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

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Abstract

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Abstract

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

JEL classification: G21, G24

1. Introduction

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 which their banks took public.

Notwithstanding this correlation, there is no systematic evidence that analyst behavior influenced their bank's likelihood of attracting an underwriting mandate. Moreover, 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.

We investigate directly whether analyst behavior influenced the likelihood of banks being awarded underwriting mandates for a sample of 16,456 U.S. debt and equity offerings sold between December 1993 and June 2002. Examining both debt and equity offerings while giving 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.

We find little evidence that analyst recommendation behavior influenced whether banks won *equity* mandates. In fact, aggressive recommendation behavior undermined banks' efforts to win equity mandates. This finding holds for both the early and latter parts of the sample period. 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.[1] Examining the determinants of analyst recommendation behavior, we find evidence that more reputable analysts and banks were associated with less aggressively optimistic recommendations. We interpret these findings as a reflection of the prominent role of reputation in certifying quality for equity offerings (Chemmanur and Fulghieri (1994)).

Frictions associated with asymmetric information are less severe for debt offerings. 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. Less severe informational friction may also pose a weaker barrier to entry for potential competitors, a point that is borne out by the fact that commercial banks entered the securities underwriting business (and had their greatest competitive impact) in the debt markets.[2] Consistent with this line of reasoning, we find some evidence that analyst behavior favorably influenced banks' chances of winning debt mandates but only during the post-1997 period. Past underwriting relationships remain a strong influence on the issuer's choice of bank but it appears that at least some banks were willing to provide aggressively optimistic recommendations in the hope of gaining competitive advantage in the debt markets.

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 term and we

[1] 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)).

[2] 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 (2002) find little evidence that commercial banks and investment banks differed in their underwriting performance.

contend it is therefore not likely to characterize long-term equilibrium in the industry.

Our analysis is complicated by several factors. First, a favorable research report, though surely of value to a potential issuer, 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 find evidence 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). More recently, Hong and Kubik (2002) and Hong et al. (2000) provide evidence of career concerns in analyst forecast behavior. 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 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. In the following section we develop this structural econometric model and then outline the data we have gathered to enable its estimation.

2. The Empirical Model[3]

2.1 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

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

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 provides a relatively bullish recommendation for the issuer's stock, or has recently upgraded the issuer's stock more aggressively than have other banks. We control for the reputation of the bank's analyst, the bank's research reputation, its broader reputation within the debt and equity markets, 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.

Investment bankers are alleged to have pressured analysts to provide more favorable recommendations for potential issuers. However, research is an experience good so analysts have incentive to build and 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 problem by obtaining an instrumental variable for analyst behavior from the following model:

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

where $\mathbf{X}_A$ is a matrix of explanatory variables that control for analyst reputation, bank reputation, time-variation in the size of the potential pool of "side payments" bankers might use to gain analyst cooperation, and the strength of the bank's relationship with the issuer. We envision the pool of potential side payments increasing with deal flow.

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 therefore model the coverage decision explicitly as follows:

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

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 for research and its broader 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.

2.2 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 expressed as follows:

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:

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

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 $y_L^* \le 0$. 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

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

y_A is a continuous, observed variable measuring analyst behavior, $\mathbf{X}_k$ ($k = L, A, C$) are the aforementioned matrices of explanatory variables, and u_k ($k = L, A, C, LL$) are error terms whose distributions are described shortly.

Note that while 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_{LL} to be equal. This enables us to test the hypothesis that in the absence of coverage and thus of strategic analyst behavior, prior relationships have a significantly stronger effect on the lead-bank hiring decision.

2.3 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, 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.[4] To ensure that the first-step estimates are consistent, we need to account for truncation. It is well-known (Heckman (1979)) 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).

In step 2, we estimate the determinants of a given bank winning a given underwriting mandate, replacing the analyst behavior variable y_A with the predicted values $\hat{y}_A$ from step 1. Again, we have to account for truncation, so we adjust the probit likelihood function for the sample selection bias, $E(u_L \mid y_C = 1) \neq 0$ (see Van de Ven and Van Pragg (1981) for the derivation of the likelihood function). As long as our 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), which is 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, $y_A = 0$. In this case we simply estimate a single-equation probit model, again corrected for truncation since $E(u_{LL} \mid y_C = 0) \neq 0$.

