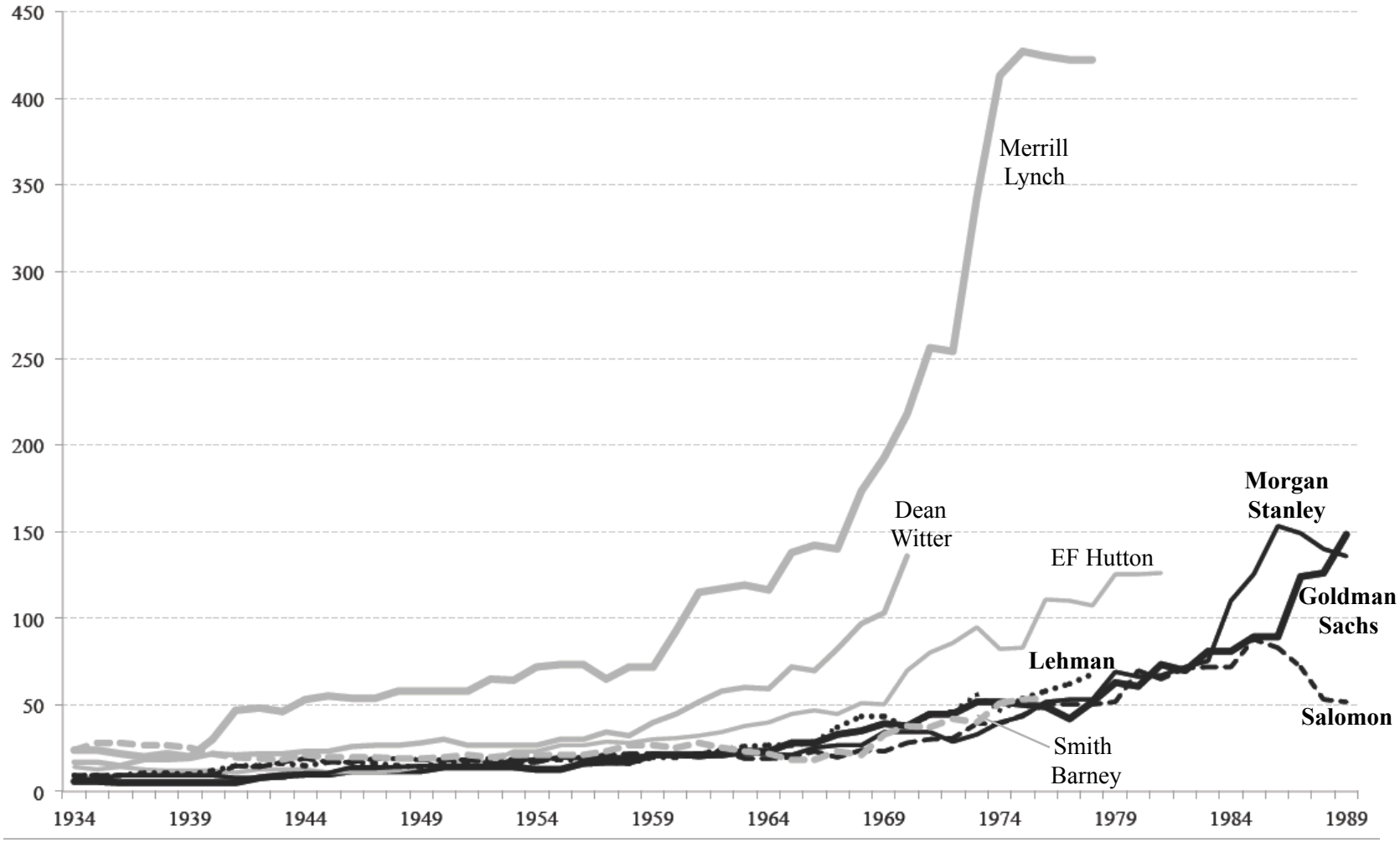

Figure 7. Number of Partners. This figure plots the number of partners on an annual basis for the 8-bank subsample. Goldman Sachs, Lehman, Morgan Stanley, and Salomon comprise the "wholesale" bank group in the nested logit analysis. Dean Witter, EF Hutton, Merrill Lynch, and Smith are assigned to the "retail" bank group. Series' that end before 1989 reflect the point at which the bank changed its reporting convention for the NYSE member firm directories.

