Investment-Banking Relationships: 1933–2007

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We study the evolution of investment-banking relationships from 1933 to 2007. Relationship exclusivity and client concerns for the state of their banking relationships were strong through the first part of our sample period but then entered a period of sharp decline beginning around 1970. We interpret the bank-client relationship as an informal governance mechanism for curbing opportunistic behavior in a weak contracting environment and examine how technological change aggravated conflicts of interest within investment banks and between banks and their clients. This perspective sheds light on why trust between banks and their clients now appears to be in short supply. (*JEL* G24, G34, L14)

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Our clients' interests always come first.
–The first of Goldman Sachs' 14 Business Principles[1]

1. Introduction

In the aftermath of the 2008 financial crisis, claims that investment banks placed their clients' interests first ring hollow, and, to many observers, trust appears to be in short supply. It is easy to imagine why this might be the case. Banks are well informed relative to their clients, who hire them for their expertise, advice, and investor networks, and it is rarely possible to determine what would have happened had the bank provided them with different advice.[2] Moreover, banks are conflicted because they are able to profit by abusing client information and favoring the counterparties to a client's transaction.[3] It is difficult for clients to observe how banks respond to such conflicts and it is similarly difficult for the courts that are charged with adjudicating disputes to verify the substance of complaints.

But these are also conditions under which a reputation for being trustworthy should be valuable to both banks and their clients.[4] In fact, at one time, bankers and their clients at least acted as though they trusted one another. Clients dealt repeatedly, and often exclusively, with a single bank for many years. Banks exposed themselves to a loss of client trust by providing many advisory services in the expectation that they would be compensated when their clients awarded future underwriting mandates (Eccles and Crane 1988). Our goal in this paper is to document the unraveling of this way of doing business and to provide an interpretation of the changes we observe.

Our first challenge is to measure changes in trust or in the reputation concerns on which it rests. In the spirit of (Klein and Leffler 1981) and the related literature on relational contracting, we view bank-client

[1] The Principles were first enumerated by John Whitehead in the late 1970s and recently reaffirmed in the aftermath of the firm's $550 million settlement of the Securities and Exchange Commission's April 16, 2010, civil complaint in connection with the 2007 ABACUS transaction.

[2] See Bolton, Freixas, and Shapiro (2007) and Chen, Morrison, and Wilhelm (2015) on conflicts that arise because banks are better able to judge the suitability of products or advice offered to their clients. Benveniste and Spindt (1989) and Sherman and Titman (2002) study how banks acquire information from institutional investors.

[3] See Kang and Lowery (2014), Reuter (2006), and Nimalendran, Ritter, and Zhang (2007) on conflicts stemming from institutional brokerage relationships; Asker and Ljungqvist (2010) on conflicts related to banks serving multiple clients within a product market; Bodnaruk, Massa, and Simonov (2009), Griffin, Shu, and Topaloglu (2012), and Jegadeesh and Tang (2010) on banks' ability to exploit information gained from advising merger and acquisition (M&A) clients; and Mehran and Stulz (2007) for a broad review of the literature on conflicts of interest in financial institutions.

[4] See Fernando, May, and Megginson (2012) for evidence that clients suffered economic losses in the immediate aftermath of Lehman Brothers' 2008 bankruptcy filing. Losses were larger for clients with stronger and broader relationships and especially so for equity underwriting clients and for smaller, younger, and more financially constrained clients.

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relationships as a mechanism for curbing opportunistic behavior in a weak (formal) contracting environment.[5] From this perspective, a client who values trustworthy behavior opts to deal with a single bank rather than to allocate underwriting mandates through competitive bidding. This creates a potential rent stream for the bank; the bank meets client expectations provided the value of future relationship rents exceeds the one-time benefits that can be earned by from violating the client's trust. The bank thus earns a reputation for client service that sustains this type of dealing. Clients who deal with several banks reduce the value of their business to each of the banks and, hence, are less able to rely on reputation concerns to keep the banks honest. In other words, variation in the degree of relationship exclusivity is evidence of variation in reputation concerns on the part of both the client and its banks. Hence, forces that improve the formal contracting environment or that otherwise lower the value of reputational commitment should diminish relationship exclusivity.

We study long-run variation in the state of investment-banking relationships by constructing a hand-collected data set containing U.S. public and private underwritten securities transactions from 1933–1969, which we supplement with post-1970 data compiled by the Securities Data Corporation (SDC).[6] We define the state or strength of a bank-client relationship at the time when a client decides to issue new securities to be the bank's dollar share of securities issued by that client during the preceding 10 years. Using the average of this measure across clients with whom the bank did at least one transaction during the preceding 10 years, Figure 1 provides a snapshot of the evolution of investment-banking relationships from 1944 to 2009 for three major banks and the average across the top-30 banks by market share.[7]

The 1933 (Glass-Steagall) Banking Act upset many existing client relationships as commercial banks withdrew from securities underwriting and individual bankers changed their affiliations. The Banking Act was followed by further regulatory intervention intended to weaken client relationships, culminating in an unsuccessful antitrust complaint filed by the U.S. Justice Department in 1947 (*United States v. Henry S. Morgan et al.*). Notwithstanding the regulatory climate, Figure 1 shows that relationships strengthened through the early part of the sample period. By 1959,

[5] See MacLeod (2007) for a review of the (bilateral) relational contracting literature and its connection to the seminal work of Klein and Leffler (1981), and see (Morrison and Wilhelm, 2007, chap. 2 and 7) for an application to investment banking.

[6] With the exception of Asker and Ljungqvist (2010), the existing literature on investment-banking relationships focuses on post-1990 data. See, for example, Krigman, Shaw, and Womack (2001), Ljungqvist and Wilhelm (2005), Fernando, Gatchev, and Spindt (2005), Drucker and Puri (2005), Ljungqvist, Marston, and Wilhelm (2006, 2009), Yasuda (2005), Yasuda (2007), Schenone (2004), Benzoni and Schenone (2010), and Corwin and Stegemoller (2014).

[7] See Section 2.2.1 for the details of this measure.

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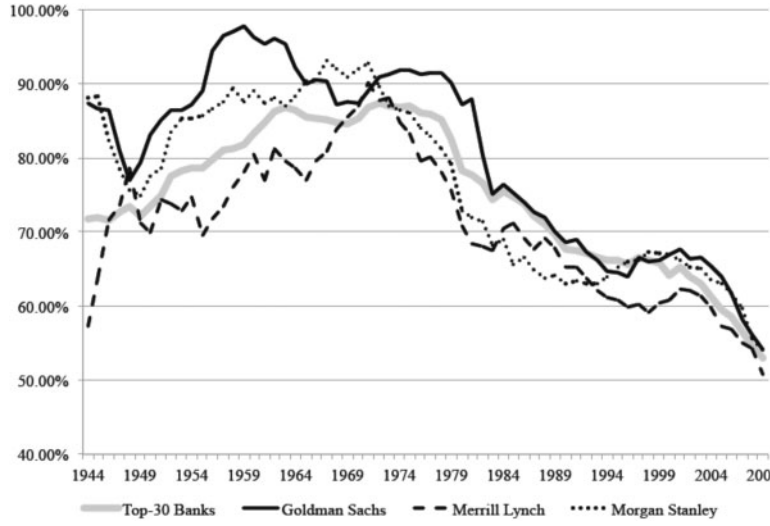

Figure 1
Bank-firm relationship exclusivity
The figure reports an annual measure of a bank's average relationship strength among firms for which the bank managed at least one deal during the preceding 10 years. Relationship strength is the bank's share of proceeds raised by a firm during the 10-year 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.

Goldman Sachs was responsible for about 98% of the proceeds raised by its clients during the preceding 10 years; in other words, essentially all of Goldman's client relationships at that date were exclusive. Other banks had less exclusive relationships, but the average degree of exclusivity among the top-30 banks in 1959 was over 80%. Relationship exclusivity began to level off or weaken during the 1960s, before declining sharply during the 1970s and 1980s and then again during the 2000s. By 2009, the average client of the top-30 banks directed only about 50% of its business to banks with which it had dealt during the preceding 10 years.

We provide a more nuanced description of this time pattern by estimating conditional and nested logit models that condition the issuer's bank choice on the state of its existing relationships with the top-30 banks by dollar market share as well as additional bank- and transaction-specific attributes. This enables us to examine the economic and statistical significance of changes in the sensitivity of issuers' underwriter choice to the state of their relationships over the course of the sample period. The econometric models identify the 1970s and the 1990s as periods in which issuer underwriter choice is significantly less sensitive to the state of bank relationships.

Our analysis raises two difficult questions. First, why would banks and their clients allow their relationships to weaken? And second, why were

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relationship changes concentrated in the periods identified by our econometric models? The long time horizon over which bank-client relationships evolved witnessed a good deal of change in financial markets and in the economy at large. No single event is likely to have caused the patterns we observe in the data and a deep understanding of the patterns we observe in the data is unlikely to emerge from a sharp identification strategy that focuses on a narrow time window. Instead, we combine theory with an analysis of technological, institutional, and regulatory change to shed light on the long-term decline of informal governance in financial markets.

We consider the time patterns in the data from two theoretical perspectives. The preceding discussion identifies investment-banking relationships with a relational contract that responds to conflicts that arise because *banks are better informed than their clients*. A second, and more common, perspective on banking relationships is that *clients are well informed relative to their banks*. Better-informed clients give rise to the moral hazard problems at the heart of the lending relationship literature and the literature on investment banks' certification function in securities offerings.[8] In Section 5 we review our results from each perspective

We begin by noting that maintaining an exclusive relationship is costly both for bank clients, who forgo the opportunity to use competitive tenders to assign underwriting mandates, and for banks, who are forced to circumscribe their actions to protect their relationship rents. These costs are worth bearing only if there is no cheaper way to make the economically essential commitments that can be achieved in the context of a long-lived relationship. Our explanation for the decline in bank-client relationships rests on the emergence of new codification and contracting technologies that allow for cheaper, although sometimes less nuanced, forms of commitment. Technological change that enables better arm's-length contracting should therefore weaken client commitment to exclusive bank relationships. Such change could take the form of greater codification of judgment-intensive elements of the underwriting process for which verification of service quality and behavior was previously limited. For example, there is little need to trust one's banker if the banker is transparent; rules-based auction mechanisms displace the banker's judgment in securities offerings. We have yet to reach this point, particularly in the equity markets. Information remains complex and trust is still an essential precursor to business. A steady progression in computing and information technology has nevertheless improved measurement and transparency and so has chipped away at bank-client relationships.

[8] See Boot (2000) for a review of the vast literature on lending-relationships. (Boot and Thakor, 2000, p. 680) provide a concise summary of motivations for lending relationships. Other important examples include Diamond (1991) and Boot, Greenbaum, and Thakor (1993). Work on investment-bank certification includes Booth and Smith (1986), Titman and Trueman (1986), Carter and Manaster (1990), and Chemmanur and Fulghieri (1994).