Finally, note that the unit of observation is a securities transaction. We estimate the probability that a given bank wins the lead underwriter mandate for a transaction by conditioning on information for both the winning bank and the banks that unsuccessfully competed for the mandate. Thus, for each transaction,

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[4] In principle, one could argue for simultaneity in the determination of y_L^* and y_A on the grounds that the analyst's expectation of the likelihood of her bank winning the mandate might influence her willingness to jeopardize her reputation by aggressively upgrading the issuer's stock recommendation. Empirically, we find a negative relation between y_A and $E(y_L^*)$ but the relation is not statistically significant.

we construct a data panel containing both winning and non-winning banks. Estimation of equations (4)-(6) thus involves a data matrix containing a row vector of explanatory variables for the winning bank and one for each potential competitor for the deal's underwriting mandate. To keep the estimation sample to a manageable size, we restrict the sample of non-winning banks to those that were "active" at time *t* as defined in the next section.

3. Data

3.1 The Sample of Securities Offerings and Underwriters

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 deals range from IPOs to issues by seasoned firms, and include both public and private issues and issuing firms. We use this set of transactions to generate a variety of variables, including prior relationships between issuers and banks. The distribution of different types of offerings is reported in Table 1. 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 Lenfest Communications Inc, Vanguard Cellular Systems Inc, Lucent Technologies Inc, NCR UK Group Ltd, Teligent Inc, AT&T Wireless, 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 whether it had a relationship with any firm in 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.

Among the 36,173 sample transactions, 6,904 were the sole transaction carried out by a unique parent firm during the 1988-2002Q2 sample period. Parent firms carrying out more than twenty (and up to a

maximum of 313) transactions during the sample period accounted for 9,211 sample transactions with a mean of 70.3 transactions during the sample period or about 6 per year. The issuance frequency of these firms is greater than the issuance frequency reported by Eccles and Crane (1988) for the 186 most-active firms during their 1984-1986 sample period.

I/B/E/S data on analyst recommendations is available only from late 1993, so the estimation period for the econometric model includes a sub-sample of deals carried out between December 1, 1993 and June 30, 2002. We exclude a) any issuer or family of issuers which did not hire one of our sample banks (see below) for a capital raising transaction between 1988 and June 2002; and b) purely-foreign issuers or families of issuers (we do include corporate families that have at least one U.S. member). This leaves an estimation-period sample of 16,456 transactions, shown in the final two columns of Table 1, involving 6,711 unique firms and 5,368 unique corporate families.

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 generating two transaction histories for each deal in the estimation period. The first measures the frequency and size of the issuer's past capital market transactions. The second measures the state of the issuer's relationship with sample banks based on each bank's share of the issuer's past debt and equity offerings.

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 co-lead) underwriters as measured by the nominal proceeds from deals completed during the 2000-2002 period.[5] 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

[5] Our bank sample excludes Bank One, whose deal activity places it above some of our sample banks. However, Bank One does not have equity analysts.

competitors for a deal prior to their joining forces with one of the final 16. Thus, from the perspective of 1988, there were 37 independent sample banks in potential competition for each deal.

Table 2 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 $318 billion in total capital underwritten assigned to JP Morgan Chase reflects the sum of underwriting mandates granted to JP Morgan, Chase, Chemical Bank, and Hambrecht & Quist during the sample period. The top five underwriters (Credit Suisse First Boston, Goldman, 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% of the dollar amount of capital raised during the sample period. The dominant positions of these five banks extended to the individual debt and equity categories, with some evidence of specialization among banks. Salomon, for example, was the dominant debt underwriter (at 14% of the market) with Merrill Lynch running close behind (13.5%). In the equity markets, Goldman Sachs (at 17.5% of the market) held a 3.5 percentage point lead over CSFB, its closest competitor.

Together, the 16 sample banks and their predecessors underwrote $1,174 billion in equity and $2,499 billion in debt (in nominal terms) over the sample period – more than 90% of underwriting activity in either market. Their annual market share fell below 90% only twice (77% in 1988 and 81% in 1989). Excluding banks other than our final 16 and their predecessors results in little loss of data but significant economies in coding banking relationships and in the probability model estimation.

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.[6] Figure 1 documents the dates when sample commercial banks received such

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

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, 23.3 banks competed for a given deal.

3.2 Prior Investment-Banking Relationships

Our main proxy for the strength of an issuer's relationship with a particular bank focuses on a bank's share of the client's previous mandates. This is coded as follows. For a 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* years, where *T*=1…5, and divide by the total raised by the firm to reduce the impact of differences in scale across firms. This measure ranges from zero 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 underwriting mandate at time *t*.

In the simplest cases, such as Goldman Sachs, the implementation of the algorithm is straightforward. Cases involving one or more acquisitions are more complicated. Bank of America, easily the most complicated in the sample, illustrates the complexities involved. Bank of America was treated as eligible to underwrite private debt and equity offers throughout the sample period and eligible to underwrite public debt and equity offers (through BA Securities) after October 11, 1994 (see Figure 1). In October 1997, Bank of America 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 Bank of America 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 Bank of America's merging with NationsBanc. From this point forward, the mandate history of Robertson Stephens, including those received while owned by Bank of America, belongs to BankBoston (and then Fleet). But we also assume that the probability of Bank of America 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.