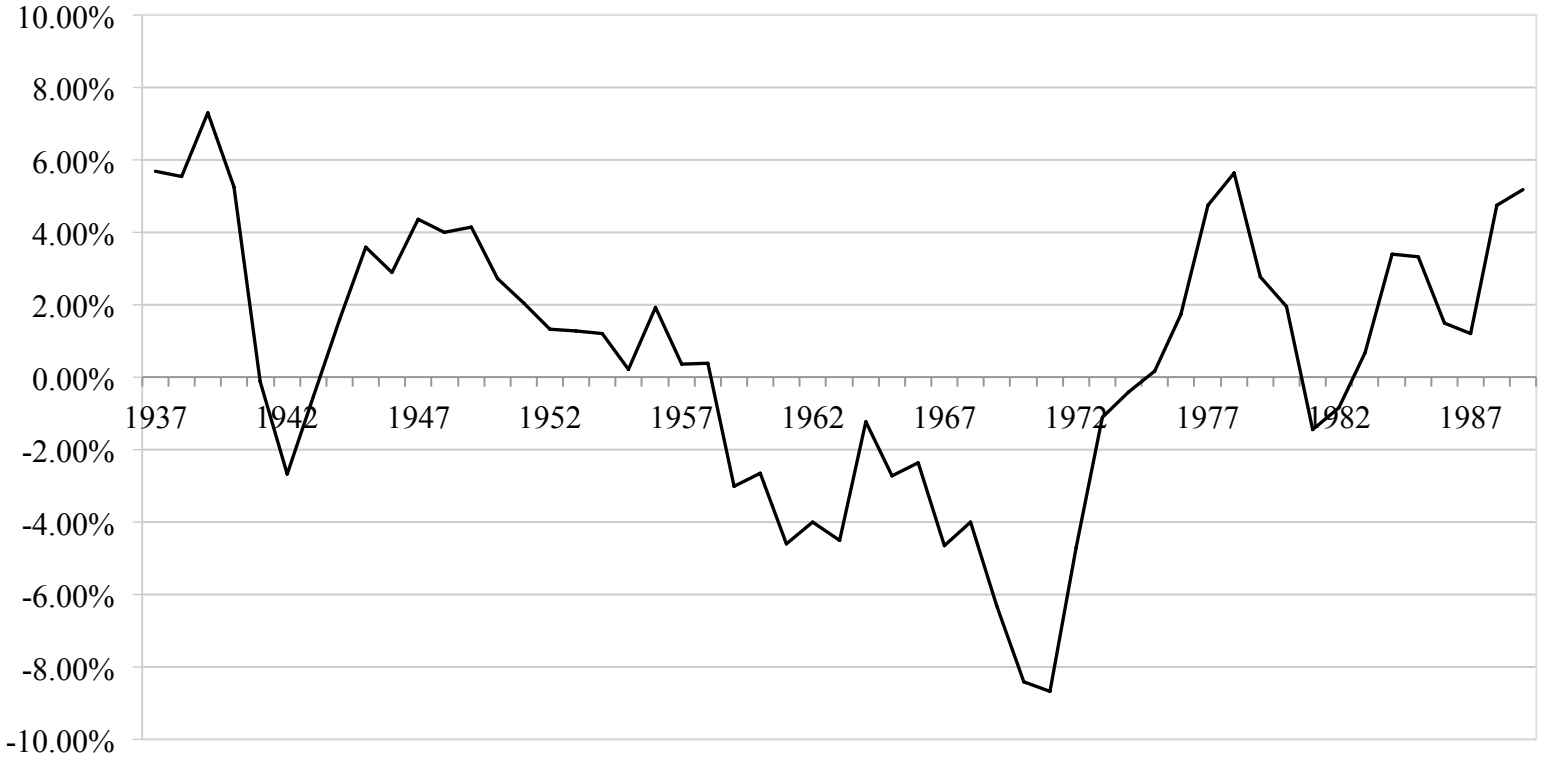

Figure 8. 3-Year Moving Average Percentage Change in Partner Tenure. Partner tenure is measured as the number of years served as a partner entering the current year. The percentage change is calculated annually and used to calculate the average percentage change for the preceding 3 years. The figure reports the average of this 3-year moving average calculated for each of the 8 banks.

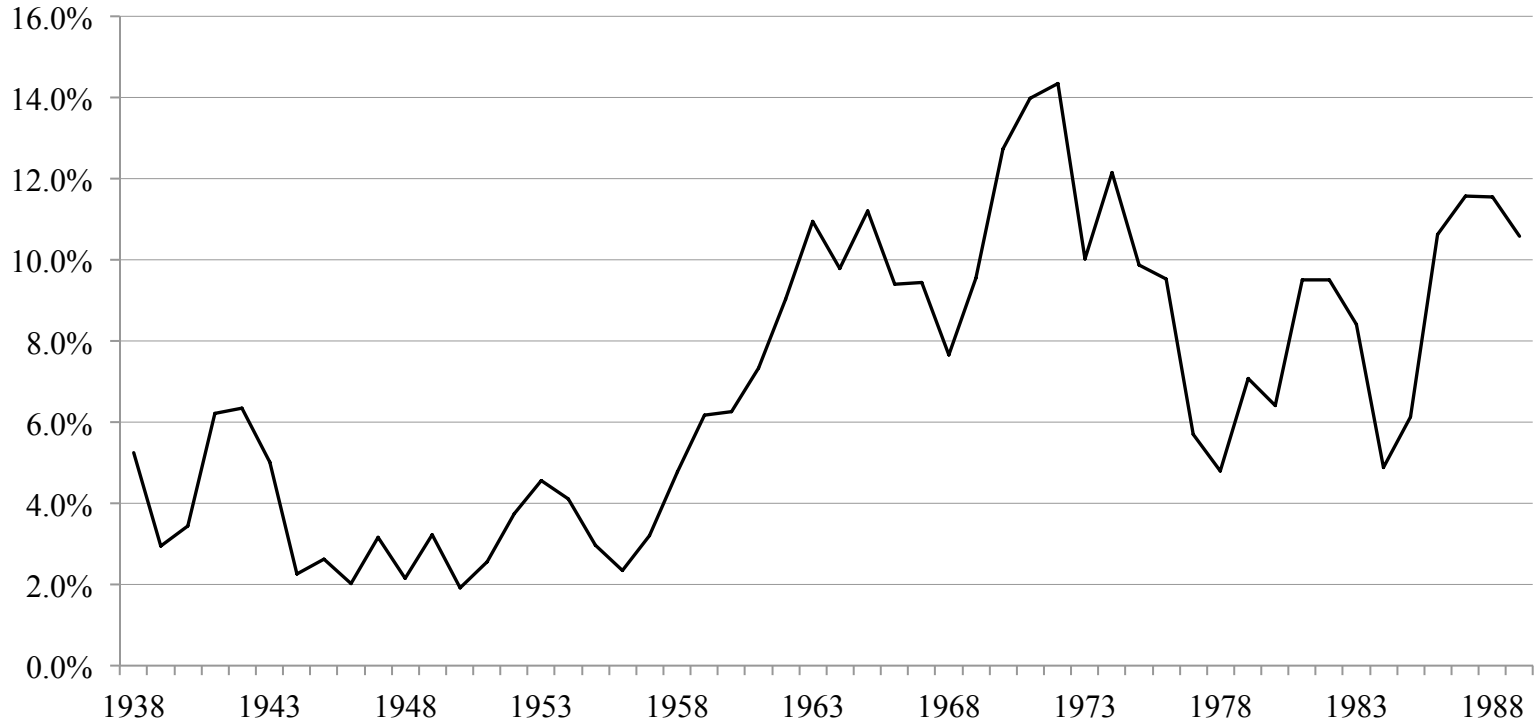

Figure 9. Bank Partner Years of Experience Lost to Departure. The figure reports a 3-year moving average of the annual number years of bank partner experience lost to departure as a percentage of the total years of partner experience remaining with the bank. The measure is calculated annually for 8 banks for use as a bank-specific attribute in the bank choice model. The figure reports the average value of this measure across the 8 banks for a given year.

Table I
Top 30 Banks by Market Share for 1933-1969 and 1970-2007

This table reports the percentage of deals and the percentage of proceeds managed by the top 30 banks by market share for the final sample of 63,302 deals described in section 2. Dollar amounts and all calculations reflect 1996 dollars. Deal credit is apportioned equally to all bookrunners. The top 30 banks reported here generally will not correspond with the 30 banks appearing in the issuer's choice set for any given year in the econometric analysis. Issuer choice sets include the top 30 banks (by proceeds) for the decade in which a transaction occurs.