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These tradeoffs are studied by Morrison and Wilhelm (2004), who argue that investment banks constituted themselves as private partnerships so as to maintain the reputation concerns that were in operation through the early part of our sample period. Private partnerships relied on internal governance arrangements that were difficult to sustain at the larger scales that were promoted by the technological forces that undermined exclusive relationships; Morrison and Wilhelm (2008) therefore argue that the technologies that weakened bank relationships also swept away traditional forms of investment bank governance. In line with this argument, nearly every investment bank went public and increased its scale of operation between 1970 and the mid-1980s. As scale increased, so did operational scope; Chen, Morrison, and Wilhelm (2015) argue that this further amplified conflicts within investment banks.

Technological advances and the rapid rise of institutional investing beginning in the 1960s also enabled search efficiency gains of the sort envisioned by Boot and Thakor (2000). In their model, this would increase competitive pressure on "transactional" lending and, indirectly, on relationship lending. The 1990s witnessed the first significant entry by commercial bank to securities underwriting and further broadening of the scope of operations within large investment banks. All else equal, we would expect increased competition between and commercial banks and investment banks to raise the cost of maintaining a relationship. However, Drucker and Puri (2005) provide evidence suggesting that informational economies of scope stemming from concurrent lending and underwriting could strengthen relationships. In Section 5.1.3 we suggest this as an explanation for an apparent stabilization of relationships during the 2000s.

Finally, in Section 5.2 we consider regulatory and market forces that may have attenuated informational frictions. In so doing, these forces may have diminished issuers' needs for relationships to provide credible certification of their quality. Although we believe that investment-banking relationships could be motivated, in part, by demand for certification, this perspective does not appear to shed additional light on time variation in bank-client relationships.

2. Data and Variable Construction

Details of securities offerings between 1933 and 1969 were 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 million or more from July 26, 1933 to December 31, 1949.[9] The records were

[9] *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.

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subsequently published in 1951 as *Issuer Summaries*.[10] There was little issuance activity between 1933 and the end of 1934, but, thereafter, activity was relatively strong through 1949, as industrial demand rose and interest rates declined, "except for occasional falling off in the depression of 1937 and in the early years of World War II" (Medina [1975] 1954, p. 40). Data for 1950s and 1960s deals were collected from the *Investment Dealers' Digest*.[11] The appendix provides a detailed description of the data and data 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-U.S. incorporated entities. SDC provides incomplete records for issues between 1970 and 1979. For example, there are no private placements data for this period; the SDC was unable to provide more complete data.

Although absolute dispersion in transaction size grew over time, our sample includes both (relatively) large and small transactions over the entire sample period.[12] It is important to note that, because we focus on underwriting activity of the top-30 banks by dollar market share in a given decade, our sample is biased toward relatively large transactions across the entire sample period. When we use the dollar value of transactions in our statistical analysis, amounts are in 1996 constant dollars, deflated using the annual gross domestic product (GDP) deflator.

The full sample data set (1933–2007) contains 287,332 underwritten 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).[13]

For the post-1969 period, for which we have more complete information, we make some additional exclusions. Deals for which the underwriter is recorded as "No Underwriter" or "Not Available" are excluded and so are issues by funds, depositaries, leveraged buyout deals, issues by

[10] 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 a further discussion of the data and its collection, see the appendix to the *Corrected Opinion of Judge Harold R. Medina.*

[11] Investment Dealers' Digest, Corporate Financing, 1950–1960, 1961; Investment Dealers' Digest, Corporate Financing, 1960–1969.

[12] Judge Medina noted that "an issue of $5,000,000 was considered small" during the 1933-49 period. Between 1933 and 1949, 155 issues raised at least $50 million, 559 raised at least $20 million, and over 1, 000 raised at least $10 million (Medina [1975] 1954, p. 40).

[13] We also exclude 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."

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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 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 2 years. These exclusions trim the sample to 63,302 transactions.

2.1 Long-horizon sample problems

Tracking and analyzing bank-client relationships over a very long horizon presents two significant problems. First, the choice model that we estimate assumes that issuers select an underwriter from a fixed set of banks determined by market share ranking. But banks rise and fall in the rankings through time and so we cannot hold the choice set fixed over the entire sample period.

Second, and related to this problem, although many of the major banks were very long lived, some discontinued their operations and others were acquired. In the case of acquisitions, we need to allow for relationships that are passed along to the acquiring bank. In the following subsections, we explain how we address these problems.

2.1.1 The issuer's bank choice set. Our econometric analysis involves the estimation of bank choice models for seven time periods that, with the exception of the first and last, correspond with decades. We use the 1933–1942 time window to seed several of the variables described below. For each subsequent time period, we fix the issuer's choice set for a given transaction to be 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*. Table A1 includes a list of the 30 banks that appear in each decade's choice set and their dollar market share during the decade. The market share accounted for by the top-30 banks ranges from 88% during the 1940s to 96% in the 2000s.

It is important to note that we stratify the full sample period only because we cannot hold the bank choice set constant over the entire sample period. Although decades roughly correspond with the timing of some important changes in the market environment, their endpoints are not intended to identify regime shifts; we do not believe that attempting to identify regime shifts statistically would be a meaningful exercise. As we point out below, there were many forces at play over this time period, and few, if any, could be meaningfully said to have had a discrete effect on bank-client relationships within a narrow time frame.

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The construction of the bank choice set excludes transactions managed by banks outside of the top 30 in a given decade. We also exclude transactions for which the issuer's SIC code was unavailable. These restrictions yield a final sample of 33,577 transactions for use in the econometric analysis. Table 1 reports the distribution of transactions in total and by type across the estimation periods. The number of transactions per estimation period ranges from a minimum of 842 for the 1943–1949 sample to a maximum of 12,574 for the 1990–1999 sample. Debt issues substantially outnumber equity (and preferred) issues in every estimation period. Over the entire sample period, debt, equity, and preferred issues accounted for 64%, 31%, and 5% of the sample of transactions. The percentage of transactions carried out by issuers that did no business with a bank in its choice set during the preceding 10 years ranged from 21% during the 1950–1959 estimation period to 48% during the 1970–1979 estimation period. Generally, equity issuers were less likely than debt issuers to have dealt with a bank in their choice set during the preceding 10 years.

2.1.2 Bank lifelines. Bank acquisitions or mergers occur throughout the sample period. We have data that enable us to observe many bankers from the dissolved bank joining the surviving bank. As a consequence, it is reasonable to assume that at least some of the dissolved bank's client relationships follow these bankers. This motivates us to follow Ljungqvist, Marston, and Wilhelm (2006, 2009) in the creation of a bank lifeline that, at a particular date, will comprise the names of all of the institutions that were merged into, or that were acquired by, the bank prior to that date as well as their relationships. The bank's lifeline ends either when it fails or when it is absorbed into another bank.

For example, Merrill Lynch acquired White, Weld in 1978. At this point, White, Weld's lifeline terminates and its client relationships are absorbed by Merrill. For White, Weld clients who did not work with Merrill during the 10 years preceding the acquisition, the client relationship is simply passed along to Merrill. On the other hand, if Merrill and White, Weld worked for a common client during the preceding 10 years, then Merrill's relationship with the client becomes more exclusive by virtue of merging each bank's business with the client into a common pool.

2.2 Variable selection and construction

The nested logit model treats each issuer as conditioning its bank choice on both bank-specific and transaction-specific attributes. In broad terms, we think of bank-specific attributes as reflections of bank behavior and capabilities. Other things equal, we expect issuers to prefer more

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Table 1
Distribution of transactions across estimation periods

	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
All Transactions	842		1,217		2,164		2,602		10,311		12,574		3,867	
	230 (27%)	612 (73%)	259 (21%)	958 (79%)	810 (37%)	1,354 (63%)	1,256 (48%)	1,346 (52%)	4,830 (47%)	5,481 (53%)	4,647 (37%)	7,927 (63%)	1,681 (43%)	2,186 (57%)
Equity	193		172		724		1,061		2,551		4,190		1,658	
	88 (46%)	105 (54%)	56 (33%)	116 (67%)	415 (57%)	309 (43%)	724 (68%)	337 (32%)	1,444 (57%)	1,107 (43%)	2,420 (58%)	1,770 (42%)	854 (52%)	804 (48%)
Debt	516		1,000		1,399		1,494		7,179		7,858		1,865	
	98 (19%)	418 (81%)	193 (22%)	807 (81%)	387 (28%)	1,012 (72%)	524 (35%)	970 (65%)	3,037 (42%)	4,142 (58%)	1,873 (24%)	5,985 (76%)	550 (29%)	1,315 (71%)
Preferred	133		45		41		47		581		526		344	
	44 (33%)	89 (67%)	10 (22%)	35 (78%)	8 (20%)	33 (80%)	8 (17%)	39 (83%)	349 (60%)	232 (40%)	354 (67%)	172 (33%)	277 (81%)	67 (19%)

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.

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trustworthy and more capable bank(er)s. Our primary concern lies with studying the former while controlling for bank capabilities and transaction-specific attributes that are intended to reflect the degree of risk or asymmetric information presented by different issuers and transaction types.

Our selection of variables to proxy for bank-specific and transaction-specific attributes reflects two considerations. First, we have sought to include variables that have proven to have explanatory power in existing research on issuers' choices. However, we wish to maintain consistency in the model specification across the entire sample period and this goal imposes some limitations. We use the final-stage, bank-choice specifications in Ljungqvist, Marston, and Wilhelm (2006, 2009) as a guide for variable selection and construction. Our primary shortcoming relative to this benchmark is the inability to measure analyst behavior and bank lending across the entire sample period. We do not believe that this is a serious limitation. Lending capacity and analyst coverage are significant elements of investment-banking relationships only during the last two decades of our sample period, that is, the time period covered by the existing literature. The main contribution of our paper is to document and explain the evolution of investment-banking relationships to the point at which they have been studied extensively in the literature. Moreover, the eigenvector centrality measure of a bank's syndicate connections described below appears to embody changes in the menu of bank capabilities considered by issuers when they select a bank.

In the remainder of this subsection we describe the motivation for each bank-specific and transaction-specific variable and explain how they are measured.

2.2.1 Bank-specific attributes: Relationship strength. Our proxy for the strength or state of a banking relationship, *RelStr*, is the bank's dollar share of securities that the client issued over the preceding 10-year window. More precisely, the relationship strength for any bank and any issuer is calculated on a given date D as follows. First, we calculate the total dollar quantity Q of proceeds raised by any firm during the 10 years prior to D. Second, the total amount A lead managed for the firm 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. Using a similar measure, Ljungqvist, Marston, and Wilhelm (2006, 2009) document a strong influence of the state of bank-client relationships on the selection of lead managers and comanagers for both debt and equity issues brought to market from 1993 to 2002.

