Information Disclosure Concerns as a Limit to Competition in Investment Banking [*] [†]

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Abstract

We conjecture that issuing firms seek to avoid sharing underwriters with their product-market rivals in order to limit the risk that strategically sensitive information is leaked to a rival firm via the underwriter relationship. We investigate this conjecture in a sample of 5,272 equity deals and 12,453 debt deals by large U.S. firms between 1975 and 2003. Using several distinct sources of identification, we find that this phenomenon is at least as important in determining the choice of lead underwriter as the issuing firm's existing relationship with the underwriter. We argue that this finding has important implications for understanding the nature of competition among investment banks, the success of entrants, and the likely impact of investment bank mergers on market power.

Key words: Investment banking; Securities underwriting; Competition; Entry; Glass-Steagall Act; Commercial banks.

JEL classification:

1. Introduction

The last 20 years have seen substantial changes in the structure of investment banking in the United States: A series of deregulatory measures by banking regulators lifting restrictions on commercial banks' ability to underwrite securities offers, culminating in the repeal of the Glass-Steagall Act in 1999; waves of mergers involving investment and commercial banks; and large-scale entry by commercial banks into securities underwriting. These structural changes have been accompanied by an ongoing debate about the appropriate regulatory structure for the provision of investment banking services, both in terms of ensuring competitive outcomes and minimizing conflicts of interest across the various services investment banks provide. A necessary condition for this debate to be well informed is that the nature of competition in the investment banking sector be well-understood.

How do investment banks compete? Given that informational frictions are at the heart of securities underwriting, reputation plays a critical role. Reputation enables an investment bank to certify the validity of information released when a company sells securities to less well-informed investors. It has long been acknowledged that reputation can, as a result, present a barrier to entry. Another apparently important competitive tool is the provision of research analyst coverage (Ljungqvist, Marston, and Wilhelm (2005)) and market-making (Ellis, Michaely, and O'Hara (2005)). Price competition, on the other hand, does not appear to play a large role in securities underwriting (Chen and Ritter (2000)).

In this paper, we investigate a different constraint on competition: The need to maintain exclusive client relationships to avoid information leakage. We contend that corporate issuers care about the risk that information revealed to their underwriters will be disclosed to one of their product-market competitors when underwriting services are provided by a common bank. This leads us to the following conjecture:

Issuing firms, whether they raise debt or equity, disclose information to underwriters that is commercially sensitive. All else equal, they will seek to avoid sharing underwriters with a rival

firm to limit the chance that a rival may take advantage of this information.

Several models exist in the industrial organization literature that formalize the concern expressed in this conjecture (albeit not with our application in mind). See, for instance, Baccara and Razin (2004). Intuitively, the story is as follows. Through due diligence and other activities designed to protect their reputations with investors, underwriters gain access to a great deal of commercially sensitive information about their client firms. This information may include details of distribution channels, customer lists, new product launches, future cash flow projections, the progress of research and development projects, and the condition of existing plant and equipment. Information about any of these areas of operations may give a competing firm a strategic advantage. Thus, if the underwriter is shared with a rival firm, issuing companies are likely to be concerned that contact between the rival and the underwriter increases the risk that sensitive information is leaked. If so, this limits a firm's choice of investment bank given the structure of existing bank-firm relationships in its industry.

To examine the extent to which the information disclosure conjecture is empirically relevant, we take as a maintained assumption that underwriters do gain access to sensitive information and examine the propensity for a bank's relationships with rivals to affect an issuing firm's choice of underwriter. Attributing the estimated impact of a rival relationship on underwriter choice to concerns about information disclosure presents a series of interesting identification challenges. The first problem is how to separate the attraction of a bank's accumulated industry expertise from information leakage concerns: A bank serving a rival will likely have more experience of the issuing firm's industry than a bank that has no rival clients in the industry. Second, information leakage could work in both directions: While a firm may not wish for its own information to be disclosed, using a shared underwriter may enable it to glean useful information about a rival. Ideally, we would like to measure the relative impacts of the costs and benefits of such information leakage.

We approach these issues with a series of identification strategies. Each produces evidence that is strongly consistent with the conjecture motivating this paper. Unconditionally, evidence covering the period 1970 to 2003 suggests that investment banks have traditionally maintained relationships with no more than one large firm in a given industry, as we would expect in the presence of information leakage concerns. Using a set of 5,272 equity and 12,453 debt deals completed by large firms between 1975 and 2003, we demonstrate that relationships with a large rival company have a negative effect on the choice of underwriter in a probit specification. The estimated marginal effects suggest that this effect is first-order economically, both in the equity and the debt markets.

We note, however, that the probit coefficients are likely contaminated by the positive impact of industry expertise. To separate out information disclosure concerns from industry expertise, we examine the behavior of rival firms when their relationship banks merge. Using exogenous variation from bank mergers enables us to hold industry expertise constant while increasing the probability of information leakage occurring. While there have been numerous mergers over the sample period, we find that banks have largely avoided merging with another bank that has large, rival clients. Where there has been overlap, we show that issuers intending to raise equity capital are indeed more likely to switch away from their relationship bank than if the merger involves no overlap or if the bank has not been involved in a merger. Economically, the effect is extremely large, increasing a client's switching probability by more than thirty percentage points.

Finally, we tease apart the informational costs and benefits of leakage concerns by looking at firms' responses to their rivals switching relationship banks. The key to identification here is the fact that when a rival client ends its relationship with a bank, the bank continues to benefit from superior knowledge of the rival's operations but no longer presents a danger that information might be leaked to the rival. Such a bank should thus be more attractive to an issuing company, and our results strongly

support this prediction. Moreover, under relatively weak assumptions, we can estimate the net effect of information disclosure concerns, which we find to be around twice as large economically as the estimated benefit of prior relationships between the bank and the issuing company.

Previous work by Ljungqvist, Marston, and Wilhelm (2005, 2006) has made it clear that prior bank-firm relationships, along with the provision of research analyst coverage, are first-order determinants of which bank an issuing firm will choose to underwrite its debt or equity offer. That is, demand for underwriting services is sticky relative to other industries.[1] Our results help explain why issuers typically maintain strong relationships with one investment bank. With a limited number of banks capable of executing large or complex deals, there simply may not be enough banks to go around to allow each company to have multiple relationship banks while at the same time avoiding sharing banks with its major rivals. Entry by commercial banks appears to have played an important role in loosening this constraint since deregulation began in 1988, and as a result we document a stunning shift away from exclusive bank-firm relationships during the 1990s, especially in the debt markets where commercial banks have made the greatest inroads.[2] The fact that there is no corresponding shift away from banks serving at most one large client per industry indicates that clients are indeed careful whom they choose to have relationships with.

Our findings have important implications for how competition among investment banks is viewed. Previously, prior bank-firm relationships were seen as the most important facet of demand to influence competition in the underwriting market. This shaped a view where entry was difficult as the position of incumbents was protected by their long history of involvement with many issuers. The competitive advantage from relationships embedded in a bank's employees could hence be argued to be overwhelming. Our evidence suggests that this view of investment banking is overly simplistic in that

[1] This stylized fact likely applies more broadly to service industries as compared to manufacturing or retail industries.
[2] See Gande, Puri, and Saunders (1999), Gande et al. (1997), and Yasuda (2005) for further evidence concerning the effects of commercial bank entry into debt underwriting.

it puts too much weight on the characteristics of banks as determining the competitive landscape.

An implication of our findings is that competition among underwriters is more subtle. The sensitivity of firms to the risk of information leakage makes it unlikely that any one underwriter will dominate the provision of underwriting services for a given client industry. Instead, industry expertise will likely be spread across several banks. Likewise, the possibility of mergers to create a dominant position for a bank is weakened in underwriting since client firms will be highly likely to switch to another bank if a merger leads to underwriting services being shared across rivals. Entry by sufficiently credible players, such as that by commercial banks during the 1990s, is not only possible but likely to be successful despite traditionally strong bank-firm relationships.

While the picture up to this point seems pro-competitive, it is balanced by the fact that, within the set of banks with expertise in a given industry, an issuing firm's choice of underwriter is significantly constrained by information leakage concerns. This means that information leakage limits the choice set of issuing firms, restricting their ability to substitute away from an existing relationship bank, should they choose to. This effect is likely to dampen competition in the investment banking industry. Perhaps not surprising, therefore, there is little evidence of price competition in underwriting (see Hansen (2001) on the recent Department of Justice investigation into price collusion on Wall Street).

The remainder of the paper is organized as follows. In the next section, we present a series of stylized facts about the underwriting industry and so set the stage for confronting our conjecture with empirical evidence. Section 3 sketches the empirical strategy and describes the data. Section 4 develops each empirical strategy in detail and discusses the results. Section 5 concludes.

2. Stylized Industry Facts

In this section we graph certain characteristics of the underwriting market in the U.S. over the period 1970 to 2003 to generate stylized facts about the industry. The data come from the U.S. New

Issues database of Thomson Financial's Securities Data Corporation, excluding only financial and governmental issuers (i.e., SIC codes in the 6000s and 9000s) and non-underwritten issues.[3] Applying these filters yields 54,659 transactions ranging from IPOs to seasoned debt and equity offerings, including both public and private offerings and firms. In constant 1996 dollars, the total amount raised in these transactions exceeds $5 trillion. The distribution of different transaction types is reported in Table 1. Public common stock and public nonconvertible debt offerings account for 35.5% and 26.9% of transactions, respectively, but public debt dominates in dollar terms.

Owing to differences in the amount and nature of information disclosed in equity and debt issues, equity and debt underwriting are best thought of as separate markets. The nature of debt securities implies that investors are mostly concerned with downside (repayment) risk, while equity investors are (relatively) more concerned about the upside. As a consequence, a bank's due diligence – and hence the information it learns about its corporate clients – may focus more on left-tail risk in debt issues and more on right-tail risk in equity issues. While it is hard to generalize, we expect industry rivals, in most situations, to be more interested in the latter, to the extent that corporate strategy, acquisition plans, investment policy etc. have a greater expected impact on equity than on debt returns.

2.1 Market Share Concentration

We compute a bank's annual market share as the combined proceeds of all debt or equity issues that it has lead managed (with equal credit given in the case of co-leads), divided by the total debt or equity proceeds raised by issuers that year.[4] Figures 1a and 1b show annual concentration measures for each market over the period 1970 through 2003. Both the equity and debt underwriting markets appear somewhat concentrated. Historically, the four largest equity underwriters have had a combined market share of between 31% in 1971 and 71% in 1977, with a long-run average of 51%, while the C4

[3] SIC codes were replaced by the NAICS system in 1997. SIC 6000-6999 correspond to NAICS 5000-5999. SIC 9000-9999 remained substantially unchanged in the NAICS system.

[4] Throughout the paper, we focus attention on a firm's lead manager (rather than lower-tier members of its underwriting syndicates) as this is where the bank-firm relationship and thus any confidential information reside.

measure for debt underwriting has fluctuated between 45% in 1997 and 63% in 1984, with a mean of 53%. Thus, the main difference at the four-firm level is that concentration is much more variable over time in equity underwriting than in debt underwriting. The same basic pattern is true at the ten-firm level. The C10 concentration measure tends to average less for equity than for debt underwriting but it is twice as variable in the equity market.

As a point of comparison for these concentration ratios, consider the following industries. In 1997 the beer industry (NAICS 31212) had a C4 measure of 89.7%; motor vehicle manufacturing (NAICS 3361) had a C4 of 82.4%; bookstores (NAICS 451211) had a C4 of 54.1%; semiconductor manufacturing (NAICS 334413) had a C4 of 52.5%; and pharmaceutical manufacturing (NAICS 3254) had a C4 of 32.3%. This places the C4 of underwriting well within the set of industries that invite occasional regulatory supervision by the Federal Trade Commission and Department of Justice for potential competition law violations. However, the C4 is not high enough to put underwriting in the set of industries that invite ongoing interest by regulators, unlike the beer industry, for example.[5]

Figures 1a and 1b also plot the C20, C30, C40, and C50 concentration measures. The fifty largest debt underwriters account for almost all debt underwriting activity, with annual C50 varying between 98% and 100%. The equity market accommodates slightly more players, with C50 fluctuating between 86% and 100%, but even there the long-term average C50 is 96%. The remaining 4% is split among 82 banks in an average year.

2.2 Entry

The relatively stable size and concentration of the equity and debt underwriting markets is remarkable against the background of constant entry, exit, consolidation, and restructuring in the investment banking industry over the sample period. Since these events have involved some of the

[5] All numbers are by value of shipments. The sources are Census (2001), Concentration Ratios in Manufacturing, 1997 Economic Census, Manufacturing, Subject Series, Table 2. Census (2000), Concentration of Firms: Retail Trade, Economic Census, Retail Trade, Subject Series, Table 6.

largest players, the identities of the largest banks whose market shares are shown in Figures 1a and 1b have changed from year to year, yet their combined market share has been relatively unchanged. The most notable force shaping the structure of the industry over the last two decades has been deregulation of Glass-Steagall separation of commercial and investment banking. In a series of steps beginning in 1988, commercial banks were allowed to underwrite securities offerings for the first time since 1933, culminating in the repeal of the Glass-Steagall Act in 1999. Commercial banks responded by either building capital markets operations in-house or acquiring investment banks (or, in some cases, both).

Figures 2a and 2b show the annual number of commercial banks active in equity and debt underwriting in the U.S., respectively, as well as their combined annual market share. While the number of commercial banks offering underwriting services is now fairly large, most do little business. A handful of commercial banks, including Citigroup, JP Morgan Chase, and Bank of America, have taken substantial business away from the investment banks, and as a group, commercial banks now have around 70% of the debt underwriting market and 40% of the equity underwriting market.

2.3 Exclusivity of Client Relationships

Figures 3a and 3b investigate the exclusivity of relationships between underwriters and their equity and debt issuing clients, respectively, for every quarter between 1970Q2 and 2003Q4. We code a bank as having an equity (debt) client in industry *i* in quarter *t* if it has lead managed one or more equity (debt) issues for a firm in that industry over the five years ending in quarter *t*-1. Since SDC does not provide underwriting data for the 1960s, observations before 1975Q1 (indicated by a vertical line in the figures) use less than five years of data.

Figure 3a plots the fraction of equity underwriters that have exactly one client among the top 3, 5, and 10 largest firms (ranked by annual COMPUSTAT net sales) in an industry (defined as a four-digit SIC code), conditional on having at least one such client. This is what we call an exclusive *client*

relationship. (We will call an exclusive *bank* relationship the case where a firm does business with a single bank.) Prior to the mid 1990s, exclusivity in client relationships was evidently the norm in the equity market: Nearly every bank had at most one client among the three largest firms in an industry. Even among the ten largest firms in an industry, banks evidently maintained client exclusivity, given the around 95% frequency of having one client in an industry. From the mid 1990s on, however, we see a modest decline in exclusivity. The largest decline has been in the fraction of underwriter-industry pairs that involve an exclusive relationship with a top 10 firm, which in the last quarter of 2003 dropped to 84.8% – clearly still very high, but a substantial decline from the near-100% level seen earlier in the sample period.

Debt underwriting relationships, shown in Figure 3b, display the same pattern of exclusivity though the level of exclusivity is consistently lower than in the equity market and the decline has been steeper over time, with the fraction of banks doing business with a single top 10 firm in an industry falling from 96% to 76% over the sample period.

Before we conclude that client relationships have historically been exclusive but have recently become looser, we address one possible concern that could mechanically give rise to the patterns we see in Figures 3a and 3b. Suppose that in any given industry, only one of the three, or five, or ten largest firms happens to be an active issuer of securities in any five-year period. Then naturally we would observe banks having what we call exclusive client relationships, but this would be mechanical. And imagine that over time, for whatever reason, the number of top 3, or 5, or 10 firms that issue securities has increased. We might then also see that banks have apparently moved from exclusive to looser relationships over time. To rule this out, the blue graphs in Figures 3a and 3b are computed for industries that have at least two active issuers in an industry at any given point in time.[6] While this lowers the frequency of exclusive relationships a little, it does not alter our conclusion.

[6] Similar results obtain for cut-offs greater than two.

2.4 Exclusivity of Bank Relationships

Figures 4a and 4b show the extent to which issuing firms have tended to concentrate their underwriting business with a single bank. We measure this by calculating the total amount raised by each issuing firm in a given window and then looking at how this was shared among the one or more banks acting as lead manager. (For the purposes of the figures, we use one-, two-, and three-year windows.) From this we construct a Herfindahl index of the concentration of each issuer's bank relationships. A Herfindahl of one indicates an exclusive bank relationship. We then take a weighted average over firms in a quarter, weighting by the total proceeds raised in each firm's debt or equity issues over the relevant window. Weighting has the effect of reducing average exclusivity, indicating that larger issuers are more likely to have more than one relationship bank.