	1933-1969			1970-2007	
	Number of Deals	Proceeds ($m)		Number of Deals	Proceeds ($m)
Total	19,888	$808,989		43,414	$5,241,142
Morgan Stanley	2.12%	14.16%	Goldman Sachs	7.96%	13.01%
First Boston	2.78%	8.02%	Morgan Stanley	6.15%	11.87%
Kuhn, Loeb	1.92%	6.23%	Merrill Lynch	7.53%	9.91%
Halsey, Stuart	3.61%	6.07%	First Boston	5.93%	8.38%
Lehman Brothers	3.35%	5.96%	Citicorp	3.95%	6.89%
Dillon Read	1.37%	5.10%	J. P. Morgan	3.94%	6.27%
Blyth	3.20%	4.78%	Lehman Brothers	4.83%	5.68%
Goldman Sachs	2.66%	4.12%	Salomon Brothers	4.51%	5.29%
Salomon Brothers	3.94%	3.86%	Drexel	2.58%	4.01%
Kidder Peabody	4.29%	2.99%	Bank of America	3.90%	3.67%
Smith Barney	1.43%	2.69%	Bear Stearns	1.81%	1.72%
Eastman Dillon	2.23%	2.63%	Donaldson, Lufkin & Jenrette	1.80%	1.71%
Harriman Ripley	1.08%	2.25%	Deutsche Bank	1.91%	1.68%
Merrill Lynch	1.38%	2.00%	Smith Barney	1.64%	1.15%
White Weld	1.85%	1.99%	Paine Webber	2.27%	1.14%
Glore Forgan	1.27%	1.49%	UBS	1.37%	1.09%
Paine Webber	1.84%	1.48%	Kidder Peabody	1.83%	0.90%
Lazard Freres	0.31%	0.98%	Chase Manhattan Bank	1.08%	0.89%
Drexel	0.57%	0.92%	Dillon Read	0.88%	0.75%
Dean Witter	1.32%	0.80%	Barclays Bank	0.33%	0.58%
F. Eberstadt	0.82%	0.59%	Wachovia	0.53%	0.53%
Mellon Securities	0.20%	0.56%	Bank One	0.47%	0.48%
R. W. Pressprich	0.68%	0.56%	Lazard Freres	0.40%	0.46%
A. G. Becker	1.04%	0.54%	Alex. Brown	1.31%	0.44%
Loeb Rhoades	0.61%	0.53%	Prudential-Bache Securities	0.88%	0.37%
Hayden Stone	0.70%	0.52%	1st Nat'L Bank Of Chicago	1.17%	0.36%
Allen & Co.	0.70%	0.49%	NationsBank	0.70%	0.34%
Brown Brothers Harriman	0.19%	0.45%	Montgomery Securities	0.86%	0.31%
Bear Stearns	0.70%	0.38%	Dean Witter	0.79%	0.30%
Shields & Co.	0.59%	0.33%	Blyth	0.24%	0.30%
Totals for top 30 banks	48.75%	83.47%		73.55%	90.48%

Table II

Distribution of Transactions Across Estimation Periods

This table reports the distribution of transactions used in the econometric analysis for each estimation period. We report transactions by type (Equity, Debt, Preferred) and whether or not the issuer had an existing banking relationship. The presence of a relationship is determined by the issuer having completed a transaction during the preceding 10 years for which one of the 30 banks in its choice set served as the bookrunner.

	1943-1949		1950-1959		1960-1969		1970-1979		1980-1989		1990-1999		2000-2007	
	No Prior Relationship	Prior Relationship	No Prior Relationship	Prior Relationship	No Prior Relationship	Prior Relationship	No Prior Relationship	Prior Relationship	No Prior Relationship	Prior Relationship	No Prior Relationship	Prior Relationship	No Prior Relationship	Prior Relationship
Total Number of Transactions	842		1,217		2,164		2,602		10,311		12,574		3,867	
	612	230	259	958	810	1,354	1,256	1,346	4,830	5,481	4,647	7,927	1,681	2,186
	(73%)	(27%)	(21%)	(79%)	(37%)	(63%)	(48%)	(52%)	(47%)	(53%)	(37%)	(63%)	(43%)	(57%)
Equity	193		172		724		1,061		2,551		4,190		1,658	
	88	105	56	116	415	309	724	337	1,444	1,107	2,420	1,770	854	804
	(46%)	(54%)	(33%)	(67%)	(57%)	(43%)	(68%)	(32%)	(57%)	(43%)	(58%)	(42%)	(52%)	(48%)
Debt	516		1,000		1,399		1,494		7,179		7,858		1,865	
	98	418	193	807	387	1,012	524	970	3,037	4,142	1,873	5,985	550	1,315
	(19%)	(81%)	(22%)	(81%)	(28%)	(72%)	(35%)	(65%)	(42%)	(58%)	(24%)	(76%)	(29%)	(71%)
Preferred	133		45		41		47		581		526		344	
	44	89	10	35	8	33	8	39	349	232	354	172	277	67
	(33%)	(67%)	(22%)	(78%)	(20%)	(80%)	(17%)	(83%)	(60%)	(40%)	(67%)	(33%)	(81%)	(19%)

Table III

Relationship Exclusivity: 1933-1969 and 1970-2007

This table reports the number of client relationships and their degree of exclusivity for the top 30 banks by market share for the sample of 63,302 deals described in section 2. The number of clients is the number of distinct issuers for which a bank managed a deal during the reporting period. Exclusive relationships reflect the percentage of the bank's clients for which the bank managed all of the client's deals during the reporting period. The % of client's deals managed is the average fraction of proceeds raised by a bank's clients for which the bank had management responsibility. Deal credit is apportioned equally to all bookrunners.