Traditional measures of reputation in the investment-banking literature focus on bank market share (Megginson and Weiss 1991) and

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tombstone rankings (Carter and Manaster 1990). Although these measures are useful proxies for a market-wide reputation, neither has the relationship-specific interpretation that we seek here. We do not wish to suggest that banks' reputation concerns are strictly bilateral. Unlike typical consumer transactions, securities transactions are often highly visible. To the extent that this visibility increases the threat of community punishment through damage to a market-wide reputation, the burden of sustaining bilateral trust faced by an individual client could be diminished. The literature usually interprets these measures as a reflection of a bank's capacity for producing information about the issuer and certifying the quality of its securities. With this in mind, we have also included each bank's market share during the year of a transaction as an additional bank-specific variable in some specifications of our models.

Table 2 complements Figure 1 by presenting data summarizing client relationships for each of the top-30 banks by market share for the periods 1933–1969 and 1970–2007. For each bank, the table reports the number of clients for which it managed securities offerings, the percentage of clients with which its relationships were exclusive, and the fraction of all of its clients' transactions by dollar value for which the bank was the lead manager. Proceeds from transactions with multiple bookrunners are apportioned equally among the bookrunners.[14] Table 2 reveals that bank-client relationships during the 1933–1969 period were very different from those examined in previous research that uses post-1970 SDC data. During the first half of our sample period, 53% of all client relationships among the top-30 banks were exclusive; in those relationships, one bank *managed every deal* that the issuer brought to market during the 38-year interval. This figure dropped to "only" 34% during the second half of the sample period. A larger drop, from 39% to 16%, occurs in the mean fraction of all client underwriting proceeds for which a each bank had management responsibility. In no small part this decline is due to the reentry of commercial banks into securities underwriting during the 1990s and 2000s. Our underwriting measure ascribes no initial (underwriting) relationships to those banks, but many of them rapidly built underwriting relationships on the back of existing (but unmeasured) lending relationships.

2.2.2 Bank-specific attributes: Relationship strength within industry groups. A bank's capabilities include industry-specific expertise acquired by executing transactions in that industry. We control for a bank's expertise in the issuer's industry with a measure of that bank's

[14] We use the terms "lead underwriter," "lead manager," and "bookrunner" interchangeably and distinguish them from comanager with equal apportionment of proceeds. The presence of comanagers and multiple bookrunners is largely a post-1990 phenomenon.

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Table 2
Relationship Exclusivity: 1933-1969 and 1970-2007

	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
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%	13.2
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%	12.9
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%	15.3
A. G. Becker	110	63.64%	46.30	Alex. Brown	392	50.77%	28.6
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

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.

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relationships with other firms in that industry. We identify industry by four-digit SIC code. Starting in 1944, we compute a measure *RelStrSIC* of industry expertise for each bank in the issuer's choice set as follows. Banks that managed deals for one or fewer firms in a given SIC code in the previous 10 years are assigned a zero *RelStrSIC*. If a bank managed at least one deal for more than one firm within the same SIC classification in the preceding 10 years, then we compute the average *RelStr* index of section 2.2.1 across each of those firms, and assign that average to *RelStrSIC*.

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 category 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.

We cast a wider net than Asker and Ljungqvist because we consider *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%.[15] The pre-1960 peak was not surpassed until 1985.

Asker and Ljungqvist (2010) argue that issuers prefer not to engage banks that work with their competitors for fear that strategic information about the issuer may leak. If this concern arises across our entire sample period, issuers must trade off industry expertise, as witnessed by a high level of *RelStrSIC*, against exposure to any conflicts that might arise from retaining a bank that works with their competitors. *RelStr* does not control for concern for such conflicts so that the coefficients that we estimate for *RelStrSIC* reflect the *net* impact of these effects on issuer decisions.

2.2.3 Bank-specific attributes: Syndicate connections. In addition to industry expertise, issuers account for the broad range of services that the

[15] 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.

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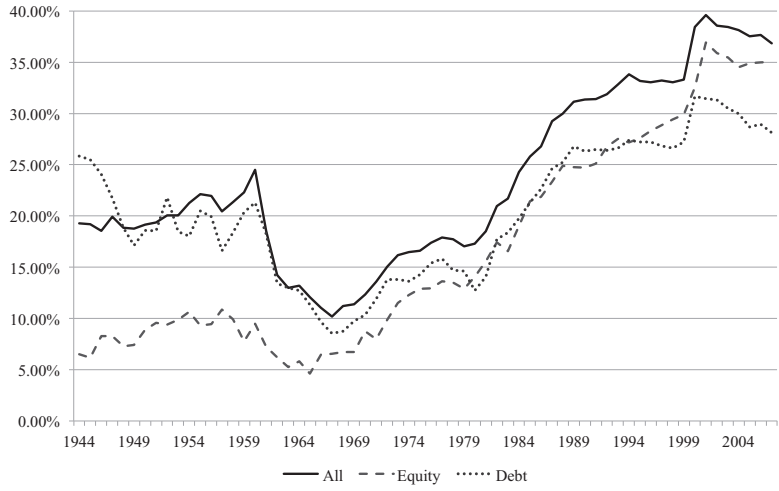

Figure 2
Bank-firm relationships within SIC categories
The figure reports the fraction of banks with multiple clients within a four-digit SIC category, conditional on a bank having at least one client in the industry category. A bank is identified as having a client in an SIC category in a given year 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.

investment bank supplies when it serves as underwriter. The bank may supply these services directly or indirectly via the underwriting and selling syndicates that it assembles for the transaction. These services include pricing and distribution, market making, analyst coverage, and lending capacity.[16] We cannot directly and independently measure the ability to provide these services over our entire sample period; we therefore develop a proxy for the quality of the bundle of syndicate services that an issuer expects a lead underwriter to deliver by virtue of the quantity and quality of the banks with which it maintains syndicate relationships.

We use graph-theoretic techniques to quantify the quality of the bank's syndicate relationships.[17] Each year, we create a graph in which every bank in our data set forms a node. An edge connects two banks in the graph if, at any time in the previous 5 years, one of the banks invited the other to be a comanager in an underwriting syndicate for which it was a lead manager. For each bank in the graph we calculate a standard graph-theoretic measure of network connectedness called eigenvector centrality

[16] See Corwin and Schultz (2005) for a detailed discussion of the functions carried out by modern underwriting syndicates.

[17] 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.

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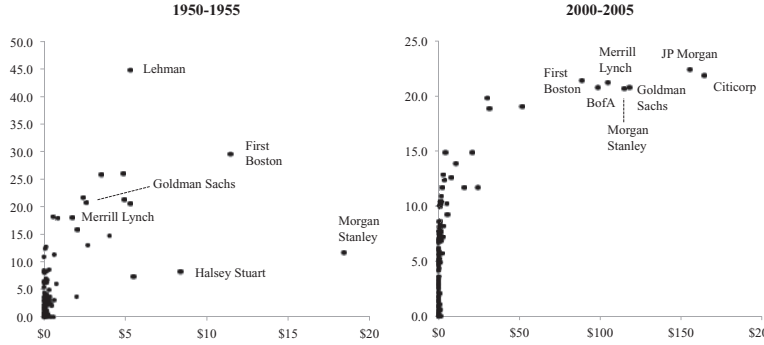

Figure 3
Relationship between EVC and underwriting volume
The figure plots banks' eigenvector centrality (EVC) against their underwriting volume for the time periods 1950-1955 and 2000-2005. Underwriting volume is the total proceeds managed by the bank ($m) during the time period. EVC is measured for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

(*EVC*).[18] Eigenvector centrality reflects both the quantity and the quality of a bank's syndicate relationships, where quality is determined by the connectedness of the bank's relationship peers. The formal definition of eigenvector centrality appears in the appendix.[19]

Figure 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. Some of the points that correspond to particularly significant banks are labeled in both plots. 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.[20] Moreover, Morgan Stanley was a strong defender of traditional, negotiation-based modes of doing business during this period

[18] Note that, although we use *EVC* for only the 30 banks in the choice set, it is calculated using a graph that encompasses every bank in our data set. For the 30 banks in the choice set, *EVC* therefore measures connectedness to banks inside and outside the choice set.

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

[20] 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).

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and its client relationships were among the strongest.[21] Halsey, Stuart & Co. also had a low EVC and high underwriting proceeds over this period. However, in contrast to Morgan Stanley, Halsey Stuart was an aggressive bidder for competitive tenders, by which it hoped to destroy existing bank-client relationships (Medina [1975] 1954, pp. 506 and 623); as shown in Table 2, it maintained relatively weak relationships with its clients. 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.

It is plausible that syndication weakens the immediate gains from a competitive advantage in one or more of the services for which we envision *EVC* serving as a proxy. For example, in the early part of our sample period, Merrill Lynch had by far the largest and most sophisticated retail brokerage network, whereas Morgan Stanley and Kuhn Loeb had none. Merrill Lynch nevertheless remained a second-tier bank through the 1960s (see Table A1). Moreover, to the extent that many banks were similarly able to assemble the capabilities necessary for a transaction via syndication, individual banks would be close substitutes along this dimension and, hence, *EVC* would have little explanatory power in our model. We return to this point when we discuss the results from estimating the bank-choice model.

2.2.4 Transaction-specific attributes. We include three transaction-specific variables in our econometric analysis: an indicator for whether the transaction was an equity issue (*Equity*), the log of the (1996 constant) dollar value of proceeds raised (*log deal value*), and the number of the issuer's transactions between 1933 and the present transaction (*Deals to date*). Each variable is intended to control for the characteristics of the issuer or the transaction at hand. Other things equal, we expect equity issues to be subject to more severe informational frictions. If the more challenging certification problems of equity underwriting also expose banks to greater reputational risk, then more reputable banks may be relatively less inclined to "match" with equity issuers (see Carter and Manaster 1990; Chemmanur and Fulghieri 1994; Fernando, Gatchev, and Spindt 2005). Similarly, to the extent that technological change attenuates reputational concerns, we expect it to weaken this effect.

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

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We expect informational frictions to be weaker among firms that are more mature and more frequent participants in the capital markets. We conjecture that information about large firms is more widely disseminated and include *log deal value* as a proxy for firm size. Finally, given the prohibitive cost of tracking firm age, we use *Deals to date* as a proxy for this attribute and expect informational friction to be smaller among firms that have done more deals prior to the transaction at hand to present less informational friction. But note also that, if past issuance activity is perceived as an indicator of future activity, then more active issuers might also have greater capacity for sustaining a rent stream sufficient to support trustworthy behavior.

2.3 Summary statistics

Table 3 reports summary statistics for the primary bank-specific and transaction-specific variables used in the full-sample nested logit model. For estimation purposes, *RelStr*, *RelStrSIC*, and *EVC* have been normalized to a 0–100 scale. We report each variable by time period and, for the bank-specific variables, 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 10 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 10 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 3 also reveals that banks selected to manage deals generally maintained (statistically) stronger relationships with other firms in the issuer's four-digit SIC category. The difference is statistically significant during the 1950s, 1960s, and 1980s. On average, banks selected by issuers also 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 are statistically significant during every decade, except for 1943–1949. In further contrast, the mean levels for *EVC* for both bank types are relatively stable through time. Finally, on average, issuers selected higher-ranking banks (with lower mean rank values). Thus the average rank for banks that were not selected is centered slightly below the midpoint of the ranking scale.