The patterns in Figures 4a and 4b are striking. Prior to the mid 1990s, bank relationships were nearly all exclusive. The concentration of debt relationships was historically always lower than that of equity relationships, suggesting that issuing firms have tended to share their debt underwriting business around a little more. From the mid 1990s on, however, bank relationships have become stunningly less exclusive. For the average equity issuer, concentration has fallen from around 0.95 to between 0.62 and 0.7 in 2003Q4, depending on the window used, suggesting that by the end of the sample period, the dominant model is no longer an exclusive bank relationship but a set of multiple relationships around a core bank that is awarded a disproportionate share of the average issuer's underwriting business. This may be the result of efforts to engender competition among banks in terms of either fees or some dimension of service. Alternatively, it is possible that commercial banks (which began entering the market around this time) leaned on their borrowers to share their underwriting business in return for preferential loan terms (Drucker and Puri (2005)).

In the debt market, the decline in exclusivity has been even more remarkable. By the end of the

sample period, the concentration of the (weighted) average debt issuer's bank relationships had fallen to between 0.39 and 0.47, depending on the window, a level consistent for instance with a stable two-bank relationship.

Figures 1 through 4 present a picture of an industry in flux. Banks have steadily been accumulating clients over the 34 sample years, although this appears to have been a slow process. Banks have traditionally found it hard to work for competing firms in an industry, which suggests the presence of concerns about conflicts of interest among issuing firms. While it has become more common to see banks providing underwriting services for more than one of the largest firms in a given industry, this is still a relatively rare event. On the issuer side, the data suggest two regimes. Prior to the mid 1990s, firms appear to have maintained relationships with just one bank. More recently, however, firms appear to have started fostering relationships with multiple banks, perhaps in response to entry by commercial banks. This pattern is very sharp in the firm-level data shown in Figures 4a and 4b, with no corresponding break in the bank-level data shown in Figures 3a and 3b. This suggests that firms are being selective in how they choose their underwriters and pay attention to who their underwriters' other clients are.

In the remainder of the paper, we seek to unravel the interplay of the relationships between issuing firms and underwriters on the one hand and an issuing firm's choice of underwriter on the other. Specifically, we investigate the impact of concerns that sharing underwriters may lead to information being leaked to competitors on the demand for underwriting services.

3. Data and Methodology

3.1 Empirical Strategy

Our empirical strategy is to look in the data for sources of exogenous variation that allow us to mimic the following experiment. Take an issuing firm, operating in an oligopoly setting, and two

banks. One bank has a relationship with one of the firm's major product-market rivals, while the other bank has no client in the industry. In all other respects the banks are equal. Does the issuing firm choose the bank that has no relationship with a competitor over the bank that does? If the issuing firm chooses the bank with no rival relationship, we will view this as consistent with the firm having concerns about information leaking to its rival via the underwriting relationship. As in all empirical work, the challenge is to find sources of exogenous variation that allow us to draw meaningful conclusions about the impact of information disclosure on the demand for underwriting services.

There are, potentially, many tradeoffs in a firm's decision about whether to share an underwriter with a competitor. Perhaps most importantly, the firm may trade off the underwriter's industry expertise garnered from dealing with rivals against the chance that the underwriter may leak sensitive information to a competitor. Controlling for this effect will be an ongoing challenge in our treatment of the data. We confront this issue in a number of different ways.

The firm may also consider sharing an underwriter in the hope that it will learn some information about its competitors in the process. This will often prove to be observationally equivalent to benefiting from an underwriter's accumulated industry expertise (at least in our data). A related issue is that firms may wish to share underwriters to share information and facilitate collusion in the product market. While this may be conceivable, we find it difficult to envisage an investment bank having a sufficiently strong incentive to be party to such an arrangement and thus leave this issue undeveloped.

Before discussing the sources of exogenous variation that we exploit to identify the impact of information disclosure concerns, we describe our sample and data.

3.2 Sample and Data

The estimation sample of deals used in the econometric analyses is a subset of the transactions used to construct Figures 1 through 4. In addition to excluding financial and governmental issuers[7] and non-

[7] Our results are qualitatively unchanged if we also exclude regulated industries (SIC 4000-4999).

underwritten deals, we impose three more filters. First, certain of our variables are constructed using five years of pre-deal data, which limits the estimation sample to transactions completed from 1975 onwards. Second, we require that each deal was lead-managed by one of the 50 largest underwriters (by market share) during the year of the offering. Third, we restrict attention to the 10 largest firms (by COMPUSTAT net sales) in each four-digit SIC industry. The information disclosure conjecture assumes that leaked information has some strategic value to other firms in the industry. In most markets, a necessary condition for a firm being strategically relevant is that it must have a substantial presence in the market. Smaller firms – often called the competitive fringe – are typically price-takers and so are unlikely to be strategically affected by information spilling over from or to the largest firms in their markets (see Carlton and Perloff (2004) for a standard textbook treatment of this issue). Implicit in our approach is the assumption that firms below the top 10 are best considered part of the competitive fringe.[8]

Applying these filters yields 17,725 transactions by 3,406 distinct companies in 418 different four-digit SIC industries raising $2.4 trillion in constant 1996 dollars. These account for 35.4% of the deals completed and 51.5% of the amount raised by U.S. non-financial companies in underwritten offerings over the period 1975-2003. As Table 1 shows, public nonconvertible debt and common stock offerings account for the majority of deals and proceeds.[9]

In some specifications, we split the sample period in 1990. Table 1 shows that the pace of capital market issuance by the ten largest firms in an industry has increased since 1990. There were 55% more transactions raising 119% more capital in 1990-2003 compared to 1975-1989.

3.3 Bank-firm and Bank-rival Relationships

Our measure of the strength of bank-firm relationships follows the procedure in Ljungqvist,

[8] The product market share of the tenth largest COMPUSTAT firm in the average industry between 1970 and 2003 is 1.5%, with a range from nearly zero to 6.1%. This puts an upper bound on the market shares of firms in the competitive fringe.
[9] Results are unchanged if we restrict estimation to public nonconvertible debt and common stock offerings.

Marston, and Wilhelm (2006). Let $P^{d}_{j,k,t}$ denote the aggregate proceeds company *k* raised in deals lead-managed by bank *j* over the four quarters preceding quarter *t* in deals of type *d* = {*equity*, *debt*}.[10,11] The strength of company *k*'s type-*d* relationship with bank *j* then is $R^{d}_{j,k,t} = P^{d}_{j,k,t} \Big/ \sum_{k} P^{d}_{j,k,t}$. $R^{d}_{j,k,t}$ ranges from zero (no relationship) to 100% (when the company maintained an exclusive bank relationship).

Ljungqvist, Marston, and Wilhelm (2005) present evidence that some banks, and especially new entrants, accept lower syndicate positions (specifically, "co-manager") as a way to establish relationships with an issuing company with a view to becoming its preferred lead manager in future. To capture this, we compute $R^{d-co}_{j,k,t}$ using the prior four quarters of co-management data.

Our sample period is characterized by a substantial number of mergers and acquisitions among investment and commercial banks. In these cases, we code banks as inheriting their predecessors' relationships. For instance, after its September 2000 merger, JP Morgan Chase is treated as having relationships with both JP Morgan's and Chase's former clients. Also, many companies are related to one another, so we form corporate families on the basis of SDC's "ultimate parent CUSIP" identifier. Our relationship strength measures are constructed at the level of the corporate parent by giving the parent credit for any relationships that tie any of its "subsidiaries" to the bank.

Table 2 reports summary statistics for $R^{d}_{j,k,t}$ and $R^{d-co}_{j,k,t}$, broken down by whether or not the candidate bank was chosen as lead manager for the deal in question. Ahead of equity transactions, the average successful candidate bank had lead-managed 13.0% and 6.5% of the issuing company's equity and debt transactions by value over the prior four quarters, respectively. By comparison, unsuccessful candidate banks had significantly weaker relationships with the issuing company. The same pattern holds for co-management relationships as well as ahead of debt transactions.

Our primary focus in this paper is on the effect of a bank's relationships with an issuer's principal

[10] Ljungqvist, Marston, and Wilhelm (2006) also control for lending relationships. However, systematic data on bank loans are not available for the 1970s and 1980s.
[11] Results remain significant using longer windows, though they become progressively weaker.

product-market competitors. To this end, we set a dummy variable equal to one if, ahead of company *k*'s equity (debt) transaction in quarter *t*, candidate bank *j* lead-managed one or more equity (debt) transactions for one or more firms (other than *k* itself) ranked among the three largest companies (based on annual COMPUSTAT net sales) in *k*'s four-digit SIC industry during the previous five years. We similarly code a dummy variable capturing relationships with firms ranked fourth through tenth in *k*'s industry. Using a five-year window is conservative, since there is no guarantee that every rival is *still* one of the bank's clients toward the end of the window. To the extent that the rival has since switched banks, concerns about information being disclosed are eliminated, biasing us against finding support for the information disclosure conjecture. In Section 4.3, we will exploit variation in the duration of rival relationships to construct a more powerful test of the conjecture.

As shown in Table 2, a greater fraction of winning banks than of losing banks has relationships with an issuer's top 3 or top 4-10 rivals, ahead of both equity and debt transactions. This univariate result runs counter to our conjecture that concerns over information leaking to rivals influence underwriter choice. As mentioned in the introduction, a bank's relationships with an issuer's main rivals is likely to have two additional effects besides the risk of information leaking to the rivals, in the form of the bank having greater industry expertise and disclosing information about its other clients to the issuer. Clearly, finer tests are required to disentangle these effects in the data. Furthermore, the possibility that the rival client has in fact switched banks could easily account for this univariate result.

3.4 Bank Characteristics

To proxy for a bank's reputation capital, we use its prior-year shares of the debt and equity underwriting markets (see Megginson and Weiss (1991)). Following a merger, the surviving bank is credited with both predecessors' market shares. Table 2 illustrates that successful candidate banks have, on average, significantly larger equity and debt market shares than other candidate banks.

We also include a "loyalty index" measuring how often a bank retains its clients in consecutive

deals.[12] This varies between zero and 100%. Companies are relatively loyal, and so the average successful candidate bank has a loyalty index of 61.4% ahead of equity transactions and 49.1% ahead of debt transactions. By comparison, unsuccessful candidate banks retain their clients only 44% and 33.2% of the time on average ahead of equity and debt transactions, respectively.

We define two further variables designed to measure a candidate bank's standing in the industry. Based on the results in Ljungqvist, Marston, and Wilhelm (2005), we expect better networked banks to have a competitive advantage in the competition for lead management mandates. Based on social network analysis, we view banks as better networked the more frequently they are chosen as syndication partners by other banks. Formally, candidate bank *j*'s $indegree^{d}_{j,t} = \sum_i I(S^{d}_{l,j,t} > 0)/(\text{N}-1)$, where $I(\,)$ is an indicator function evaluating whether bank *j* ever served as co-manager in deals lead-managed by bank *l* in year *t*-1, and *N* is the number of banks active as lead manager that year. *Indegree* varies from zero (for a bank that has syndicated with no other banks) to one (for a bank that has syndicated with every bank). Table 2 shows that the average successful candidate bank has syndicated equity deals with 4.6% of all banks and that this is significantly greater than the average *indegree* of 2.8% among unsuccessful candidates. The difference is even greater among underwriters competing for debt lead management mandates.

While *indegree* captures whether a bank is popular, it does not allow for reputation differences among its syndication partners. For instance, a bank may achieve high *indegree* without ever syndicating with a top-tier bank. Assuming that status and influence derive, in part, from being networked to others who themselves are well-networked, we construct a second measure of network position called eigenvector centrality (Bonacich (1972, 1987)). This weights a bank's ties to others by the importance of the banks it is tied to. The weights are the reciprocal of the principal eigenvector p^{d}_{t}

[12] Define $I_{c,k} = 1$ if bank *j* acted as lead manager in company *k*'s penultimate equity deal in the five years to quarter *t*, and 0 otherwise. Define $I_{r,k} = 1$ if bank *j* lead-managed company *k*'s most recent equity deal in the same window, and zero otherwise. Then the loyalty index for bank *j* in quarter *t* equals $\Sigma_k I_{c,k} I_{r,k} / \Sigma_k I_{c,k}$, that is, the number of retained clients over the total number of clients.

of a square and symmetric matrix $A^{d}_{l,j,t}$ whose cells (*l*,*j*) record whether or not banks *l* and *j* syndicated one or more transactions of type *d* = {*equity*, *debt*} in the calendar year preceding year *t*. Formally, $eigenvector^{d}_{j,t} \equiv E^{d}_{j,t} = \sum_{i} p^{d}_{l,j,t} E^{d}_{l,t}$. As Table 2 shows, successful candidate banks have relationships with significantly better-networked banks than do the losing candidate banks.

A recurring empirical challenge in this paper is how to disentangle the effects of information disclosure concerns and a bank's industry expertise garnered from dealing with the issuer's rivals. As a first pass, we measure a bank's industry expertise as the combined product market share of its clients in the same four-digit SIC industry as the issuer, in the year of the deal in question. Product market shares are computed from annual COMPUSTAT net sales data. Successful candidate banks have vastly greater industry expertise. The combined market share of their clients averages 12% ahead of equity deals and 22.3% ahead of debt deals, compared to the average combined market share of the unsuccessful banks' clients of 1.6% and 3.3%, respectively.

In some specifications, we control for whether a candidate bank was involved in a merger around the time of the sample transaction, given prior evidence that mergers can help expand a bank's client base. In a separate test reported in Section 4.2, we will design an experiment around bank mergers in an attempt to identify the effect of information disclosure concerns on company behavior.

Our final control compares the size of the deal at hand to the candidate bank's average deal size in the prior calendar year. This is intended to capture the fact that a bank is unlikely to be chosen to lead manage a transaction that is either unusually large or unusually small given its normal deal size. The comparison of means reported in Table 2 shows relatively little difference between winning and losing banks on this dimension.

4. Information Disclosure and Demand for Underwriting Services

4.1 Lead Manager Choice Models

Our first model takes as the unit of observation an issuing firm seeking external finance at a given date. The firm, having decided on the form of financing (i.e., debt or equity), chooses a bank to act as lead manager. Estimating a bank's probability of being selected to lead manage a particular offering requires data for both the successful bank and its competitors. In the case of a debt (equity) transaction in year *t*, we treat as lead manager candidates the 50 banks with the largest debt (equity) underwriting market share during that year.[13] This follows the approach taken in Ljungqvist, Marston, and Wilhelm (2005). As we saw in Figure 1, the combined market shares of the top 50 banks is very high, averaging 96.5% in the equity market and 99.5% in the debt market over the 1970-2003 period. Note that there were a few years when fewer than 50 banks were active in the equity or debt market.

To investigate the determinants of the issuing firm's choice of lead manager we estimate a standard multivariate probit specification. Each company *k* is modeled as having a utility $u_{k,j,t} = x_{k,j,t}\beta + \varepsilon_{k,j,t}$ associated with each bank *j*, where the $x_{k,j}$ are the determinants of lead manager choice and the $\varepsilon_{k,j}$ is an observation-specific idiosyncratic shock that is assumed to have a normal distribution. Faced with these utilities over choices, each firm chooses the candidate bank that maximizes its utility.

The objective of the probit model is to estimate the effect of a candidate bank having a relationship with a rival on a firm's decision to award its lead management mandate to the bank. To identify this effect we need to control for a variety of other factors affecting the lead manager choice. Perhaps most importantly, we control for prior bank-firm relationships established through the candidate bank having served as lead or co-manager on the firm's prior deals, both of which Ljungqvist, Marston, and Wilhelm (2005, 2006) have shown to affect lead manager choice positively. In addition, we include a variety of controls for bank characteristics that might increase the firm's utility, namely proxies for the candidate bank's reputation capital (using prior-year equity and debt market shares); the loyalty of the

[13] By construction, a commercial bank is treated as competing for a lead-management mandate prior to the repeal of the Glass-Steagall Act only if it had a Section 20 subsidiary with Tier II securities underwriting authority granted by the Federal Reserve Board.

bank's clients as defined previously; its standing in the investment banking industry (as measured by *indegree* and *eigenvector* centrality); a dummy variable identifying recent mergers involving the bank; the log absolute difference between the size of the firm's deal at hand and the candidate bank's average deal size in the previous year; and our proxy for the bank's industry expertise.[14]

Note that we need only include the characteristics of the issuing firm to the extent that they interact with bank characteristics. All other firm characteristics are common to all choices and thus cancel out in the probit specification. Unlike Ljungqvist, Marston, and Wilhelm (2005, 2006), we do not control for research analyst coverage provided by a candidate bank as coverage data is not available for the first half of our sample period.[15]

The probit model is estimated separately for equity and debt transactions, and the results are reported in Tables 3 and 4, respectively. As mentioned earlier, we restrict attention to the 10 largest firms in each four-digit industry and ignore firms in the competitive fringe. There are 15,475 equity deals during the sample period 1975-2003, of which 5,272 involve a top 10 firm in col. (1) of Table 3. Like Ljungqvist, Marston, and Wilhelm (2006), we find that a candidate bank's chances of becoming lead manager improve significantly, the stronger its prior relationships with the issuer; the greater its reputational standing (as measured by its equity and debt underwriting market shares); the more loyal its clients; the better networked the bank; the greater its industry expertise; following a merger; and if the deal is similar in size to the bank's typical deal. The pseudo R^2 of 21.6% suggests the specification has good fit.