	1933-1969				1970-2007		
	Number of Clients	Exclusive Relationships	% of Client Deals Managed		Number of Clients	Exclusive Relationships	% of Client Deals Managed
Morgan Stanley	166	53.61%	69.66%	Goldman Sachs	1,284	31.15%	28.08%
First Boston	262	48.47%	34.60%	Morgan Stanley	1,064	28.95%	27.41%
Kuhn, Loeb	157	55.41%	59.54%	Merrill Lynch	1,264	30.22%	22.05%
Halsey, Stuart	157	18.47%	30.79%	First Boston	1,225	35.35%	22.00%
Lehman Brothers	319	54.86%	47.88%	Citicorp	765	21.44%	17.51%
Dillon Read	117	62.39%	61.49%	J. P. Morgan	783	21.71%	15.18%
Blyth	331	53.78%	36.54%	Lehman Brothers	971	31.00%	17.63%
Goldman Sachs	319	62.38%	55.17%	Salomon Brothers	706	25.50%	15.86%
Salomon Brothers	147	27.21%	24.74%	Drexel	585	46.67%	50.73%
Kidder Peabody	446	69.28%	36.86%	Bank of America	969	35.81%	13.20%
Smith Barney	173	52.60%	33.82%	Bear Stearns	515	37.28%	14.39%
Eastman Dillon	249	69.48%	61.63%	DLJ	513	45.03%	19.93%
Harriman Ripley	103	33.98%	20.14%	Deutsche Bank	523	30.98%	7.72%
Merrill Lynch	176	47.16%	21.76%	Smith Barney	424	36.32%	17.31%
White Weld	226	60.62%	34.43%	Paine Webber	536	45.90%	12.90%
Glore Forgan	124	63.71%	37.97%	UBS	376	23.67%	6.97%
Paine Webber	152	57.24%	50.71%	Kidder Peabody	441	45.12%	10.61%
Lazard Freres	38	31.58%	47.60%	Chase Manhattan Bank	277	36.10%	6.43%
Drexel	75	57.33%	31.53%	Dillon Read	205	45.85%	23.45%
Dean Witter	146	65.07%	38.96%	Barclays Bank	68	17.65%	6.96%
F. Eberstadt	76	63.16%	61.58%	Wachovia	132	13.64%	7.04%
Mellon Securities	19	5.26%	22.79%	Bank One	92	25.00%	7.47%
R. W. Pressprich	64	53.13%	16.38%	Lazard Freres	95	23.16%	15.30%
A. G. Becker	110	63.64%	46.30%	Alex. Brown	392	50.77%	28.60%
Loeb Rhoades	77	67.53%	37.27%	Prudential-Bache Sec.	269	40.89%	8.99%
Hayden Stone	93	73.12%	35.68%	1st Nat'L Bank Chicago	316	36.08%	3.98%
Allen & Co.	81	61.73%	55.81%	NationsBank	194	33.51%	7.82%
Brown Brothers Harriman	31	22.58%	12.56%	Montgomery Securities	251	51.00%	34.97%
Bear Stearns	96	66.67%	19.56%	Dean Witter	221	44.80%	6.15%
Shields & Co.	80	62.50%	25.32%	Blyth	76	27.63%	10.07%
Mean	153.67	52.80%	38.97%	Mean	517.73	33.94%	16.22%

Table IV

Summary Statistics for Bank Relationship Variables

This table reports summary statistics for the primary explanatory variables used in the econometric analysis. Mean values are reported by estimation period and for banks selected to manage transactions and for those that were not. *RelStr* is a bank's share of an issuer's transactions (fraction of proceeds) executed in the decade preceding the transaction at hand. For each issuer in a given year, this variable is fixed at the level of a given bank in the choice set (even if the issuer carries out multiple transactions within the year). *RelStrSIC* is the bank's share of proceeds managed for all firms in the issuer's SIC category that executed transactions during the decade preceding the issuer's transaction. For each bank in the choice set, this variable takes a fixed value for all transactions executed by firms in a given 4-digit SIC category in a given year. *EVC* measures a bank's connectedness with other banks during the decade preceding an issuer's transaction. For each bank in the choice set, this variable takes a fixed value in a given year. A bank's rank (1-30) is measured by market share of proceeds during the estimation period and is provided here for comparison purposes. The log of transaction value and the number of transactions brought to market by the issuer since 1933, appear as transaction-specific variables in the ASCLogit and NLogit specifications (along with an indicator for equity deals). Standard deviations are reported in parentheses. *** indicates a statistically significant difference in means for banks selected and not selected at the 1% level.

	1943-1949		1950-1959		1960-1969		1970-1979		1980-1989		1990-1999		2000-2007	
	Not Selected	Selected	Not Selected	Selected	Not Selected	Selected	Not Selected	Selected	Not Selected	Selected	Not Selected	Selected	Not Selected	Selected
RelStr	1.14	32.79***	1.15	40.11***	0.68	41.28***	0.76	28.01***	0.95	23.04***	1.36	19.87***	1.12	17.70
	(1.41)	(40.71)	(1.28)	(40.11)	(1.16)	(44.23)	(1.29)	(41.01)	(1.40)	(38.28)	(1.47)	(33.23)	(1.37)	(31.84)
RelStrSIC	13.61	44.24	18.69	51.46***	10.00	43.77***	13.80	43.50	20.08	43.82***	26.36	45.33	17.77	46.67
	(9.17)	(36.63)	(9.96)	(35.03)	(9.74)	(42.55)	(11.98)	(42.75)	(14.19)	(40.87)	(15.95)	(35.75)	(11.10)	(34.29)
EVC	12.14	12.49	13.34	14.48***	13.99	16.63***	14.31	18.72***	12.56	16.98***	11.68	15.21***	8.95	15.66***
	(0.91)	(10.52)	(0.56)	(9.70)	(0.56)	(8.66)	(0.52)	(5.97)	(0.65)	(7.50)	(0.71)	(6.00)	(1.33)	(3.95)
Bank's Rank within the Issuer's Choice Set	15.71	9.29	15.75	8.29	15.62	12.13***	15.72	9.20	15.72	9.15	15.72	9.22	8.95	15.66
	(8.62)	(7.18)	(8.60)	(6.84)	(8.65)	(8.01)	(8.61)	(7.48)	(8.61)	(7.58)	(8.60)	(7.96)	(1.33)	(3.95)
Transaction Value ($m)	69.50 (105.00)		66.70 (130.00)		75.60 (158.00)		138.90 (206.00)		104.60 (218.00)		134.20 (266.00)		140.10 (212.00)	
Transactions to Date (from 1933)	6.10 (8.66)		11.78 (14.66)		10.02 (17.51)		6.21 (15.92)		5.17 (10.67)		16.11 (33.28)		38.37 (101.22)	
Number of Transactions	842		1,217		2,164		2,602		10,311		12,574		3,867	

Table V

Bank Choice Model

This table reports coefficients estimated for 3 specifications of the bank choice model: conditional logit (CLogit), alternative specific conditonal logit (ASCLogit), and Nested Logit (NLogit). The issuer's choice is conditional on 3 bank-specific attributes: *RelStr* is the bank's share of the issuer's proceeds raised during the preceding decade; *EVC* is the bank's eigenvector centrality measure; *RelStrSIC* is the bank's share of proceeds raised by other firms in the issuer's 4-digit SIC category during the preceding decade. The ASCLogit specification estimates (unreported) coeeficients for 3 transaction-specific variables (log dollar value of transaction, issuer's number of transactions from 1933, and an equity issue indicator variable) interacted with 29 individual bank indicators (with the 30th bank serving as the base). The NLogit specification estimates (unreported) coefficients for the 3 transaction-specific variables for the first and second nests (with the third nest serving as the base). Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels. For each regression we report the log likelihood (ll) value and a $\chi 2$ test statistic for goodness of fit with (n) degrees of freedom. There is a smaller number of transactions for the NLogit specification during the last four estimation periods because it does not admit cases where the issuer selected more than one bank. In these cases the log likelihood value and $\chi 2$ test statistic are not directly comparable those reported for the CLogit and ASCLogit specifications.