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Table 3
Summary statistics for bank-specific and transaction-specific variables

	1943-1949		1950-1959		1960-1969		1970-1979		1980-1989		1990-1999		2000-2007	
Bank-specific variables														
	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***	12.26	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	15.77	7.72
	(8.62)	(7.18)	(8.60)	(6.84)	(8.65)	(8.01)	(8.61)	(7.48)	(8.61)	(7.58)	(8.60)	(7.96)	(8.59)	(6.80)
Transaction-specific variables														
log deal value ($m)	69.50		66.70		75.60		138.90		104.60		134.20		140.10	
	(105.00)		(130.00)		(158.00)		(206.00)		(218.00)		(266.00)		(212.00)	
Deals to date	6.10		11.78		10.02		6.21		5.17		16.11		38.37	
	(8.66)		(14.66)		(17.51)		(15.92)		(10.67)		(33.28)		(101.22)	
Equity	22.90%		14.73%		33.46%		40.78%		24.74%		33.32%		43.00%	
Number of transactions	842		1,217		2,164		2,602		10,311		12,574		3,867	

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 four-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. *log deal value* is the log of the dollar value of proceeds raised in the transaction. *Deals to date* is the number of transactions from the beginning of the sample period (1933) carried out by the issuer prior to the transaction at hand. *Equity* is 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.

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Turning to the transaction-specific variables, equity issues ranged from 14.73% of sample transactions during the 1950s to 43% during the 2000s. The average transaction value was substantially larger from 1970 forward while issuers' average number of transactions from 1933 to the present (*Deals to date*) sharply declined during the 1970s and 1980s, reflecting an increase in initial public offering (IPO) activity. We provide further details and examine the sensitivity of our results to this change in Section 4.

3. 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, comprising 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 that specifies utility for transaction i as:

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

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

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

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. A nested logit specification addresses this problem by permitting

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error correlation within groups while treating errors across groups as independent. Note that the nested logit specification reduces to the conditional logit model under the assumption of independent and identically distributed errors. In contrast to the expression for conditional logit choice probabilities given above, nested logit choice probabilities equal the product of the probability of selecting a group and the probability of selecting a bank conditional on having selected the bank's group (see (Cameron and Trivedi, 2008, ch. 15) for further details).

Our setting has no obviously "correct" nesting structure. 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, the banks in a group should be close substitutes for one another, and banks in different groups should differ. The 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. Table A1 reveals that the market share accounted for by the top-5 banks ranges from 37% (1960s) to 60% (1980s). The market share for the second group of 15 banks ranges from 29% (1980s) to 40% (1960s). Finally, for the last 10 banks, market share ranged from 2% (2000s) to 6% (1960s). Recognizing that there remains a degree of arbitrariness in our grouping strategy, we have experimented with alternative groupings. Although we do not report these results, our conclusions are not sensitive to the alternatives with which we have experimented.

Our primary interest is in the influence of the bank-specific attributes X_i, especially *RelStr*, on the issuer's bank choice. In addition to *RelStr*, these attributes include *RelStrSIC* and *EVC*. *RelStr* and *RelStrSIC* generally vary across transactions in a given year, 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. Transaction-specific attributes (*Equity*, *log deal value*, and *Deals to date*) vary across transactions but not across banks in the issuer's choice set. Transaction-specific parameters are estimated for the top-5 and next 15 bank groups with the bottom-10 bank group providing the basis for comparison.

4. Estimation Results

Table 4 presents results for each of the 7 estimation periods. For each period, we report coefficients (with standard errors in parentheses) for

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Table 4
Bank Choice Model

Estimation Period	*RelStr*	*EVC*	*RelStrSIC*	*Equity*	*log (deal value)*	*Deals to date*	Transactions	χ2(n)
1943-1949	0.0296***	−0.0118***	0.0096***				842	248(9)
	(0.003)	(0.003)	(0.002)					
Top-5 Banks				−1.6310***	0.0370**	0.0996***		
				(0.310)	(0.017)	(0.038)		
Banks 6 - 20				−0.8869***	0.0521***	0.1015***		
				(0.270)	(0.016)	(0.037)		
1950-1959	0.0272***	−0.0057***	0.0033***				1,217	370(9)
	(0.002)	(0.003)	(0.001)					
Top-5 Banks				−0.8080***	0.0705***	0.0624***		
				(0.284)	(0.012)	(0.018)		
Banks 6 - 20				−0.9278***	0.0758***	0.0652***		
				(0.274)	(0.012)	(0.018)		
1960-1969	0.0432***	0.0125***	0.0071***				2,164	672(9)
	(0.002)	(0.004)	(0.001)					
Top-5 Banks				−1.0393***	0.0637***	−0.0384***		
				(0.170)	(0.011)	(0.010)		
Banks 6 - 20				−0.6770***	0.0475***	0.0153***		
				(0.146)	(0.010)	(0.006)		
1970-1979	0.0366***	0.0330***	0.0100***				2,602	564(9)
	(0.002)	(0.005)	(0.001)					
Top-5 Banks				−1.1379***	0.0915***	0.1182***		
				(0.163)	(0.017)	(0.037)		
Banks 6 - 20				−0.7755***	0.0631***	0.1078***		
				(0.157)	(0.017)	(0.037)		
1980-1989	0.0333***	0.0238***	0.0045***				10,311	1,855(9)
	(0.001)	(0.002)	(0.000)					
Top-5 Banks				−0.8479***	0.0534***	0.0356***		
				(0.073)	(0.005)	(0.007)		
Banks 6 - 20				−0.7438***	0.0209***	0.0422***		
				(0.070)	(0.005)	(0.007)		
1990-1999	0.0307***	0.0258***	0.0043***				12,574	1,767(9)
	(0.001)	(0.002)	(0.000)					
Top-5 Banks				0.0977	0.0413***	0.0380***		
				(0.067)	(0.005)	(0.003)		
Banks 6 - 20				0.2271***	0.0264***	0.0316***		
				(0.064)	(0.005)	(0.003)		
2000-2007	0.0299***	0.0960***	0.0061***				3,867	747(9)
	(0.002)	(0.008)	(0.001)					
Top-5 Banks				−0.0406	−0.0179*	0.0007		
				(0.142)	(0.011)	(0.001)		
Banks 6 - 20				−0.6257***	0.0416***	−0.0035***		
				(0.141)	(0.009)	(0.001)		

This table reports coefficients estimated for the nested logit bank-choice model. The issuer's choice is conditional on the following 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 four-digit SIC category during the preceding decade. The issuer choice also conditions on three3 transaction-specific variables: *Equity* is an indicator variable equal to 1 for equity transactions and zero otherwise; *log (deal value)* is the log of the dollar value of proceeds raised in the transaction; *Deals to date* is the number of transactions from the beginning of the sample period (1933) carried out by the issuer prior to the transaction at hand. Parameter estimates for the transaction-specific variables for the nests containing the top-5 banks and the next 15 banks by market share are measured relative the third nest containing the last 10 banks by market share. Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels. We report a χ2 test statistic for goodness of fit with (n) degrees of freedom.

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each bank-specific and transaction-specific attribute. The signs of conditional logit coefficients can be directly interpreted to indicate the directional effect of a change in the attribute on the choice probability (Cameron and Trivedi 2008). The χ^2 test statistics reported in Table 4 indicate a very good fit to the data in each estimation period. Consistent with these test statistics, the (unreported) average predicted probabilities for individual banks generally correspond closely with their sample probabilities.[22]

RelStr has a positive and statistically significant effect on the issuer's bank choice during each of the seven estimation periods. Following the pattern exhibited in Figure 1, the influence of *RelStr* on the issuer's bank choice was greatest during the 1960s, following a post-war period of relationship rebuilding; it declined thereafter, with the largest change occurring between the 1960s and 1970s.

The estimated coefficients for *RelStrSIC* indicate that the state of a bank's relationships with other firms within the issuer's four-digit SIC category had a more modest (but statistically significant) positive influence on the issuer's bank choice throughout the sample period. This suggests that, notwithstanding potential conflicts of interest, issuers valued broad industry experience throughout the sample period. The 50% decline in the estimated *RelStrSIC* coefficient from the 1970s to the 1980s suggests either a growing concern for conflicts of interest or a sharp devaluation of industry-specific expertise.

Coefficient estimates for *EVC* are negative and statistically significant through the 1950s. Several factors may explain this seemingly counterintuitive result. First, the 1947 antitrust suit cast underwriting syndicates in a negative light, at least temporarily, and it encompassed most of the major investment banks. Second, retail investors dominated markets in the middle of the twentieth century so that issuers at that time would have placed a low value on a bank's ability to assemble sophisticated institutional investor networks for pricing and distribution through syndication (see the historical background discussion in Appendix A1). Third, as we note below, banks in the middle of the twentieth century generally did not distinguish themselves by their capitalization: with few exceptions, all were thinly capitalized. Finally, the analyst coverage and market-making services that

[22] As noted in Section 2.2.1, we have also estimated specifications of the models reported in Table 4 that include bank market share among the bank-specific attributes. As one would expect given findings in the existing literature, coefficients estimated for this variable were positive and statistically significant during each estimation period. On the other hand, the inclusion of market share yielded minimal additional explanatory power and led to virtually no absolute change in the estimated coefficients and standard errors for the primary variables of interest described in this section. In the interest of clarity and simplicity, we have not reported these results in Table 4.

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distinguish many modern syndicate leaders received little attention through the 1950s.[23]

In contrast, the effect of *EVC* is positive through the remainder of the sample period, and is especially strong in the 2000s. This pattern gives us some confidence in our interpretation of *EVC* as a proxy for a bank's ability to assemble the capabilities demanded by issuers. By the 2000s, there was an increasing use of multiple bookrunners in IPOs (Hu and Ritter 2007) and debt offerings (Shivdasani and Song 2011) and there was growing desire among issuers for (star) analyst coverage (Corwin and Schultz 2005) and lending facilities (Drucker and Puri 2005). Furthermore, as concern for conflicts of interest grew, a lead bank's willingness to work with multiple comanagers capable of "whisper[ing] in the issuer's ear" (Corwin and Schultz 2005) or of monitoring performance may have been perceived as a valuable commitment device.[24]

If leading investment banks have more valuable reputational assets, then we expect them to protect those assets by avoiding exposure to deals with significant information frictions. Those frictions are greatest for small issues, deals brought to market by infrequent issuers, and for equity issues. If we take market share as a proxy for a bank's broad reputation in the market (Megginson and Weiss 1991), then the coefficient estimates for each of the transaction-specific variables reported in Table 4 are broadly consistent with this hypothesis. The top-5 and middle-15 banks generally were more likely to be selected for larger deals and for deals brought to market by more active issuers. Similarly, equity issuers generally were 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 and the magnitude of this effect diminished through time.[25] These effects weaken from the 1970s forward, and, indeed, the signs on the coefficients for the equity indicator reversed during the 1990s. This change is consistent with an attenuation of reputation concerns as trade becomes more codified and arm's length. In addition, the 1990s included the run-up to the dot-com bubble during which the highest ranking banks actively sought to manage technology startups that previously were the purview of smaller and more specialized regional banks, such as Hambrecht & Quist.

