Competing for Securities Underwriting Mandates: Banking Relationships and Analyst Recommendations [*] [†]

Alexander Ljungqvist
Stern School of Business
New York University
and *CEPR*

Felicia Marston
McIntire School of Commerce
University of Virginia

William J. Wilhelm, Jr.
McIntire School of Commerce
University of Virginia
and
Saïd Business School
University of Oxford

December 8, 2003

Abstract

We investigate directly whether analyst behavior influenced the likelihood of banks winning underwriting mandates for a sample of 16,625 U.S. debt and equity offerings sold between December 1993 and June 2002. We control for the strength of the issuer's investment-banking relationships with potential competitors for the mandate, prior lending relationships, and the endogeneity of analyst behavior and the bank's decision to provide analyst coverage. We find no evidence that aggressive analyst recommendations or recommendation upgrades increased their bank's probability of winning an underwriting mandate after controlling for analysts' career concerns and bank reputation. Our findings might be interpreted as suggesting that bank and analyst credibility are central to resolving information frictions associated with securities offerings.

[*] We are grateful to Bill Greene for helpful suggestions, to Rajesh Aggarwal, Susan Chaplinsky, Randy Cohen, Francesca Cornelli (our NBER discussant), Josh Coval, David Denis, Greg Duffee, Darrell Duffie, Ken Eades, Joel Hasbrouck, Florian Heider, Harrison Hong, Ajay Khorana (our WFA discussant), Ross Levine, Robert Marquez, Stefan Nagel, Jay Ritter, Rick Ruback, Gideon Saar, Tony Saunders, Anna Scherbina, Peter Tufano, Daniel Wolfenzon, and Jeff Wurgler for useful thoughts, and to seminar audiences at Harvard Business School, Northwestern University, the University of Minnesota, Tulane University, Oxford University, the University of Virginia, the NYU Monday Seminar, the Norwegian School of Economics, the 2003 NBER Summer Institute, the 2003 Oxford Summer Finance Symposium, and the 2003 Western Finance Association meetings for comments. We gratefully acknowledge the contribution of Thomson Financial for providing broker recommendations data, available through the Institutional Brokers Estimate System. These data have been provided as part of a broad academic program to encourage earnings expectations research. All errors are our own.

[†] Address for correspondence: Salomon Center, Stern School of Business, New York University, Suite 9-160, 44 West Fourth Street, New York NY 10012-1126. Phone 212-998-0304. Fax 212-995-4220. e-mail aljungqv@stern.nyu.edu.

Competing for Securities Underwriting Mandates: Banking Relationships and Analyst Recommendations

Abstract

We investigate directly whether analyst behavior influenced the likelihood of banks winning underwriting mandates for a sample of 16,625 U.S. debt and equity offerings sold between December 1993 and June 2002. We control for the strength of the issuer's investment-banking relationships with potential competitors for the mandate, prior lending relationships, and the endogeneity of analyst behavior and the bank's decision to provide analyst coverage. We find no evidence that aggressive analyst recommendations or recommendation upgrades increased their bank's probability of winning an underwriting mandate after controlling for analysts' career concerns and bank reputation. Our findings might be interpreted as suggesting that bank and analyst credibility are central to resolving information frictions associated with securities offerings.

Key words: Analyst behavior; Underwriting; Commercial banks; Glass-Steagall Act.

JEL classification: G21, G24

The U.S. securities industry currently faces perhaps the strongest challenge to its integrity since the Great Depression. Particularly troubling are the allegations that investment bank research analysts systematically sacrificed objectivity, and thereby misled the investing public, to attract securities underwriting mandates for their banks. Recent work by Lin and McNichols (1998), Michaely and Womack (1999), and Bradley, Jordan, and Ritter (2003) lends weight to these allegations in the sense that analysts are shown to be more optimistic towards firms taken public by their bank.

Notwithstanding this correlation, there is no systematic evidence that analyst behavior influenced their bank's likelihood of attracting an underwriting mandate.[1] Moreover, most existing research focuses on initial public offerings of equity. While IPOs are the most lucrative segment of the securities underwriting business and sometimes mark the beginning of a banking relationship, they are a relatively small part of overall capital market activity. The bulk of this activity involves firms that are frequent participants in the capital markets, particularly for raising debt. Finally, the 1990s witnessed profound changes in the competitive landscape as commercial banks incrementally shed Glass-Steagall constraints on their ability to compete for securities underwriting mandates. By most accounts, commercial banks exploited their larger capital accounts to win underwriting mandates. Investment banks generally had smaller balance sheets but more reputation capital derived from their long experience with capital market transactions.

Against this background, we investigate directly whether analyst behavior influenced the likelihood of banks being awarded underwriting mandates for a sample of 16,625 U.S. debt and equity offerings sold between December 1993 and June 2002. Examining both debt and equity offerings enables us to compare settings (i.e., equity transactions) in which the intermediary's reputation capital is likely to be a central consideration for the issuing firm to those in which it is perhaps less important. Further, paying careful attention to a variety of strategic considerations facing both investment and commercial banks provides considerable nuance to our understanding of the analyst's role in attracting underwriting mandates.

[1] Recent work by Cliff and Denis (2003) suggests, however, that the probability of switching underwriters between the IPO and subsequent equity offerings is related to analyst behavior.

Among other things, we suggest that it is useful to think of systematic deviations from objectivity in research as a means of trading on (or liquidating) one's reputation capital. We then explore whether such behavior was a competitive response to commercial bank entry during the sample period.

We find no evidence that analyst recommendation behavior favorably influenced whether banks won either debt or equity mandates. Far more important appears to be the strength of the bank's relationship with the issuer as measured by the share of the issuer's past securities offerings (both debt and equity) underwritten by the bank, and to a somewhat lesser extent the strength of prior lending relationships.[2]

Examining the determinants of analyst recommendation behavior before equity offerings, we find evidence that more reputable analysts and banks were associated with less aggressively optimistic recommendations. We interpret these findings as a reflection of career concerns among analysts and the certification function of investment banks (Chemmanur and Fulghieri (1994)).

The informational frictions that create demand for investment-bank certification are less severe among debt offerings and thus pose a weaker reputational barrier to entry in this market segment. Other things equal, incentives to preserve reputation capital should then be less constraining for banks that specialize in debt underwriting, implying a greater willingness to test the limits of investor credulity. It also follows naturally that commercial banks entered the securities underwriting business (and had their greatest competitive impact) in the debt markets.[3] Interpreting aggressive analyst behavior as a means of liquidating reputation capital, less reputable investment banks competed more aggressively on this dimension but it was a losing proposition. Commercial banks gained considerable market share at their expense.

---

[2] There is a substantial literature on commercial bank lending relationships (e.g., Boot and Thakor (2000), Diamond (1991), Petersen and Rajan (1994, 1995)). There is much less theory to guide an empirical analysis of investment-banking relationships (but see Anand and Galetovic (2002) and Fernando, Gatchev, and Spindt (2003)).

[3] Gande, Puri, and Saunders (1999) find that commercial bank entry is associated with a decline in debt underwriting spreads but not in equity underwriting spreads. The effect is strongest among lower-rated and smaller debt issues. Gande et al. (1997) provide evidence that commercial banks brought a larger proportion of small debt offerings to market during the January 1993-March 1995 period and that more reputable banks (evidenced by market share) obtain lower yields for borrowers. Similarly, Livingston and Miller (2000) report slightly lower gross spreads and lower yields obtained by more reputable banks. After the first quarter of 1997, when the Federal Reserve Board relaxed constraints on cross-marketing and information flows between commercial banks and their 'Section 20' affiliates, Roten and Mullineaux (2003) find little evidence that commercial banks and investment banks differed in their underwriting performance.

Thus, in broad terms we believe the evidence favors the interpretation that deregulation of commercial banks coupled with enormous deal flow in the late 1990s upset an equilibrium in which market forces (i.e., reputational concerns) moderated the longstanding conflict of interest between investment banking and research. Interpreting aggressive behavior among analysts (and its subsequent fallout) as liquidation of reputation capital, the evidence suggests that it did not serve banks' interests in the short run and we contend it is therefore not likely to characterize long-run equilibrium in the industry.

Our analysis is complicated by several factors. First, a favorable research report, though surely of value to a potential issuer,[4] is not the only consideration in selecting an underwriter. In short, decisions at the transaction level are made within the context of banking relationships that are complex, vary through time, and are a relatively unexplored phenomenon. Among other things, we show that bank research coverage decisions are strategic and heavily influenced by past dealings with the issuer. Second, a large literature documents systematic positive biases in earnings forecasts (Brown et al. (1985), Stickel (1990), Abarbanell (1991), Dreman and Barry (1995), Chopra (1998), and others), which in part appear driven by career concerns (Hong and Kubik (2003) and Hong et al. (2000)). Analyst research is an experience good and thus individual analysts have incentive to build, and maintain, reputation for objectivity and forecast accuracy. The private incentive to protect one's reputation and the quasi rents it confers provide a countervailing force against incentives to sacrifice objectivity (Graham (1999)). In short, there is ample reason to believe that analyst behavior reflects at least in part a trade-off and so cannot be treated as an exogenous determinant of a bank's chances of winning an underwriting mandate.

We address these problems by empirically modeling the bank's coverage decision and analyst behavior under the assumption that each is embedded in a banking relationship that evolves over time. Their joint evolution, in turn, conditions the likelihood that an issuing firm grants an underwriting mandate to a particular bank. We develop this structural econometric model in Section I. We use data

[4] The perceived value of coverage could have many sources. For instance, Chan et al. (2003) find that analysts in the U.S. help firms avoid negative earnings surprises.

from six principal sources (SDC, I/B/E/S, Dealscan, 13f filings, *Institutional Investor* magazine, and news reports) to estimate the model. Section II describes our data and coding choices in some detail. Our empirical results are in Section III. Section IV concludes.

I. The Empirical Model[5]

A. Economic Structure of the Model

In this section we outline the economic structure of the model and provide an overview of the key variables. We defer precise specification of the variables to subsequent sections.

Our central focus is on the determinants of a bank *j*'s likelihood of receiving an issuing firm *i*'s underwriting mandate at time *t*. The probability model takes the general form:

$$Pr(\text{bank } j \text{ leads firm } i\text{'s deal at time } t) = f_L(\text{analyst behavior}, \mathbf{X}_L) \quad (1)$$

where $\mathbf{X}_L$ is a matrix of explanatory variables. By 'analyst behavior' we mean either the *level* of bank *j*'s analyst's recommendation for firm *i*'s stock, or the *change* in that recommendation. In either case, we normalize by the recommendation behavior of other banks. Thus, we test whether a bank is more likely to win an underwriting mandate if its analyst provided a relatively bullish recommendation for the issuer's stock, or recently upgraded the issuer's stock more aggressively than did other banks. We control for the reputation of the bank's analyst, the bank's broader reputation within the debt and equity markets, its lending capacity, and the strength of the bank's relationship with the issuer. Other things equal, we expect a higher probability of success from a more reputable bank that maintains a strong relationship with the issuer. Including proxies for lending relationships enables us to examine allegations that commercial banks successfully tied lending facilities to opportunities for underwriting capital market transactions.[6]

It is alleged that investment bankers pressured analysts to provide more favorable recommendations for potential issuers. However, research is an experience good so analysts have incentive to build and

[5] We are grateful to Bill Greene for helpful comments and advice on our empirical modeling strategy.

[6] 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.

protect reputation for meaningful recommendations. Thus if analysts are self-interested, they should weigh career concerns against any immediate expected payoffs cooperation with investment bankers might bring. In short, treating analyst behavior as an exogenous determinant of the bank's probability of attracting an underwriting mandate is likely to bias inference. We address this 'simultaneity' problem by obtaining an instrumental variable or fitted value for analyst behavior from the following model:

$$\text{Analyst behavior at time } t = f_A(\mathbf{X}_A) \qquad (2)$$

$\mathbf{X}_A$ is a matrix of explanatory variables that control for the expected cost to the analyst of jeopardizing her reputation and the benefit she expects to receive (or equivalently, the amount of pressure the investment bankers put on her to bias her recommendation upward). We proxy for the former using various measures of analyst reputation. Absent data on bonuses paid to research analysts, we control for the latter with proxies for the bank's expected underwriting profits. We contend that profit opportunities are tied to the strength of the banking relationship with the issuing firm, the issuer's general capacity for generating fee income within this relationship, and the fee potential in the deal at hand. We also control for time-variation in the size of the potential pool of 'side payments' bankers might use to gain analyst cooperation, based on changes in market-wide deal flows (such as the 'hot' market of the late 1990s).

A bank's relationship with an issuer has potentially competing effects on analyst behavior. On the one hand, a bank and its analyst might sacrifice reputation capital to protect a rent stream associated with a strong relationship. Conversely, if an existing banking relationship presents a barrier to entry, there is less incentive for a reputable bank maintaining a strong relationship with the issuer to offer an aggressive recommendation. Competition via more aggressive analyst recommendations would then be the province of less reputable banks seeking to build relationships with issuing firms.

If every sample bank covered every sample issuer at the time of every sample transaction, we could estimate (1) and (2) as a system of two simultaneous equations with the dichotomous dependent variable in equation (1) the only non-standard feature (Maddala (1983), pp. 244-245). However, universal

coverage is not a feature of the marketplace, and so we observe analyst behavior – and its effect on lead underwriter choice – only if bank *j* covers firm *i*'s stock at time *t*. Moreover, the selection criterion leading to this sample truncation is likely non-random: given resource scarcity it is plausible, and indeed likely, that bank research directors are strategic in their coverage decisions. We address this 'selectivity' problem by modeling the coverage decision explicitly as follows:

$$Pr(\text{bank } j \text{ covers firm } i \text{ at time } t) = f_C(\mathbf{X}_C) \tag{3}$$

where $\mathbf{X}_C$ is a matrix of explanatory variables that control for the strength of the bank's relationship with the issuer, the bank's reputation, and various characteristics of the issuing firm that might attract coverage. Commercial banks were relatively late entrants to the equity markets and generally provided less equity research during the sample period. Thus we allow their coverage decision criteria to differ from those of investment banks.