Estimation Period		*RelStr*	*EVC*	*RelStrSIC*	Transactions	$\chi 2$(n)	ll
1943-49	CLogit	0.0385***	-0.0050	0.0139***	842	1,601(3)	-2,063
		(0.001)	(0.003)	(0.001)			
	ASCLogit	0.0337***	-0.0263*	0.0134***	842	2,432(119)	-1,647
		(0.002)	(0.014)	(0.002)			
	NLogit	0.0296***	-0.0118***	0.0096***	842	248(9)	-1,944
		(0.003)	(0.003)	(0.002)			
1950-59	CLogit	0.0496***	0.0015	0.0097***	1,217	3,037(3)	-2,621
		(0.001)	(0.004)	(0.001)			
	ASCLogit	0.0380***	-0.0073	0.0105***	1,217	4,322(119)	-1,978
		(0.001)	(0.013)	(0.001)			
	NLogit	0.0272***	-0.0057***	0.0033***	1217	370(9)	-2,420
		(0.002)	(0.003)	(0.001)			
1960-69	CLogit	0.0492***	0.0216***	0.0082***	2,164	5,557(3)	-4,582
		(0.001)	(0.003)	(0.001)			
	ASCLogit	0.0442***	0.016	0.0061***	2,164	6,704(119)	-4,008
		(0.001)	(0.013)	(0.001)			
	NLogit	0.0432***	0.0125***	0.0071***	2,164	672(9)	-4,503
		(0.002)	(0.004)	(0.001)			
1970-79	CLogit	0.0386***	0.0688***	0.0101***	2,607	4,756(3)	-6,502
		(0.001)	(0.003)	(0.001)			
	ASCLogit	0.0337***	0.0421***	0.0094***	2,607	6,169(119)	-5,796
		(0.001)	(0.015)	(0.001)			
	NLogit	0.0366***	0.0330***	0.0100***	2,602	564(9)	-6,281
		(0.002)	(0.005)	(0.001)			
1980-89	CLogit	0.0337***	0.0460***	-0.0058***	10,373	13,183(3)	-28,857
		(0.000)	(0.002)	(0.002)			
	ASCLogit	0.0328***	0.0179***	0.0031***	10,373	19,065(119)	-25,916
		(0.002)	(0.006)	(0.000)			
	NLogit	0.0333***	0.0238***	0.0045***	10,311	1,855(9)	-27,672
		(0.001)	(0.002)	(0.000)			
1990-99	CLogit	0.0341***	0.0556***	0.0056***	12,941	14,053(3)	-38,098
		(0.000)	(0.002)	(0.000)			
	ASCLogit	0.0298***	0.1197***	0.0029***	12,941	23,486(119)	-33,382
		(0.000)	(0.005)	(0.000)			
	NLogit	0.0307***	0.0258***	0.0043***	12,574	1,767(9)	-34,641
		(0.001)	(0.002)	(0.000)			
2000-07	CLogit	0.0313***	0.1659***	0.0056***	5,664	12,554(3)	-19,417
		(0.001)	(0.004)	(0.000)			
	ASCLogit	0.0296***	0.1312***	0.0030***	5,664	18,091(119)	-16,649
		(0.001)	(0.015)	(0.001)			
	NLogit	0.0299***	0.0960***	0.0061***	3,867	747(9)	-9,889
		(0.002)	(0.008)	(0.001)			

Table VI

Bank Directorships: 1935-1949

This table reports summary information about banker participation on client boards of directors for the 17 defendant banks in *U.S. v. Henry S. Morgan et al.* The data are from trial records stored with the Harold R. Medina Papers housed at the Mudd Library, Princeton University. For each bank, we reoprt the number of individual bankers who served as directors between 1935 and 1949, the number of clients for which each bank provided a director, the total number of years served by banker directors across the clients, the average number of years served by each banker in his directorships, and the number of clients for which a banker served for at least 15 years. We also identify cases in which a directorship was identified as beginning before 1935 (without a specific date) and cases in which the banker rmained as a director at the end of the reporting period (usually year-end 1949).

	Bankers	Directorships	Director Years	Average Years per Director	$\geq$ 15 Years Service	Before 1935	After 1949
Blyth	6	10	68	7	3	4	3
Dillon Read	3	2	33	17	0	2	2
Drexel	2	2	22	11	0	0	2
Eastman Dillon	3	4	30	8	0	0	2
First Boston	2	3	33	11	2	1	2
Glore Forgan	5	6	60	10	2	2	6
Goldman Sachs	9	34	592	17	21	1	25
Harriman Ripley	5	6	58	10	0	1	5
Harris Hall	1	1	4	4	0	0	0
Kuhn Loeb	6	10	146	15	3	8	10
Kidder Peabody	3	4	36	9	0	2	0
Lehman	14	53	788	15	22	0	35
Morgan Stanley	2	2	11	6	0	0	1
Smith Barney	9	8	102	13	0	3	3
Stone & Webster	1	2	17	9	0	2	0
Union Securities	5	9	55	6	0	0	8
White Weld	7	6	70	12	3	5	4
Total	83	162	2,125		56		
Average	5	10	125	13			

Table VII

Bank Choice Model with Changes in Partner Tenure and Experience

This table reports coefficients estimated for the nested logit (NLogit) specification of the bank choice model for a subset of 8 banks. For nesting purposes, we identify E.F. Hutton, Dean Witter, Merrill Lynch, and Smith Barney as retail banks and Goldman Sachs, Lehman Bros., Morgan Stanley, and Salomon Bros. as wholesale banks. E.F. Hutton and Dean Witter are excluded from the 1943-1949 estimation period because they were not among the top 30 banks by dollar market share. E.F. Hutton also does not appear in the 1950-1959 and 1960-1969 periods. The issuer's choice is conditional on 4 bank-specific attributes: *RelStr* is the bank's share of the issuer's proceeds raised during the preceding decade; *EVC* is the bank's eigenvector centrality measure; *RelStrSIC* is the bank's share of proceeds raised by other firms in the issuer's 4-digit SIC category during the preceding decade. *Tenure* is the 3-year moving average of the percentage change in the average tenure of a bank's partners during the year of the transaction. *Experience* is the 3-year moving average of partner years of experience lost annually to departure as a percentage of remaining partner years of experience during the year of the transaction. The NLogit specification estimates (unreported) coefficients for the 3 transaction-specific variables for the retail nest (with the institutional nest serving as the base). Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels. For each regression we report the log likelihood (ll) value and a $\chi 2$ test statistic for goodness of fit with (n) degrees of freedom.