Controlling for these effects, we find that firms are loath to share a lead manager with one of the three largest firms in their industry. This effect, which is strongly statistically significant, is consistent

[14] Because we cannot observe the fees *quoted* by banks that subsequently fail to win an underwriting mandate, we do not attempt to control for price competition. However, it is well known that cross-sectional variation in percentage fees *paid* is minimal, at least for equity deals.

[15] Including research coverage in the second half of our sample period strengthens our conclusions concerning the effect of relationships with rivals on lead manager choice.

with the information disclosure conjecture. Its economic significance is about as large as that of prior bank-issuer relationships and of industry expertise. Specifically, having a relationship with an issuer's top 3 rival reduces a bank's likelihood of becoming lead manager by 16% (i.e., by 0.3 percentage points from the 2.2% unconditional likelihood), holding all other covariates at their sample means.[16]

The negative sign of this rival-client effect contrasts with the univariate results shown in Table 2. The control responsible for switching the sign on the top 3-rival variable in the multivariate model is our measure of industry expertise. Given that the industry expertise variable contains no information about the identity of the bank's clients, we can rule out mechanical reasons for the sign switch. Instead, it appears that the trade-off between the cost of information disclosure and the benefits of industry expertise is a first-order identification problem, as conjectured.

In contrast to the negative effect of relationships with a top 3 rival, firms appear eager to share a lead manager with one of the smaller firms in their industry (those ranked fourth through tenth by sales). This suggests that industry expertise is still tainting the estimates of the negative impact of information disclosure, despite our attempts at controlling for industry expertise directly. Since the benefits of industry expertise introduce a positive bias to the estimates of relationships with an issuer's rivals, the likely impact of information disclosure concerns are actually stronger than indicated by the estimated coefficient. We will attempt to remove this bias in the next two sections.

In columns (2) and (3) we split the sample period in 1990. While the control variables behave similarly in the two sub-periods, the negative effect of a candidate bank having relationships with one of the issuer's three largest rivals is larger and more significant in the 1975-1989 sample. This finding tallies with the evidence presented in Figures 3a and 4a that bank-firm relationships have become both less exclusive (in the sense of banks increasingly having more than one large client in an industry) and much less concentrated (in the sense of companies increasingly using more than one bank for their

[16] The unconditional likelihood is greater than 2% (one in 50) because some issuers hire more than one lead manager.

investment banking needs).

The results for the debt sample, reported in Table 4, are very similar. Notably, relationships with the largest rivals significantly reduce the likelihood that the bank wins the lead management mandate (col. (1)), and unlike in the equity sample, this effect is present and significant in both sub-periods (columns (2) and (3)). Economically, the effect is similar in magnitude to that in the equity sample.

In Table 5, we explore whether frequent issuers are particularly sensitive to information disclosure concerns. We include in the probit specification an interaction term crossing the indicator variable identifying banks that have one or more clients among the three largest firms in the industry with the issuer's log cumulative amount raised in equity (col. (1)) or debt (col. (2)) securities offerings over the five years preceding the transaction in question.[17] For both equity and debt transactions we find that the effect of relationships with rivals becomes significantly more negative the greater the firm's issue activity. This indicates that concerns about information disclosure are greatest among the most frequent issuers. Presumably frequent issuers disclose a greater amount of sensitive information to their lead managers than do infrequent issuers, so the results in Table 5 lend further support to the information disclosure conjecture.

A potential concern about the tests reported in Tables 3 through 5 is that the probit coefficients on rival relationships imperfectly identify the impact of information disclosure concerns on lead manager choice. That is, identification is hampered by concerns that an underwriter's industry expertise, skill in

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[17] It is well known that the interpretation of the marginal effect of interaction terms in a probit model can be complicated due to the non-linear nature of the specification (see Powers (2005)). Consider the following simplified example:

$$\mathrm{E}(y|x_1, x_2) = L(\beta_0 + \beta_1 x_1 + \beta_2 x_1 x_2)$$

where x_1 is a binary variable, x_2 is a continuous variable, and L is the probit likelihood function. The marginal effect of x_1 is given by:

$$\left.\frac{\Delta \mathrm{E}(y|x_1, x_2)}{\Delta x_1}\right|_{x_2} = \mathrm{E}(y|x_1 = 1, x_2) - \mathrm{E}(y|x_1 = 0, x_2)$$

The interaction term is intended to measure

$$\frac{\partial[\mathrm{E}(y|x_1 = 1, x_2) - \mathrm{E}(y|x_1 = 0, x_2)]}{\partial x_2} = \frac{\partial[L(\beta_0 + \beta_1 + \beta_2 x_2) - L(\beta_0)]}{\partial x_2} = \frac{\partial L(\beta_0 + \beta_1 + \beta_2 x_2)}{\partial x_2}$$

Hence, in the case of a binary variable that is crossed with a continuous variable, the interpretation of the interaction term presents no additional difficulty as compared to any other coefficient in the model.

executing the transaction, or some other quality variable may be creating what amounts to an endogeneity problem. Similar identification concerns arise if we consider the candidate banks themselves as having a say in whom they do business with (Fernando, Gatchev, and Spindt (2005)). For instance, a bank may not compete for an issuer's business if it feels this would generate concerns among its existing clients, disrupt the management of steady deal flow within the bank, or concentrate sectoral exposure too much.

To address these concerns, we look for particular sources of exogenous variation in the data that can be used as instruments to separately identify information concerns, as opposed to these various dimensions of quality of service provision and banks' preferences over client type. The first of these exploits the impact of bank mergers. The second exploits a firm's response to clients switching banks.

4.2 Exploiting Variation due to Bank Merger Activity

To isolate the effect of concerns about information disclosure on the matching of banks and firms, we look for events that shock the bank-firm equilibrium such that the risk of damaging information disclosure is increased for some firms, holding everything else constant. Under the information disclosure conjecture, we expect that the firms concerned will react to such a shock by minimizing the risk of damaging information disclosure, while other firms will take no action.

The consolidation of investment banking throughout the sample period, and especially during the 1990s, in anticipation of the repeal of the Glass-Steagall Act, gives a useful instance of an exogenous shock with which to disentangle the industry expertise and information disclosure effects of sharing a lead manager with a rival. Diagram 1 presents our identification strategy:

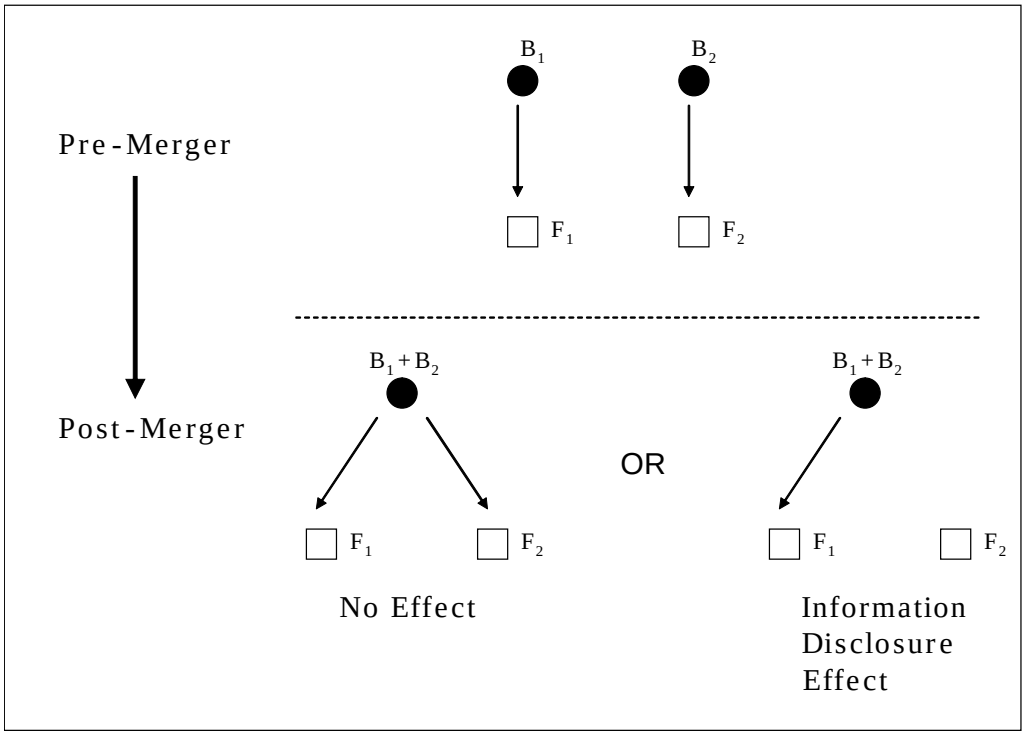

Diagram 1: Effect of Bank Merger on Firms' Choice of Lead Manager

Diagram 1 shows two banks, B_1 and B_2, and their respective client firms, F_1 and F_2, assumed to be product-market competitors. At some point B_1 and B_2 merge. Under the information disclosure conjecture, the merger should lead to one of the two client firms switching banks (although we have no prediction as to which). The empirical analogue of Diagram 1 is that the probability of a firm ending its bank relationship should increase after a merger involving a bank that has a relationship with one of the firm's main product market rivals.

This test provides an empirical measure of the propensity to change relationships given a change in the risk of information disclosure. It helps us distinguish the information disclosure story from the industry expertise effect, since the industry expertise of the population of banks other than the merging banks is unaffected by the merger and so is held constant. Likewise, it allows us to eliminate the effect of not controlling adequately for a bank's skill in executing the transaction or some other quality variable. If these are driving a firm's lead manager choice, we should find no difference, following a

given bank merger, in the switching behavior of firms in those industries where the banks have competing clients and those where they do not.

Formally, this is a differences-in-differences test using bank merger activity as the source of exogenous variation. We compare the switching behavior of a treatment group (those firms whose relationship bank has, since their last securities issue, merged with their chief rival's relationship bank) to the switching behavior of two control groups: Those whose relationship bank has merged with a bank lacking relationships with the largest firms in the industry (control group 1), and those whose relationship bank has not undergone a recent merger (control group 2). Under the information disclosure conjecture, we expect greater switching in the treatment group compared to either of the two control groups, and we expect no difference in switching in control group 1 compared to control group 2, all else equal.

To implement the test, we estimate the probability that an issuing company switches lead managers in consecutive equity or debt deals. A switch is defined as an equity (debt) issuer hiring as lead manager any bank other than the lead manager of its most recent equity (debt) deal (or, if that bank has since been acquired, its successor). In the case of multiple lead managers on a deal, we code as a switch any failure to retain every lead manager from the previous deal.[18] As in the previous section, we focus on deals involving a firm ranked among the ten largest by COMPUSTAT net sales in its four-digit SIC industry that year. This yields 3,177 equity deals and 9,939 debt deals over the 1975-2003 sample period, once first-time deals, which cannot involve a switch, are excluded.

Figures 5a and 5b graph the switching propensity and the quarterly number of transactions for the equity and debt samples, respectively. On average, large firms switch lead managers in 1,670 of the 3,177 equity deals (52.6%) and 5,977 of the 9,939 debt deals (63.7%). For comparison, Ljungqvist and Wilhelm (2005) report a 35.9% switching rate between a company's IPO and its first seasoned equity

[18] This is the most logical way to code the data, but our results are not sensitive to this coding choice.

offering, over the period 1993-2003. Thus, firms appear to switch lead managers more frequently as they mature. We are not aware of prior estimates of the switching rate for debt issuers, but it is clear that it is considerably higher than for equity issuers.

We identify 202 mergers involving sample banks over the 1970-2003 period, shown in Figure 6. The figure distinguishes three cases: Mergers between two investment banks; mergers between two commercial banks active in securities underwriting; and acquisitions of investment banks by commercial banks. Note that the set of mergers includes some between foreign banks, to the extent that these banks are actively involved in securities underwriting in the U.S. market (according to Securities Data Corporation). The figure shows three distinct merger waves, with the last one, beginning in 1994 and ending in 2001, the most active. This, of course, revolved around commercial banks entering securities underwriting by acquiring investment banks (Ljungqvist, Marston, and Wilhelm (2006)).

Our identification strategy requires a bank not just to merge, but to merge with a bank that has rival clients. As it turns out, this appears to be something banks have largely avoided doing. Among the 202 mergers, only 12 involve banks with rival equity clients and only 19 with rival debt clients ranked among the ten largest firms in a given industry. Conditional on there being overlap, the average merger involves 3.9 industries in which both banks have large equity clients (47 industries in total) and 6.3 industries in which both banks have large debt clients (119 industries in total).[19] Assuming conservatively that each bank involved in a merger has one client per industry gives a maximum number of treatment cases of 94 for equity and 238 for debt (fewer to the extent that some clients of the acquirer's or the target's have not raised capital in the remaining sample years since the merger).

Generally, even when a merger involved overlap, the extent of overlap is small. On average, only 6.7% of the combined number of industries in which the merging banks had large clients overlap on the equity side; the corresponding number is 12% on the debt side. This pattern could signify a general

[19] The merger with the greatest degree of overlap was the November 2000 acquisition of Donaldson, Lufkin & Jenrette by CS First Boston, which overlapped in 23 industries for debt and 11 industries for equity.

reluctance to merge with a bank whose client relationships would upset the existing bank-firm matching. Alternatively, we cannot rule out that the large number of industries and banks in the sample leads to a small probability of two random banks having overlapping industry exposure. Either way, the small number of treatment cases will make it harder to find the predicted effect in the data, especially once we look for firms in the relevant industries completing securities transactions before *and* after a bank merger.

Of the 3,177 equity deals in the switching estimation sample, 630 follow a merger involving the bank lead-managing the issuer's previous deal. In 49 of these cases, the previous lead manager merged with a bank that had a relationship with one or more of the issuer's top 10 rivals; focusing on rivals in the top 3, there are 18 cases. These events are clearly associated with increased switching: 17 of the 18 issuers (94.4%) and 38 of the 49 issuers (77.6%) switch in response to their relationship bank merging with the relationship bank of one of their top 3 or top 10 rivals, respectively. For comparison, mergers with banks lacking relationships in the industry (control group 1) are followed by a 63.3% switching rate while issuers whose relationship bank has not undergone a recent merger (control group 2) switch 49.6% of the time. Statistically, the switching rates of the two control groups are significantly lower than those of the treatment groups.

The corresponding results for the debt sample are statistically and economically weaker. 848 deals follow a merger since the issuer's previous deal, with a switching rate of 67%. In the 63 (23) cases involving a target bank with relationships among the ten (three) largest firms in the issuer's industry, switching occurs 74.6% (73.9%) of the time. The switching rate in the absence of a merger is 63.3%.

These results, at least in the equity sample, provide preliminary support for the information disclosure conjecture. However, they make no attempt to control for other determinants of the switching decision. We therefore turn to multivariate probit specifications that include the control

variables considered in Tables 3 and 4. In addition, we control for the log time since the firm's previous deal in view of prior evidence that the switching probability increases with time (Ljungqvist and Wilhelm (2005)). Figures 7a and 7b present kernel density estimates for the time between consecutive equity and debt deals, respectively, for all issuers (rather than just the top 10 in each industry). Most repeat equity issuers complete deals every one or two years; debt issuers typically do deals much more frequently.[20]

The probit estimates are reported in Table 6. In columns (1) and (3) we use all 3,177 equity and 9,393 debt deals, respectively. The base category is control group 2, so we test whether a) firms in the treatment group and b) firms in control group 1 are more likely to switch than are firms in control group 2. We refrain from pooling equity and debt deals to allow firms to have specialized relationship banks. In columns (2) and (4), we drop control group 2, focusing on the 630 equity and 848 debt deals that follow a bank merger, respectively. Here, we test for differences between the treatment group and control group 1.