[23] (Medina [1975] 1954, p. 43) observed in reference to secondary market price stabilization "While the authority to stabilize is generally given, it is only in relatively few cases that the authority has been exercised." Medina makes no reference to analyst coverage in his detailed discussion of the factors bearing on the selection of a bank to lead a deal or to join a syndicate.

[24] Evidence of comanagement serving as stepping stone to lead-management opportunities (Ljungqvist, Marston, and Wilhelm 2009) suggests that comanagers had an incentive to serve in this capacity.

[25] 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.

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Recall that the nested logit model specification was motivated by rejection of the independence of irrelevant alternatives (IIA) assumption. We examine the sensitivity of our results to this modeling decision by estimating both a simple conditional logit model that includes only the bank-specific attributes (using Stata's *CLogit* routine) and a model that includes both the bank-specific and transaction-specific attributes (using the *ASClogit* routine). Estimated coefficients for the bank-specific attributes in these models are reported in Table 5, where we also include the bank-specific results from the nested logit models for ease of comparison. Each specification yields results that are qualitatively similar to those obtained under the nested logit specification. We are particularly interested in the cross-model sensitivity of the time pattern associated with *RelStr* and whether cross-decade changes are statistically significant. From the 1960s onward, we see little difference between coefficient estimates for *RelStr* for the *ASCLogit* and *NLogit* models, each of which includes the transaction-specific attributes.

The relative insensitivity of these results to model specification is useful because we are not aware of a formal statistical test for differences in the nested logit coefficients across time periods and we have been unable to devise such a test. However, it is possible to conduct such a test for the alternative-specific conditional logit (*ASCLogit*) estimated for the same set of bank- and transaction-specific variables.[26] Cross-decade χ^2 tests for the *ASCLogit* model indicate that the decline in the *RelStr* coefficients from the 1960s to the 1970s is statistically significant at the 1% level as is the decline from the 1980s to the 1990s. Differences between the 1970s and 1980s and 1990s and 2000s are not statistically significant at the 5% level.[27] Figure 4 presents 95% confidence intervals for the nested logit coefficient estimates that are consistent with these results. Specifically, there is little or no overlap between the confidence intervals for the 1960s and 1970s and for the 1980s and 1990s. Taken together, these results suggest that the apparent weakening of issuers' concern for their investment-banking relationships is statistically meaningful between the 1960s and 1970s and between the 1980s and 1990s.

[26] *Stata's suest* ("seemingly unrelated estimation") routine provides a χ^2 test of differences in individual coefficients across decades for conditional logit specifications with both bank- and transaction-specific attributes. The inability to employ this test to the nested logit results 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 4 and a poorer model fit as indicated by the log likelihood for the regression.

[27] Increases in the coefficient estimates for *RelStr* between the 1940s and 1950s and between the 1950s and 1960s are statistically significant at the 5% and 1% levels, respectively. For *RelStrSIC*, changes across decades from the 1950s through the 1980s are statistically significant at the 1% level, while for *EVC*, the only statistically significant change occurred between the 1980s and 1990s.

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Table 5
Bank choice model: Alternative specifications

Estimation period		*RelStr*	*EVC*	*RelStrSIC*	Transactions	χ2(n)	ll
1943-1949	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)			
1950-1959	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)			
1960-1969	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)			
1970-1979	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)			
1980-1989	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)			
1990-1999	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)			
2000-2007	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)			

This table reports coefficients estimated for three 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 four-digit SIC category during the preceding decade. The ASCLogit specification estimates (unreported) coeeficients for three 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 three transaction-specific variables for the first and second nests (with the third nest serving as the base). Robust standard errors are reported in parentheses Robust standard errors are reported in parentheses (within transaction clustering is used to address potential error correlation among the 30 banks in the choice set). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels. For each regression we report the log likelihood (ll) value and a χ2 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 χ2 test statistic are not directly comparable those reported for the CLogit and ASCLogit specifications.

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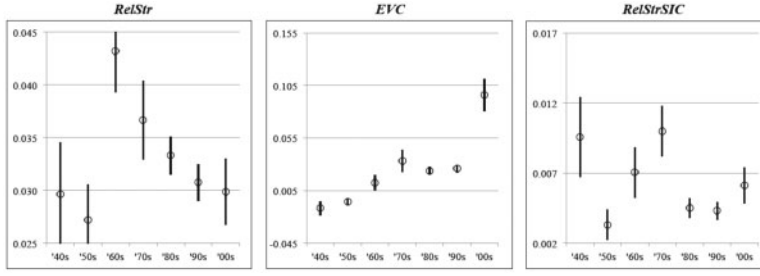

Figure 4
Estimated coefficients and confidence intervals
This figure plots the estimated coefficients and confidence intervals for bank-specific attributes in the nested logit models reported in table 4.

We shed further light on the nature of change in bank-client relationships 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 that the issuer selects bank j for transaction i and $RelStr_{ij}$ is bank j's relationship strength with the issuer.[28] Figure 5 plots elasticities against their corresponding value of *RelStr* for each estimation period using the full-sample specification. 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 includes 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 is 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. The elasticity of their choice probability with respect to *RelStr* is defined to be zero, so that the scatterplots are anchored at the 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 (elasticity < 1.0) with respect to *RelStr* and elastic (elasticity > 1.0) for intermediate levels of *RelStr*: that is, issuers were relatively insensitive to a small change in *RelStr* for banks with which they had very weak or very strong

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

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

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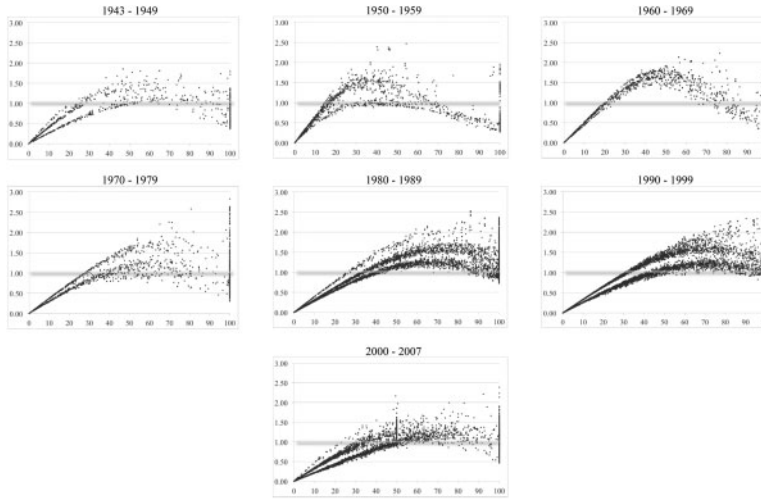

Figure 5
Choice probability elasticities with respect to *RelStr*
During each estimation period, we calculate choice probability elasticities with respect to *RelStr* for each bank in the choice set for each transaction. Elasticities are pooled across transactions and banks and then plotted against *RelStr*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

relationships. The latter conclusion is consistent with the high level of relationship exclusivity observed in the data: a well-established relationship was not easily contested.

With the exception of the 1960–1969 estimation period, there is a clear separation among elasticities for a given value of *RelStr* that closely corresponds with the nesting structure in the nested logit. Elasticities for a given level of *RelStr* are lowest among the top-5 banks and greatest among the bottom-10 banks. Thus, for a given level of relationship strength, relationships maintained by the more highly ranked banks were less contestable. This observation is consistent with the hypothesis that the top banks had very important and difficult-to-replicate reputational assets. By the 1980s, when we argue that reputational commitment was being displaced by contract, even the top-5 banks generally exhibited elastic choice probabilities for values of *RelStr* greater than 50. Note further that the center of mass for elasticities associated with exclusive relationships shifted up considerably so that, by the 1990s, virtually all exclusive relationships exhibited elastic choice probabilities. In general, as the influence of *RelStr* (and, as we argue, of tacit commitment) on issuer choices diminished, as exhibited in Table 4, bank-client relationships with intermediate to high levels of *RelStr* were subject to competition regardless of the bank's status. By the 2000s there is little observable difference between the top-5 and next 15 banks as elasticities for both groups hovered at or below 1.0 for moderate to strong relationships.

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Before turning to the discussion and interpretation of our findings, it is worth examining the senstitivity of our results to two noteworthy changes in the investment-banking landscape. First, the declining influence of *RelStr* corresponds in time with a sharp increase in primary equity market activity. For example, Jovanovic and Rousseau (2001) identify 525 new equity *listings* from 1940–1959, 2,008 during the 1960s, and 4,517 during the 1970s. Gompers and Lerner (2003) report a similar number of *IPOs* for 1940–1959 (588) and 1960–1969 (2,151).[29] We check whether this change has any bearing on our conclusions by reestimating the nested logit model while excluding IPOs from the sample. The results, reported in Table A2, indicate that neither the magnitudes of the coefficients estimated for *RelStr* nor their time pattern meaningfully differ from the results reported in Table 4.

Finally, it is likely that bank-client relationships were influenced by commercial bank entry to securities underwriting during the latter part of our sample period. This process started when, on March 18, 1987, the Federal Reserve Board approved Chase Manhattan's application to underwrite and deal in commercial paper through a commercial finance subsidiary. Approval of similar applications from Citicorp, J. P. Morgan, and Bankers Trust followed soon thereafter. Our sample does not include commercial paper transactions, and it was not until January 18, 1989, that commercial banks could gain approval for underwriting corporate debt. The Fed did not grant equity underwriting powers to commercial banks until September 1990.

Nine commercial banks appear in our 30 bank choice set for 1980–1989 (see Table A1). The most active among these banks, Citicorp, managed only 1.5% of the dollar value of underwritten debt and equity transactions in our 1980–1989 sample. We test whether limited commercial bank participation in securities underwriting during the 1980s influenced the estimation results for this period by reestimating the nested logit model for the years 1980–1986. This estimation period rules out potential contamination of existing bank-client relationships by commercial bank participation in the commercial paper market as well as their

[29] Identifying IPOs prior to 1970 is challenging. New *listings* do not necessarily correspond with IPOs, and we are not aware of a source that provides a comprehensive report of IPOs prior to 1970. We identify IPOs in our estimation sample by comparing the first public equity offering after 1933 by any firm in our database to the set of new listings identified by Jovanovic and Rousseau (2001) and, following Gompers and Lerner (2003), by checking issues of *Moody's* for any indication of the issuer having been previously listed. Details of our classification strategy and the transactions identified as IPOs are available on request. Also, note that our criteria for inclusion in the estimation sample screens out a large fraction of transactions identified as IPOs. For example, of the 4,517 new listings during the 1970s in the Jovanovic and Rousseau (2001) sample, only 202 deals identified as IPOs by SDC, or 8% of the 2,602 deals in our estimation sample for the 1970s, meet our criteria for inclusion in the estimation sample. Using screening methods similar to ours, Jay Ritter reports 111 IPOs from 1975 to 1979. In contrast, using less stringent screens, such as including best efforts and smaller deals, he reports 1,425 IPOs for the first half of the decade. See table 8 in "IPOs 2013 Underpricing" at http://bear.warrington.ufl.edu/ritter/ipodata.htm (December 7, 2014).