Estimation Period	*RelStr*	*EVC*	*RelStrSIC*	*Tenure*	*Experience*	Transactions	Banks	$\chi 2$(n)	ll
1943-49	0.032***	-0.008	0.006***	-3.448*		242	6	39 (7)	-235
	(0.008)	(0.006)	(0.003)	(1.84)					
	0.030***	-0.006	0.004**		-0.070			57 (7)	-234
	(0.008)	(0.004)	(0.002)		(0.627)				
1950-59	0.055***	-0.020**	-0.002	-5.004***		511	7	86 (7)	-491
	(0.009)	(0.009)	(0.002)	(1.939)					
	0.052***	-0.010	-0.000		7.724***			85 (7)	-484
	(0.009)	(0.008)	(0.002)		(2.102)				
1960-69	0.046***	0.025***	0.006***	1.914**		823	7	107 (7)	-747
	(0.006)	(0.006)	(0.002)	(0.855)					
	0.045***	0.020***	0.006***		-0.752			106 (7)	-749
	(0.005)	(0.005)	(0.001)		(0.612)				
1970-79	0.032***	0.027***	0.007***	0.845**		1,364	8	222 (7)	-1,942
	(0.003)	(0.006)	(0.001)	(0.416)					
	0.032***	0.031***	0.006***		-2.111***			228 (7)	-1930
	(0.002)	(0.006)	(0.001)		(0.444)				
1980-89	0.027***	0.124***	0.002***	-1.063***		2,556	8	395 (7)	-3,998
	(0.002)	(0.013)	(0.001)	(0.303)					
	0.028***	0.134***	0.002***		0.678**			390 (7)	-4002
	(0.002)	(0.015)	(0.001)		(0.309)				

9. APPENDIX

9.1. Data for Issues Between 1933 and 1969

Our database contains a complete transcription of records from the *Issuer Summaries* produced for the *United States v. Henry S. Morgan, et al* antitrust case and from the Investment Dealers' Digest, Corporate Financing, 1950-1960, 1961; Corporate Financing, 1960-1969. Transaction details were scanned using optical character recognition software, and then checked by hand.

For each transaction, the 1933-69 source data includes the name of the issuer,[41] the date of the offering,[42] the exact title of the security issue, bond ratings where reported in the source data, the manager or co-managers for underwritten offerings and the dollar amount raised.[43] For transactions between 1933 and 1949 additional information about the gross spread and issue registration are also included. A descriptive field contains additional information in free text. We used text processing software to extract information about stock type (preferred, common, cumulative preferred), debt offerings (preferred, cumulative, convertible, note, debenture), number of shares, debt yield, and debt maturity from this field.

We need to identify the lead manager for each issue. However, the source data for deals prior to 1950 lists all managers and co-managers in alphabetical order, and does not name the lead manager. In practice, this is a relatively small problem: only $1,378$ of the offerings performed in the 1940s (17 percent of the total) had more than one manager. We identified the lead bank for 20 percent of those transactions by matching them with contemporary tombstones. The remaining transactions appear to have been too small to have published tombstones, and we were unable to identify lead managers for them. We retain them in the database, with syndicate seniority assigned alphabetically. Excluding these transactions from our econometric analysis does not have a

[41]The source data frequently included several different names for the same entity. This occurred for both bank and issuer names. For example, Lehman Bros., Lehman Brothers, and Lehman all refer to the same firm. We identified cases like these with a similarity algorithm that determined the minimum number of character changes required to turn one text field into another (the "Levenshtein distance"). This enabled us to identify groups of names referring to the same firm (bank or issuer), and, hence, to map each such name to a common identifier.

[42]The transaction dates for some deals do not include a day; these transactions are assumed to occur on the first day of the month.

[43]For 1933-1949, the data source also includes the number of underwriters including the manager. The dataset contains dollar amount raised for the 1930s, 40s, and 60s. The data source gave this information only sporadically in the 1950s. Where possible, we supplemented this information with data from the CRSP database, as discussed below.

significant effect upon our results.

The source data for 1950-1969 records managers and co-managers in decreasing order of seniority. We checked that this was the case by matching a random sample of 400 syndicates to contemporary tombstone advertisements that listed underwriters in decreasing order of seniority.

The combined hand-collected 1933-1969 database comprises 51,278 transactions. We excluded data that were obviously erroneous, or that were ambiguous.[44] We also excluded a subset of issuance data that were duplicated in 1950s and 1960s source documents. This reduced the sample to 49,155 transactions.

The 1933-1969 source data does not include SIC codes. We extracted SIC codes, as well as closing prices and trading volumes, for issuers of sufficient size to appear in the CRSP database. The SIC codes were then matched to Cusips for use in extracting financial statements from the Compustat North American database. Since company SIC codes can change over time, we match company names to SIC codes by decade.

Company names not matched in CRSP were manually checked; those that were easily identified as banking, insurance, re-insurance, real estate, and securities industry players were assigned SIC code 6000. Similarly, all public and government bodies were assigned SIC code 9000. We used text-processing programs to identify companies in the natural resources and agricultural sectors, to which we assigned SIC code 1000, railroad companies, which were assigned SIC code 4011, and utilities and transport companies excluding railroads, which were assigned SIC code 4911.[45] Using these methods, we were able to identify SIC codes for 25,088 out of 49,155 transactions between 1933 and 1969.

[44]Generally, this occurred when commas were misplaced: for example, we excluded data that included numbers recorded as 1,00,000.

[45]Specifically, we used regular expression matching within Python scripts to identify companies with specific keywords in their names. Natural resource and agriculture companies were matched to the following keywords: mining, mines, mineral, coal, fuels, oil, petroleum, drill, onshore, farm, grower, dairy, ranch, cattle, breed, irrigation, tree, timber, forest, soil, marine. Railroads companies were matched to keywords rail, RR, Rr, railroad. Utilities and transportation companies excluding railroads were matched to the following keywords: power, light, heat, atomic, energy, electric, public service, gas, utility, hydro, hydraulic, water, pipeline, waste, recycle.