We first discuss the effects of the control variables. In the first three columns, we see that issuers are significantly less likely to switch lead manager the stronger their underwriting relationships with the bank. While a large equity market share does not insulate a bank from being dropped, a large debt market share does when we consider each of the two full samples in columns (1) and (3). Banks whose clients are generally more loyal are significantly less likely to be dropped in a given deal. Position in the network of banks has a similar, though less consistent, effect. We find some evidence that issuers switch when their deal is either unusually large or unusually small compared to the bank's typical deal size, and relatively strong evidence that their switching propensity increases with time since their last

[20] This might raise concerns that some consecutive debt deals may not, in fact, be independent of each other. This could lead to biased inferences if issuers pre-select their lead managers for a sequence of debt deals spaced a few weeks or months apart. To address this concerns, we have repeated every one of our tests excluding the 1% most active debt issuers (101 unique firms), which account for around a third of debt deals overall and two-thirds of the deals that complete within a short time (say 7, 30, or 60 days) of the most recent deal. All results are unaffected.

deal (except in col. (3)).

Controlling for these factors, the positive and statistically significant coefficient estimated in col. (1) for firms in the treatment group (i.e., merger cases involving a bank whose clients include one of the issuer's top 3 rivals) supports the information disclosure conjecture: Issuers intending to raise equity capital are indeed likely to switch to another bank in response to a shock to the bank-firm equilibrium that increases their risk of damaging information disclosure. Compared to the two control groups, the switching probability is significantly greater in the treatment group, as predicted.[21] Economically, the effect is extremely large. The average switching rate is 33.2 *percentage points* greater in the treatment group than in control group 2, holding all other covariates in col. (1) at their sample means. (This difference is in line with that reported earlier for the bivariate comparison, indicating that the control variables included in Table 6 have little effect on this result.) On the other hand, we find no significant difference in switching between control groups 1 and 2, as predicted, which provides indirect support for the information disclosure conjecture.

Interestingly, mergers involving a bank whose clients include one of the issuer's smaller (top 4-10) rivals are also associated with a greater likelihood of switching. Although the coefficient is imprecisely estimated, it is large economically: For instance, it is 42% larger than the effect of increasing the prior bank-issuer equity underwriting relationship by one standard deviation. The sign of this effect contrasts with our result in Tables 3 and 4 that a bank having relationships with an issuer's top 4-10 rivals is *more* likely to be chosen as lead manager. Earlier, we conjectured that the coefficient for top 4-10 rivals may pick up both information disclosure concerns and the beneficial effects of industry expertise. The fact that we now find no less switching statistically, and more switching economically, when the bank maintains relationships with an issuer's top 4-10 rivals validates our merger

[21] The coefficient provides an estimate of the difference in switching propensity between the treatment group and the base category, control group 2. Comparing this coefficient to the one estimated for firms issuing equity following mergers by their previous lead managers that involve merger partners without rival relationships, we see that the switching propensity is also significantly different between the treatment group and control group 1 ($p = 0.048$).

identification strategy, albeit at the expense of power.

The model shown in col. (2) excludes control group 2, focusing only on firms whose previous equity lead manager has undergone a merger since the issuer's last deal. The positive and statistically significant coefficient estimated for firms in the treatment group confirms that it is a merger with a bank that has rival relationships, rather than a merger per se, that induces greater switching. This rules out the possibility that firms switch underwriters simply to avoid any upheaval accompanying merger integration.

The fact that we find no corresponding results for the debt sample in columns (3) and (4) could be due to the small number of relevant merger cases, or it could indicate that information disclosure concerns play a substantially smaller role in the debt markets. The alternative identification strategy we pursue in the next section will help us distinguish between these possible explanations.

4.3 Exploiting Variation due to Firm Switching

The exogenous variation provided by bank mergers enables us to identify information disclosure effects free from contamination due to industry expertise or unobserved bank quality, at least in the equity sample. The data suggest that firms have considerable concerns about confidential information being leaked to competitors. However, recall that this may be partially offset by the chance of gleaning useful information about their rivals in return. That is, there are both negative and positive aspects to information leakage (an information benefit and an information cost, respectively). We would like to separately identify these aspects.

To do this, we exploit instances of firms switching away from their relationship bank. Using this source of variation raises concerns about the exogeneity of the client switch. The main concern is that firms switch underwriters when quality of service has deteriorated. Thus, we run the risk of having our treated underwriters being poor quality relative to the untreated set. The direction of this potential bias

is such that it can only weaken any support we find for the information disclosure conjecture.

We focus on two types of switches. The first can reasonably be thought of as exogenous. We consider a candidate bank's rival client to have switched if it has been acquired by another firm at some point in the five years preceding the deal for which an issuing company is selecting a lead manager. We use CRSP delisting codes 200 and 300 to identify acquisitions. Our maintained assumption is that the merged firm's CFO will most likely use the bank with which he has an existing relationship, leaving the target's relationship bank in the position of having lost an important client.

The second type of switch exploits variation in the duration of rival relationships. We consider a candidate bank's rival client to have switched if the firm has awarded no underwriting business to the bank for T years, and report results for T=3 and T=5. Within T years of its most recent deal, a rival firm is coded as an active client of the bank's. After T years, it is coded as a former or inactive client. We assume the bank's information about the rival client to decay following a switch, and so code the bank as having an inactive rival client for only one year following the switch (i.e., in year T+1). Beyond that, the bank is coded as no longer having a rival client in the industry.

Our identification builds on the following insight. For other issuing firms in the industry, the rival's switch away from its former relationship bank presents a unique opportunity. This bank has both general industry expertise and specific knowledge of the rival (or, as the case may be, of the merged firm), both of which are beneficial to an issuing company, but there is no longer a risk of information leaking to the issuer's rivals. In contrast, banks that continue to serve the issuer's rivals have general industry expertise and offer both an information benefit (in the form of specific knowledge of the rival) and an information cost (in the form of possible information leakage). By comparing the propensity of firms to match with these two types of underwriters, we can isolate the cost of having information leak to a rival via a shared underwriter.

We implement this strategy by adapting the probit models shown in Tables 3 and 4. Simplifying for notational ease, the reduced-form utility of a company *k* choosing underwriter *j* implicit in these models is

$$u_{k,j,t} = \alpha R_{j,t} + x_{k,j,t}\beta + \varepsilon_{k,j,t}$$

where $R_{j,t}$ = 1 if the underwriter has a rival client in the issuer's four-digit SIC industry, $x_{k,j,t}\beta$ is the impact of the other covariates in the model, and $\varepsilon_{k,j,t}$ is the idiosyncratic i.i.d. taste parameter (distributed normally in the probit specification). We adjust this so that

$$u_{k,j,t} = \hat{\alpha} R^{ns}_{j,t} + \hat{\gamma} R^{s}_{j,t} + x_{k,j,t}\beta + \varepsilon_{k,j,t}$$

where $R^{ns}_{j,t}$ = 1 if underwriter *j* has a large rival client in the issuer's industry and that client has not switched (i.e., it remains an active rival client), and $R^{s}_{j,t}$ = 1 if the underwriter had a large rival client that has switched (i.e., an inactive rival client).

To see where identification is coming from, we decompose $\hat{\alpha}$ and $\hat{\gamma}$. Let

$\hat{\alpha}$ = industry expertise + information cost + information benefit

$\hat{\gamma}$ = industry expertise + information benefit

so that

$\hat{\alpha} - \hat{\gamma}$ = information cost

The function $\hat{\alpha} - \hat{\gamma}$ is a function of estimated parameters and so can be easily constructed. Standard errors for this estimate of the information cost are easily computed using the delta method.[22]

This identification strategy imposes three maintained assumptions: First, that an underwriter's industry expertise is not affected by the switch, at least within the timeframe after the switch we consider; second, that the information benefit is similarly unaffected; and third, that the switch is orthogonal to any unobserved bank quality (though recall that failure of this assumption biases us

[22] See Greene (2003, p. 916), theorem D.22.

against identifying the size of the information cost).

Table 7 reports the results separately for equity and debt transactions, and for the entire sample period (Panel A) as well as splitting the sample in 1990 (Panels B and C). In each case, there are three specifications, using firm mergers and client switches with T=3 and T=5, respectively, to identify active and inactive rival clients. Given the large number of specifications, to conserve space, we report only the coefficients estimated for the active and inactive rival relationship dummies $R_{j,t}^{ns}$ and $R_{j,t}^{s}$ and the difference between the two. As per the above decomposition, this difference is a measure of the net effect of concerns about information disclosure. As before, we distinguish between rivals ranked in the top three and those ranked fourth through tenth in their industry.

The results provide strong support for the conjecture that information disclosure concerns have a first-order effect on firms' choice of lead manager. In Panel A, $\hat{\alpha} - \hat{\gamma}$ is consistently negative and significant in five of the six specifications for the case of top 3 rivals and four of the six specifications for the case of top 4-10 rivals. The economic magnitude of the information cost, shown in the columns labelled dF/dx, is very large. An equity issuer, for instance, is 1.3 to 1.5 percentage points less likely to choose a bank that presents a risk of information leakage than one that does not, which is enormous relative to the unconditional likelihood of a bank being selected of 2.2%. Comparing these estimated economic magnitudes to the much smaller ones in Tables 3 and 4, and recalling that relationships with top 4-10 rivals previously appeared to *help* a bank become lead manager, supports our view that our earlier estimates were contaminated by the beneficial effects of industry expertise. Compared to the bank merger identification strategy in the previous section, we here appear to have sufficient power to establish that debt issuers too are concerned about information leakage.

When we split the sample period in 1990, we continue to find evidence of a weakening over time in the negative effect of information disclosure concerns, especially when the bank has rival

relationships with one of the three largest firms in the issuer's industry; see Panels B and C.

Before we conclude, we note that $\hat{\gamma}$ is not only almost invariably positive and significant but also frequently large economically. Depending on the specification, a bank is several percentage points more likely to be chosen if it used to have relationships with one of the issuer's main rivals. This suggests that industry expertise and intimate knowledge of key rivals do, in fact, play an important role in underwriter selection.

5. Conclusions

Collectively, our results suggest that an issuing firm's concerns about information leakage are at least as important as its existing bank relationships in determining the identity of the lead manager in a given debt or equity deal. A less conservative view would take this as a lower bound and argue that concerns about information leakage may be up to twice as important.

We have argued that these results help explain why issuers typically maintain strong relationships with one investment bank. With a limited number of banks capable of executing large or complex deals, there simply may not be enough banks to allow each company in a given industry to have multiple relationship banks while at the same time avoiding sharing banks with its major rivals. We document a stunning shift away from exclusive bank-firm relationships during the 1990s. This suggests that entry by commercial banks has played an important role in loosening the constraint imposed by information leakage concerns since deregulation began in 1988.

Our results have important implications for how competition among investment banks is viewed. They suggest that the position of incumbent banks is not quite as strong as was previously thought: Relationships are not everything and issuing firms are keen to maintain relationships with multiple banks so long as there is little risk sensitive information is disclosed to a rival. This is good news for entrants who have the capacity to handle complex deals. Similarly, banks that merge are unlikely to

retain clients in industries where the merger results in rivals sharing an underwriter. We find that the probability of losing at least one such client is over 80% following such mergers.

On the other hand, our evidence suggests that clients' underwriter choice is more constrained than was previously thought. Concerns about information leakage appear to reduce the effective choice set of lead managers enjoyed by an issuing firm. This would dampen the pressure of competition among banks, in the absence of a competitive shock such as a merger or entry. We conjecture that this may be a part of the reason so little price competition is observed in the underwriting market.

Our study has examined demand for underwriting services and drawn implications for the nature of competition from the estimated structure of demand. To better understand the competitive nature of investment banking, and as a result the way capital markets are accessed, it is also necessary to consider the supply side of the industry. In particular, a rigorous empirical understanding of the production function underlying investment banking would go a long way to fleshing out the appropriate competitive model of investment banking. This is no small task since the capital and labor used in production in this industry are meshed together in the minds of banks' employees. Thus a first place to start would be unraveling the returns to, and market for, bankers at different stages of their careers. Needless to say, this requires investment in datasets of a quite different nature than that used in this study.

References

Baccara, Mariagiovanna, and Ronny Razin, 2004, From thought to practice: Appropriation and endogenous market structure with imperfect intellectual property rights, Unpublished working paper, New York University.

Bonacich, Philip, 1972, Factoring and weighting approaches to status scores and clique identification, Journal of Mathematical Sociology 2, 113-120.

Bonacich, Philip, 1987, Power and centrality: A family of measures, American Journal of Sociology 92, 1170-1182.

Carlton, Denis W., and Jeffery M. Perloff, 2004, Modern Industrial Organisation, Fourth Edition, New York: Addison, Wesley, and Longman.

Chen, Hsuan-Chi, and Jay R. Ritter, 2000, The seven percent solution, Journal of Finance 55, 1105-1131.

Drucker, Steven, and Manju Puri, 2005, On the benefits of concurrent lending and underwriting, Journal of Finance, forthcoming.

Ellis, Katrina, Roni Michaely, and Maureen O'Hara, 2005, Competition in investment banking: Proactive, reactive, or retaliatory? Unpublished working paper, Cornell University.

Fernando, Chitru S., Vladimir A. Gatchev, and Paul A. Spindt, 2005, Wanna dance? How firms and underwriters choose each other, Journal of Finance 60, 2437-2470.

Gande, Amar, Manju Puri, and Anthony Saunders, 1999, Bank entry, competition and the market for corporate securities underwriting, Journal of Financial Economics 54, 165-195.

Gande, Amar, Manju Puri, Anthony Saunders, and Ingo Walter, 1997, Bank underwriting of debt securities: Modern evidence, Review of Financial Studies 10, 1175-1202.

Greene, William H., 2003, Econometric Analysis, Prentice Hall.

Hansen, Robert S., 2001, Do investment banks compete in IPOs? The advent of the '7% plus contract', Journal of Financial Economics 59, 313-346.

Ljungqvist, Alexander, Felicia Marston, and William J. Wilhelm, 2005, Scaling the hierarchy: How and why investment banks compete for syndicate co-management appointments, Unpublished working paper, New York University.

Ljungqvist, Alexander, Felicia Marston, and William J. Wilhelm, 2006, Competing for securities underwriting mandates: Banking relationships and analyst recommendations, Journal of Finance, forthcoming.

Ljungqvist, Alexander, and William J. Wilhelm, 2005, Does prospect theory explain IPO market behavior?, Journal of Finance 60, 1759-1790.

Megginson, William L., and Kathleen A. Weiss, 1991, Venture capitalist certification in initial public offerings, Journal of Finance 46, 879-903.

Powers, Eric A., 2005, Interpreting logit regressions with interaction terms: An application to the management turnover literature, Journal of Corporate Finance 11, 504-522.

Yasuda, Ayako, 2005, Do bank relationships affect the firm's underwriter choice in the corporate-bond underwriting market?, Journal of Finance 60, 1259-1292.

Figure 1a. Equity Underwriting Market Shares of Top 50 Banks

The graphs show, from bottom to top, the combined equity underwriting market shares of the four, 10, 20, 30, 40, and 50 largest equity underwriters each year, the first three of which are labeled C4, C10, and C20.