B. Econometric Structure of the Model

If bank *j*'s analyst covers firm *i*, we observe both the probability model for winning the underwriting mandate in equation (1) and the analyst behavior model in equation (2). Otherwise, we do not observe (2) and we observe only a modified form of (1) that relates the probability of winning the underwriting mandate to the explanatory variables $\mathbf{X}_L$ but not to analyst behavior. Suppressing subscripts for *i*, *j*, and *t*, the econometric model is:

Coverage case:

$$\left.\begin{aligned} y_A &= \beta_A \mathbf{X}_A + u_A \\ y_L^* &= \beta_L \mathbf{X}_L + \delta_L y_A + u_L \end{aligned}\right\} \quad \text{if } y_C^* > 0 \tag{4}$$

No-coverage case:

$$\left.\begin{aligned} y_A &= 0 \\ y_L^* &= \beta_{LNC} \mathbf{X}_L + u_{LNC} \end{aligned}\right\} \quad \text{if } y_C^* \le 0 \tag{5}$$

where stars indicate unobserved latent variables whose realizations are observed as binary outcomes.

Specifically, y_L^* is a latent variable measuring the propensity of issuer *i* to hire bank *j* as lead underwriter, observed as $y_L = 1$ if $y_L^* > 0$ and $y_L = 0$ if $y_L^* \leq 0$. y_C^* is a latent variable measuring bank *j*'s propensity to cover firm *i*'s stock at time *t* which we observe with realizations

$$\begin{aligned} y_C &= 1 \quad if \quad y_C^* = \beta_C \mathbf{X}_C + u_C > 0 \\ y_C &= 0 \quad if \quad y_C^* \leq 0 \end{aligned} \tag{6}$$

y_A is a continuous, observed variable measuring analyst behavior, and u_k ($k = L, A, C, LNC$) are error terms whose distributions are described shortly.

Although the $\mathbf{X}_L$ matrix in the two lead-bank equations in (4) and (5) remains the same, we do not constrain the two coefficient vectors β_L and β_{LNC} to be equal. This enables us to test the hypothesis that in the absence of coverage and thus of strategic analyst behavior, variables such as prior relationships have a significantly stronger effect on a bank's probability of winning underwriting mandates.

C. Estimation

Equations (4)-(6) form a simultaneous-equations system with endogenous switching (Maddala (1983), Ch. 8 and especially sections 8.3, 8.6 and Model 1 on p. 241). The switching criterion is given in (6), which determines whether we observe system (4) or (5). Estimation is carried out through the following two-step procedure. Consider first the coverage case ($y_C = 1$). In step 1, we estimate the determinants of analyst behavior in reduced-form, including all variables in $\mathbf{X}_A$ and $\mathbf{X}_L$. Since the model is recursive (y_L^* depends on y_A but not vice versa) it is not strictly necessary to include $\mathbf{X}_L$ when estimating the first-step equation.[7] To ensure that the first-step estimates are consistent, we account for truncation due to non-coverage. Heckman (1979) shows that the errors in a truncated sample are not zero mean, and so OLS yields biased and inconsistent coefficient estimates. We therefore estimate the first-step coefficients using the MLE version of Heckman's sample selection correction using equation (6).

[7] In principle, y_L^* and y_A could be jointly determined if the analyst's expectation of her bank winning the mandate influences her willingness to jeopardize her reputation by inflating the issuer's stock recommendation. Empirically, we find a negative relation between y_A and $E(y_L^*)$ but this is not statistically significant. We thus focus on the recursive model outlined here.

Step 2 estimates the determinants of a given bank winning a given underwriting mandate, replacing the analyst behavior variable y_A with the fitted value $\hat{y}_A$ from step 1. Again, we account for truncation by adjusting the probit likelihood function for truncation bias, $E(u_L \mid y_C = 1) \neq 0$ (see Van de Ven and Van Pragg (1981) for the derivation of the joint likelihood function). If the estimates from step 1 are consistent, and the equation system is identified, the second step yields consistent estimates for $(\hat{\beta}_L, \hat{\delta}_L)$. Since the second step involves a generated regressor (the predicted analyst behavior from the first step) estimated with sampling error, the second-step covariance matrix is not consistent. Consistent standard errors are obtained using the procedure derived in Murphy and Topel (1985, Section 5).

In the absence of coverage, $y_A = 0$, and so we simply estimate a single-equation probit model of system (5), again corrected for truncation since $E(u_{LNC} \mid y_C = 0) \neq 0$.

Finally, because our unit of observation is a securities transaction, the model for the probability of a given bank winning an underwriting mandate conditions on information for both the winning bank (or, for co-leads, banks) and the banks that unsuccessfully competed for the mandate. Thus, for each transaction, we construct a data panel containing conditioning information for both winning and non-winning banks. To keep the estimation sample to a manageable size, we restrict the set of non-winning banks to those that were most 'active' over the period as defined in the next section. Note that our probability model can be thought of as a generalization of the binary models that have been estimated to explain why some firms switch underwriters after their IPO (e.g. Krigman, Shaw, and Womack (2001)), in the sense that we allow firms not just to switch but to choose any underwriter from among our set of sample banks.[8]

[8] An obvious alternative approach would be to estimate a multinomial choice model where each issuing firm chooses its underwriter from a slate of competing banks. However, a selectivity-adjusted multinomial choice model has not yet been developed. Therefore, estimates from existing multinomial choice models in our setting are biased due to the non-random nature of the decision to provide analyst coverage.

II. Data

A. The Sample of Securities Offerings

Between January 1, 1988 and June 30, 2002, Thomson Financial's Securities Data Corporation reports 36,173 debt and equity offerings, after excluding transactions by firms classified as SIC 6000-6999 (financial institutions etc) and SIC 9000-9999 (government agencies etc). The transactions or 'deals' range from IPOs to offerings by seasoned firms, and include both public and private offerings and firms. We use the full sample period to generate a variety of variables, including prior relationships between issuers and banks. The distribution of different types of offerings is reported in Table I. Public common stock offerings, public non-convertible debt, and private non-convertible debt each account for around one third of the number of sample transactions but public debt dominates in dollar terms.

Many issuers are related to each other so we form 'corporate families' on the basis of SDC's 'ultimate parent CUSIP' identifier. This allows us to control for prior relationships between a given bank and any member of a corporate family. For example, AT&T Corp is the parent of AT&T Wireless, Lucent Technologies, Teligent, etc. Transactions involving any of these 'subsidiaries' are grouped under AT&T. Thus when Lucent went public in 1996, we condition the probability of a bank receiving the mandate on the strength of its relationship with the AT&T 'family' in the prior *T* years. The 36,173 deals in 1988-2002 involve 15,306 unique firms reflecting 12,470 unique corporate families.

I/B/E/S tracks analyst recommendations only from late 1993, restricting the estimation period in the econometric model to December 1, 1993 through June 30, 2002. We further exclude a) any issuer or family of issuers that *never* hired one of our sample banks (see below) as a lead manager between 1988 and June 2002; and b) *purely* foreign issuers or families of issuers. The first restriction eliminates small deals managed by small banks which presumably were not being fought over by our (mostly large) sample banks. The second restriction is imposed to keep the data collection manageable. This leaves an estimation-period sample of 16,625 transactions, shown in the final two columns of Table I, involving 6,821 unique firms and 5,472 unique corporate families.

B. Sample Underwriters

Estimating a bank's probability of winning the underwriting mandate for a particular offering requires data for both the winning bank and its competitors. We keep the size of the dataset manageable by focusing on the 16 most-active debt and equity lead (or joint lead) underwriters as measured by the nominal proceeds from deals completed during the 2000-2002 period.[9] Each bank is treated as a potential competitor for each deal in the estimation period (subject to regulatory constraints described below). Many of the sample banks are the product of mergers (or demergers) and acquisitions during the sample period, summarized in Figure 1. The predecessors of the 16 sample banks also are treated as potential competitors for a deal prior to joining forces with one of the final 16. For example, from the perspective of 1988, there were up to 41 independent sample banks in potential competition for each deal.

Table II reports summary statistics for the 16 banks to which we confine our attention. To compute the banks' market shares over the 1988-2002 period, we allocate to each bank the proceeds underwritten by its predecessor banks. For example, the $323 billion in total capital underwritten assigned to JP Morgan Chase includes the underwriting mandates granted to JP Morgan, Chase, Chemical Bank, Hambrecht & Quist, and Manufacturers Hanover during the sample period. The top five underwriters (Credit Suisse First Boston, Goldman Sachs, Merrill Lynch, Morgan Stanley, and Salomon Smith Barney) each held at least an 11% market share in the debt and equity markets, accounting in aggregate for 63.5% of the dollar amount of capital raised during the sample period.

Together, the 16 sample banks and their predecessors underwrote $1,181 billion in equity and $2,524 billion in debt (in nominal terms) over the sample period – more than 90% of underwriting activity in either market. Their combined market share ranged from 80.7% in 1988 to 96.4% in 1990, falling below 90% only twice, in 1988 and 1989. Excluding banks other than our final 16 and their predecessors therefore results in little loss of data but significant economies in coding banking relationships and in the probability model estimation.

[9] We exclude Bank One (whose debt market share places it above some of our sample banks) for lack of equity analysts.

The sample includes commercial banks whose ability to compete for public offers historically was restricted by the Glass-Steagall Act and regulatory rules. We account for this by treating a commercial bank as capable of competing for a *public* offering mandate prior to the repeal of the Glass-Steagall Act only if it had a so called 'Section 20' subsidiary with Tier II securities underwriting authority granted by the Federal Reserve Board.[10] Figure 1 documents the dates when sample commercial banks received such approval. Tier II authority was not required for *private* offers, so we treat every sample bank as being in competition for every private deal. On average, 24.3 banks competed for a given deal.

As mentioned earlier, we exclude from the sample any issuer or family of issuers which *never* hired one of our sample banks as lead manager between 1988 and June 2002. Among the remaining 16,625 mandates, 2,204 were won by non-sample banks, such as Banque National de Paris or a regional underwriter. Thus, non-sample banks are in the sample when they won a deal, but they are not treated as competing for any mandates they did not win.

C. Prior Investment-Banking Relationships

The lag between the 1988 beginning of the sample period and the 1993 beginning of the estimation period provides us with at least five years of prior data for measuring investment-banking relationships. Our main proxy for the strength of an issuer's relationship with a particular bank focuses on the bank's share of the client's previous mandates, coded as follows. For firm i at time t, we determine whether it (or any member of its corporate family) extended an underwriting mandate to bank j or any of j's predecessors (but not j's successors). If so, we accumulate the proceeds from the deals that bank j managed for firm i in the preceding T=1…5 years, and divide by the total raised by the firm to reduce the impact of differences in scale across firms. This measure ranges from zero (no relationship) to one (when the issuer maintained an exclusive banking relationship). It is computed separately for debt and equity deals, and for any sample bank that was a potential competitor for the mandate at time t.

In the simplest cases, such as Goldman Sachs, the implementation of the algorithm is straightforward.

[10] In some instances debt and equity approval were granted at different times.

Cases involving one or more acquisitions are more complex. Bank of America, easily the most complicated in the sample, illustrates the complexities involved. In October 1997, BofA acquired Robertson Stephens and, from our perspective, inherited Robertson Stephens' history of relationships with a particular firm *i*. Their joint history then conditions the probability of BofA winning any future mandate of firm *i*. In June 1998, Robertson Stephens was sold to BankBoston (which was acquired by Fleet in 1999) in advance of BofA's September 1998 merging with NationsBanc. From this point forward, the mandate history of Robertson Stephens, including those received while owned by BofA, belongs to BankBoston (and then Fleet). But we also assume that the probability of BofA receiving a future mandate is conditional on the Robertson Stephens mandate history up to the time it was sold to BankBoston. This element of 'double-counting' reflects our inability to trace precisely the extent to which relationships remain exclusive to Robertson Stephens.[11]

Table III provides summary statistics for our relationship proxy at the maximum 5-year horizon used in our econometric model. (Subsequent econometric results are somewhat stronger if we use shorter horizons, indicating that more 'recent' relationships carry more weight, but our qualitative conclusions are unaffected.) Results are reported separately for debt and equity transactions, and partitioned by whether or not the bank won the underwriting mandate and whether or not it provided research coverage for the issuer at the time of the deal in question. Banks providing research coverage that won equity mandates underwrote on average 46.3% of the issuer's equity proceeds raised during the prior five years. The strength of underwriting relationships appears less important among debt offerings as evidenced by the 25.9% share of debt proceeds underwritten by the average winner of an issuer's debt mandate. In general, winners of a mandate in a particular market (debt or equity) had stronger relationships with the issuer on both the debt and equity dimension.

[11] In June 1997 NationsBanc acquired Montgomery Securities. Thus in addition to 'inheriting' relationships via its short-lived ownership of Robertson Stephens, Bank of America inherited relationships from Montgomery and NationsBanc at the time of the merger. On September 21, 1998, in the wake of the merger, Montgomery's founder, Thomas Weisel, resigned from Montgomery, founded Thomas Weisel Partners and subsequently raided a large fraction of Montgomery's banking professionals. Relationships held by Montgomery prior to Weisel's resignation are coded as being inherited by Weisel Partners, but similar to the 'double-counting' in the Robertson Stephens case, we also count them as being held by BofA.