9.2. Eigenvector Centrality

Eigenvector centrality measures the quality as well as the volume of a bank's relationships. It is defined recursively: a bank's eigenvector centrality is the sum of its ties to other banks, weighted by their respective centralities. For a bank i, write $M(i)$ for the set of banks connected to bank i via co-membership of a syndicate, and let λ be a proportionality factor. We define the eigenvector centrality e_i of bank i as follows:

$$e_i = \frac{1}{\lambda} \sum_{j \in M(i)} e_j. \tag{1}$$

We can rewrite equation (1) as follows. Write A for the symmetric matrix whose (i, j)th element A_{ij} is 1 if bank i and j have a relationship, and zero otherwise; A is often referred to as an *undirected adjacency matrix*. Then

$$e_i = \frac{1}{\lambda} \sum_{j=1}^{N} A_{ij} e_j, \tag{2}$$

where N is the total number of banks in the network. Write

$$\mathbf{e} = [e_1, e_2, ..., e_N]'$$

for the $N \times 1$ vector of bank centrality scores. Then equation (2) can be written as follows:

$$\lambda \mathbf{e} = A\mathbf{e}.$$

That is, any set e_1, e_2, ..., e_N of solutions to equation (1) corresponds to an eigenvector of the adjacency matrix A. When we require centrality scores to be non-negative, the Perron-Frobenius theorem implies that λ must be the highest eigenvalue of A, and, hence, that $\mathbf{e}$ must be the corresponding eigenvector.

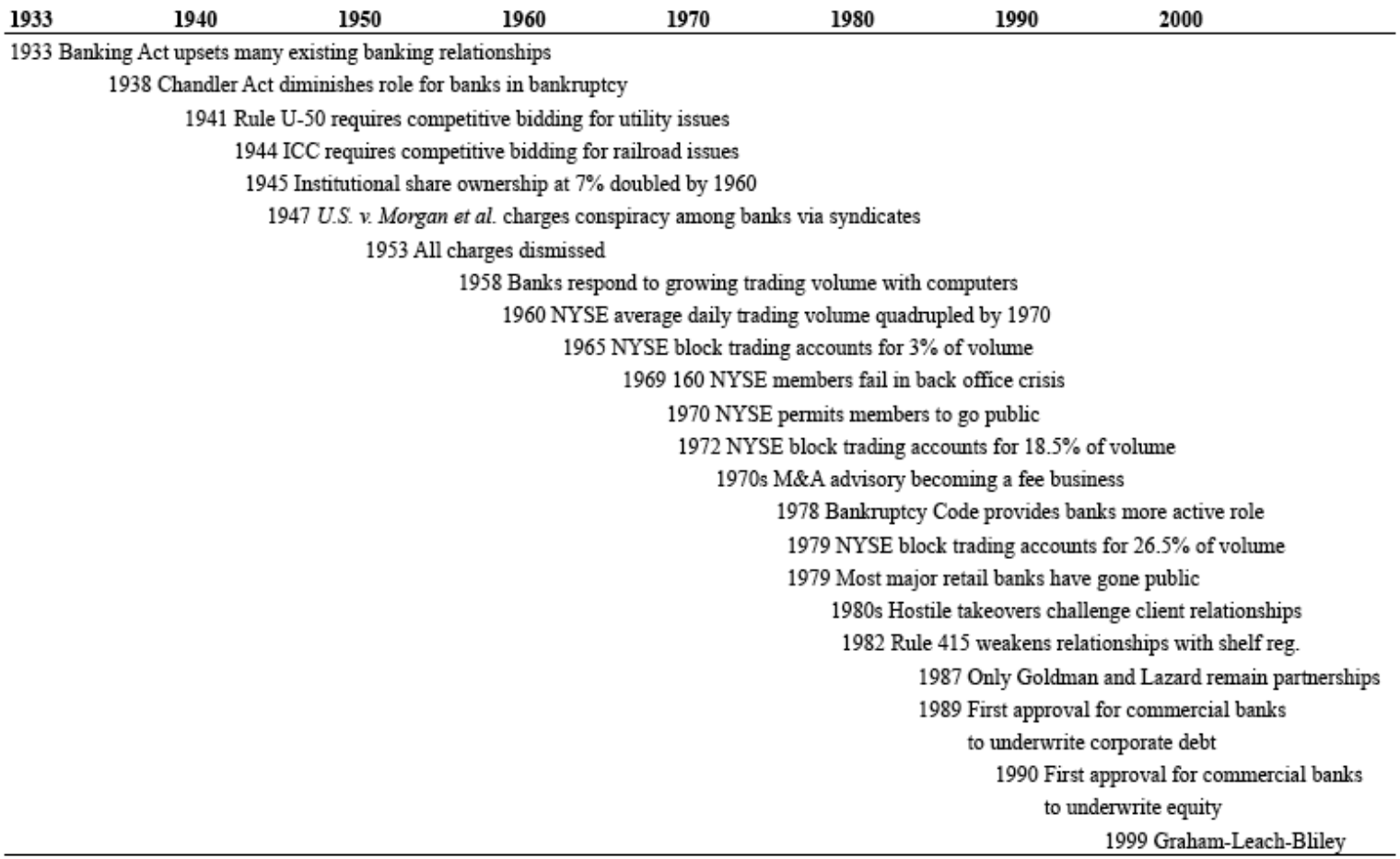

Figure A.1 Historical Timeline

Table A.I

Top 30 Banks by Decade Ranked by Dollar Value of Transactions

This table reports the top 30 banks by market share that appear as members of issuers' choice set for each estimation period.