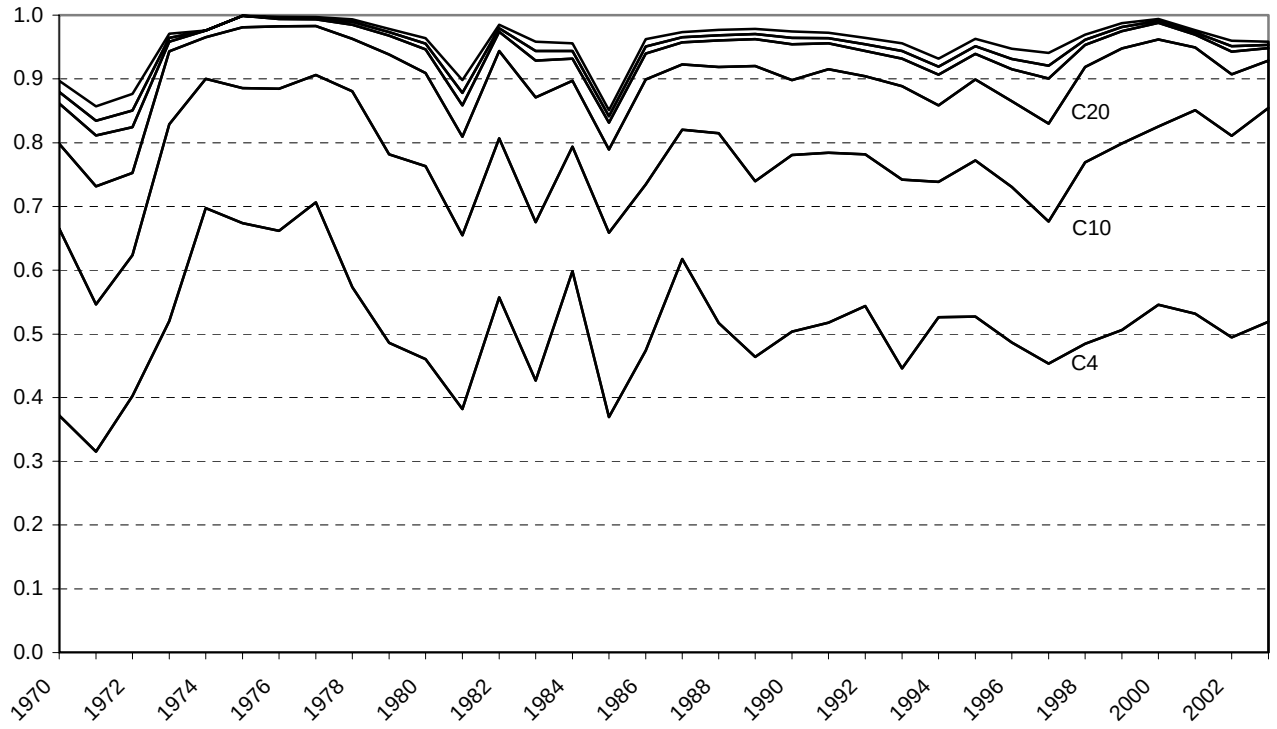

Figure 1b. Debt Underwriting Market Shares of Top 50 Banks

The graphs show, from bottom to top, the combined equity underwriting market shares of the four, 10, 20, 30, 40, and 50 largest debt underwriters each year, the first three of which are labeled C4, C10, and C20.

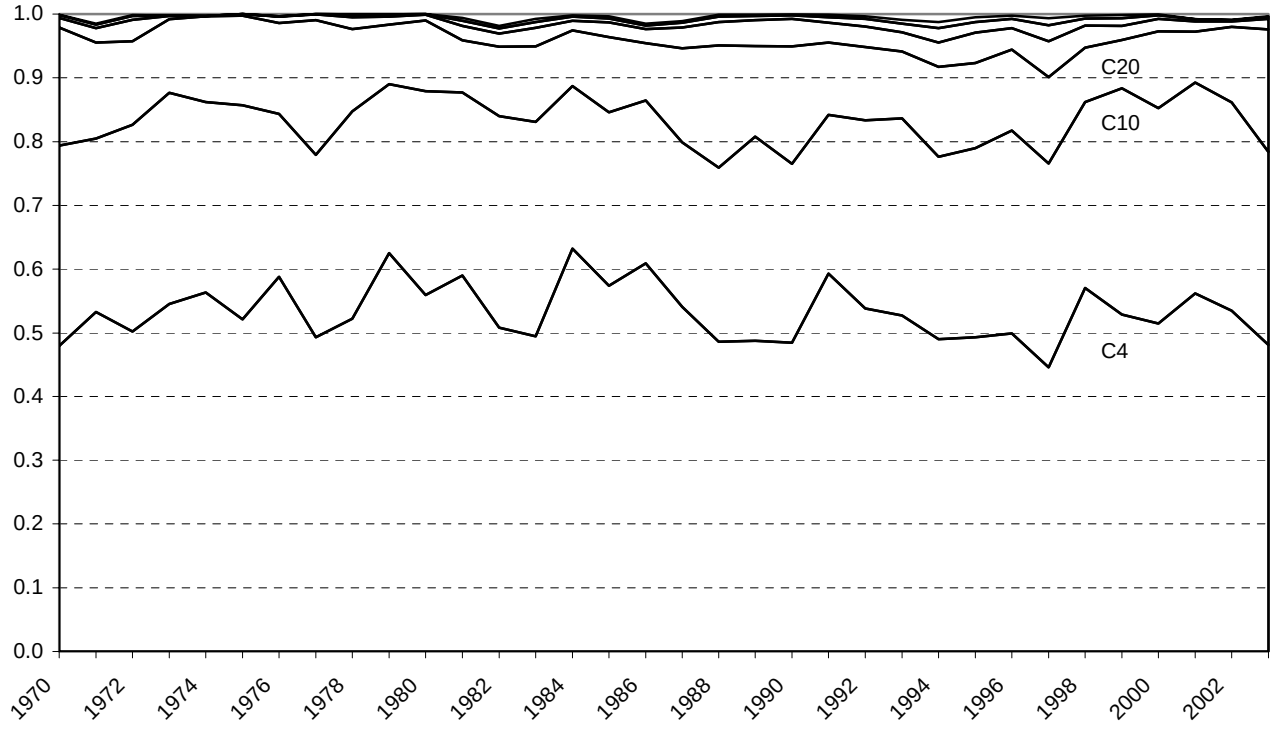

Figure 2a. Number and Combined Equity Market Share of Commercial Banks

The graphs show the combined equity (in 2a) and debt (in 2b) market share of commercial banks (on the right-hand axis) and the number of commercial banks that have positive market share in each year (on the left-hand axis). Deregulation began in 1988 and the Glass-Steagall Act was repealed in 1999. There is underwriting by commercial banks prior to 1988 as some banks had grandfathered underwriting rights; due to the inclusion of foreign banks active in the U.S. capital markets; and because we include private placements, which fell outside the Glass-Steagall restrictions.

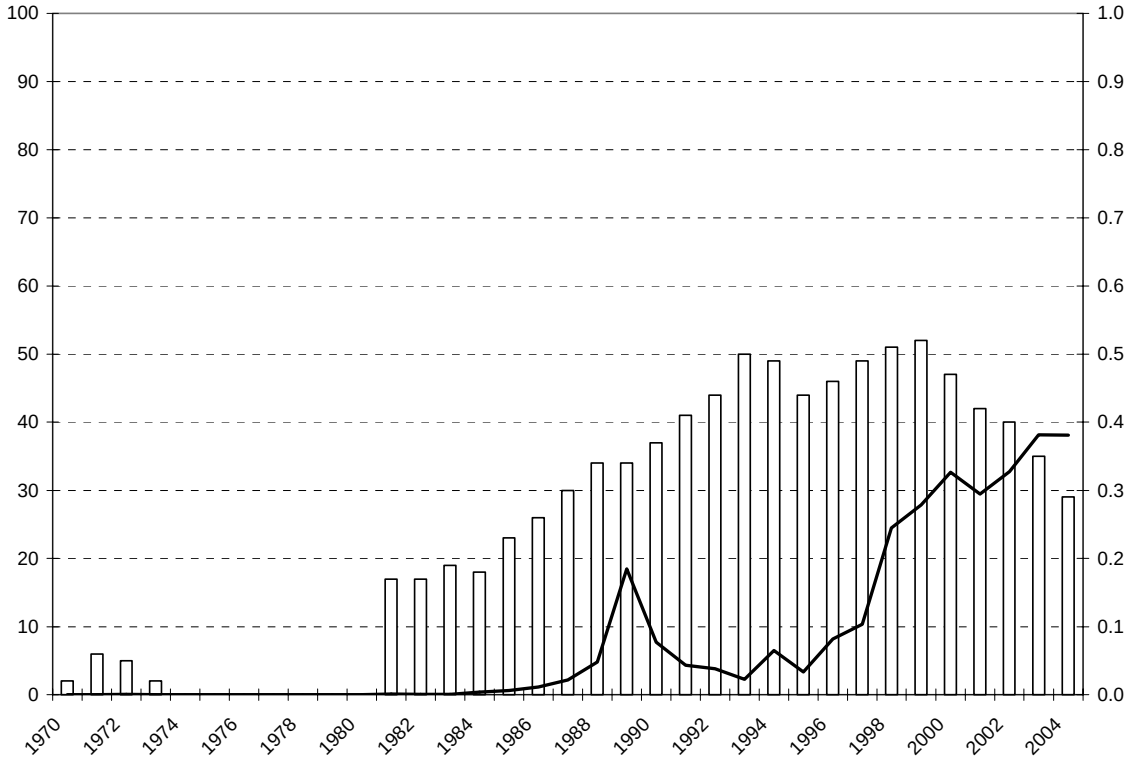

Figure 2b. Number and Combined Debt Market Share of Commercial Banks

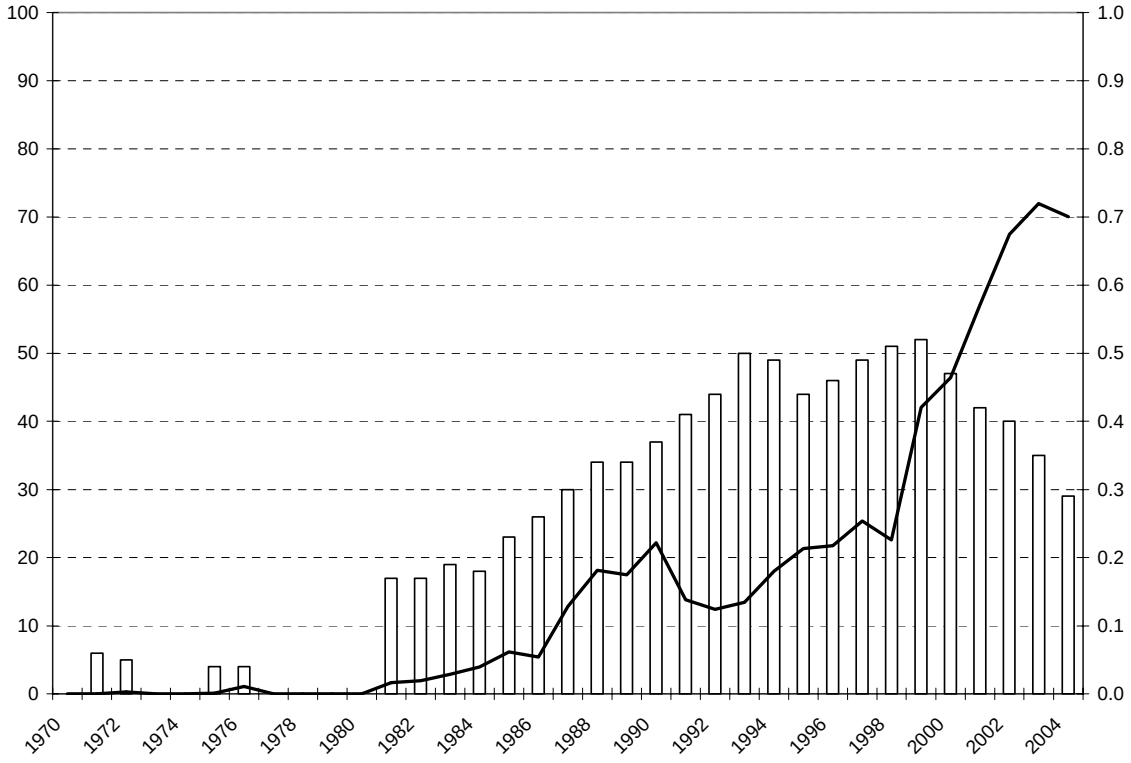

Figure 3a. Exclusivity of Bank-firm Equity Relationships

The graphs show the fraction of time that a given bank with at least one or debt equity relationship client among the 3, 5, or 10 largest firms (by Compustat net sales) in a given 4-digit SIC code in a given quarter has exactly one such relationship client.

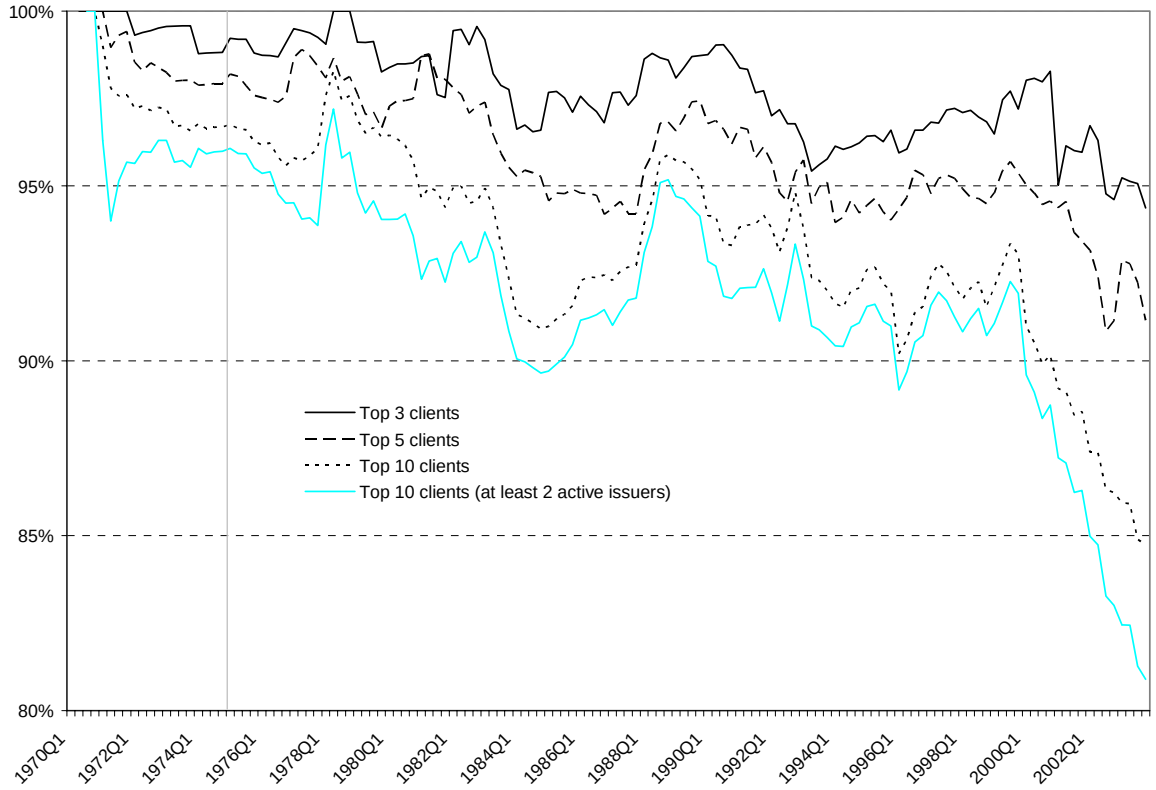

Figure 3b. Exclusivity of Bank-firm Debt Relationships

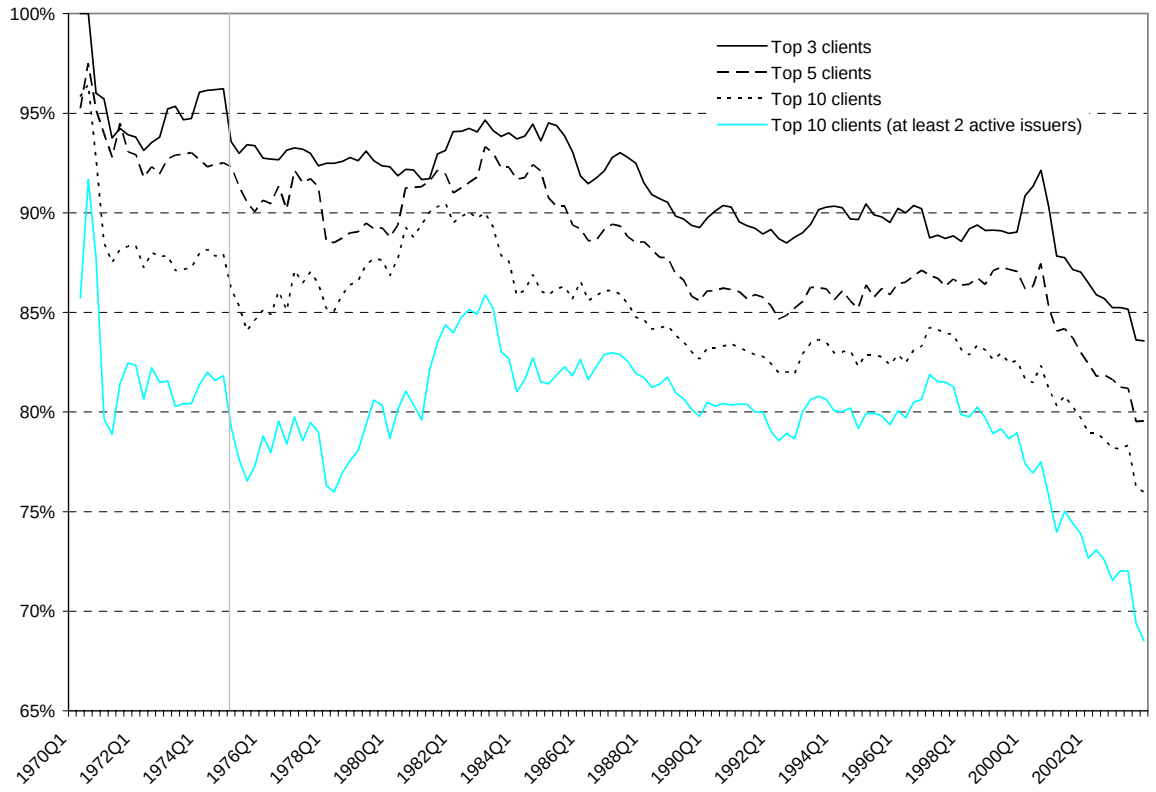

Figure 4a. Concentration of Bank-firm Equity Relationships

The graphs show the Herfindahl concentration index of bank-firm relationships, measured over the prior one, two, or three years, of the average U.S. issuer (weighted by each issuer's cumulative proceeds over the relevant window).