D. 'Paying to Play'

The more active firms in our sample (corporate families carrying out more than 20 transactions during the sample period) spread their transactions across 12.8 different lead underwriters on average (median: 12). This represents a marked decline in the exclusivity of banking relationships by comparison to earlier periods (Baker (1990), Eccles and Crane (1988)). The decline of exclusive relationships can be traced in part to the weakening and ultimate repeal of the Glass-Steagall Act during the sample period. From the late 1980s the largest commercial banks bought or built first debt and then equity underwriting capacity in Section 20 subsidiaries. Throughout the early and mid 1990s the securities industry criticized commercial banks for using government-insured deposits to subsidize bids for underwriting mandates with offers of low-margin lending facilities. By 2001, 'paying to play' became commonplace as issuers in both the public debt and equity markets demanded credit lines from banks bidding for underwriting business (Drucker and Puri (2003)).

We control for this change in the competitive landscape by constructing a measure of prior lending relationships similarly to the underwriting relationship measures outlined in the previous section. The underlying loan data are derived from the Loan Pricing Corporation's DealScan database, excluding non-U.S. borrowers and firms in SIC codes 6000-6999 (financial institutions etc) and 9000-9999 (government agencies etc). LPC lists 15,273 borrowers between 1988 and June 2002, taking out 49,459 loan facilities totaling $8 trillion. We are able to hand-match 6,701 LPC borrowers by name (LPC's principal firm identifier) to our sample of SDC issuers. These account for 30,068 of the 49,459 loan facilities, or 60.79% by number and 79.92% by loan amount.[12] In the case of syndicated loans, each bank acting in a leading role (i.e. 'arranger') is credited with the corresponding fraction of the loan.[13]

As Table III shows, the average winning bank had relatively weak lending relationships with equity

[12] Of the remaining 8,572 borrowers not matched to SDC, 1,678 can be matched to the CRSP master tape, so we can definitively rule out that they are in SDC (since we can merge SDC and CRSP without a problem). This leaves unmatched 6,894 borrowers taking out 14,344 loans for $1.3 trillion (16.25% of the total). It is possible that some of these are in fact in SDC, but given the above numbers, we are confident that we have captured the vast majority of lending activity.

[13] Yasuda (2003) shows that lending relationships are strongest at the 'arranger' level, though widening the scope to include 'lead managers' leaves her results unaffected.

issuers, in sharp contrast to the importance of prior equity underwriting relationships. For instance, winning banks providing coverage arranged only 2.4% of the average equity issuer's loans in the prior 5 years. Among debt issuers, lending relationships are somewhat more concentrated, peaking at 7.4% among winning banks not providing coverage. Not coincidentally, Table III also confirms the well-known fact that commercial banks enjoyed considerable success in the debt markets. Of course, prior lending relationships need not proxy solely for 'tied' loans. Yasuda (2003) shows that bond issuers that hire their lenders as underwriter obtain keener prices, suggesting that lenders having greater certification capacity. Schenone (2003) finds similar evidence for IPO firms.

Commercial banks' larger balance sheets almost certainly provided greater capacity for sweetening bids for underwriting mandates by including a loan. Thus, we also compute each bank's share of the corporate loan market in the calendar year before the deal in question, based on loans arranged, as a proxy for their capacity to sweeten their bids or tie lending to capital market transactions. Descriptive statistics are reported in Table III. Whether or not they provided coverage, large lenders more often failed in the competition for equity deals while succeeding in competition for debt mandates.

E. Supplemental Relationship Measures

The sample period witnessed a high frequency of bank consolidation and associated disruptions to bank-issuer relationships. We therefore supplement our transactions-based relationship variables with measures of banks holding equity stakes in potential issuers (which might cement relationships), key-banker movements (who might take relationships with them as they move to a new bank), and bank mergers (which might cause issuers to re-evaluate their investment banking relationships).

Ljungqvist and Wilhelm (2003) document a sharp rise from 18.2% in 1996 to 44% in 2000 in the frequency of banks having equity stakes in firms whose IPOs they underwrite. We measure whether this means of cementing a banking relationship was part of a broader trend by merging our sample of issuers with the Spectrum 13f data on equity stakes held by financial institutions. For each deal, we check whether any sample bank active at that time reported an equity holding in the issuer or its corporate

parent as of the quarter-end prior to the deal.[14] Table III indicates a generally high frequency of equity stakes among banks winning underwriting mandates. The exception involves equity transactions prior to which the bank did not provide research coverage. This segment of the sample is dominated by commercial banks that for most of the period were prevented by regulation from holding equity stakes in their clients.

The high degree of mobility among investment bankers creates potential for relationship shocks not captured by transaction-based measures of prior relationships. In general, both theory and casual evidence suggest that client relationships are embodied, perhaps in large part, in individual bankers. Thus their moves should influence the probability of receiving a mandate faced by both the firm they join and the one from which they defected.[15] We control for this effect by tracking the movement of key bankers or teams of bankers during each quarter in the estimation period.[16] We searched electronically through the major business periodicals covered by *Lexis/Nexis* and *Proquest* to identify individuals or teams who most likely played key roles in developing and maintaining client relationships. The bulk of the sample came from *Investment Dealers' Digest*, which provides weekly reports of the movements of high profile bankers. In general, we focused on movements by bankers at the rank of managing director (or its equivalent) and above, except in cases where a less senior banker is part of a team or small group of bankers switching firms. We classified key bankers as equity or debt specialists. The latter classification is more precise in the sense that debt specialists were more typically identified clearly as such. In general, M&A professionals were classified as equity specialists. We excluded cases involving prominent traders, foreign exchange, mortgage-backed securities and derivatives professionals as well as senior bankers primarily involved in management functions. We also excluded professionals whose primary

[14] The Spectrum 13f data of institutional holdings are filed with the SEC on a quarterly basis. We match the names of filers to our sample banks using where necessary *Nelson's Directory of Investment Managers*. We thank Edie Hotchkiss for help in performing the match.

[15] See Anand and Galetovic (2000) for a discussion of competition among investment banks when client relationships are embodied in key employees and therefore non-excludable. Eccles and Crane (1988) provide numerous examples from their survey of bankers and their clients supporting this claim.

[16] See Clarke, Dunbar, and Kahle (2002) and Clarke et al. (2003) for related analysis regarding the movement of analysts.

responsibilities fell outside North America. This search yielded a sample of 169 records.[17]

In many instances, reported defections probably understate the potential damage to client relationships. Most bank acquisitions were followed by a substantial degree of movement although not necessarily at the most senior level where completion of the deal may have depended on bankers signing commitments that would prevent them from joining competitors for a fixed period. To avoid not detecting what may be a substantial reordering of banking relationships, we code whether the bank was involved in a merger during the quarter before the sample deal took place.

F. Bank Reputation

We use prior-year market share to proxy for a bank's reputation for success in securities underwriting (Megginson and Weiss (1991)). Among the summary statistics provided for this variable (separately for debt and equity) in Table III, two patterns stand out. First, banks that win underwriting mandates are more reputable as evidenced by their higher market shares. Second, this is true whether or not the bank provides research coverage. The differences are particularly large for debt transactions.

G. Analyst Behavior

We measure analyst behavior using data from the I/B/E/S 'recommendations' database. I/B/E/S tracks analyst recommendations from late October 1993, covering roughly 10,000 firms, 8,000 analysts, and 500 banks. Sample firms are matched to I/B/E/S using the corporate parent's CUSIP if possible and the issuing firm's CUSIP otherwise. Using this algorithm, 3,511 of the 6,821 sample companies and 2,598 of the 5,472 unique corporate families match firms covered in I/B/E/S. Some of these matches do not correspond with analyst coverage provided by a sample bank. Among the 16,625 sample deals, 10,796 involve issuers covered by at least one sample bank prior to the deal. Issuers that do not appear in I/B/E/S around their deal dates are treated as not receiving coverage from a sample bank.

[17] Some records involve a defection from one sample bank to another, so the number of independent records is much smaller. As one might expect, banker defections cluster for two reasons: an acquisition or a high level of market activity in the banker's area of specialization. When several key bankers defect in close proximity to one another, existing relationships are more likely to suffer. When bankers actually move as teams to a competitor, it is more likely that an existing relationship survived and moved with them. When it was stated explicitly that bankers moved as a team, we coded their movement separately as a team movement. Our estimation results are robust to focusing only on team movements.

Table IV provides descriptive statistics for the deals and issuing firms, according to whether or not they received coverage. As one might expect, for both equity and debt deals, firms receiving research coverage from sample banks were significantly larger (as measured by deal size), more frequent and substantial issuers of securities (as evidenced by their deal histories), more mature (as measured by the time from their IPO), and more frequently listed. Firms are also more likely to receive research coverage when the bank's analysts already provided broad coverage for the issuer's industry, measured as the fraction of firms in the issuer's Fama-French (1997) industry grouping the bank covered at the time.

I/B/E/S codes recommendations from 1 (strong buy) to 5 (sell).[18] We reverse the ordering so that larger numbers indicate more positive recommendations. New, reiterated, or changed recommendations arrive, and are recorded by I/B/E/S, irregularly rather than on a monthly or quarterly basis. Thus, the most recent recommendation for a given firm by a given bank will not necessarily correspond in time with the most recent recommendation from a competing bank. We resolve the time-matching problem by requiring that the most recent estimate for firm *i* be no earlier than 730 days prior to its transaction date. This window balances concerns that recommendations by competing banks are relatively close in time with concerns that a narrow window potentially eliminates relevant forecasts.[19] On average, recommendations associated with a particular securities offering were recorded 270 days before the transaction date, with a median of 229 days and a standard deviation of 201 days.

We construct two proxies for analyst behavior. The first measures bank *j*'s recommendation *level* relative to consensus which we take to be the median recommendation of all other banks covering firm *i* in the 730-day window before *i*'s deal.[20] By construction, relative recommendations lie between –4 and + 4. Positive values correspond to relatively optimistic recommendations.

Recent allegations (such as those arising from the Congressional investigation of Salomon Smith

[18] Strong buys account for 25% of recommendations, 36% are buy recommendations, 37% are hold recommendations, 1.4% are under-perform recommendations and 0.6% are sell recommendations.

[19] All results are robust to Lin and McNichols' (1998) selection criterion that the most recent recommendation be no earlier than one year prior to the offer date.

[20] We subtract the consensus because Bradshaw, Richardson, and Sloan (2003) document that the analyst consensus moves up ahead of issuance and down ahead of stock repurchases.

Barney's pursuit of AT&T Wireless's IPO in 2000) center not on the level of recommendations but on analysts aggressively upgrading their recommendations prior to the award of an underwriting mandate. We examine these allegations by constructing a second measure focusing on relative recommendation *upgrades*. For each bank we calculate the change between the two most recent recommendations. We require the latest recommendation to be within 275 days (nine months) of the deal date and the last-but-one recommendation to be no older than 2 years. If the analyst does not issue a new recommendation in the 275 days before the deal, we assume the prior recommendation still stands, implying a zero upgrade. If the analyst's *first* recommendation occurs in the 275 days prior to the deal (i.e. initiation of coverage), we assume that the bank previously was neutral toward the issuer (recommendation level 3) and measure the difference between the recommendation at coverage initiation and the assumed neutral prior recommendation.[21] The *relative* upgrade is then defined as a bank's recommendation change for firm *i* less the median change for other banks. Relative upgrades lie between –8 and +8, with positive values representing relatively aggressive upgrades.[22]

The relative upgrade measure has two potential shortcomings. Not surprisingly, it is zero for the majority of firms and so exhibits less variance than do relative recommendations. Moreover, a bank can provide a relative upgrade but still be relatively less optimistic than another bank identified as providing no upgrade. For example, Goldman's analyst might have rated IBM as a '5' (strong buy) and not altered her opinion before the deal date, while Bear Stearns' analyst might have upgraded IBM from '2' to '3'. Bear Stearns would be considered to have upgraded the stock more aggressively than Goldman, even though Goldman's analyst had a higher recommendation *level* which could not be increased further. To account for this, our model for relative upgrades will include a dummy equaling one if the last-but-one

[21] Our results are robust to excluding banks with fewer than two recommendations or, in cases where coverage is being initiated, using the median rating among competitors rather than a 'hold' rating as the basis for relative comparison.
[22] Our results are robust to instead subtracting the *mean* recommendation or upgrade, defining the peer group to include only sample banks (rather than all banks), or defining relative recommendations and upgrades as dummy variables equal to one if the sample bank is relatively more aggressive than its peers.

recommendation was already a 'strong buy', so that a further upgrade would have been impossible.[23] In summary, the relative upgrade measure emphasizes whether the analyst changes her opinion while the relative recommendation measure focuses on the (relative) strength or level of the analyst's opinion.

Table V shows that by either measure, analysts at winning banks were more aggressive in their recommendations, especially prior to debt deals. These results extend the findings of Michaely and Womack (1999) and Bradley, Jordan, and Ritter (2003) who show that *after* underwriting an IPO, underwriter-affiliated analysts are relatively more optimistic. However, the differences between the unconditional means are economically small, and there is no difference between the medians.

Table V also summarizes three controls for reputation-related career concerns. The first is based on buy-side evaluations reflected in the annual *Institutional Investor* analyst rankings. We match these rankings to I/B/E/S records by broker and analyst name. For a deal at time *t*, we define a dummy to equal 1 if bank *j*'s analyst covering the stock was an 'all-star' (i.e. ranked as a top-three or runner-up analyst in her industry) just prior to making the recommendation. Among equity (debt) deals, 33.4% (41.9%) of winning banks have an all-star analyst covering the issuer versus only 27% (35.1%) for losing banks.