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participation in debt underwriting beginning in 1989. This specification yields results that are not meaningfully different from those reported in Table 4 for the full 1980–1989 estimation period. Thus, we find no evidence that commercial bank participation in securities underwriting influenced bank-client relationships before the 1990s. We give further consideration to the elimination of Glass-Stegall restrictions on securities underwriting by commercial banks as well as other regulatory interventions that might have influenced bank-client relationships in Section 5.2.

5. Discussion

In this section we examine the econometric results from two theoretical perspectives. As we noted earlier, our analysis is motivated by an interpretation of investment-banking relationships as a response to *conflicts that arise because banks are better informed than their clients*. These conflicts are difficult to observe and to quantify and, hence, cannot be resolved using arm's-length black-letter contracts. Strong bank-client relationships are a response to this problem. They yield a rent stream for banks that refrain from opportunistic behavior, and so reassure clients that their bank will place their interest before its own. Both parties' commitment to their relationship therefore reflects the state of the contracting environment and also the potential gains from opportunistic behavior. We therefore examine technological, organizational, and institutional changes that altered the value of bank-client relationships in line with the time patterns we observe in the data.

The commercial banking literature presents an alternative explanation for banking relationships. That literature studies situations in which *borrowers are well informed relative to prospective lenders* (see Boot 2000 and the work cited therein). Lending relationships address this problem by promoting screening and behavioral monitoring, but it creates a potential hold-up threat that derives from the lender's information monopoly. This perspective has its closest investment-banking analogy in the certification function commonly associated with securities underwriting (see Booth and Smith 1986; Titman and Trueman 1986; Carter and Manaster 1990; Chemmanur and Fulghieri 1994). We conclude this section by examining whether it provides additional explanatory power for the long-run behavior of investment-banking relationships.

5.1 Relationships as a response to the threat of banks betraying client trust

5.1.1 Conditions that sustained relationships and reputation concerns: 1933–1959. Investment-banking relationships and the client-specific reputations they foster stem from the interactions between *individual* bankers and senior officers of the client firm. A long-term relationship

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that creates value for the bank and its client therefore rests on the bank's ability to control internal conflicts of interest that could cause violations of client trust, or prevent relationships from being passed from one generation of bankers to the next. But relationships and reputation concerns are tacit assets that cannot be transferred at arms length (by formal contract) across generations of bankers. Investment-banking relationships therefore require an institutional device that allows for the formation of very long-lived reputations and relationships, and for their transfer between generations of bankers.

Morrison and Wilhelm (2004) demonstrate how partnership firms, like the banks that dominated the first half of our sample period, can achieve this intergenerational transfer. In their model, tacit assets, such as a reputation for fair dealing that underlies client relationships, can only be transferred from senior to junior agents via on-the-job mentoring. That mentoring is not verifiable and, hence, is not susceptible to formal contract. In particular, because human capital is mobile, the beneficiaries of mentoring may leave the firm and sell their new skills to the highest bidder. The partnership addresses this problem: it is deliberately *opaque*, so that employees face an adverse selection problem in the labor market until they make partner, at which stage they are locked in by the need to invest in an *illiquid* partnership stake (Morrison and Wilhelm, 2007, pp. 270–1). Partners mentor because they can only sell out to a narrow pool of next-generation partners, who will invest only if they have gained the tacit skills to maintain fee income in the future. Partners prevent free riding in the mentoring function by monitoring one another, but this is only feasible at a *small scale of operation*.

The investment-banking partnerships of the early part of our sample period had the technological features of the model presented by Morrison and Wilhelm (2004). Opacity was supported by the absence of public reporting requirements for NYSE member firms. Merrill Lynch decided to publish an annual report in 1940; it was the first of its kind among member firms and was widely viewed as violating the spirit of NYSE regulation (Perkins, 1999, pp. 164–5). Illiquidity of early partnership stakes is evidenced by the fact that, once admitted to the partnership, bankers routinely spent the remainder of their career with with the same bank. For example, Goldman Sachs had 5 partners in 1934. *On average*, members of this cohort spent 37 years as partners in the firm (data collected from annual volumes of the NYSE's Member Firm Directory).

Figure 6 provides a broader perspective on banker longevity and immobility by reporting a measure of change in the experience level of partners for eight representative banks. For each bank, we compute the percentage change from the preceding year in the number of years served by the bank's partners. We then compute a 3-year moving average

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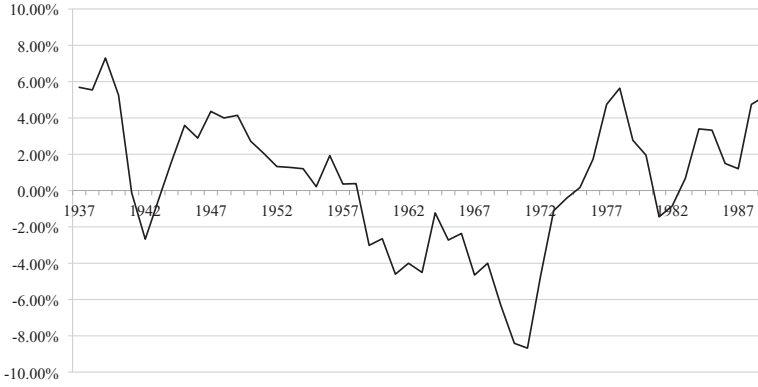

Figure 6
Bank partner tenure
The figure reports a measure of the average change in bank partner tenure for a subset of eight banks (Dean Witter, E. F. Hutton, Merrill Lynch, Smith Barney, Goldman Sachs, Lehman Brothers, Morgan Stanley, and Salomon Brothers). For each bank, partner tenure is measured as the number of years served as a partner entering a given year. For each year, we calculate a 3-year moving average of the annual percentage change in partner tenure. The figure reports the average of the 3-year moving average obtained for the eight banks in a given year.

of this change to smooth the effect of discreteness in the length of partnership agreements that determined the years in which old partners left and new ones were appointed. Figure 6 reports the average value of this measure of change in partner tenure across the eight banks. With the exception of 1942, when a number of bankers left to join the war effort, Figure 6 indicates that banker tenure increased, but at a declining rate, through the mid-1950s. The average banker tenure for these eight banks peaked at 14.7 years in 1957.

The small scale of the early banking partnerships is illustrated by Figure 7, which reports the annual number of partners for each member of the eight-bank sample used in Figure 6. With the exception of Merrill Lynch, these banking partnerships remained quite small through the 1950s with the number of partners ranging from 20 to 45 in 1960.[30] The smallest partnerships maintained one or very few offices and thus provided an environment in which partners could easily monitor one another, for example, they often sat in close proximity, if not in the same room.

Chen, Morrison, and Wilhelm (2015) argue further that the narrow scope and light capitalization of early banking partnerships limited internal conflicts of interest of the sort that occur in modern, full-service banks that combine large-scale trading and advisory operations. Among the top ten underwriters in 1953, First Boston's $20

[30] Merrill's much larger partnership (93 partners in 1960) reflects the 1941 merger with Fenner & Beane that nearly doubled the size of the firm's retail brokerage network, coupled with the fact that brokerage offices generally were headed by a partner (Perkins 1999, p. 167).

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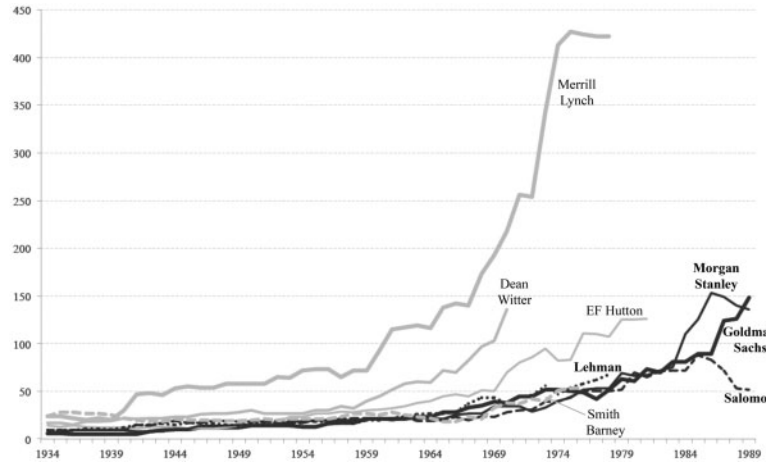

Figure 7
Number of partners
This figure plots the number of partners on an annual basis for the eight-bank subsample. Goldman Sachs, Lehman, Morgan Stanley, and Salomon comprise the "wholesale" bank group in the nested logit analysis. Dean Witter, E. F. Hutton, Merrill Lynch, and Smith are assigned to 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.

million capitalization, was the highest by a wide margin. In contrast, Morgan Stanley and Kuhn, Loeb each held less than $6 million in capital. At the end of the decade, First Boston's capitalization remained little changed at $22 million, and even in 1963 the capitalization of Morgan Stanley ($5 million) and Kuhn, Loeb ($7 million) remained well below $10 million. (See the annual rankings provided in *Finance* magazine.)

In summary, until at least the middle of the twentieth century, investment banks exhibited properties that, Morrison and Wilhelm (2004) and Chen, Morrison, and Wilhelm (2015) argue, support the development and preservation of institutional reputation concerns. Consistent with this interpretation, we are not aware of any changes in the contracting environment that would have undermined client demand for informal governance of their banking relationships. With the exception of First Boston, all of the major banks operated as private partnerships, most of which were very lightly capitalized and narrow in their operations. During this period, investment-banking relationships recovered from the upheaval of the 1933 Banking Act and grew stronger through the 1950s (Figure 1) in spite of persistent efforts to force competitive bidding (see Appendix A1). Issuers more heavily conditioned their bank choices on the state of their relationships (Table 4). And, judged by the choice probability elasticities with respect to *RelStr* reported in Figure 5, many banks maintained relationships that were virtually uncontestable.

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5.1.2 First indications of the decline of relationships and reputation concerns: 1960–1989. As a vehicle for preserving relationships and reputation concerns, the partnership has one serious limitation: because partners can free-ride on one another's mentoring effort, there is an upper bound on partnership membership and, hence, on the partnership's capitalization. Morrison and Wilhelm (2008) show how a technological shock that increases potential scale efficiencies in investment banking can undermine the bank's commitment to partnership organization. Realizing scale efficiencies undermines mentoring incentives but, for large enough efficiency gains, banks nevertheless choose optimally to adopt the new technology and to jettison the partnership form. This inevitably weakens the bank's incentives to protect client relationships.