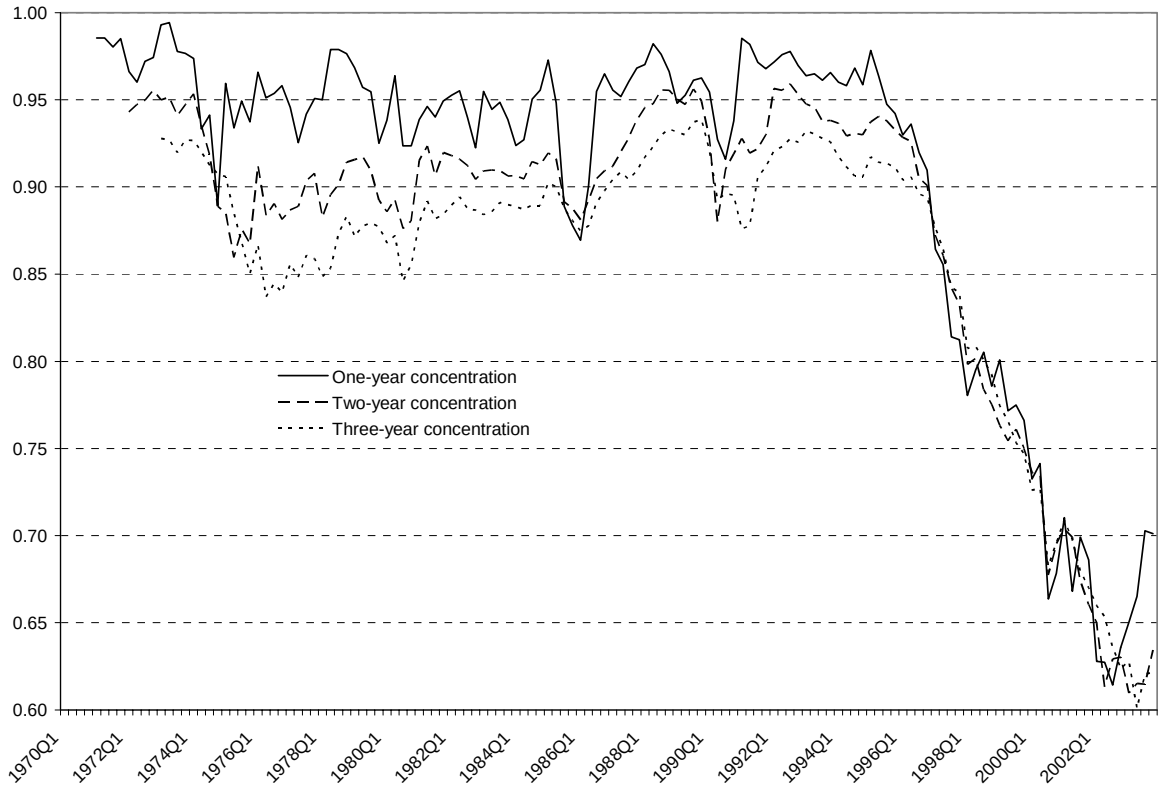

Figure 4b. Concentration of Bank-firm Debt Relationships

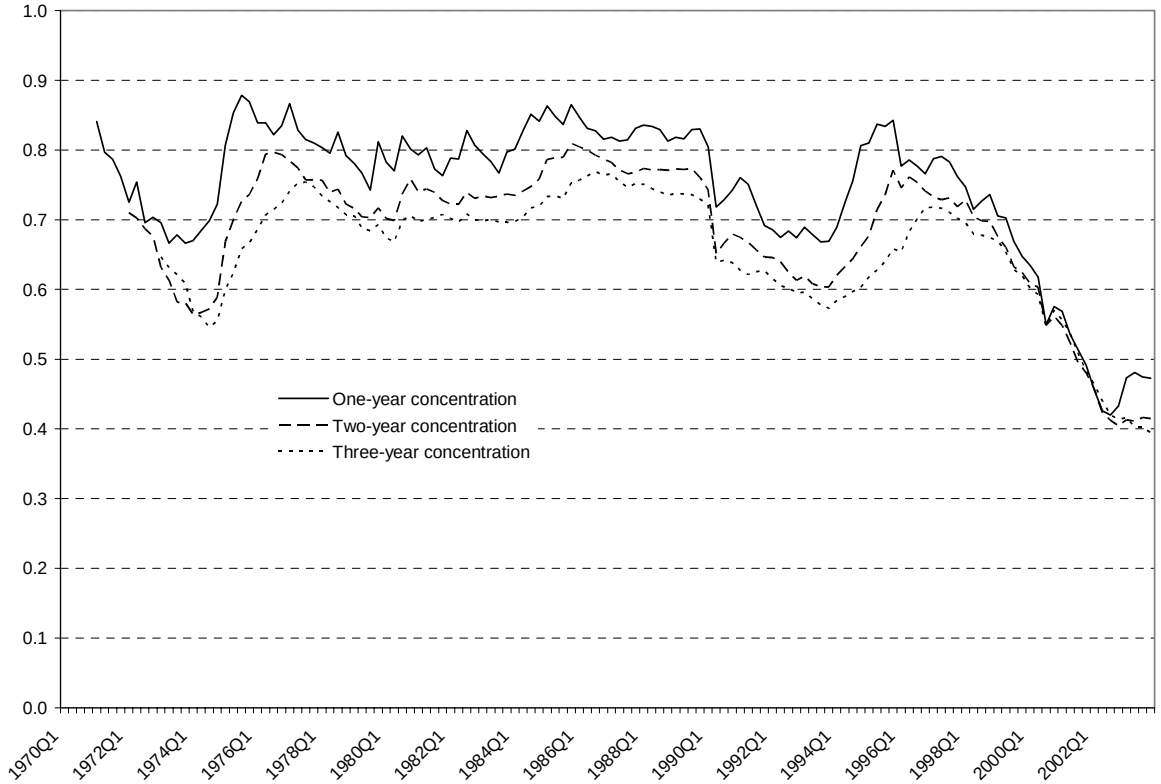

Figure 5a. Switching Propensity in Consecutive Equity Transactions

The bars represent the quarterly number of equity or debt transactions by issuers ranked among the top ten largest firms in their industry by sales, excluding an issuer's first recorded deal in 1970-2003 as we focus on lead manager switches compared to the most recent deal. A switch is defined as the issuer hiring as lead manager any bank other than the lead manager of its most recent deal (or, if that bank has since been acquired, its successor). In the case of multiple lead managers on a deal, we code as a switch any failure to retain every lead manager from the previous deal. The quarterly fraction of switchers is indicated by "o" and measured on the right-hand axis. Note that we do not condition on the time between deals.

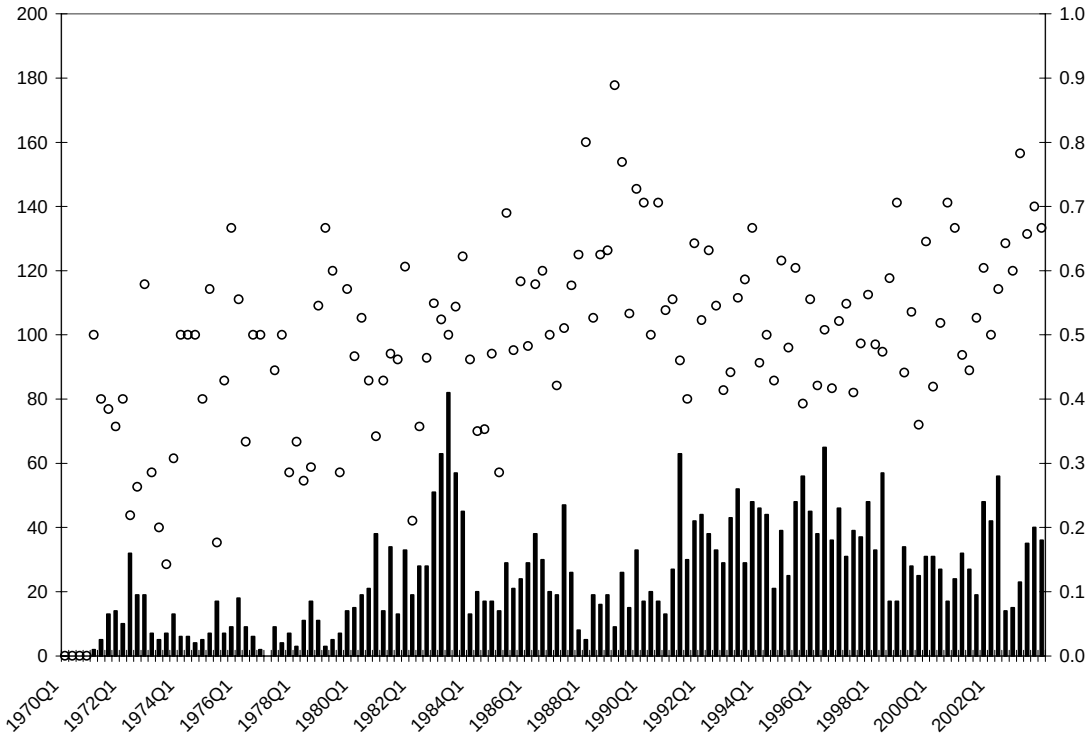

Figure 5b. Switching Propensity in Consecutive Debt Transactions

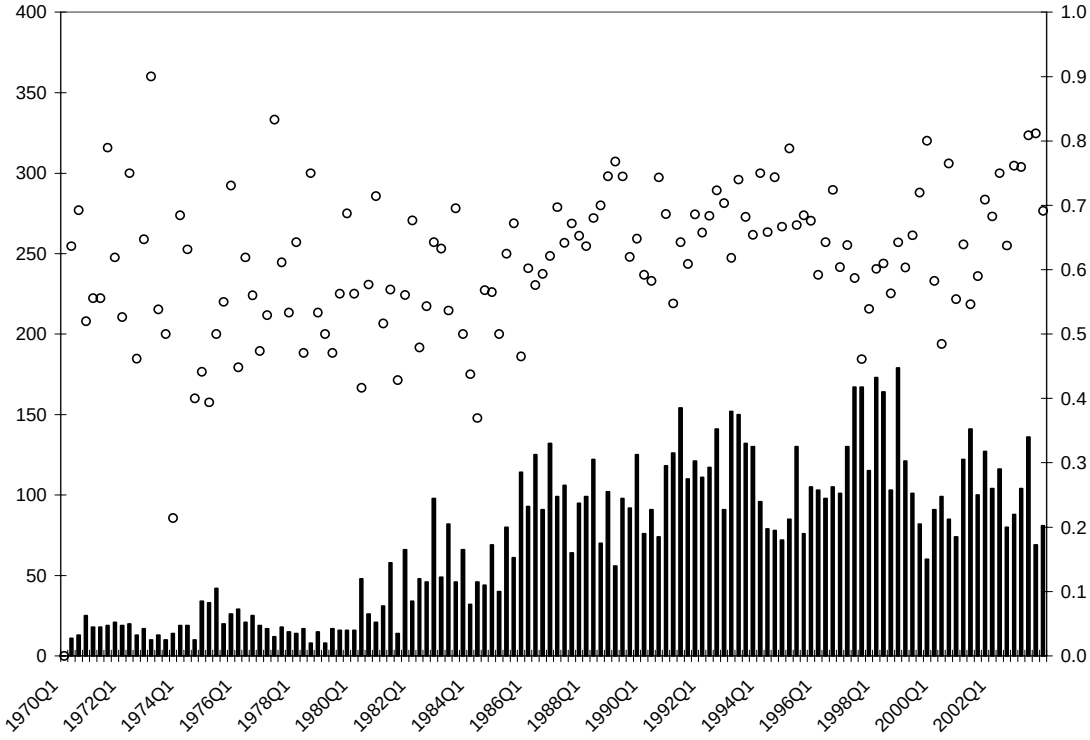

Figure 6. Annual Number of Bank Mergers

The figure shows the annual number of bank mergers. We distinguish three cases: Mergers between two investment banks (IB-IB); mergers between two commercial banks (CB-CB); and acquisitions of investment banks by commercial banks (CB-IB). We continue to call a commercial bank a commercial bank after it has acquired an investment bank. We include all mergers (and in two cases, joint ventures of the two banks' capital markets divisions) by any bank involved in securities underwriting, according to Securities Data Corporation, between 1970 and 2003. As a consequence, the figure includes mergers between foreign banks, such as the 1984 merger between two Canadian commercial banks, Harris Bankcorp and Bank of Montreal. The total number of mergers included in the figure is 202.

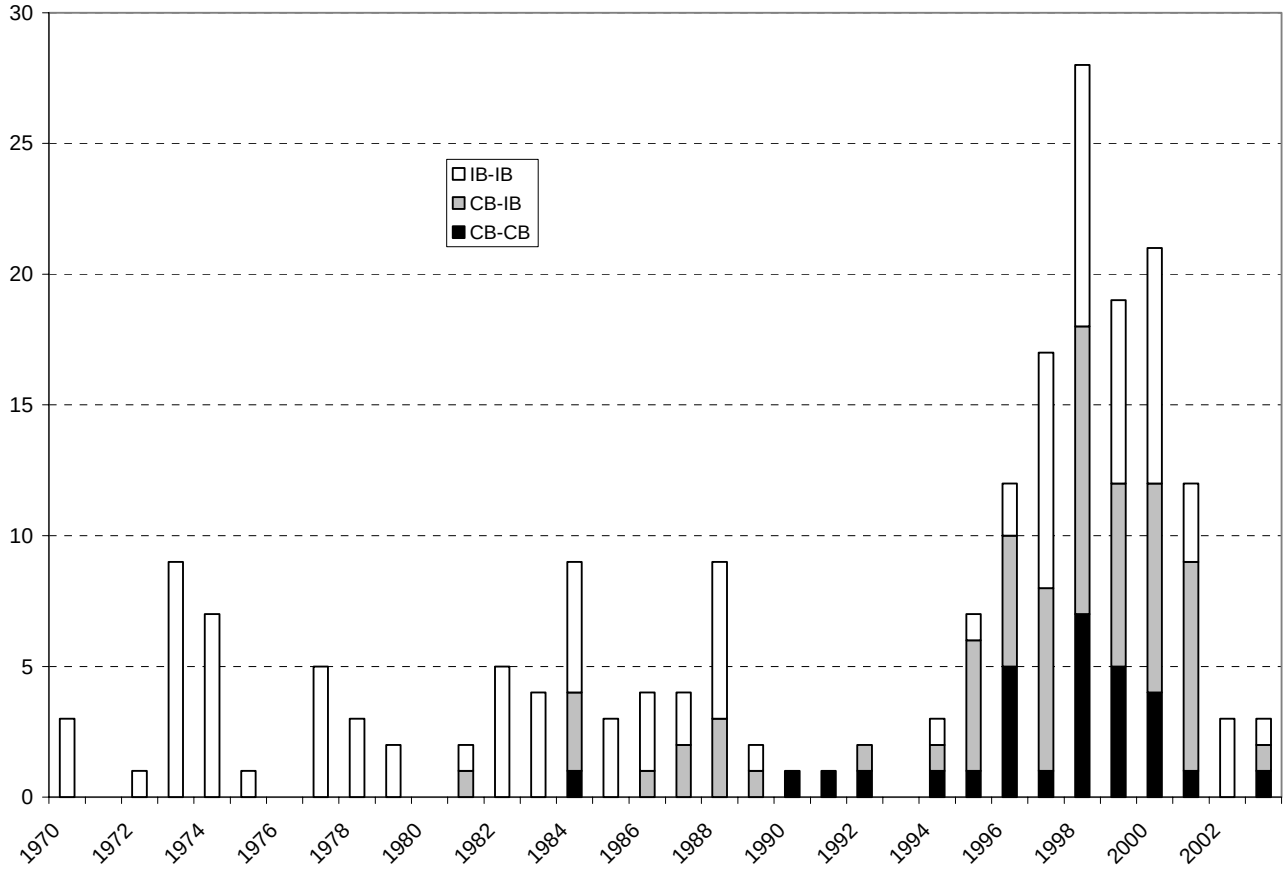

Figure 7a. Kernel Density Estimate for Time between Consecutive Equity Deals

The graph plots a kernel density estimate using an Epanechnikov kernel with bandwidth = 0.2 and N = 10,064, of the time in years between any two equity deals that a U.S. issuer completes between 1970 and 2003. For the purpose of the graph (but not the kernel estimation), times longer than 20 years are not shown.