Second, assuming analyst reputation derives, at least in part, from forecasting ability, we measure forecast accuracy as in Hong and Kubik (2003). We compute the absolute forecast error of each analyst *a* covering firm *i* in year *t* as the difference between the analyst's most recent forecast of year-end earnings per share (issued between January 1 and July 1 of that year) and subsequent realized earnings, scaled by price (measured as of the prior December). Sorting absolute forecast errors by size, the 'best' (most accurate) analyst is assigned a rank of 1, the second best a rank of 2, and so forth. To address possible biases due to variation across firms in the number $N_{i,t}$ of analysts, ranks are then scaled as follows:

$$Score_{a,i,t} = \left(1 - \frac{Rank - 1}{N_{i,t} - 1}\right) \cdot 100,$$

[23] This does not drive our results (see footnote 25 below). Alternatively, it is straightforward to show that a composite measure that adds *relative recommendations* to *relative upgrades* serves to control for the starting level of recommendations. In our example, this composite measure would identify Goldman's analyst as more aggressive than Bear Stearns'. Using this composite measure, we find qualitatively identical results (available on request).

Thus the most accurate analyst scores 100 and the least accurate zero. We reduce noise by defining an analyst's relative forecast accuracy as her average score in years *t*-2 to *t*. Table V reveals relative forecast accuracy to average around 50, with a distribution similar to that reported by Hong and Kubik.

Finally, we measure the analyst's seniority as the number of years since she first appeared in the I/B/E/S database. Hong et al. (2000) find that analysts are less bold early in their careers. For both equity and debt deals, analysts at winning banks in our sample are significantly more senior on average, though only by a few months.

III. Estimation Results

Estimation results are reported in three steps. Section III.A provides a summary of the results from estimating the switching criterion given in equation (6). Whether bank *j* covers an issuing firm *i*'s stock at time *t* determines whether we observe system (4) or system (5). In the presence of coverage, we use a two-step procedure to estimate system (4). The first step estimates the determinants of analyst behavior adjusted for truncation due to non-coverage. These are reported in Section III.B for each measure of analyst behavior described in the preceding section. In the second step, we model the probability of winning the underwriting mandate as a function of the fitted values of analyst behavior obtained in step 1, again adjusted for truncation. In the absence of coverage, analyst behavior is unobserved and we estimate system (5) as a single-equation model with truncation. The results for these underwriting mandate probability models are reported in Section III.C.

A. The Bank Coverage Model

Table VI reports results of 'stand-alone' probit models of the likelihood that an analyst working for bank *j* covers issuer *i*'s stock ahead of a deal at time *t* (equation (6)), estimated separately for equity and debt transactions.[24] We relate the coverage decision to the strength of the bank's relationship with the

[24] By 'stand-alone' we mean that the coefficients are not those obtained from joint maximum likelihood estimations of one of the systems that includes the coverage equation. With two measures of analyst behavior and two selectivity-adjusted equations, we estimate four sets of coverage parameters for each of the debt and equity samples. There are slight differences among these parameter estimates and between these and the stand-alone probit estimates. None of our conclusions are sensitive to this reporting convention.

issuer, the bank's market share, the breadth of the bank's coverage of the issuer's Fama-French industry, and various characteristics of the issuer that might attract coverage. Each of these explanatory variables is interacted with a dummy variable equal to 1 for commercial banks, to allow for differences in the coverage decision criteria between commercial and investment banks.

The explanatory power for both the equity and debt models is substantial as evidenced by the pseudo-R^2 exceeding 33% in each case. Consistent with the univariate results shown in Tables III and IV, we find that a firm's stock is more likely to be covered prior to a capital market transaction, the stronger the relationships between bank and issuer, the larger the bank (in terms of market share), when the bank's analyst already covers a large fraction of the issuer's sector, the larger the issuer's fee-generating capacity (measured by the log of the size of the current deal and the log of the issuer's equity or debt proceeds raised during the previous five years), the more mature the firm (measured in log years since its initial public offering of equity), among U.S. firms, and for exchange-listed firms. In general, the magnitude of these effects is smaller for commercial banks, which, all else equal, were less likely to provide coverage.

In sum, the research coverage models reveal the coverage decision to be heavily influenced by variables associated with the strength of a bank's relationship with the issuing firm and the issuing firm's capacity for sustaining such relationships via fee-generating transactions. Commercial banks were latecomers to the provision of research by virtue of Glass-Steagall restrictions on their participation in securities markets. Where they did provide coverage, the evidence suggests it was more closely linked with a past underwriting relationship than for the investment banks that traditionally provided broader coverage as a complement to their brokerage activities.

B. The Analyst Behavior Models

Table VII presents estimation results for the analyst behavior model (2) in structural form, for each of the two proxies for analyst behavior. The models are estimated separately for debt and equity deals, and conditioned on the coverage decision using joint MLE. The relative upgrade specifications include a dummy variable equaling one if the last-but-one recommendation was already a strong buy, ruling out

a further upgrade (the coefficients, which are negative as expected and strongly significant, are not reported).[25]

Consistent with prior evidence regarding IPO underwriters, analysts are relatively more aggressive when their bank has a strong relationship with the issuer. Specifically, relative recommendations are more aggressive, the greater the bank's shares of the issuer's past debt and equity proceeds or commercial loans, and among banks with equity stakes in the issuing firm. The effects are present in both equity and debt transactions and generally are highly statistically significant (see columns 1 and 3).[26]

The relative upgrade proxy reflects recent changes in analyst recommendations. As such, it more nearly captures the idea that banks pressured analysts to position their recommendations to help the bank compete for a specific deal. If banks less closely aligned with the issuer compete for deal flow with more aggressive upgrades, we should observe an attenuation of the positive relation between analyst behavior and the bank-issuer relationship proxies observed in the relative recommendation model. This appears to be the case. For the debt deals shown in column 4, the coefficients associated with the bank's debt underwriting and lending relationships are significantly smaller than in the relative recommendations specification. For the equity deals in column 2, the debt-underwriting and lending relationship variables cease to be significant at conventional levels, while the coefficient for equity-underwriting relationships turns significantly negative: underwriters with strong equity ties upgrade their recommendations less aggressively ahead of their clients' equity deals. Perhaps they don't need to, as their recommendations are already relatively more aggressive.

A strong reputation in the equity market provides a countervailing force to aggressive behavior: banks

[25] As a robustness check, we have repeated our analysis on a sub-sample that drops all cases where the last-but-one recommendation was a strong buy, so that the relative upgrade specification no longer requires inclusion of the dummy. All results are qualitatively unaffected.

[26] Banks generally are thought to act as intermediaries in securities offerings balancing the competing interests of issuers and institutional investors. One might expect banks to favor one side or the other locally as they compete for new business opportunities but not globally in equilibrium. Thus the apparent tendency for banks to issue more aggressive recommendations for firms with which they already have strong relationships begs for further consideration. If institutional investors do not take such behavior particularly seriously or any negative consequences can be offset by other means, then perhaps this is a relatively low-cost form of non-price competition of the sort envisioned by Anand and Galetovic (2002). Alternatively, it might reflect banks colluding with issuers against investors during our estimation period. Distinguishing between these and other potential explanations requires additional modeling to incorporate the relationship between banks and institutional investors.

with large equity market shares are associated with significantly less aggressive analyst behavior ahead of both equity and debt deals. In contrast, large debt-market and loan-market shares are associated with more aggressive behavior, especially for the debt sample.

In reconciling these apparently conflicting effects, it is useful to recall that equity transactions likely suffer more under the burden of informational frictions and so the intermediary's reputation has a more prominent role in certifying issuer quality. One should therefore expect that banks with strong reputations in the equity markets would be less inclined to liquidate reputation capital via overly aggressive behavior. On the other hand, during the estimation period, commercial banks gained substantial market share in the debt markets (in part entering via the corporate loan market) where an intermediary's reputation poses a weaker barrier to entry. Their gains came largely at the expense of lower-ranked investment banks. Other things equal, less reputable banks (both commercial and investment) faced weaker countervailing forces to their incentive to compete for debt mandates via more aggressive analyst behavior.

Relative upgrades are less aggressive among all-star analysts suggesting that career concerns moderate analysts' incentives to bend to investment bankers' demands. The moderating effect of all-star status is reversed during the 1999-2000 period usually associated with the 'dot-com bubble' during which the potential rewards for sacrificing one's individual reputation might have been greater. As a proxy for the size of the potential rewards, we calculate the percentage difference in market-wide proceeds raised during the current quarter and a five-year quarterly moving average, and interact it with the bank's overall market share.[27] As market-wide issuance activity increased relative to trend, analysts behaved more aggressively when their bank was more likely to capture a large share, and this effect is generally statistically significant. Similarly, large deals and more active issuers attract more aggressive upgrades, consistent with analysts being pressured more when more potential fee income is at stake.

Finally, more accurate forecasting ability and greater analyst seniority are associated with more aggressive behavior in each debt specification, with much weaker evidence in the equity specifications.

[27] Our results are robust to using shorter windows and to defining the variable separately for equity and debt deals.

This is consistent with the debt markets being the point of entry for commercial banks and non bulge-bracket investment banks responding to competitive pressure in this market segment by liquidating reputation capital.

Heckman's λ is an estimate of the effect of the probability of non-coverage on analyst behavior. The positive λ's reported in Table VII suggest that analysts behave more aggressively ahead of deals by issuers whose stock they are unlikely to cover (according to the coverage model). Conversely, companies that are more likely to be covered anyway receive less aggressive recommendations and upgrades.

Instrument Validity

To ensure that our models are identified, the first-step (analyst behavior) equations include a set of five instruments that are excluded from the second-step (lead bank) probits, namely relative forecast accuracy, the change in issue activity and its interaction with the bank's market share, deal size, and the issuer's cumulative proceeds over the prior five years. Economically, these are reasonable instruments: the analyst's tradeoff between the costs and benefits of risking her reputation reasonably affects the observed degree of relative aggressiveness without directly bearing on an issuing company's choice of underwriter. Moreover, a given issuer's deal size and five-year deal history do not vary across banks and so do not determine the issuer's underwriter choice.

Econometrically, we verify that these are valid instruments in the sense that one or more of them correlate with analyst behavior but not with the second-step dependent variable. This is true for three of the four analyst behavior models, with *F*-test statistics well in excess of 10, the critical value for 'strong' instruments advocated by Staiger and Stock (1997). The exception is the relative recommendation specification in the equity sample. There, four of the potential instruments are uncorrelated with the second-step dependent variable as required, but their partial correlation with analyst behavior in the reduced-form model, though significant, is low (F=3.59), making them 'weak' instruments in the sense of Staiger and Stock. This has two consequences: the two-step estimator in the equity sample will likely not improve on a one-step estimator that treats relative recommendations as exogenous; and the second-

step standard errors for this specification will be imprecise because the Murphy-Topel correction is partly based on the first-step covariance matrix.

C. The Determinants of the Probability of Winning an Underwriting Mandate

Having estimated the bank coverage and analyst behavior equations, we now condition the probability of a bank winning an underwriting mandate on its potentially strategic decision regarding whether to cover the issuing firm and if so, on the relative optimism of its analyst's recommendation.

Equity Transactions

Table VIII summarizes the results from estimating the underwriting mandate model for equity transactions. Conditional on a bank providing research coverage, there are two specifications in the table, one for each measure of analyst behavior. These correspond to system (4) in Section I. In addition, we estimate the likelihood of winning a deal in the absence of coverage (i.e. system (5)).

The first striking result is that among equity deals, relative upgrades *reduce* a bank's chances of winning an underwriting mandate ($p<0.001$). This finding runs counter to the spirit of previous research and the arguments embodied in recent allegations.[28] Interpreting aggressive upgrades as liquidation of reputation capital, this strategy appears particularly ineffective in the case of equity offerings where reputation is viewed as more central to successful placement. Banks pressed to compete on this dimension fought a losing battle.

The coefficient estimated for the relative recommendation measure, though not significant, also is not positive. Recall however that our instruments for this specification are weak, which at minimum biases the Murphy-Topel standard errors upwards and possibly causes the two-step estimator to fail to improve on a simple one-step estimator treating relative recommendations as exogenous. In other words, in the absence of better instruments, it is unclear what effect aggressive recommendations have on a bank's likelihood of winning an equity mandate.

[28] It also illustrates the importance of accounting for sample truncation and the endogeneity of analyst behavior arising from their career concerns. Had we treated analyst behavior as exogenous, the sign on the coefficient for relative upgrades would have flipped to become positive ($p<0.001$). However, a formal Smith-Blundell (1986) test rejects the null hypothesis that analyst behavior is exogenous with respect to the lead bank choice in our data ($p<0.0001$).

If aggressive analyst behavior does not attract equity mandates, what does? The strength of the bank-issuer relationship (measured as the bank's shares of the issuer's prior equity or debt issuance and borrowing or when the bank owns an equity stake in the issuer) strongly increases the likelihood of the bank winning the issuer's current underwriting mandate. Judging from the magnitude of the coefficients,[29] relationships derived from prior equity deals influence the choice of equity underwriter more than those based on prior debt deals. The fact that lending relationships help win equity mandates is consistent with allegations that commercial banks attempted to tie lending capacity to securities underwriting.[30] Prior equity underwriting relationships are significantly more important when the bank did not provide coverage for the issuer during the event window preceding its equity offering. This is consistent with issuing firms valuing research coverage but making tradeoffs at the margin between coverage and the strength of their relationships with banks competing for their mandate.

Banks involved in mergers during the quarter preceding an issuer's transaction were more likely to win mandates, suggesting that at least some of the target bank's relationships transferred to the acquirer. This effect is concentrated among firms not receiving coverage, where issuers might expect the merger to result in broader research coverage (including the issuer). Movements of key bankers, on the other hand, have little effect on the likelihood of winning an equity mandate, except in the absence of coverage where hiring bankers increased and losing bankers decreased the chances of winning an equity mandate.