By the late 1950s, it became economically feasible for investment banks to complement human capital with batch-processing computing technology (Morrison and Wilhelm, 2008, pp. 329–30). This technological shock increased the efficient scale of banks' brokerage operations. At the same time, the post-1950 expansion of institutional investing (see Appendix A1) placed increasing pressure on banks with significant brokerage business to better accomodate the demands of this newly important clientele. Simultaneously, growth rates at Merrill Lynch, Dean Witter, and E. F. Hutton, all of whom had large brokerage operations, began to diverge from growth rates of other banks (see Figure 7).

Banks that failed to adapt to the new technology experienced a back office crisis in the late 1960s. Approximately 160 NYSE member firms were forced to merge with competitors or dissolve their operations (see Appendix A1). Among the firms that survived, Merrill Lynch, Goldman Sachs, and Salomon Brothers were noteworthy for heavy investments in block trading and arbitrage services (Allan 1971) that strengthened their investor relationships. Other firms claimed that they were forced to decline institutional business for want of capital to fund investments in technology. Efficiency concerns were further amplified by growing threats to the NYSE's fixed-rate commission structure. Indirect rebates referred to as "give ups" increased sharply between 1964 and 1968 (Seligman, 1982, p. 397) at which point both the SEC and, more directly, the U.S. Justice Department's Antitrust Division were pressuring for the formal elimination of fixed commissions. The abolition of fixed commission rates was announced in 1973 and was fully carried through by May 1, 1975 (Seligman, 1982, pp. 466–483). Against this background, the NYSE membership decided in 1970 to permit member firms to operate as public corporations.

Partnerships that go public lose at least some of their ability to sustain long-lived reputations and to maintain client relationships. Morrison and Wilhelm (2008) demonstrate that they may nevertheless opt to float in response to technological shocks that yield a greater efficient scale than

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the operating scale at which a banking partnership sustains tacit assets. Consistent with their argument, the first banks to sacrifice reputational incentives for scale by going public included Merrill in 1971 and Dean Witter and E. F. Hutton in 1972; at the time of their IPO, each was substantially larger than the other banking partnerships shown in Figure 7 and, by virtue of their large brokerage operations, relatively less dependent on underwriting relationships. By the end of the decade, every other major bank with a significant retail-brokerage operation had also gone public (Morrison and Wilhelm, 2008, table I). The first wave of public offerings also presaged a sharp increase in the capitalization of investment banks as they increased the scope of their risk-taking activities (Morrison and Wilhelm, 2008, figure 2). In 1980, the capitalization of Dean Witter, E. F. Hutton, and Merrill was 6.4, 10.5, and 4.4 times their 1970 levels.

Alongside the wave of brokerage-oriented bank IPOs, industry observers began to comment for the first time on banker mobility and client account switching (Thackray 1971, 1972). Figure 6 and table 9.1 in (Morrison and Wilhelm, 2007, p. 282) show that this followed a period of sharp decline in banker tenure; the average partner tenure among the eight banks reported in Figure 6 had declined to 7.6 years in 1970 or about half the 1957 average of 14.7 years reported above. Table 4 identifies the 1970s as the decade in which client sensitivity to the state of banking relationships experienced the sharpest decline; Figure 5 suggests an especially large effect among relatively exclusive relationships, as evidenced by their associated choice probability elasticities. It is no coincidence that, during this period of technologically driven upheaval, John Whitehead attempted to reinforce Goldman's "core values" with the 14 business principles highlighted by the epigraph to this paper.

The 1980s witnessed complementary advances in computing power and financial engineering that transformed and codified many elements of wholesale banking and also triggered an unprecedented wave of financial innovation (Miller 1986) that included the development of over-the-counter derivative markets, structured financing techniques, and hostile takeover deals that were considered an affront to client relationships (Armour and Skeel, 2007, pp. 1752–53). Human capital in new risk-taking businesses was amplified by computing technology to a far greater degree than in the traditional advisory functions. In addition to further promoting scale efficiencies, these technological changes contributed to increasing demand for skilled labor, rising relative wages (Philippon and Reshef 2012) and increasing skewness in compensation.

An important manifestation of these changes among the remaining banking partnerships was a decline in the importance of traditional (and more tacit) advisory functions relative to more highly-codified risk-taking functions and, again, a rapid increase in the size of the

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remaining banking partnerships. For example, Morgan Stanley's 1986 S-1 filing for its initial public offering states that investment banking accounted for 25% of the firm's total revenues in 1981 and 24% in 1985. In contrast, the contribution to revenues from principal transactions nearly doubled, rising over the same period from 7% to 13%. The growing commitment to risk-bearing activity and scale efficiencies is further evidenced by the tripling of the firm's capitalization between 1981 and 1985 from $204m to $672m; it then doubled as a result of the 1986 IPO. Over the same time period, the partnership roughly doubled in size from 67 to 125 partners (Figure 7). With the exception of Goldman and Lazard, by 1987 all of the major wholesale banks had gone public or were acquired by publicly held firms (Morrison and Wilhelm, 2008, table 1).[31]

Chen, Morrison, and Wilhelm (2015) argue that rapid technological change created an environment in which bankers with exceptional capabilities attracted outsized rewards but were continually under threat of obsolescence from financial innovation. They explicitly model the conflict within banks between "traders," whose profitability derives from a (type) reputation for superior skill in executing arm's-length transactions, and "relationship managers," who are paid for their (behavioral) reputation for placing their clients' interests first. Their model exhibits a "phased" equilibrium, in which banks have no concern for client trust until they have built a sufficiently strong type reputation, after which they elect optimally to maintain a reputation for client-centric behavior. But, faced with innovations that threaten the status quo, even well-established bank(er)s with strong behavioral reputations act opportunistically toward clients as they are forced to continually rebuild their capability and type reputations. This conflict devalues client-specific behavioral reputations and so weakens incentives for maintaining client relationships.

Consistent with the theoretical framework developed in this section, client sensitivity to the state of a banking relationship declined during the 1980s, although, unlike the 1970s, the change does not appear to be statistically significant. Relationship exclusivity followed suit (Figure 1) and choice probability elasticities with respect to *RelStr* for the most exclusive relationships continued to rise, suggesting increasing contestibility.

It is worth noting that the March 1982 implementation of Rule 415, which provided for shelf registration of securities offerings, attempted deliberately to undermine investment-banking relationships

[31] In light of Goldman's sustained commitment to the partnership structure, it is worth noting that Goldman was an outlier among its peers because it actively sought to protect its client relationships by virtually refusing to advise hostile bidders between 1978 and 1989 (Chen, Morrison, and Wilhelm 2015, p. 1175). Senior management justified this position "partly as a matter of business ethics, but primarily as a matter of business judgement" (Ellis 2008, p. 271).

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on anti-competitive grounds. (Calomiris and Raff, 2000, p. 121) argue that Rule 415 was "designed to produce a decline in the market power of bankers in their relationship with issuers." 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 would have the desired effect. From March 1982 through May 1983, there were 508 shelf registrations worth a total of $79.3 billion; 25% of these were equity offerings (Denis 1991). But from 1986 to 1995, fewer than 2% of equity offerings were registered under Rule 415 (Calomiris and Raff, 2000, p. 114). Judging from the market share rankings reported in Table A1, Rule 415 does not appear to have upset either the status quo in rankings or the concentration of activity at the top ranks. In fact, market share among the top 5 banks rose from 37% in the 1960s to 54% in the 1970s and then to 60% in the 1980s before stabilizing over the remainder of the sample period. But even if Rule 415 had a significant permanent effect on banking relationships, the introduction of shelf registration cannot explain the large decline in the coefficient estimates for *RelStr* from the 1960s to the 1980s or the decline in the average level of *RelStr* that began around 1970.

5.1.3 Commercial bank entry to securities underwriting: 1990–2007. We contend that the challenges to client relationships during the 1990s and 2000s were similar in kind to those of the preceding decades, with one obvious exception. In 1987, incremental relaxation of the Glass-Steagall restrictions on securities underwriting began. Commercial banks gained considerable traction during the 1990s, as underwriting restrictions were relaxed further and then eliminated by the 1999 Gramm-Leach-Bliley Act.[32] By the late 1990s, commercial bank entry to securities underwriting clearly posed a serious challenge to even the strongest investment-banking relationships.[33] This is consistent with the statistically significant decline on the coefficient estmated for *RelStr* in Table 5 between the 1980s and 1990s and the continued high level of relationship contestibility suggested by the choice probability elasticities in Figure 5 for relatively exclusive relationships.

In contrast, the coefficients estimated for *RelStr* in Table 5 for the 1990s and 2000s are not statistically different from one another, and

[32] Note that Citicorp and J. P. Morgan were the only commercial banks to enter the top 10 in our 1990s sample with respective market share by dollar value of 5.78% and 4.4% (see Table A1).

[33] For example, Goldman Sachs maintained an exclusive relationship with Ford Motor Company from 1955 until 2000, at which point Ford's treasurer threatened to favor commercial banks for underwriting bond offerings unless Goldman also provided Ford with a credit line (Schack 2001).

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Figure 5 shows that choice probability elasticities declined during the 2000s. These results suggest that bank-client relationships may have stabilized during the 2000s. This would be consistent with the findings of Drucker and Puri (2005). Specifically, note that the distinction between commercial banks and investment banks diminished quite rapidly as most of the commercial banks in our 30-bank choice set entered underwriting, at least in part, by acquiring investment banks (Ljungqvist, Marston, and Wilhelm, 2006, figure 1). In doing so, they widened the scope of existing investment-banking relationships that could benefit from concurrent lending and underwriting capacity. Drucker and Puri (2005) provide evidence that such capacity could strengthen relationships, especially with firms, such as those with noninvestment-grade ratings, where informational economies of scope are likely to be large.

5.2 Investment-banking relationships and certification

Although investment banks are not generally in a position to monitor their clients as closely as is feasible in a lending relationship, repeated dealing might enable an investment bank to acquire proprietary information in support of its certification function. If certification is an important motivation for investment-banking relationships, then, presumably, the time patterns we observe in the data would reflect time variation in the asymmetric-information problem that certification seeks to address. We consider this possibility by examining regulatory and market forces that might have diminished informational friction over the course of the sample period.