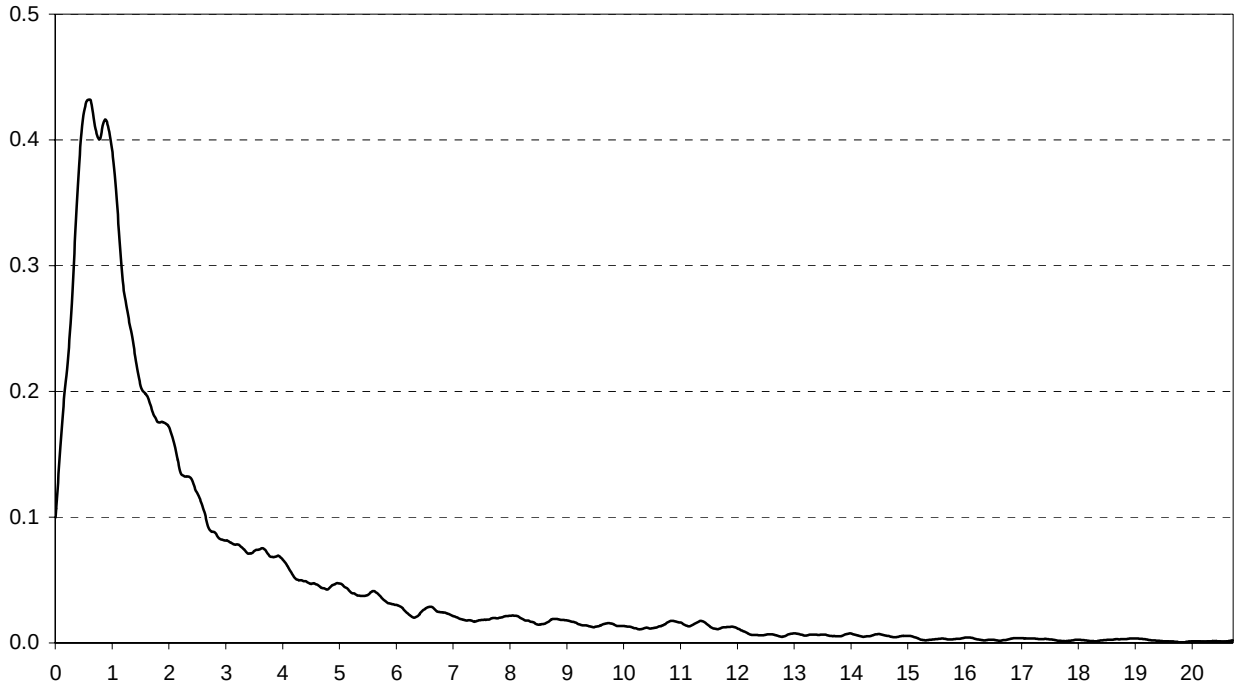

Figure 7b. Kernel Density Estimate for Time between Consecutive Debt Deals

The graph plots a kernel density estimate using an Epanechnikov kernel with bandwidth = 0.2 and N = 23,984, of the time in years between any two debt deals that a U.S. issuer completes between 1970 and 2003. For the purpose of the graph (but not the kernel estimation), times longer than 20 years are not shown.

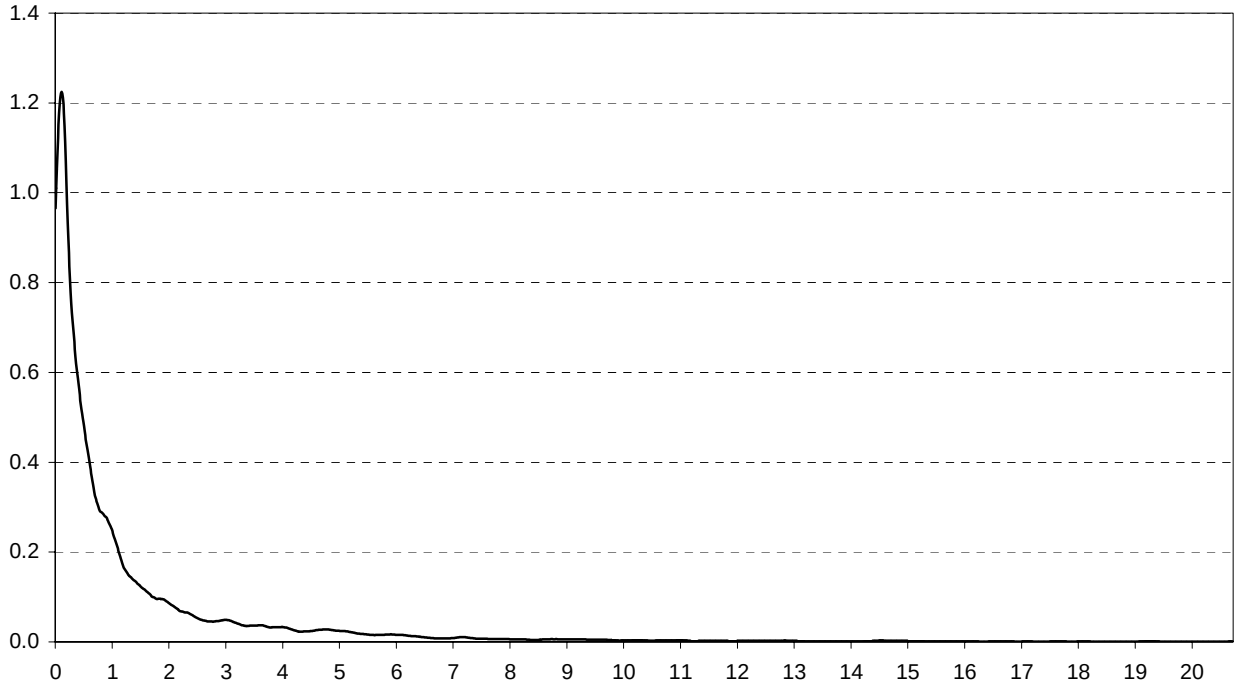

Table 1. The Sample of Capital-raising Transactions

Thompson Financial's Securities Data Corporation reports 54,659 capital-raising transactions completed between January 1970 and December 2003, after excluding non-underwritten issues; transactions by firms classified as SIC 6000-6999 (financial institutions, etc.) and SIC 9000-9999 (government agencies, etc.); and offerings by non-U.S. corporations. The sample used in the econometric analyses imposes three additional filters. First, because we require five years of data to establish prior relationships with rivals, the econometric models use data from 1975 onwards. Second, we require that each deal was lead-managed by one of the 50 largest underwriters active that year. Third, we focus on the ten largest firms (by COMPUSTAT net sales) in each four-digit SIC industry and ignore transactions involving smaller firms. In some specifications, we split the sample in 1990. All currency amounts are in 1996 constant dollars, deflated using the quarterly GNP deflator.

					Estimation sample (ten largest firms per industry)					
	1970 - 2003				1975 - 2003		1975 - 1989		1990 - 2003	
	No. of deals	% of deals	Aggregate amount raised ($m, real)	% of amt.	No. of deals	Aggregate amount raised ($m, real)	No. of deals	Aggregate amount raised ($m, real)	No. of deals	Aggregate amount raised ($m, real)
Equity										
Common stock	19,388	35.5	1,244,409	24.4	5,012	570,972	2,240	126,844	2,772	444,128
Private common	2,579	4.7	63,488	1.2	260	11,199	87	4,220	173	6,979
Debt										
Non-convertible debt	14,706	26.9	2,566,572	50.4	7,307	1,386,102	1,927	400,829	5,380	985,273
Convertible debt	1,458	2.7	177,474	3.5	609	97,286	396	39,772	213	57,514
Private non-convertible debt	12,248	22.4	764,347	15.0	3,741	261,637	1,877	148,959	1,864	112,678
Private convertible debt	481	0.9	11,162	0.2	77	3,397	46	1,432	31	1,965
Non-convertible preferred	1,288	2.4	123,761	2.4	311	36,983	165	18,389	146	18,594
Convertible preferred	561	1.0	79,596	1.6	229	46,916	119	13,848	110	33,069
Private non-convertible preferred	747	1.4	22,337	0.4	78	3,776	52	2,305	26	1,471
Private convertible preferred	1,203	2.2	40,739	0.8	101	9,777	45	5,400	56	4,376
All deals	54,659	100.0	5,093,886	100.0	17,725	2,428,044	6,954	761,998	10,771	1,666,045

Table 2. Descriptive Statistics

The unit of observation is a bank-deal pair. The estimation dataset consists of 5,272 equity deals and 12,453 debt deals completed by firms ranked among the ten largest in their four-digit SIC industries (based on COMPUSTAT net sales) between 1975 and 2003, for each of which the 50 largest banks are deemed to compete to become lead manager (except where fewer than 50 banks were active in the market at the time). This gives a sample of 262,580 bank-deal pairs for equity and 610,500 for debt. The columns headed 'winning banks' refer to the bank-deal pairs involving banks that were awarded lead-management assignments, while the columns headed 'losing banks' refer to the bank-deal pairs involving banks that were eligible to compete for but were not chosen as lead manager. Note that some deals have more than one lead manager, and so the number of winning banks exceeds the number of deals. For each bank-deal pair, we report the main explanatory variables used in the econometric models. A candidate bank's prior relationships with the issuing company and with the issuing company's product market rivals are based on their joint capital raising histories before the deal in question. The loyalty index measures how often a bank retains its underwriting clients in consecutive deals. To measure a candidate bank's position in the network of syndicate banks, we compute *indegree* (the number of unique banks it has syndicated with in the prior calendar year, normalized by the number of possible syndication partners) and *eigenvector* centrality (a recursive measure of indegree that weights syndication ties by how well networked each syndication partner is). A bank's industry expertise is proxied by the combined product market share of its clients in the same SIC4 industry as the issuer, at the time of the deal. The last column provides *t*-tests of differences in means/fractions comparing winning to losing banks.

Continued over

Table 2. Descriptive Statistics (Continued)

	Winning banks		Losing banks		
	Mean or fraction	St.dev.	Mean or fraction	St.dev.	*t*-test
Panel A: Equity Transactions	N=5,694		N=256,886		
Bank-firm relationships (lead)					
bank's share of firm's debt deals as lead prior 4 quarters (%)	6.5	22.9	0.2	3.6	95.6
bank's share of firm's equity deals as lead prior 4 quarters (%)	13.0	32.6	0.1	3.4	165.1
Bank-firm relationships (co-manager)					
bank's share of firm's debt deals as co-manager prior 4 quarters (%)	0.8	6.9	0.1	2.3	22.0
bank's share of firm's eq. deals as co-manager prior 4 quarters (%)	1.2	9.0	0.2	3.6	19.8
Bank-rival relationships					
=1 if bank has ≥1 clients among 3 largest firms in industry (%)	5.5		1.6		22.4
=1 if bank has ≥1 clients among the 4-10 largest firms in ind. (%)	8.8		2.7		27.5
Bank characteristics					
bank's equity market share in prior calendar year (%)	6.0	6.2	1.8	3.9	79.2
bank's debt market share in prior calendar year (%)	6.0	6.0	1.8	3.9	79.7
bank's loyalty (%)	61.4	21.8	44.0	35.1	37.2
bank's *indegree* centrality	4.6	2.6	2.8	2.6	52.6
bank's *eigenvector* centrality	26.4	12.2	13.7	12.8	73.9
bank's industry expertise (%)	12.0	20.0	1.6	8.1	90.8
=1 if bank involved in merger (%)	8.4		5.3		10.5
abs(deal size – bank's mean deal size in prior calendar year) ($m)	95.5	339.2	95.8	271.4	-0.1
Panel B: Debt Transactions	N=13,861		N=596,639		
Bank-firm relationships (lead)					
bank's share of firm's debt deals as lead prior 4 quarters (%)	17.8	32.6	0.8	6.9	236.9
bank's share of firm's equity deals as lead prior 4 quarters (%)	4.2	19.3	0.2	4.5	86.9
Bank-firm relationships (co-manager)					
bank's share of firm's debt deals as co-manager prior 4 quarters (%)	3.0	11.6	0.4	3.7	77.1
bank's share of firm's eq. deals as co-manager prior 4 quarters (%)	1.0	8.3	0.2	2.8	34.4
Bank-rival relationships					
=1 if bank has ≥1 clients among 3 largest firms in industry (%)	23.6		6.1		82.4
=1 if bank has ≥1 clients among the 4-10 largest firms in ind. (%)	21.9		5.7		79.1
Bank characteristics					
bank's equity market share in prior calendar year (%)	6.7	6.7	1.7	3.9	143.0
bank's debt market share in prior calendar year (%)	7.9	5.9	1.9	3.8	182.4
bank's loyalty (%)	49.1	15.8	33.2	30.9	60.2
bank's *indegree* centrality	8.7	4.0	4.2	4.3	122.5
bank's *eigenvector* centrality	30.2	13.0	12.7	13.8	147.9
bank's industry expertise (%)	22.3	24.6	3.3	11.2	190.7
=1 if bank involved in merger (%)	9.6		6.8		13.1
abs(deal size – bank's mean deal size in prior calendar year) ($m)	128.3	253.2	121.6	210.7	3.7

Table 3. Lead Manager Choice – Equity

We estimate the probability that a given bank is chosen to lead-manage a particular securities transaction. We focus on deals involving a firm ranked among the ten largest by COMPUSTAT net sales in its four-digit SIC industry that year, and treat the 50 largest equity underwriters by market share that year as being in competition for each deal. (Note there were only 35 banks active in equity underwriting in 1975.) The dependent variable equals 1 if the bank won the lead-management mandate, and 0 otherwise. There are 15,475 equity deals during the sample period 1975-2003, of which 5,272 involve a top 10 firm in column (1). In columns (2) and (3) we split the sample period in 1990. The models are estimated using probit. Intercepts are not shown. Heteroskedasticity-consistent standard errors (which are clustered on deal id) are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively.

	Equity transactions		
	1975-2003	1975-1989	1990-2003
	(1)	(2)	(3)
Bank-rival relationships			
=1 if bank has one or more clients among the three largest firms in industry	-0.139***	-0.284***	-0.097*
	0.036	*0.064*	*0.043*
=1 if bank has one or more clients among the 4-10 largest firms in industry	0.142***	0.059	0.153***
	0.027	*0.047*	*0.033*
Bank-firm relationships (lead)			
bank's share of firm's debt deals as lead in prior four quarters	1.342***	1.567***	1.125***
	0.069	*0.096*	*0.101*
bank's share of firm's equity deals as lead in prior four quarters	2.206***	2.011***	2.298***
	0.053	*0.088*	*0.066*
Bank-firm relationships (co-manager)			
bank's share of firm's debt deals as co-manager in prior four quarters	0.604***	0.524*	0.781***
	0.152	*0.218*	*0.205*
bank's share of firm's equity deals as co-manager in prior four quarters	0.646***	0.592***	0.663***
	0.095	*0.164*	*0.115*
Bank characteristics			
bank's equity market share in prior calendar year	2.015***	0.878***	3.409***
	0.166	*0.248*	*0.338*
bank's debt market share in prior calendar year	2.339***	1.998***	1.437***
	0.168	*0.240*	*0.298*
bank's loyalty	0.276***	0.203***	0.377***
	0.022	*0.031*	*0.034*
bank's *indegree* centrality	4.399***	0.027	3.989***
	0.278	*1.593*	*0.384*
bank's *eigenvector* centrality	1.470***	1.323***	1.984***
	0.062	*0.083*	*0.107*
bank's industry expertise	1.038***	1.313***	0.835***
	0.049	*0.088*	*0.058*
=1 if bank involved in merger	0.099*	-0.046	0.171***
	0.039	*0.073*	*0.048*
ln abs(deal size – bank's mean deal size in prior calendar year)	-0.121***	-0.169***	-0.109***
	0.005	*0.008*	*0.006*
Diagnostics			
Pseudo R^2	21.6 %	19.3 %	24.4 %
Wald test: all coefficients = 0 (χ^2)	9,878***	3,576***	6,320***
No. of equity transactions	5,272	2,327	2,945

Table 4. Lead Manager Choice – Debt

We estimate the probability that a given bank is chosen to lead-manage a particular securities transaction. We focus on deals involving a firm ranked among the ten largest by COMPUSTAT net sales in its four-digit SIC industry that year, and treat the 50 largest debt underwriters by market share that year as being in competition for each deal. (Note there were fewer than 50 banks active in debt underwriting in 1975-1980 and in 2002.) The dependent variable equals 1 if the bank won the lead-management mandate, and 0 otherwise. There are 29,674 debt deals during the sample period 1975-2003, of which 12,453 involve a top 10 firm in column (1). In columns (2) and (3) we split the sample period in 1990. The models are estimated using probit. Intercepts are not shown. Heteroskedasticity-consistent standard errors (which are clustered on deal id) are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively.