The coefficients associated with analyst reputation provide further evidence that issuers value research capability in equity offerings. Having an all-star analyst or an analyst of greater seniority provide research coverage for the issuing firm significantly increases a bank's likelihood of winning the mandate.

The coefficients for the bank's market share in the prior year suggest that a strong reputation in the equity market at large increases the likelihood of winning a mandate regardless of whether the bank provides coverage for the issuing firm. By contrast, a strong position in the debt markets has no bearing

[29] This being a probit with sample selection correction, the error variance has been normalized to one, so we cannot measure the economic magnitudes corresponding to the estimated coefficients. We can, however, make statements about the relative size of the coefficients.

[30] Drucker and Puri (2003) find that discounting loans increases the likelihood of winning SEO underwriting mandates.

on competition for equity deals. We interpret this as evidence of a degree of bank specialization in either debt or equity. Large lenders – effectively, commercial banks – were significantly less likely to win equity mandates, especially when they did not provide research coverage. Thus while having a lending relationship helps, just being a large lender does not.

Debt Transactions

Table IX reveals that more aggressive stock recommendations significantly *decreased* the likelihood of winning debt-underwriting mandates (p=0.008). In terms of the raw data, this implies that banks frequently won debt-underwriting mandates despite their analysts having issued a below-consensus recommendation for the issuer's stock. This is borne out in the underlying data. Among winners of debt underwriting mandates, only 32.8% of recommendations were 'strong buys'. In other words, 67.2% of the time, the winning banks' analysts were not necessarily the most aggressive, issuing 'buy' (42.4%), 'hold' (24.3%) or even 'under-perform' and 'sell' recommendations (0.4%). While having a relatively aggressive recommendation thus doesn't necessarily help a bank's chances of winning a debt mandate, the essentially zero coefficient estimated for relative upgrades suggests that it doesn't matter if the analyst has been bullish for a long time or only recently upgraded the stock.

As with equity deals, prior relationships strongly influence issuers' choices of debt underwriters. This is true for both prior debt and equity deals, though relationships derived from having underwritten an issuer's prior debt offerings are most effective. This is consistent with specialization and mirrors the results for the equity sample. Lending relationships too help win debt mandates.

In contrast to the equity results, owning an equity stake in the issuing firm had little effect on the likelihood of winning debt mandates when the bank provided coverage, and a negative effect when it did not. Commercial banks and non-bulge-bracket investment banks accounted for the bulk of the cases where no research coverage was provided. Commercial banks were prohibited from holding equity stakes during the first half of the estimation period. Moreover, commercial banks gained substantial debt-market share largely at the expense of non-bulge-bracket investment banks (at least through 1998). Thus we

favor the interpretation that in the absence of coverage, lending relationships dominated any positive relationship effects associated with equity ownership. As a consequence, we observe a negative relation between bank equity stakes (mostly held by investment banks) and the likelihood of winning a debt mandate in the absence of coverage. Regardless of this interpretation, commercial banks appear to have gained leverage in the debt markets via their lending capacity.

Mergers have a positive effect on winning debt mandates, though this is significant only in the upgrade specification. Movements of key bankers, on the other hand, which often coincided with mergers, have a more consistent effect: a bank's chances of winning a mandate were lower when it recently had lost key members of its debt team and higher when it had poached debt professionals from other banks. This finding suggests that relationships are embodied in key people.

Interestingly, having an all-star analyst covering the issuer's stock had a negative effect on whether the analyst's bank was awarded the debt-underwriting mandate. This is consistent with commercial banks – which employ fewer all-stars – successfully competing for debt deals. All else equal, however, issuers were more likely to choose banks with more senior analysts.

The coefficients associated with a bank's debt and equity market share during the calendar year preceding a transaction provide further evidence of bank specialization. Banks with larger debt market shares were more likely to win subsequent debt mandates, similar to the direct effect of equity market share on the likelihood of winning subsequent equity mandates. By contrast, banks with larger equity market shares were less likely to win debt-underwriting mandates, other things equal.

We also find that a larger share of the corporate loan market increased a bank's probability of winning debt-underwriting mandates. This result is consistent with the argument that competitive pressure from the 'pay-to-play' movement initiated by commercial banks had its greatest impact in the debt markets. Both the analyst behavior coefficients and the large gains in debt-market share among commercial banks even in the early part of the 1990s suggest that liquidation of reputation capital was not an effective competitive response, at least not across the entire estimation period. In the next section, we examine

whether the effectiveness of this competitive strategy changed over time.

Differences Across Time

Panel A of Table X reports coefficients for the instrument for analyst behavior during the 1993-1997 and 1998-June 2002 sub-periods. The rationale for partitioning the estimation period is that the end of the first sub-period corresponds roughly with the de facto repeal of the Glass-Steagall Act revealed by the approval of Citicorp's acquisition of Salomon Smith Barney in 1998 and the beginning of the 'dot-com bubble' with which allegations of analyst misbehavior primarily are associated. We estimate the full model discussed previously but to conserve space, we suppress all but the analyst-behavior coefficients. The remainder of the model is quite stable across the sub-periods and so we simply highlight instances in which partitioning the data leads to qualitative changes in our interpretation of the results.

For the equity sample, we find no evidence that analyst behavior positively influenced the likelihood of winning equity-underwriting mandates, even after 1997. On the contrary: post-1997 banks whose analysts upgraded issuers' stocks more aggressively were significantly less likely to win mandates (p=0.014). To gain further insight, we interact the analyst behavior instruments with a dummy equaling one for deals completed during the bubble years (1999 and 2000), but find no evidence that analyst behavior had a differential effect on issuers' choices during that period (not shown in the table).

The main changes over time for the equity sample concern the increasing importance of a highly rated analyst and the (relatively) decreasing importance of prior lending relationships (which go from being three times more effective than debt relationships and nearly as effective as equity relationships to being the least important source of a bank's relationship benefits).

The picture is quite different for debt deals. The relative recommendation specification reveals that the significant negative effect on the likelihood of winning a debt-underwriting mandate is concentrated in the pre-1997 period (p=0.037), precisely when commercial banks began to enter debt underwriting. The negative sign of the effect is consistent with incumbent (investment) banks reacting, unsuccessfully, to commercial bank entry by liquidating reputation capital. After 1997, the effect remains negative but is

no longer significant at conventional levels (p=0.085).

There are three additional significant differences across the two time periods. In contrast to the equity model, the presence of an all-star analyst – typically employed at an investment bank – *reduced* the likelihood of winning debt mandates during the post-1997 period. Second, large lenders were significantly less likely to win debt mandates pre-1997 but more likely in the post-1997 period. Both of these results are indicative of the successful inroads commercial banks made into the debt markets. Third, holding an equity stake in the issuer helped the bank win the mandate only in the pre-1998 period. A natural interpretation of this finding is that by 1998, the easing of restrictions on holding equity stakes helped level the playing field between investment banks and commercial banks.

Controlling for the Exclusivity of Relationships

Although relationship exclusivity declined during the sample period, one might conjecture that the majority of issuers continued to maintain relatively exclusive relationships. We explore whether this possibility influenced our findings by interacting the analyst behavior proxies with two measures of the likelihood that a mandate truly is 'up for grabs'.[31]

The first measure is a dummy for firms maintaining relatively weak underwriting relationships. For each of the 5,908 equity deals and 10,717 debt deals in the sample, the dummy variable equals 1 if during the prior five years no bank competing for the deal underwrote 25% or more of the issuer's prior equity or debt offerings, respectively. In other words, the issuer maintained relationships with at least five banks. This measure classifies 59.2% of equity issuers and 31.8% of debt issuers as not maintaining exclusive relationships. The second measure attempts to capture a firm's 'switching propensity' by estimating probits (separately in the equity and debt samples) for generating the predicted likelihood that a firm will hire a different bank than the one it used in its previous deal. The probits are conditioned on the firm's maturity (log years since IPO), the dummy for firms maintaining relatively weak relationships, the log size of the current deal, and (for debt deals) a dummy for high-yield bond offers. Firms are more likely to

[31] We thank Francesca Cornelli and Raghu Rajan for suggesting this analysis.

switch, the more mature they are and if they have weaker relationships. Equity issuers are more likely to switch the larger the current deal, while the reverse is true for debt issuers. Issuers of high-yield bonds are more likely to switch underwriters.

The results using these interactions for the strength of the underwriting relationship are reported in Panels B and C of Table X, respectively. As in the sub-period analysis, we report only the coefficients of interest. In Panel B, more aggressive analyst behavior generally is associated with a significantly *lower* likelihood of the bank winning the mandate when the issuer maintains relatively weak relationships. Relatively aggressive recommendations ahead of equity deals and aggressive upgrades ahead of debt deals, neither of which were significant in the sample as a whole, have a significantly detrimental effect on a bank's chances of winning a mandate when the issuer maintains weak relationships. The only exception involves aggressive upgrades ahead of equity deals where the negative effect on a bank's chances of winning the mandate are virtually neutralized in the presence of a weak relationship.

Exactly the same results obtain when we interact the analyst behavior variables with our measure of switching propensity. The more prone an issuer is to switch underwriters, the less the bank benefits from aggressive analyst behavior. The exception again is aggressive upgrades ahead of equity deals, which neutralize the otherwise harmful effect of such behavior.

These results suggest that competing for mandates that were more likely to be up for grabs by aggressively liquidating reputation capital was counter-productive. Presumably it was the more desperate banks that resorted to such tactics.

IV. Conclusion

We examine 16,625 U.S. debt and equity offerings sold between December 1993 and June 2002 for evidence that sell-side analyst behavior influenced the issuer's choice of bank to underwrite its offering. This is precisely the motivation suggested by recent allegations that analysts misrepresented their beliefs about potential issuers under pressure from investment bankers competing for underwriting mandates. Our findings provide little support for this argument but perhaps more importantly they draw

attention to the complexity of the situation and some unique features of the sample period.[32]

In the equity markets, we find little evidence that banks gained competitive advantage via aggressive recommendation behavior among their analysts. In general, the state of bank-issuer relationships and the reputation of both the bank and the analyst had far more influence over the outcome of competition for equity mandates. Prior equity underwriting relationships are significantly more important when the bank did not provide coverage for the issuer during the event window preceding its equity offering.

Recent allegations related to aggressive analyst behavior have arisen primarily in the context of the equity markets. Seen in this light, our findings may strike some readers as surprising if not implausible. However, there is a straightforward economic argument consistent with the negative relation between aggressive analyst behavior and the likelihood of winning equity mandates. Equity transactions are subject to significant information frictions that are best resolved by a credible intermediary. If overly aggressive recommendations undermine credibility, they will compromise a bank's capacity for resolving information frictions. Theory suggests that the information frictions that make credibility so important for equity underwriting are less severe in debt offerings. We find evidence that reputation concerns carried less force for tempering aggressive behavior among analysts prior to debt offerings.

Both banks and individual analysts have incentive to build and preserve reputations for accuracy and honesty in their research. We find evidence of this moderating force at work in the data. This should not be surprising given the industry's heavy dependence on reputation for carrying out underwriting functions and the longstanding nature of the conflict of interest between investment banking and sell-side research. In light of calls for heavier regulation or even separation of research from investment banking, one might

[32] Relative to existing research, our research design de-emphasizes the initial public offering by examining all capital market transactions by an issuer during the sample period. From a theoretical perspective we contend that an issuer's transactions with a bank should not be treated as independent events. Our evidence is consistent with this argument. From a practical perspective, relatively few firms attract analyst research coverage prior to their IPO and thus most IPOs are classified as no-coverage cases in our sample. The exception is carve-outs by parents whose stocks are already covered. In this sub-sample, we still find that aggressive analyst behavior failed to help banks win business. We note, however, that anecdotal evidence suggests that banks and their analysts competed for IPO underwriting mandates by making (non-binding) commitments to provide favorable research coverage. Although such behavior is relevant to the question at hand, it is econometrically unobservable and thus we cannot determine how it influenced the issuer's choice of underwriter. The finding by Cliff and Denis (2003) that firms are more likely to switch underwriters when they receive less coverage than expected is consistent with punishment for violation of such implied contracts.

ask whether the fundamentals of securities underwriting have changed. We contend that preservation rather than aggressive liquidation of reputation capital will more likely characterize equilibrium behavior in the industry for the foreseeable future.

It does not follow that our findings absolve analysts and their banks from any alleged misconduct. In fact, we find some evidence that competition for the massive fee pool available in the late 1990s overwhelmed the moderating effect of reputational concerns. But even with an unusually large fee pool at stake, banks should not grossly misrepresent their beliefs about issuers unless they expect misrepresentations to favorably influence investor behavior. Perhaps not coincidentally, the late 1990s (not unlike the 1920s) were unusual for witnessing a temporarily high level of direct securities market participation among retail investors.

References

Abarbanell, Jeffrey S., 1991, Do analysts' earnings forecasts incorporate information in prior stock price changes? *Journal of Accounting and Economics* 14, 147-165.

Anand, Bharat, and Alexander Galetovic, 2000, Information, non-excludability and financial market structure, *Journal of Business* 73, 357-402.

Anand, Bharat, and Alexander Galetovic, 2002, Does competition kill relationships? Inside investment banking, unpublished working paper, Harvard Business School.

Baker, Wayne, 1990, Market networks and corporate behavior, *American Journal of Sociology* 96, 589-625.

Boot, Arnoud, and Anjan V. Thakor, 2000, Can relationship banking survive competition? *Journal of Finance* 55, 679-713.

Bradley, Daniel J., Bradford D. Jordan, and Jay R. Ritter, 2003, The quiet period goes out with a bang, *Journal of Finance* 58, 1-36.