The Securities Act of 1933 and the Securities Exchange Act of 1934, which established mandatory information disclosure as the animating force in U.S. securities regulation, surely had the single greatest influence on corporate transparency during our sample period but they preceded our first estimation period by nearly a decade. Issuing-firm transparency increased throughout the sample period but it is difficult to make a case for time variation in firm transparency that would correspond with the patterns we observe for the state of bank-client relationships. If we consider the 1970s, when client concerns for the state of banking relationships declined most sharply, it is possible to identify regulatory interventions that were aimed at promoting transparency. For example, the SEC sought to improve supervision of accounting-principles standard-setting with, among other things, its 1972 endorsement of the creation of the Financial Accounting Standards Board [FASB] (Seligman, 1982, pp. 551–2). Although the SEC complemented this effort by initiating reforms in corporate disclosure, in 1976 the House Commerce Subcommittee on Oversight and Investigations still claimed that "FASB has accomplished virtually nothing toward resolving fundamental accounting problems plaguing the profession" (Seligman, 1982,

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p. 556). Perhaps the most important change during the decade occurred in 1979 when the SEC created a safe harbor for firms voluntarily to provide forward-looking forecasts (Seligman, 1982, p. 559). However, neither effort appears to have been capable of producing a sea change in banks' certification function.

Moreover, even if we accept that issuing firms became more transparent over the course of the sample period, one might argue that they grew more complex on average with the conglomerate merger movement of the 1960s and early 1970s and with rapid advances in information technology and the biological sciences thereafter. Moreover, if firm-level volatility is directly related to asymmetric information, then the increase in the former documented by Campbell (2001) suggests that asymmetric information became more severe over the 1962-1997 period. Coupled with the rise of institutional investing during the 1960s and 1970s, it seems likely that the gap between the best- and least-well-informed investors widened after 1960. Thus if certification is the primary motivation for investment-banking relationships, one would expect them to grow stronger.

In summary, we have little doubt that bank-client relationships could be motivated, in part, as a vehicle for enhancing certification capabilities. On the other hand, it is not clear how this theoretical perspective sheds additional light on the time variation in bank-client relationships that we have documented, especially during the periods of greatest change.

6. Conclusion

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. Moreover, bank(er)s are conflicted, both because they stand between issuers and investors and, increasingly, as a consequence of competing interests within modern, full-service investment banks. Because it is difficult to contract over information and to verify bank(er) behavior, banks and their clients may be forced to fall back on reputational commitment devices. We argue that strong client relationships provided the conditions necessary for reputational commitment to flourish through the 1960s.

However, we show that concern for the state of bank-client relationships diminished thereafter. We argue that the most pronounced changes in bank-client relationships coincided with technologically-driven structural changes in financial markets that weakened reputation concerns among banks and diminished issuers' perception of the value of an existing bank relationship. Reputation concerns weakened both because their necessity diminished as some dimensions of the business became more susceptible to formal contract and because increasing scale and scope of bank operations raised the cost of maintaining reputation concerns.

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We do not argue that reputation concerns are no longer relevant to the traditional advisory functions carried out by investment banks. Rather, we contend that while technological advances have rendered some areas of banking more susceptible to formal contract, the traditional advisory functions remain dependent on trust. We believe that the resultant conflict has given rise to, among other things, the growing number of advisory boutiques established by some of the most prominent bankers of the last few decades (see Chen, Morrison, and Wilhelm (2015)).

This line of argument suggests that Dodd-Frank limitations on risk-taking within large, full-service banks could reduce conflict between the arms-length world of risk-taking functions and the trust-dependent world of traditional investment banking. If so, perhaps the conditions for strong bank-client relationships will improve. But if that is the case, regulators should be especially cautious about intervening in conflicts between banks and sophisticated customers for fear of crowding out informal enforcement mechanisms.[34]

On the other hand, while M&A advising is likely to remain dependent on judgment, and thus on informal commitment devices, it is less clear that the same is true for the securities underwriting function. Although electronic auction platforms have existed for nearly 20 years with little impact on securities underwriting (DeGeorge, Derrien, and Womack 2010), Goldman's recent effort to map the step-by-step process for an IPO (Economist 2016) suggests that banks are hard at work trying to automate this function. To the extent that they are successful, this core function should be more susceptible to formal contractual enforcement and therefore less dependent on and supportive of trust.

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[34] See Davidoff Solomon, Morrison, and Wilhelm (2012) for discussion of this point in the context of the SEC's 2010 complaint in connection with Goldman's 2007 ABACUS transaction.

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Appendix

The appendix includes historical background (Section A1) and a time line (Figure A1), details of the 1933–1969 data collection process (Section A2), the formal definition of eigenvector centrality used to calculate *EVC* (Section A3), a listing of the top-30 banks by market share for each estimation period (Table A1), and results for estimation of the nest logit model with IPOs excluded from the transaction sample (Table A2).

A1 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 provide 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 ([1975] 1954), and Seligman (1982) provide authoritative accounts of events through the first half of the sample period. (Morrison and Wilhelm, 2007, chap. 7–8) and Morrison and Wilhelm (2008) provide further detail on events during the latter part of the sample period and 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, and 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. 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 ([1975] 1954)).

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).[35]

[35] 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 (2000, pp. 124–132) on the rise of private placements.

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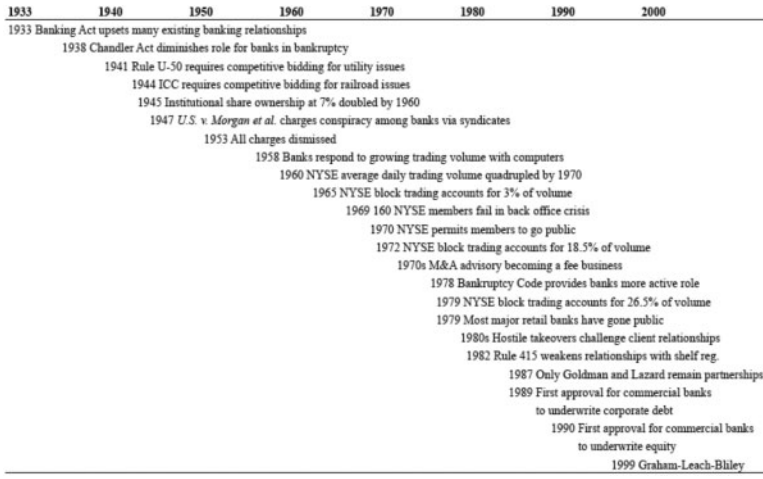

Figure A1
Historical time line

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."[36]

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 Harold Medina in October 1953 (and filed on February 4, 1954) dismissed all charges against the defendants and castigated the government for the

[36] "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).

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Table A1
Top-30 banks by decade ranked by dollar value of transactions

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

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

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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 Inc	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

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Table A2
Bank choice model with IPO subsamples

Estimation period	*RelStr*	*EVC*	*RelStrSIC*	*Number of IPOs*	Transactions	χ2(n)
1943-49						
Full sample	0.0296***	−0.0118***	0.0096***	15	842	248(9)
	(0.0025)	(0.0033)	(0.0015)			
IPOs excluded	0.0294***	−0.0128	0.0099***	0	827	246(9)
	(0.0025)	(0.0034)	(0.0015)			
1950-59						
Full sample	0.0272***	−0.0057***	0.0033***	12	1,217	370(9)
	(0.0017)	(0.0018)	(0.0006)			
IPOs excluded	0.0272***	−0.0063	0.0033***	0	1,205	370(9)
	(0.0017)	(0.0018)	(0.0006)			
1960-69						
Full sample	0.0432***	0.0125***	0.0071***	130	2,164	672(9)
	(0.002)	(0.0036)	(0.0009)			
IPOs excluded	0.0430***	0.0118***	0.0071***	0	2,034	642(9)
	(0.0020)	(0.0038)	(0.0009)			
1970-79						
Full sample	0.0366***	0.0330***	0.0100***	202	2,602	564(9)
	(0.002)	(0.005)	(0.001)			
IPOs excluded	0.03631***	0.03697***	0.01012***	0	2,400	520(9)
	(0.0019)	(0.0056)	(0.0009)			
1980-89						
Full sample	0.0333***	0.0238***	0.0045***	886	10,311	1,855(9)
	(0.001)	(0.002)	(0.000)			
IPOs excluded	0.0339***	0.01532***	0.004***	0	9,425	1,710(9)
	(0.0009)	(0.0018)	(0.0004)			
1990-99						
Full sample	0.0307***	0.0258***	0.0043***	2,016	12,574	1,767(9)
	(0.001)	(0.002)	(0.000)			
IPOs excluded	0.0316***	0.01166***	0.0036***	0	10,558	1,686(9)
	(0.001)	(0.002)	(0.0003)			
2000-07						
Full sample	0.0299***	0.0960***	0.0061***	543	3,867	747(9)
	(0.002)	(0.008)	(0.001)			
IPOs excluded	0.0314***	0.0909***	0.0054***	0	3,324	621(9)
	(0.0017)	(0.0007)	(0.0007)			

This table reports coefficients estimated for the nested logit bank choice model for the full sample and with IPOs excluded. The issuer's choice is conditional on the following 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; and *RelStrSIC* is the bank's share of proceeds raised by other firms in the issuer's four-digit SIC category during the preceding decade. We also estimate (unreported) coefficients for three transaction-specific variables. Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels. We report a χ2 test statistic for goodness of fit with (n) degrees of freedom.

weakness of its case.[37] With respect to the syndicate system Medina found "[. . .]no concert of action, no agreement and no conspiracy, integrated over-all or (Medina [1975] 1954, 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

[37] 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 [1975] 1954, p. 213).

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syndicates routinely remained in place for a year or more, as syndicate members travelled to peddle syndicates to individual investors. (Medina [1975] 1954, 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 [1975] 1954, 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.[38]

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).

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."

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 United States between 1976 and 1990 (Morrison and Wilhelm, 2007, pp. 251–262).

Figure A1 summarizes the key events of this section.

A2 Data Collection for Transactions 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

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

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Financing, 1960–1969. Transaction details were scanned using optical character recognition software and then checked by hand.

For each transaction, the 1933–1969 source data includes the name of the issuer,[39] the date of the offering,[40] the exact title of the security issue, bond ratings were reported in the source data, the manager or comanagers for underwritten offerings and the dollar amount raised.[41] 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 comanagers 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% of the total) had more than one manager. We identified the lead bank for 20% 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 significant effect on our results.

The source data for 1950–1969 records managers and comanagers 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.[42] 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. Because 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

[39] 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.

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

[41] For 1933–1949, the data source also includes the number of underwriters including the manager. The data set contains the dollar amount raised for the 1930s, 1940s, and 1960s. 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.

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

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were assigned SIC code 4011, and utilities and transport companies excluding railroads, which were assigned SIC code 4911.[43] Using these methods, we were able to identify SIC codes for 25,088 of 49,155 transactions between 1933 and 1969.

A3 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 comembership 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

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

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

[43] Specifically, we used regular expression matching within Python scripts to identify companies with specific key words in their names. Natural resource and agriculture companies were matched to the following key words: 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 the key words rail, RR, Rr, and railroad. Utilities and transportation companies excluding railroads were matched to the following key words: power, light, heat, atomic, energy, electric, public service, gas, utility, hydro, hydraulic, water, pipeline, waste, recycle.

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