	Debt transactions		
	1975-2003	1975-1989	1990-2003
	(1)	(2)	(3)
Bank-rival relationships			
=1 if bank has one or more clients among the three largest firms in industry	-0.160***	-0.180***	-0.160***
	0.013	*0.023*	*0.017*
=1 if bank has one or more clients among the 4-10 largest firms in industry	0.102***	0.084***	0.097***
	0.012	*0.021*	*0.014*
Bank-firm relationships (lead)			
bank's share of firm's debt deals as lead in prior four quarters	1.419***	1.450***	1.371***
	0.024	*0.038*	*0.031*
bank's share of firm's equity deals as lead in prior four quarters	0.697***	0.770***	0.649***
	0.039	*0.060*	*0.052*
Bank-firm relationships (co-manager)			
bank's share of firm's debt deals as co-manager in prior four quarters	0.994***	0.666***	1.163***
	0.049	*0.090*	*0.060*
bank's share of firm's equity deals as co-manager in prior four quarters	0.406***	0.502***	0.373***
	0.083	*0.125*	*0.111*
Bank characteristics			
bank's equity market share in prior calendar year	-0.264*	0.101	-1.069***
	0.107	*0.132*	*0.183*
bank's debt market share in prior calendar year	4.120***	3.303***	4.899***
	0.125	*0.173*	*0.209*
bank's loyalty	0.341***	0.332***	0.386***
	0.015	*0.025*	*0.019*
bank's *indegree* centrality	3.237***	0.749**	4.186***
	0.138	*0.266*	*0.157*
bank's *eigenvector* centrality	1.343***	0.998***	1.683***
	0.046	*0.067*	*0.065*
bank's industry expertise	1.117***	1.502***	0.973***
	0.025	*0.052*	*0.028*
=1 if bank involved in merger	0.066**	-0.137*	0.104***
	0.024	*0.065*	*0.027*
ln abs(deal size – bank's mean deal size in prior calendar year)	-0.062***	-0.099***	-0.049***
	0.003	*0.005*	*0.004*
Diagnostics			
Pseudo R^2	24.9 %	23.6 %	26.1 %
Wald test: all coefficients = 0 (χ^2)	34,148***	10,661***	23,309***
No. of debt transactions	12,453	4,627	7,826

Table 5. Lead Manager Choice – Size of Issuer

As in Tables 3 and 4, we estimate the probability that a given bank is chosen to lead-manage a particular securities transaction. We include an interaction term crossing the indicator variable identifying banks that have one or more clients among the three largest firms in the industry with the issuer's log cumulative amount raised in equity (col. (1)) or debt (col. (2)) securities offerings over the five years preceding the transaction in question. The models are estimated using probit. Intercepts are not shown. Heteroskedasticity-consistent standard errors (which are clustered on deal id) are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively.

	Equity (1)	Debt (2)
Bank-rival relationships		
=1 if bank has one or more clients among the three largest firms in industry	-0.028	-0.062*
	0.044	*0.029*
x *ln* cumulative amount raised in prior five years	-0.055***	-0.015***
	0.014	*0.004*
=1 if bank has one or more clients among the 4-10 largest firms in industry	0.146***	0.109***
	0.027	*0.012*
Bank-firm relationships (lead)		
bank's share of firm's debt deals as lead in prior four quarters	1.345***	1.427***
	0.069	*0.024*
bank's share of firm's equity deals as lead in prior four quarters	2.213***	0.698***
	0.053	*0.039*
Bank-firm relationships (co-manager)		
bank's share of firm's debt deals as co-manager in prior four quarters	0.606***	1.008***
	0.152	*0.049*
bank's share of firm's equity deals as co-manager in prior four quarters	0.666***	0.408***
	0.094	*0.083*
Bank characteristics		
bank's equity market share in prior calendar year	2.033***	-0.264*
	0.166	*0.106*
bank's debt market share in prior calendar year	2.339***	4.107***
	0.168	*0.125*
bank's loyalty	0.275***	0.340***
	0.022	*0.015*
bank's *indegree* centrality	4.431***	3.230***
	0.278	*0.138*
bank's *eigenvector* centrality	1.465***	1.343***
	0.062	*0.046*
bank's industry expertise	1.038***	1.112***
	0.049	*0.025*
=1 if bank involved in merger	0.098**	0.067**
	0.039	*0.024*
ln abs(deal size – bank's mean deal size in prior calendar year)	-0.121***	-0.062***
	0.005	*0.003*
Diagnostics		
Pseudo R^2	21.6 %	24.9 %
Wald test: all coefficients = 0 (χ^2)	9,887***	34,261***
No. of transactions	5,272	12,453

Table 6. Lead Manager Switches Following Bank Mergers

We estimate the probability that an issuing company switches lead managers in consecutive equity or debt deals. A switch is defined as an equity (debt) issuer hiring as lead manager any bank other than the lead manager of its most recent equity (debt) deal (or, if that bank has since been acquired, its successor). In the case of multiple lead managers on a deal, we code as a switch any failure to retain every lead manager from the previous deal. We focus on deals involving a firm ranked among the ten largest by COMPUSTAT net sales in its four-digit SIC industry that year. All bank variables refer to characteristics of the lead manager in the previous deal measured as of the time of the current deal. The models are estimated using probit. Intercepts are not shown. Heteroskedasticity-consistent standard errors are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively.

	Equity		Debt	
	(1)	(2)	(3)	(4)
Mergers and merger partner's rival relationships				
=1 if bank involved in merger since previous deal but merger partner has no rival relationships	0.036		0.026	
	0.068		*0.054*	
=1 if since previous deal, bank has merged with another bank that has one or more clients among 3 largest firms in issuer's industry	1.026*	0.983*	0.201	-0.006
	0.500	*0.494*	*0.278*	*0.290*
=1 if since previous deal, bank has merged with another bank that has one or more clients among 4-10 largest firms in issuer's industry	0.234	0.174	0.130	0.052
	0.269	*0.285*	*0.265*	*0.246*
Bank-firm relationships (lead)				
bank's share of firm's debt deals as lead in prior four quarters	-0.373***	-1.077**	-0.496***	0.159
	0.103	*0.345*	*0.035*	*0.164*
bank's share of firm's equity deals as lead in prior four quarters	-0.359***	-0.575*	-0.175**	0.099
	0.071	*0.252*	*0.068*	*0.399*
Bank-firm relationships (co-manager)				
bank's share of firm's debt deals as co-manager in prior four quarters	0.993**	-1.822	-0.082	0.590
	0.385	*0.980*	*0.154*	*1.670*
bank's share of firm's equity deals as co-manager in prior four quarters	0.608	-0.225	0.186	-0.143
	0.560	*1.523*	*0.157*	*1.202*
Bank characteristics				
bank's equity market share in prior calendar year	-0.190	-1.305	-0.051	0.088
	0.640	*1.658*	*0.253*	*1.174*
bank's debt market share in prior calendar year	-1.568*	-1.583	-1.253***	-1.526
	0.662	*1.596*	*0.355*	*1.334*
bank's loyalty	-1.026***	-0.850**	-0.797***	-1.182***
	0.107	*0.314*	*0.092*	*0.332*
bank's *indegree* centrality	0.782	-2.468	-1.235*	-0.650
	1.274	*2.668*	*0.505*	*1.933*
bank's *eigenvector* centrality	-0.867***	-0.810	0.035	-1.059
	0.251	*0.619*	*0.188*	*0.766*
bank's industry expertise	0.093	-0.419	0.043	0.113
	0.119	*0.254*	*0.055*	*0.186*
ln abs(deal size – bank's mean deal size in prior calendar year)	0.023	0.107*	0.026*	0.016
	0.018	*0.043*	*0.010*	*0.033*
Time since previous deal				
ln (1+ years since previous deal)	0.399***	0.396***	-0.057*	0.431***
	0.048	*0.093*	*0.026*	*0.080*
Diagnostics				
Pseudo R^2	15.4 %	14.8 %	3.4 %	6.7 %
Wald test: all coefficients = 0 (χ^2)	591.9***	121.7***	393.9***	72.1***
No. of observations	3,177	630	9,393	848

Table 7. Lead Manager Choice Following Rival Client Switches

The models shown here are identical in every respect to the specifications shown in Tables 3 and 4, except that we split the effect of rival relationships into those that are active as of the time of the deal in question and those that are inactive. We consider three definitions of active and inactive. The first (labeled "mergers" in the table) considers a candidate bank's rival client to be inactive if it has been acquired by another firm at some point in the five years preceding the deal in question (based on CRSP delisting codes 200 and 300). The second and third (labeled "switches" in the table) consider a candidate bank's rival client to be inactive if the firm has awarded no underwriting business to the bank for five or three years, respectively. We assume the bank's information about the rival client to decay following a switch, and so code the bank as having an inactive rival client for only one year following the switch (i.e., years 6 and 4, respectively). Beyond that, the bank is coded as no longer having a rival client (active or inactive). Choosing a bank that has an active rival client runs the risk of information disclosure to one of the issuer's product-market competitors, though there are two potential offsetting benefits in the form of the bank having greater industry expertise or disclosing information about the rival client to the issuer. Choosing a bank that has an inactive rival client runs no corresponding risk but still offers both potential benefits. Therefore, the difference between the coefficients estimated for active and inactive rival clients isolates the effect of concerns about information disclosure to rival firms on lead manager choice. The models are estimated using probit, separately for equity and debt transactions, and for the entire sample period (Panel A) as well as split in 1990 (Panels B and C). To conserve space, we report only the coefficients estimated for active and inactive rival relationships, and the difference between the two (as a measure of the net effect of concerns about information disclosure). Heteroskedasticity-consistent standard errors (which are clustered on deal id) are shown in italics. The standard errors for the difference between each pair of coefficients are calculated using the delta method. We also report marginal effects (denoted dF/dx); for comparison, the unconditional likelihood of a bank becoming lead manager is about 2.2%. For the number of observations used in each specification, see Tables 3 and 4. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively.

	Equity Transactions						**Debt Transactions**					
	Mergers		Switches (T=5)		Switches (T=3)		Mergers		Switches (T=5)		Switches (T=3)	
	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx
Panel A: 1975-2003												
= 1 if bank has active top 3 rival	-0.131***	-0.003	-0.115***	-0.003	-0.087*	-0.002	-0.166***	-0.004	-0.164***	-0.004	-0.118***	-0.003
	0.036		*0.036*		*0.040*		*0.014*		*0.014*		*0.014*	
= 1 if bank has inactive top 3 rival	0.255	0.010	0.295**	0.012	0.273***	0.011	-0.148	-0.003	0.729***	0.044	0.368***	0.015
	0.158		*0.098*		*0.074*		*0.112*		*0.074*		*0.052*	
Difference	-0.386*	-0.013	-0.409***	-0.015	-0.359***	-0.013	-0.019	0.000	-0.894***	-0.048	-0.487***	-0.018
	0.162		*0.104*		*0.082*		*0.112*		*0.076*		*0.053*	
= 1 if bank has active top 4-10 rival	0.176***	0.006	0.174***	0.006	0.166***	0.006	0.111***	0.003	0.119***	0.004	0.113***	0.003
	0.027		*0.027*		*0.030*		*0.012*		*0.012*		*0.012*	
= 1 if bank has inactive top 4-10 rival	0.213*	0.008	0.369***	0.016	0.396***	0.018	0.316***	0.012	0.221**	0.007	0.309***	0.012
	0.109		*0.079*		*0.059*		*0.071*		*0.079*		*0.051*	
Difference	-0.036	-0.002	-0.195*	-0.010	-0.230***	-0.012	-0.205**	-0.009	-0.103	-0.004	-0.196***	-0.008
	0.113		*0.085*		*0.067*		*0.071*		*0.081*		*0.053*	

Continued over

Table 7. Lead Manager Choice Following Rival Client Switches (Continued)

	Equity Transactions						Debt Transactions					
	Mergers		Switches (T=5)		Switches (T=3)		Mergers		Switches (T=5)		Switches (T=3)	
	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx	Coeff. *s.e.*	dF/dx
Panel B: 1975-1989												
= 1 if bank has active top 3 rival	-0.234***	-0.006	-0.233***	-0.006	-0.188**	-0.005	-0.171***	-0.004	-0.174***	-0.004	-0.089***	-0.002
	0.064		*0.064*		*0.070*		*0.023*		*0.023*		*0.023*	
= 1 if bank has inactive top 3 rival	-0.220	-0.005	0.250	0.010	0.389***	0.019	-0.319	-0.006	0.844***	0.060	0.555***	0.029
	0.469		*0.175*		*0.115*		*0.192*		*0.131*		*0.095*	
Difference	-0.014	0.000	-0.483**	-0.016	-0.578***	-0.023	0.147	0.002	-1.018***	-0.064	-0.644***	-0.031
	0.473		*0.186*		*0.129*		*0.192*		*0.132*		*0.095*	
= 1 if bank has active top 4-10 rival	0.079	0.003	0.096*	0.003	0.122*	0.004	0.074***	0.002	0.089***	0.003	0.057*	0.002
	0.045		*0.045*		*0.050*		*0.021*		*0.021*		*0.023*	
= 1 if bank has inactive top 4-10 rival	0.515**	0.029	0.391**	0.019	0.372***	0.018	0.274*	0.010	0.224	-0.008	0.579***	-0.031
	0.178		*0.134*		*0.089*		*0.120*		*0.153*		*0.082*	
Difference	-0.436*	-0.026	-0.295*	-0.016	-0.250*	-0.013	-0.200	-0.008	-0.134	-0.005	-0.523***	-0.029
	0.184		*0.142*		*0.104*		*0.121*		*0.154*		*0.085*	
Panel C: 1990-2003												
= 1 if bank has active top 3 rival	-0.105*	-0.002	-0.085*	-0.002	-0.058	-0.001	-0.177***	-0.004	-0.173***	-0.004	-0.143***	-0.003
	0.044		*0.043*		*0.048*		*0.017*		*0.017*		*0.017*	
= 1 if bank has inactive top 3 rival	0.289	0.010	0.271*	0.009	0.152	0.005	-0.129	-0.003	0.640***	0.033	0.255***	0.008
	0.167		*0.118*		*0.098*		*0.139*		*0.090*		*0.064*	
Difference	-0.393*	-0.013	-0.356**	-0.011	-0.210*	-0.006	-0.048	-0.001	-0.813***	-0.037	-0.398***	-0.011
	0.173		*0.125*		*0.107*		*0.139*		*0.092*		*0.066*	
= 1 if bank has active top 4-10 rival	0.207***	0.007	0.193***	0.006	0.168***	0.005	0.118***	0.003	0.122***	0.003	0.124***	0.003
	0.034		*0.033*		*0.037*		*0.014*		*0.014*		*0.015*	
= 1 if bank has inactive top 4-10 rival	0.008	0.000	0.323***	0.012	0.390***	0.016	0.330***	0.012	0.222*	0.007	0.177**	0.005
	0.140		*0.099*		*0.078*		*0.087*		*0.093*		*0.066*	
Difference	0.198	0.006	-0.130	-0.006	-0.223*	-0.010	-0.212*	-0.009	-0.101	-0.004	-0.053	-0.002
	0.146		*0.107*		*0.088*		*0.087*		*0.095*		*0.068*	