Bradshaw, Mark T., Scott A. Richardson, and Richard G. Sloan, 2003, Pump and dump: An empirical analysis of the relation between corporate financing activities and sell-side analyst research, unpublished working paper, Harvard Business School.

Brown, Phillip, George Foster, and Eric Noreen, 1985, *Security Analyst Multi-Year Earnings Forecasts and the Capital Market* (American Accounting Association, Sarasota, Fl.).

Chan, Louis K.C., Jason Karceski, and Josef Lakonishok, 2003, Analysts' conflict of interest and biases in earnings forecasts, NBER Working Paper No. 9544.

Chemmanur, Thomas, and Paolo Fulghieri, 1994, Investment bank reputation, information production, and financial intermediation, *Journal of Finance* 49, 57-80.

Chopra, Vijay K., 1998, Why so much error in analysts' earnings forecasts? *Financial Analysts Journal* 54, 30–37.

Clarke, Jonathan, Craig Dunbar, and Kathleen Kahle, 2002, All-star analyst turnover, investment bank market share, and the performance of initial public offerings, unpublished working paper, University of Western Ontario.

Clarke, Jonathan , Ajay Khorana, Ajay Patel, and P. Raghavendra Rau, Analyst turnover, stock coverage, and investment banking deal flow, unpublished working paper, Purdue University.

Cliff, Michael T., and David J. Denis, 2003, Do IPO firms purchase analyst coverage with underpricing? Unpublished working paper, Purdue University.

Diamond, Douglas, 1991, Monitoring and reputation: The choice between bank loans and privately placed debt, *Journal of Political Economy* 99, 689-721.

Dreman, David, and Michael Berry, 1995, Analyst forecasting errors and their implications for security analysis, *Financial Analysts Journal* 51, 30-42.

Drucker, Steven, and Manju Puri, 2003, Tying knots: Lending to win equity underwriting business, unpublished working paper, Stanford University.

Eccles, Robert G., and Dwight B. Crane, 1988, *Doing Deals: Investment Banks at Work* (Boston, Harvard Business School Press).

Fama, Eugene, and Kenneth French, 1997, Industry costs of equity, *Journal of Financial Economics* 43, 153-194.

Fernando, Chitru S., Vladimir A. Gatchev, and Paul A. Spindt, 2003, Wanna dance? How firms and underwriters choose each other, unpublished working paper, Tulane University.

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.

Graham, John, 1999, Herding among investment newsletters: Theory and evidence, *Journal of Finance* 54, 237-268.

Heckman, James J., 1979, Sample selection bias as a specification error, *Econometrica* 47, 153-162.

Hong, Harrison, and Jeffrey D. Kubik, 2003, Analyzing the analysts: Career concerns and biased earnings forecasts, *Journal of Finance* 58, 313-351.

Hong, Harrison, Jeffrey D. Kubik, and Amit Solomon, 2000, Security analysts' career concerns and the herding of earnings forecasts, *RAND Journal of Economics* 31, 121-144.

James, Christopher M., 1992, Relationship-specific assets and the pricing of underwriter services, *Journal of Finance* 47, 1865-1885.

Krigman, Laurie, Wayne H. Shaw, and Kent L. Womack, 2001, Why do firms switch underwriters? *Journal of Financial Economics* 60, 245-284.

Lin, Hsiou-wei, and Maureen F. McNichols, 1998, Underwriting relationships, analysts' earnings forecasts and investment recommendations, *Journal of Accounting and Economics* 25, 101-127.

Livingston Miles B., and Robert Miller, 2000, Investment banker reputation and the underwriting of non-convertible debt, *Financial Management* 29, 21-34.

Ljungqvist, Alexander, and William J. Wilhelm, 2003, IPO pricing in the dot-com bubble, *Journal of Finance* 58, 723-752.

Maddala, G.S., 1983, *Limited-Dependent and Qualitative Variables in Econometrics* (Cambridge, Cambridge University Press).

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

Michaely, Roni, and Kent L. Womack, 1999, Conflict of interest and the credibility of underwriter analyst recommendations, *Review of Financial Studies* 12, 653-686.

Murphy, Kevin M., and Robert H. Topel, 1985, Estimation and inference in two-step econometric models, *Journal of Business and Economic Statistics* 13, 370-379.

Petersen, Mitchell A., and Raghuram G. Rajan, 1994, The benefits of lending relationships: Evidence from small business data, *Journal of Finance* 49, 3-37.

Petersen, Mitchell A., and Raghuram G. Rajan, 1995, The effect of credit market competition on lending relationships, *Quarterly Journal of Economics* 110, 407-443.

Roten, Ivan C., and Donald J. Mullineaux, 2003, Debt underwriting by commercial bank-affiliated firms and investment banks: More evidence, *Journal of Banking and Finance*, forthcoming.

Schenone, Carola, 2003, The effect of banking relationships on the firm's IPO underpricing, *Journal of Finance*, forthcoming.

Smith, Richard J., and Richard W. Blundell, 1986, An exogeneity test for a simultaneous equation Tobit model with an application to labor supply, *Econometrica* 54, 679-686.

Staiger, Douglas, and James H. Stock, 1997, Instrumental variables regression with weak instruments, *Econometrica* 65, 557-586.

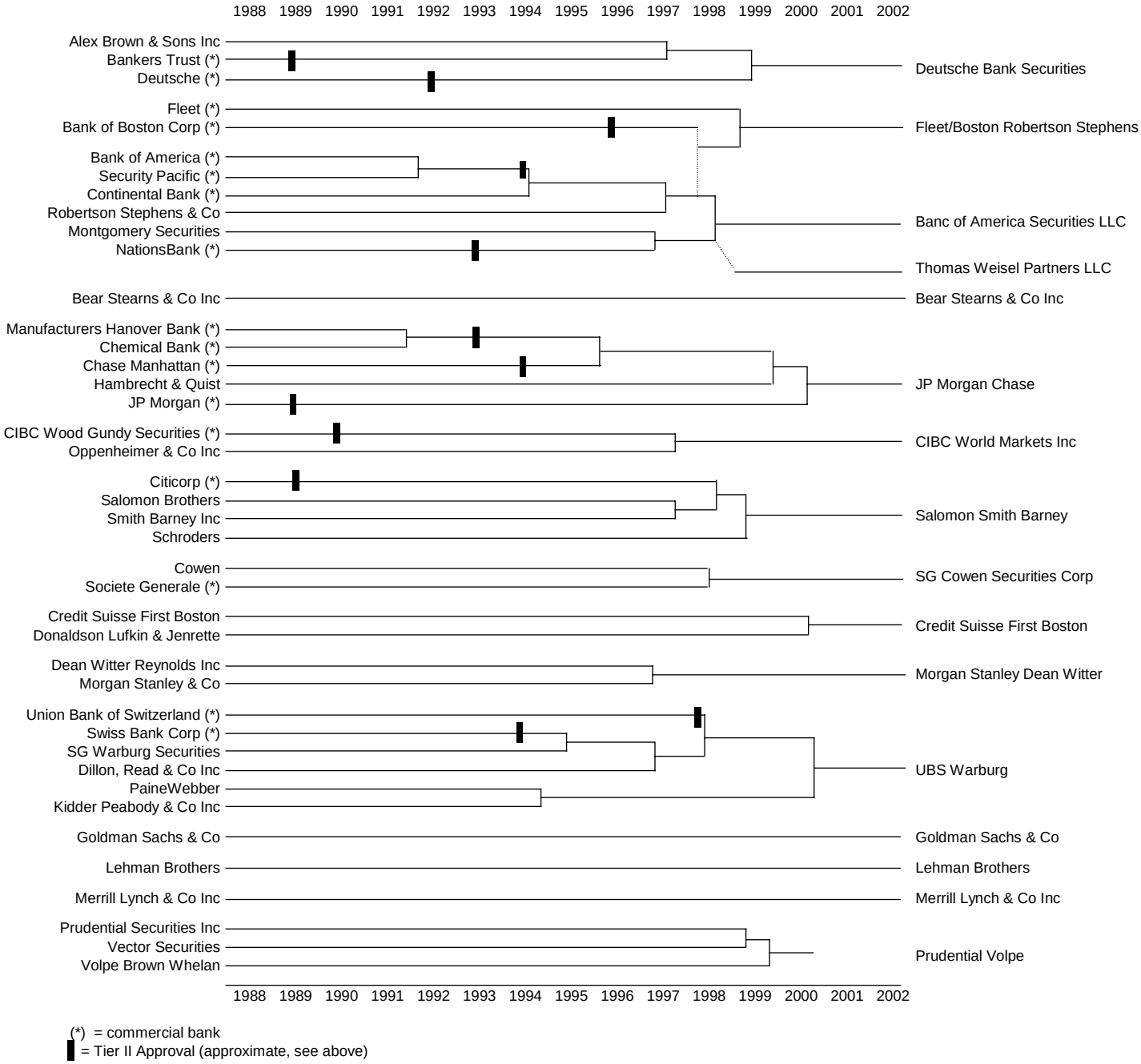
Stickel, Scott E., 1990, Predicting individual analyst earnings forecasts, *Journal of Accounting Research* 28, 409-417.

Van de Ven, W.P.M.M., and B.M.S. Van Pragg, 1981, The demand for deductibles in private health insurance: A probit model with sample selection, *Journal of Econometrics* 17, 229-252.

Yasuda, Ayako, 2003, Do bank-firm relationships affect bank competition in the corporate bond underwriting market? Unpublished working paper, The Wharton School.

Figure 1. Principal Bank Mergers, 1988-2002.

The figure presents a time line of the principal merger and acquisition events involving sample banks over the period 1988 to June 2002. A vertical line indicates a merger of two banks. A dashed line indicates a sale or split-off of a bank. For estimation purposes, the sample includes all banks active as of June 2002 (see the right-hand side legend) as well as their predecessor banks. These are the banks considered in competition for a given deal at a given point in time, as long as they held Tier II authority to underwrite securities at that time. There is one exception. The two boutique investment banks acquired by Prudential Securities, Vector Securities and Volpe Brown Whelan, are not considered in competition for any deals due to their specialized nature and small size. Prudential withdrew from underwriting in Q4 2000. Following a merger, the new entity 'inherits' the relationships of its predecessors. Following a sale or a split-off, the new entities 'inherit' the relationships previously developed by the joint entity. We consider a bank merged on the first day of the month following the completion of the merger. From that day on, it competes in its merged form. Tier II authority involves separate approval for debt and equity underwriting. The approval dates (debt, equity) used for the sample commercial banks are as follows: BA Securities (10/11/94, 10/11/94), BT Securities (1/1/93, 1/15/91), BankBoston (11/1/96, 11/1/96), CIBC Wood Gundy Securities (6/30/90, 1/15/91), Chase Securities (7/26/89, 6/15/94), Chemical Securities (6/30/93, -), Deutsche Bank (12/1/92, 12/1/92), JP Morgan Securities (1/1/89, 1/1/90), NationsBank (7/26/93, 7/26/93), SBC (1/3/95, -), UBS Securities (debt underwriting grand-fathered throughout sample period, equity: 1/1/95), Citicorp (7/26/89, expected to receive equity approval as of 3/27/95 but not clear if received prior to merger with Traveler's).



(*) = commercial bank
▮ = Tier II Approval (approximate, see above)

Table I. The Sample of Capital Raising Transactions.

The total sample includes the universe of 36,173 capital raising transactions between January 1, 1988 and June 30, 2002 reported by Securities Data Corporation excluding transactions by issuers classified as SIC 6000-6999 (financial institutions etc) and SIC 9000-9999 (government agencies etc). We use this sample to generate a variety of variables, including prior relationships between issuers and banks. Many issuers are related to each other so we form "corporate families" on the basis of SDC's "ultimate parent CUSIP" identifier. I/B/E/S data is available only from late 1993, so for the estimation of our econometric model we focus on a sub-sample of deals carried out between December 1, 1993 and June 30, 2002. We also exclude a) any issuer or family of issuers who never hired any of our "sample banks" for a capital raising transaction between 1988 and June 2002 (sample banks are identified in Table II and Figure 1); and b) purely-foreign issuers or families of issuers (though we do include corporate families that have at least one U.S. member). The resulting estimation period sub-sample is shown in the final two columns.

		1988-June 2002		Estimation period (Dec. 1993-June 2002)	
		No. of deals	Amount raised ($m, nominal)	No. of deals	Amount raised ($m, nominal)
Equity:					
	Common stock	10,945	1,230,040	5,229	745,117
	Private common	1,981	68,305	679	29,051
Debt:					
	Non-convertible debt	10,638	1,836,942	6,565	1,155,397
	Convertible debt	533	111,231	220	72,886
	Private non-convertible debt	9,510	557,167	2,714	152,233
	Private convertible debt	280	8,538	102	5,398
	Non-convertible preferred	555	73,402	217	35,357
	Convertible preferred	309	68,762	142	49,306
	Private non-convertible preferred	555	21,414	233	8,626
	Private convertible preferred	867	36,600	524	26,435
All deals		36,173	4,012,401	16,625	2,279,807

Table II. The Bank Sample.

The table summarizes the market share captured by the 16 sample banks for the 36,173 sample transactions taking place during the January 1, 1988 through June 30, 2002 sample period. The bank sample comprises the 16 most-active underwriters judged by proceeds raised in both debt and equity offerings during 2000-2002. Market share is determined by assigning to the lead underwriter 100% of the nominal amount raised. (When there are co-leaders in a transaction, they share equally for the purposes of calculating market share). Many of the 16 banks represent the outcome of one or more mergers or acquisitions during the sample period. In such cases, the surviving bank listed below "inherits" the market share of its predecessors (listed in Figure 1).