1940-1949	Market Share	1950-1959	Market Share	1960-1969	Market Share	1970-1979	Market Share
Morgan Stanley & Co.	14.37%	Morgan Stanley & Co.	18.18%	Morgan Stanley & Co.	10.09%	Morgan Stanley & Co.	19.55%
Halsey, Stuart & Co.	13.17%	First Boston	9.47%	First Boston	8.53%	Goldman, Sachs & Co.	10.38%
Kuhn, Loeb & Co.	9.57%	Halsey, Stuart & Co.	8.04%	Lehman Bros.	7.69%	Salomon Bros.	9.42%
First Boston	7.33%	Blyth & Co.	5.69%	Goldman, Sachs & Co.	5.22%	Merrill Lynch	7.58%
Dillon, Read & Co.	6.14%	Lehman Bros.	5.52%	Dillon, Read & Co.	5.07%	First Boston	7.26%
Harriman Ripley & Co.	4.80%	Salomon Bros.	4.80%	Blyth & Co.	5.01%	Lehman Bros.	6.69%
Blyth & Co.	4.43%	Dillon, Read & Co.	4.75%	Kuhn, Loeb & Co.	4.40%	Smith Barney	4.73%
Salomon Bros.	3.57%	Harriman Ripley & Co.	4.10%	Kidder, Peabody	4.02%	Blyth & Co.	4.12%
Lehman Bros.	3.44%	Eastman, Dillon & Co.	3.72%	Salomon Bros.	3.66%	Kuhn, Loeb & Co.	3.89%
Goldman, Sachs & Co.	2.53%	Goldman, Sachs & Co.	3.56%	Smith Barney	3.24%	Paine Webber	2.89%
Kidder, Peabody	2.45%	Kuhn, Loeb & Co.	3.32%	Eastman, Dillon & Co.	3.08%	Kidder, Peabody	2.74%
Mellon Securities	2.44%	Smith Barney	3.20%	White, Weld & Co.	2.81%	White, Weld & Co.	2.46%
Glore Forgan	2.02%	Kidder, Peabody	2.08%	Halsey, Stuart & Co.	2.68%	Lazard Freres & Co.	2.31%
Smith Barney	1.37%	Merrill Lynch	1.99%	Merrill Lynch	2.64%	Dillon, Read & Co.	2.05%
Harris, Hall & Co.	1.13%	Glore Forgan	1.68%	Paine Webber	2.08%	Halsey, Stuart & Co.	1.77%
Eastman, Dillon & Co.	1.10%	White, Weld & Co.	1.60%	Drexel	1.44%	E. F. Hutton & Co.	1.05%
Merrill Lynch	0.99%	Paine Webber	1.27%	Lazard Freres & Co.	1.37%	Bache & Co.	0.89%
White, Weld & Co.	0.99%	Lazard Freres & Co.	0.81%	Glore Forgan	1.36%	Drexel	0.83%
Union Securities Co.	0.79%	F. Eberstadt & Co.	0.77%	Dean Witter & Co.	1.24%	Dean Witter & Co.	0.79%
A. G. Becker & Co.	0.76%	Allen & Co.	0.68%	R. W. Pressprich & Co.	0.96%	Eastman, Dillon & Co.	0.70%
F. Eberstadt & Co.	0.58%	Shields & Co.	0.48%	Carl M. Loeb, Rhoades	0.88%	A. G. Becker & Co.	0.63%
Drexel	0.57%	Dean Witter & Co.	0.43%	Harriman Ripley & Co.	0.74%	Carl M. Loeb, Rhoades	0.60%
Paine Webber	0.50%	Union Securities Co.	0.43%	Bear, Stearns & Co.	0.61%	Stone & Webster	0.34%
Paul H. Davis & Co.	0.47%	Drexel	0.42%	Hayden, Stone & Co.	0.59%	Bear, Stearns & Co.	0.32%
Allen & Co.	0.47%	A. G. Becker & Co.	0.40%	F. Eberstadt & Co.	0.57%	Allen & Co.	0.27%
Lee Higginson & Co.	0.45%	Wertheim & Co.	0.37%	Du Pont	0.56%	Reynolds Securities Inc.	0.27%
F. S. Moseley & Co.	0.41%	Carl M. Loeb, Rhoades	0.35%	Hornblower & Weeks	0.55%	Hornblower & Weeks	0.27%
Shields & Co.	0.41%	Hallgarten & Co.	0.33%	Shearson, Hammill & Co.	0.54%	First Mid-America Corp.	0.21%
Alex. Brown & Sons	0.38%	Reynolds & Co.	0.33%	A. G. Becker & Co.	0.53%	Dominick & Dominick	0.17%
Otis & Co.	0.35%	Hornblower & Weeks	0.33%	Allen & Co.	0.48%	C. E. Unterberg, Towbin	0.17%
Total Value Issued ($bn)	$147		$195		$403		$380

1980-1989	Market Share	1990-1999	Market Share	2000-2007	Market Share
Drexel	17.79%	Goldman, Sachs & Co.	15.81%	J. P. Morgan & Co.	14.56%
Goldman, Sachs & Co.	12.72%	Morgan Stanley & Co.	13.29%	Citicorp	13.99%
First Boston	9.80%	Merrill Lynch	13.17%	Goldman, Sachs & Co.	10.12%
Salomon Bros.	9.76%	First Boston	8.93%	Morgan Stanley & Co.	9.88%
Morgan Stanley & Co.	9.49%	Lehman Bros.	6.12%	Bank of America	9.64%
Merrill Lynch	6.41%	Salomon Bros.	6.04%	Merrill Lynch	8.68%
Lehman Bros.	5.34%	Citicorp	5.78%	First Boston	6.87%
Paine Webber	2.86%	J. P. Morgan & Co.	4.40%	Lehman Bros.	5.08%
Kidder, Peabody	2.20%	DLJ	3.78%	Deutsche Bank,A. G.	3.23%
Dillon, Read & Co.	1.66%	Bear, Stearns & Co.	2.41%	UBS AG	2.75%
Smith Barney	1.64%	Chase Manhattan Bank	2.01%	Barclays Bank PLC	1.87%
Citicorp	1.50%	Bank of America	1.38%	Wachovia Corp.	1.76%
Prudential-Bache	1.14%	Deutsche Bank,A. G.	1.14%	Bear, Stearns & Co.	1.74%
Bank Of Chicago	1.12%	Smith Barney	1.11%	Bank One	1.52%
Deutsche Bank,A. G.	1.12%	NationsBank	0.84%	BNP Paribas SA	0.54%
Bank of America	0.88%	Alex. Brown & Sons	0.75%	ABN AMRO	0.50%
Bear, Stearns & Co.	0.88%	Paine Webber	0.73%	Fleet Robertson Stephens	0.47%
Morgan Guaranty Ltd.	0.84%	Montgomery Securities	0.67%	Greenwich Capital	0.47%
E. F. Hutton & Co.	0.82%	UBS AG	0.62%	SunTrust Banks	0.38%
Rothschild Unterberg	0.81%	Bankers Trust Co.	0.58%	HSBC Holdings PLC	0.31%
DLJ	0.80%	Dillon, Read & Co.	0.57%	CIBC Ltd	0.29%
Lazard Freres & Co.	0.79%	Kidder, Peabody	0.52%	SG Cowen Securities	0.24%
Chemical Bank	0.74%	Hambrecht & Quist	0.46%	Thomas Weisel Partners	0.24%
Dean Witter & Co.	0.60%	BA Securities Inc	0.39%	SunTrust Rob. Humphrey	0.20%
Alex. Brown & Sons	0.58%	Robertson Stephens	0.36%	Jefferies & Co Inc	0.18%
J. P. Morgan & Co.	0.45%	Continental Bank	0.32%	Bank of New York	0.17%
Allen & Co.	0.41%	Chemical Bank	0.30%	Tokyo-Mitsubishi	0.16%
Chase Manhattan Bank	0.35%	Prudential-Bache	0.29%	RBC Capital Markets	0.13%
Shearson/American Exp.	0.31%	Lazard Freres & Co.	0.29%	US Bancorp Piper Jaffray	0.12%
First Chicago	0.27%	Dean Witter & Co.	0.29%	Piper Jaffray Inc	0.12%
Total Value Issued ($bn)	$1,162		$2,118		$1,582