	Equity deals		Debt deals		All deals	
	Market share (%)	Amount raised ($m, nominal)	Market share (%)	Amount raised ($m, nominal)	Market share (%)	Amount raised ($m, nominal)
Banc of America Securities LLC	3.0	39,386	5.0	135,634	4.4	175,020
Bear Stearns & Co Inc	2.0	26,154	1.6	43,052	1.7	69,207
CIBC World Markets Inc	0.8	10,264	0.3	7,036	0.4	17,299
Credit Suisse First Boston	14.0	181,579	10.9	297,165	11.9	478,744
Deutsche Banc Securities	4.2	54,185	2.2	60,744	2.9	114,930
Fleet Boston (Robertson Stephens)	1.0	13,299	0.1	4,069	0.4	17,368
Goldman Sachs & Co	17.5	227,333	13.7	371,736	14.9	599,069
JP Morgan Chase	4.5	58,730	9.7	264,421	8.1	323,150
Lehman Brothers	5.0	65,413	6.5	175,650	6.0	241,063
Merrill Lynch & Co Inc	11.5	148,982	13.5	365,412	12.8	514,394
Morgan Stanley Dean Witter	12.4	161,265	10.8	293,156	11.3	454,421
Prudential Volpe Technology Group	0.8	10,340	0.3	8,918	0.5	19,258
SG Cowen Securities Corp	0.6	8,038	0.1	2,211	0.3	10,248
Salomon Smith Barney	8.7	113,432	14.4	389,678	12.5	503,110
Thomas Weisel Partners LLC	0.2	2,119	0.0	25	0.1	2,144
UBS Warburg	4.7	60,459	3.9	105,557	4.1	166,015
All 16 sample banks (and predecessors)	**91.0**	**1,180,977**	**93.0**	**2,524,463**	**92.3**	**3,705,440**

Table III. Bank-issuer Relationships and Bank Characteristics.

The dataset consists of 16,625 deals. The unit of observation is a bank-deal pair. Occasionally, banks co-lead a deal, so there are a total of 18,031 bank-deal pairs in the column headed "winning banks". The column headed "losing banks" refers to bank-deal pairs involving banks that were eligible to compete for but did not win a given deal. On average, there were 24.3 banks treated as competing for every deal. For each bank-deal pair, we report measures of the banks' prior relationships with the issuers, their shares of the equity, debt, and corporate loan markets, the number of "all-star" analyst teams they had according to the most recent *Institutional Investor* poll before the deal, the fraction of the issuer's industry covered by their analysts (aggregated into the 48 Fama-French (1997) industry groups), the extent of bank equity ownership in issuing firms (based on 13f filings as of the quarter-end preceding the deal), and the fraction of commercial banks in each group. These are broken down by equity and debt, and by whether the bank's analyst covered the issuers stock in the prior 730 days. The final column shows tests of the null that the means and fractions for winning and losing banks are equal Though not shown, comparing coverage and no-coverage, all means and fractions are significantly different with one exception (the fraction of commercial banks among banks winning equity deals). All numbers are in percent.

	Winning banks			Losing banks			test: winner vs loser
	mean	*st.dev.*	median	mean	*st.dev.*	median	
Panel A: Equity - Coverage	N=2,080			N=9,821			
bank's share of issuer's equity deals over the prior 5 years	46.3	*47.4*	30.1	6.4	*22.5*	0.0	58.1
... debt deals over the prior 5 years	8.4	*25.0*	0.0	3.0	*14.0*	0.0	13.6
... loans over the prior 5 years	2.4	*11.0*	0.0	1.3	*7.5*	0.0	5.5
bank's share of loan market, prior calendar year	1.7	*3.2*	0.4	2.0	*3.7*	0.4	-3.5
... equity market, prior calendar year	6.4	*5.8*	4.5	4.9	*5.0*	3.2	12.1
... debt market, prior calendar year	6.0	*5.6*	5.0	4.9	*5.2*	2.2	8.6
fraction with bank stake in issuer's equity	49.8			54.7			-4.0
fraction commercial banks	17.8			23.3			-5.5
Panel B: Equity - No coverage	N=4,092			N=127,028			
bank's share of issuer's equity deals over the prior 5 years	7.9	*25.7*	0.0	0.4	*5.6*	0.0	66.5
... debt deals over the prior 5 years	4.8	*20.2*	0.0	0.4	*5.5*	0.0	43.4
... loans over the prior 5 years	1.3	*8.5*	0.0	0.6	*6.1*	0.0	6.8
bank's share of loan market, prior calendar year	1.5	*3.1*	0.1	2.1	*3.6*	0.3	-10.3
... equity market, prior calendar year	5.5	*5.8*	3.2	3.5	*4.8*	1.4	25.2
... debt market, prior calendar year	5.3	*5.7*	2.7	3.7	*4.8*	1.3	20.7
fraction with bank stake in issuer's equity	17.9			13.2			8.7
fraction commercial banks	17.7			30.2			-17.3
Panel C: Debt - Coverage	N=4,427			N=54,358			
bank's share of issuer's equity deals over the prior 5 years	12.9	*31.5*	0.0	3.0	*15.5*	0.0	36.7
... debt deals over the prior 5 years	25.9	*30.8*	14.8	4.8	*13.6*	0.0	86.6
... loans over the prior 5 years	4.0	*12.1*	0.0	1.1	*5.7*	0.0	29.1
bank's share of loan market, prior calendar year	2.5	*4.0*	0.6	1.5	*2.9*	0.3	21.0
... equity market, prior calendar year	8.6	*5.8*	7.2	5.5	*5.4*	3.5	36.2
... debt market, prior calendar year	9.6	*4.9*	10.0	5.4	*5.2*	3.6	52.0
fraction with bank stake in issuer's equity	65.8			67.3			-2.1
fraction commercial banks	22.8			17.7			8.6
Panel D: Debt - No coverage	N=7,432			N=194,057			
bank's share of issuer's equity deals over the prior 5 years	4.2	*19.1*	0.0	0.6	*6.9*	0.0	40.0
... debt deals over the prior 5 years	18.1	*31.2*	0.0	1.3	*8.1*	0.0	143.4
... loans over the prior 5 years	7.4	*20.2*	0.0	1.3	*7.4*	0.0	63.2
bank's share of loan market, prior calendar year	4.5	*5.5*	1.4	2.6	*4.0*	0.8	39.5
... equity market, prior calendar year	4.8	*5.8*	2.4	3.1	*4.5*	1.2	32.7
... debt market, prior calendar year	6.4	*5.7*	4.5	3.2	*4.5*	1.2	59.0
fraction with bank stake in issuer's equity	34.1			32.6			2.7
fraction commercial banks	48.4			37.6			18.9

Table IV. Descriptive Statistics: Issuer and Deal Characteristics.

The dataset contains 16,625 deals by 6,821 unique companies and 5,472 unique corporate families. 10,796 of the 16,625 deals involve issuers that are covered by at least one sample bank in I/B/E/S in the 730 days prior to the deal. All currency amounts are in nominal terms. The last column provides *t*-tests of differences in means/fractions.

	Coverage			No coverage			*t*-test of difference in means/ fractions
	mean	st.dev.	median	mean	st.dev.	median	
Panel A: Equity deals	N=2,903			N=3,005			
deal size (in $m)	180.1	*411.7*	84.0	83.6	*192.4*	44.0	11.6
issuer's equity proceeds prior 5 years (in $m)	172.1	*511.5*	51.2	14.8	*132.2*	0.0	16.3
issuer's debt proceeds prior 5 years (in $m)	263.2	*979.3*	0.0	39.9	*550.3*	0.0	10.9
time since IPO (in years)	9.3	*12.6*	3.9	2.1	*6.7*	0.0	26.9
fraction not listed (%)	0.4			8.1			-14.5
fraction U.S. company (%)	98.4			98.9			-1.5
fraction of issuer's Fama-French industry covered by bank (%)	13.9			12.2			1.9
Panel B: Debt deals	N=7,893			N=2,824			
deal size (in $m)	164.5	*265.9*	89.5	73.4	*114.7*	32.0	17.6
issuer's equity proceeds prior 5 years (in $m)	262.7	*827.4*	0.0	52.8	*346.4*	0.0	13.1
issuer's debt proceeds prior 5 years (in $m)	2,508.0	*5,429.8*	798.8	259.8	*1416.1*	0.0	21.7
time since IPO (in years)	28.4	*18.1*	28.7	16.1	*17.5*	10.9	20.4
fraction not listed (%)	2.2			71.6			-78.5
fraction U.S. company (%)	98.2			94.2			11.2
fraction of issuer's Fama-French industry covered by bank (%)	15.4			13.0			3.2

Table V. Recommendations and Analyst Characteristics.

We construct two measures of analyst behavior. *Relative recommendations* measure bank *j*'s recommendation level relative to its peer banks by subtracting from bank *j*'s most recent recommendation the median recommendation of all sample banks covering firm *i* in the 730-day window before *i*'s next deal. *Relative upgrades* are computed as a bank's recommendation change for firm *i* less the median change of other sample banks. By construction, both measures lie between –4 and +4, with positive values denoting relatively aggressive recommendations or upgrades. We report descriptive statistics for these separately for equity and debt deals, and broken down by whether the bank won or lost the underwriting mandate. *All-star analysts* are those ranked in the top 4 in their industry in the most recent *Institutional Investor* survey preceding the deal. *Relative forecast accuracy* is a measure of the analyst's forecast accuracy for the issuer's stock, relative to other analysts. It is constructed as in Hong and Kubik (2003) and ranges from 0 to 100, with a higher number indicating greater forecast accuracy. As a proxy for seniority, we compute the number of years since the analyst first appeared in the I/B/E/S database. The last column provides *t*-tests of differences in means/fractions.

	All banks				Winning banks				Losing banks				test: winner vs. loser
	No. obs	mean	st.dev.	median	No. obs	mean	st.dev.	median	No. obs	mean	st.dev.	median	
Panel A: Equity deals													
relative recommendation	11,901	-0.039	*0.704*	0.000	2,080	0.113	*0.586*	0.000	9,821	-0.071	*0.722*	0.000	10.9
relative upgrade	11,901	0.104	*0.784*	0.000	2,080	0.131	*0.740*	0.000	9,821	0.098	*0.793*	0.000	1.7
fraction of issuers covered by all-star analysts (%)	11,901	28.1			2,080	33.4			9,821	27.0			5.9
relative forecast accuracy	11,017	51.7	*10.5*	52.3	1,968	51.8	*10.7*	52.6	9,049	51.7	*10.4*	52.2	0.6
analyst's seniority (years in I/B/E/S database)	11,468	6.5	*4.8*	5.5	2,028	6.9	*4.8*	6.0	9,440	6.4	*4.8*	5.4	4.0
Panel B: Debt deals													
relative recommendation	58,785	0.052	*0.794*	0.000	4,427	0.199	*0.745*	0.000	54,358	0.040	*0.796*	0.000	12.8
relative upgrade	58,785	0.099	*0.820*	0.000	4,427	0.160	*0.809*	0.000	54,358	0.094	*0.821*	0.000	5.2
fraction of issuers covered by all-star analysts (%)	58,785	35.6			4,427	41.9			54,358	35.1			9.0
relative forecast accuracy	55,338	52.2	*9.1*	52.9	4,145	52.7	*8.6*	53.0	51,193	52.2	*9.1*	52.9	3.8
analyst's seniority (years in I/B/E/S database)	57,207	7.2	*4.9*	6.4	4,274	7.4	*4.9*	6.8	52,933	7.1	*4.9*	6.4	3.8

Table VI. Strategic Coverage Decisions.

We estimate the determinants of the coverage decision using probit MLE. This corresponds to equation (3). The coverage decision determines whether or not we observe the analyst's behavior in subsequent tables. Therefore, the estimation results in subsequent tables are conditioned on the coverage decision using the Heckman (1979) MLE framework, where the coverage decision and analyst behavior are jointly estimated. For the purpose of illustrating what determines coverage, this table shows the results of two stand-alone probits, for equity and debt deals respectively. The dependent variable is an indicator equal to one if the bank's analyst covers the issuer's stock at any point during the two years preceding the deal. Since commercial banks in our sample period are generally less likely to provide research coverage, we interact all explanatory variables with a dummy equaling one for commercial banks. This provides an estimate of the differential effect of each explanatory variable on the likelihood that a commercial bank (rather than an investment bank) covers the issuer's stock. The dummy for mergers is coded 1 in the quarter of the event, and ½, ⅓, and ¼ in the next three quarters. Banks that cover a larger fraction of an issuer's industry are more likely to cover the issuer as well. We control for this using the fraction of the issuing firm's Fama-French (1997) industry that is covered by bank *j* at time *t*. Intercepts and year effects are not shown. Standard errors are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively. The number of observations is 143,021 in the equity model and 260,274 in the debt model.

	Probit 1: Equity deals		Probit 2: Debt deals	
		× commercial bank dummy		× commercial bank dummy
Bank-issuer relationships				
bank's share of issuer's debt deals prior 5 years	0.360***	0.133	0.346***	0.181**
	0.058	*0.127*	*0.028*	*0.065*
bank's share of issuer's equity deals prior 5 years	1.729***	-0.308***	0.550***	-0.052
	0.035	*0.076*	*0.028*	*0.076*
bank's share of issuer's loans prior 5 years	0.449*	-0.058	0.664***	-0.100
	0.209	*0.228*	*0.161*	*0.169*
=1 if bank owns equity in issuer	0.531***	-0.092**	0.492***	-0.161***
	0.016	*0.031*	*0.008*	*0.018*
Bank characteristics				
bank's equity market share prior calendar year	0.375	6.495***	0.745***	9.814***
	0.248	*0.840*	*0.128*	*0.476*
bank's debt market share prior calendar year	-1.622***	-1.471**	0.999***	-1.636***
	0.264	*0.541*	*0.140*	*0.313*
bank's loan market share prior calendar year	-1.298	2.573*	-1.261*	-0.832
	0.990	*1.033*	*0.544*	*0.575*
dummy: bank involved in merger	0.162**	0.347***	0.585***	-0.352***
	0.053	*0.080*	*0.029*	*0.046*
fraction of issuer's Fama-French industry covered	3.067***	1.136***	3.694***	1.153***
	0.064	*0.132*	*0.030*	*0.068*
Issuer characteristics				
log $ deal size	0.209***	-0.045***	0.056***	0.035***
	0.006	*0.011*	*0.003*	*0.005*
log issuer's $ equity or debt proceeds prior 5 years	0.114***	-0.005	0.125***	-0.033***
	0.003	*0.006*	*0.002*	*0.003*
log time since IPO	0.437***	-0.154***	-0.068***	-0.072***
	0.011	*0.021*	*0.006*	*0.011*
=1 if domestic firm	0.341***	0.102	0.533***	-0.228***
	0.048	*0.065*	*0.024*	*0.036*
=1 if firm is not listed	-0.442***	-0.747**	-0.966***	-0.314***
	0.073	*0.265*	*0.018*	*0.047*
Diagnostics				
LR test: all coefficients = 0 (χ^2)	27,464***		91,941***	
Pseudo-R^2	33.5 %		33.1 %	

Table VII. Analyst Behavior.

The dependent variable is analyst behavior as measured by relative recommendations and relative upgrades. This is observed only when the bank covers the stock, so we estimate Heckman (1979) selection models using joint MLE. The results for the associated selection equation are illustrated in Table VI. The table reports estimation results in structural form. The reduced forms used to generate instruments for the models in Tables VIII and IX include also the exogenous variables from the lead-bank equation and are not shown. The relative upgrade models include a dummy equal to one if the previous recommendation was a strong buy; the coefficients, which are negative and significant, are not shown. The bubble dummy equals 1 for deals in 1999 and 2000. Analyst characteristics (relative forecast accuracy and seniority) are defined as in Table V. To proxy for the size of potential rewards for liquidating reputation capital, we calculate the percentage difference in market-wide proceeds raised during the current quarter and a five-year quarterly moving average. Results are robust to using shorter windows. Intercepts are not shown. Standard errors are shown in italics. We use ***, **, * and † to denote significance at the 0.1%, 1%, 5%, and 10% level (two-sided), respectively. The number of observations where the bank provides research coverage is 11,006 in the equity model and 55,320 in the debt model.

	Equity		Debt	
Relative…	recomm. (1)	upgrades (2)	recomm. (3)	upgrades (4)
Bank-issuer relationships				
bank's share of issuer's debt deals prior 5 years	0.165***	0.079†	0.267***	0.118***
	0.041	*0.043*	*0.022*	*0.021*
bank's share of issuer's equity deals prior 5 years	0.125***	-0.063*	0.121***	0.146***
	0.028	*0.030*	*0.020*	*0.019*
bank's share of issuer's loans prior 5 years	0.107	0.157†	0.616***	0.312***
	0.086	*0.090*	*0.057*	*0.056*
=1 if bank owns equity in issuer	0.088***	0.092***	0.089***	0.073***
	0.017	*0.018*	*0.008*	*0.008*
Bank and analyst characteristics				
bank's equity market share prior calendar year	-0.955***	-0.482*	-0.500***	-0.205†
	0.232	*0.244*	*0.109*	*0.106*
bank's debt market share prior calendar year	0.983***	0.445†	1.100***	0.401***
	0.242	*0.254*	*0.123*	*0.121*
bank's loan market share prior calendar year	0.067	0.345	1.245***	1.383***
	0.222	*0.233*	*0.141*	*0.138*
=1 if analyst is ranked "all-star" by *Institutional Investor*	-0.004	-0.068***	0.009	-0.048***
	0.018	*0.019*	*0.008*	*0.008*
… x bubble dummy	0.020	0.083**	0.007	0.082***
	0.029	*0.031*	*0.015*	*0.014*
change in issue activity relative to 5-yr moving average	-0.132***	-0.051	-0.003	0.024
	0.038	*0.040*	*0.020*	*0.019*
… x bank's market share	1.190*	1.087†	0.610*	0.576*
	0.556	*0.584*	*0.264*	*0.258*
relative forecast accuracy	0.002**	0.001	0.004***	0.002***
	0.001	*0.001*	*0.0004*	*0.0004*
log analyst's seniority (in years)	0.014	0.003	0.017***	0.018***
	0.010	*0.010*	*0.005*	*0.005*
Issuer characteristics				
log $ deal size	0.008	0.028***	-0.001	0.019***
	0.007	*0.007*	*0.002*	*0.002*
log issuer's $ equity or debt proceeds prior 5 years	0.005	0.010**	0.006***	0.015***
	0.003	*0.003*	*0.002*	*0.002*
Diagnostics				
Wald test: all coefficients = 0 (χ^2)	109.1***	1,445***	1,422***	8,895***
Heckman's λ (probability of non-coverage)	0.039*	0.025	0.071***	0.126***
Likelihood ratio test of independent equations (ρ=0) (χ^2)	4.0*	1.5	54.9**	166.7***

Table VIII. Lead Bank Choice, Equity Transactions.

We estimate the probability that a particular bank is chosen to lead-manage a particular equity deal using probit MLE with sample selection correction. The results for the associated selection equation are illustrated in Table VI. Specification 1 uses relative recommendations and Specification 2 uses relative upgrades to model analyst behavior. These are instrumented from the models estimated in Table VII and so treated as endogenous. Analyst behavior is observed only if the bank provides coverage, so we estimate the probability of winning a deal separately if the bank provides research coverage and if it does not. The dummies for mergers and staff arrivals/departures are coded 1 in the quarter of the event, and ½, ⅓, and ¼ in the next three quarters. Intercepts are not shown. Standard errors are shown in italics. Where necessary, they are based on the Murphy-Topel adjustment. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively. The columns headed 'Test' show the significance of Wald tests comparing the coefficients in the coverage and no-coverage cases. The number of covered and non-covered observations is 11,006 and 131,120, respectively.

	Coverage			Test	
	Spec. 1	Spec. 2	No coverage	rel. to Spec. 1	rel. to Spec. 2
Analyst behavior					
relative recommendations	-1.596				
	1.719				
relative upgrades		-0.184***			
		0.056			
Bank-issuer relationships					
bank's share of issuer's debt deals prior 5 years	0.860***	0.613***	1.224***	***	***
	0.241	*0.080*	*0.060*		
bank's share of issuer's equity deals prior 5 years	2.140***	1.933***	1.900***	***	
	0.097	*0.058*	*0.059*		
bank's share of issuer's loans prior 5 years	0.871***	0.711***	0.600***	**	
	0.276	*0.174*	*0.091*		
=1 if bank owns equity in issuer	0.192*	0.070	0.133***	*	*
	0.098	*0.051*	*0.025*		
dummy: bank involved in merger	-0.197	0.022	0.170***	***	**
	0.297	*0.097*	*0.048*		
dummy: equity staff have departed	-0.100	-0.124	-0.113*		
	0.124	*0.088*	*0.049*		
dummy: equity staff have arrived	-0.229	-0.130	0.132***	***	***
	0.171	*0.089*	*0.041*		
Bank and analyst characteristics					
=1 if analyst is ranked "all-star" by *Institutional Investor*	0.079	0.071*			
	0.053	*0.036*			
log analyst's seniority (in years)	0.073*	0.052*			
	0.034	*0.022*			
bank's equity market share prior calendar year	2.518	2.206***	2.210***		
	1.892	*0.488*	*0.245*		
bank's debt market share prior calendar year	0.781	0.692	0.309		
	1.660	*0.513*	*0.257*		
bank's loan market share prior calendar year	-0.917	-1.062*	-2.694***	***	***
	0.944	*0.521*	*0.254*		
Diagnostics					
Wald test: all coefficients = 0 (χ^2)	2,258***	2,347***	2,255***		
Correlation of coverage and lead-bank equations (ρ)	0.385***	0.418***	0.282***		
Likelihood ratio test of independent equations (ρ=0) (χ^2)	88.9***	116.4***	43.0***		

Table IX. Lead Bank Choice, Debt Transactions.

We estimate the probability that a particular bank is chosen to lead-manage a particular debt deal using probit MLE with sample selection correction. The results for the associated selection equation are illustrated in Table VI. Specification 1 uses relative recommendations and Specification 2 uses relative upgrades to model analyst behavior. These are instrumented from the models estimated in Table VII and so treated as endogenous. Analyst behavior is observed only if the bank provides coverage, so we estimate the probability of winning a deal separately if the bank provides research coverage and if it does not. The dummies for mergers and staff arrivals/departures are coded 1 in the quarter of the event, and ½, ⅓, and ¼ in the next three quarters. Intercepts are not shown. Standard errors are shown in italics. Where necessary, they are based on the Murphy-Topel adjustment. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively. The columns headed 'Test' show the significance of Wald tests comparing the coefficients in the coverage and no-coverage cases. The number of covered and non-covered observations is 55,320 and 201,489, respectively.

	Coverage			Test	
	Spec. 1	Spec. 2	No coverage	rel. to Spec. 1	rel. to Spec. 2
Analyst behavior					
relative recommendations	-0.554**				
	0.209				
relative upgrades		-0.042			
		0.028			
Bank-issuer relationships					
bank's share of issuer's debt deals prior 5 years	1.910***	1.762***	2.009***	**	***
	0.069	*0.038*	*0.032*		
bank's share of issuer's equity deals prior 5 years	0.599***	0.540***	0.473***	**	
	0.045	*0.037*	*0.046*		
bank's share of issuer's loans prior 5 years	1.652***	1.324***	1.158***	***	***
	0.168	*0.103*	*0.042*		
=1 if bank owns equity in issuer	0.008	-0.039	-0.190***	***	***
	0.031	*0.022*	*0.015*		
dummy: bank involved in merger	0.078	0.135**	0.032		**
	0.059	*0.052*	*0.036*		
dummy: debt staff have departed	-0.059	-0.023	-0.138***	**	***
	0.040	*0.036*	*0.027*		
dummy: debt staff have arrived	0.137***	0.117***	0.145***	***	***
	0.037	*0.035*	*0.027*		
Bank and analyst characteristics					
=1 if analyst is ranked "all-star" by *Institutional Investor*	-0.069***	-0.076***			
	0.021	*0.020*			
log analyst's seniority (in years)	0.049***	0.041**			
	0.014	*0.014*			
bank's equity market share prior calendar year	-0.999***	-0.810***	-1.738***	***	***
	0.269	*0.246*	*0.208*		
bank's debt market share prior calendar year	6.818***	6.217***	5.381***	***	***
	0.377	*0.286*	*0.201*		
bank's loan market share prior calendar year	1.422**	0.648*	2.903***	***	***
	0.486	*0.315*	*0.147*		
Diagnostics					
Wald test: all coefficients = 0 (χ^2)	4,854***	4,864***	8,930***		
Correlation of coverage and lead-bank equations (ρ)	0.122***	0.124***	0.058**		
Likelihood ratio test of independent equations (ρ=0) (χ^2)	24.6***	25.4***	6.1*		

Table X. Differences Over Time and Interaction Results.

As in Tables VIII and IX, we estimate the probability that a particular bank is chosen to lead-manage a particular deal using probit MLE with sample selection correction. In Panel A, we partition the sample into two periods, 1993-1997 and 1998-June 2002. To model analyst behavior, we instrument relative recommendations and relative upgrades from auxiliary models similar to those reported in Table VII, but estimated within each sub-period. To conserve space, we report only the coefficients and Murphy-Topel corrected standard errors for the instrumented analyst behavior variables. In Panel B, we use the entire 1993-June 2002 estimation sample as in Tables VII through IX, but interact the instrumented analyst behavior variables with a dummy equaling one for firms maintaining relatively weak underwriting relationships (see text for definition). In Panel C, we interact instead with a measure of the firm's "switching propensity" to see if analyst behavior has a larger impact on companies that are more prone to switching underwriters. We obtain a proxy for a firm's "switching propensity" from an auxiliary probit that estimates, deal-by-deal and separately for debt and equity deals, the likelihood that the firm chooses a different underwriter from the one that lead-managed its previous deal, as a function of the firm's maturity (log years since equity IPO), the weak-relationship dummy from Panel B, and the log size of the deal. For debt deals, we add a dummy equaling 1 if the deal involves high-yield bonds. We use ***, **, * and † to denote significance at the 0.1%, 1%, 5%, and 10% level (two-sided), respectively.

	Equity		Debt	
	Relative recommend-ations	Relative upgrades	Relative recommend-ations	Relative upgrades
Panel A: Sub-periods				
1993-1997	0.259	-0.118	-0.572*	-0.052
	0.747	*0.084*	*0.274*	*0.048*
1998-June 2002	-1.784	-0.172*	-0.322†	-0.044
	4.161	*0.070*	*0.187*	*0.038*
Panel B:				
Analyst behavior	-1.110	-0.248***	-0.467*	-0.008
	1.111	*0.065*	*0.208*	*0.032*
… x dummy (low relationship intensity)	-1.090*	0.256*	-0.328*	-0.178**
	0.556	*0.125*	*0.143*	*0.070*
Panel C:				
Analyst behavior	-0.373	-0.426**	0.428	0.321*
	0.614	*0.142*	*0.366*	*0.150*
… x switching propensity	-1.869***	0.443†	-1.839***	-0.703*
	0.584	*0.233*	*0.572*	*0.285*