Bank of America merged with NationsBanc in September 1998. In June 1997 NationsBanc acquired Montgomery Securities. Thus in addition to "inheriting'' relationships in our coding of the data via its short-lived ownership of Robertson Stephens, Bank of America inherited relationships from Montgomery Securities and NationsBanc at the time of the merger.

Shortly after the merger was consummated, Montgomery's founder, Thomas Weisel, resigned (on September 21, 1998) from Montgomery, founded Thomas Weisel Partners and subsequently raided a large fraction of Montgomery's banking professionals. By the end of the first quarter of 1999, 20% of the Montgomery investment banking team had defected to Weisel Partners and Montgomery defections accounted for about half of Weisel's 217 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 Bank of America.

Table 3 provides summary statistics for our relationship proxy at the maximum 5-year time horizon. In light of evidence of specialization in Table 2, we report summary statistics separately for debt and equity transactions. We also cut the data 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 42.9% of the issuer's equity proceeds raised during the prior five years. The strength of the banking relationship appeared less important among debt offering as evidenced by the 26% share of debt proceeds underwritten by the winner of an issuer's debt offering. 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.

Compared to estimates of banking relationships from earlier periods, we find a marked decline of exclusive relationships. The more active firms in our sample (corporate families carrying out more than twenty transactions during the sample period) spread their transactions across 12.8 different lead underwriters on average (median=12). By contrast, during the 1981-1985 period, Baker (1990)

reports that all but 9 firms in a sample of 1,530 granted more than 50% of their business to their top three banks and on average 68% of business was allocated to a single bank. Eccles and Crane (1988) report an average of 6.6 different lead managers used by the106 most-active issuers during their 1984-1986 sample period. About 56% of the 500 most-active firms used one bank to lead over 50% of their deals while simultaneously allocating no more than 25% of their business to any other single bank.

3.3 "Pay to Play"

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-subsidized deposit-gathering capacity 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.[7]

We cannot document precisely the extent of banks "paying to play" but it is virtually certain that commercial banks' larger balance sheets provided greater capacity for sweetening bids for underwriting mandates by including a lending facility. Thus the underwriting mandate model treats commercial banks and investment banks separately under the hypothesis that commercial banks maintained an inherent competitive advantage, *other things equal*. The summary statistics in Table 3 reveal the well-known fact that commercial banks were more successful across the entire sample period in the debt markets.

As an additional proxy, we compute each bank's share of the corporate loan market in the calendar year before the deal in question. The loan data are derived from DealScan's database of commercial loans, excluding non-U.S. borrowers and firms in SIC codes 6000-6999 (financial institutions etc) and 9000-

[7] The "pay-to-play" movement gained visibility in the summer of 2000 when Ford informed several investment banks that it would exclude them from underwriting its future bond offerings unless they committed credit lines to the firm. Several banks capitulated but Goldman Sachs, which took Ford public in 1956, refused Ford's demand. In spite of their refusal, Goldman was included in subsequent debt offerings. However, as Goldman persisted in refusing such overtures, the firm was excluded from several high profile deals including Kraft's spring 2001 IPO. In many instances, investment banks responded by more aggressively pursuing syndicated lending opportunities as well.

9999 (government agencies etc). To compute market shares, we identify for each loan all banks involved in a *senior* capacity (as classified by DealScan) and credit each with an equal share of the loan amount. Descriptive statistics are reported in Table 3. Whether or not they provided coverage, large lenders more often lost out in the competition for equity deals while successfully competing for debt mandates.

3.4 Bank Reputation, Equity Stakes in Issuers, and Key-Banker Movements

The sample period witnessed a high frequency of bank consolidation and associated disruptions, an increasing frequency of banks holding equity stakes in potential issuers, and a generally high level of mobility among bankers in whom relationships often are embodied. Thus we complement the bank-issuer relationship measure described in the previous section with measures of bank market share, equity stakes in issuing firms, and key-banker movements designed to reflect information not captured by an issuer's history of mandates granted to a particular bank.

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 3, 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.

The market share reputation proxy is complemented by the bank's overall ranking for research quality provided for the calendar year preceding the transaction in question by the *Institutional Investor*. *Institutional Investor* bases these rankings on the number of a bank's analysts or teams that are rated "all-star" in the annual survey. Winning banks have consistently more "all-star" analysts, whether or not the issuer's stock is covered. On average, banks that win underwriting mandates also provide somewhat broader research coverage for the issuer's industry, measured as the fraction of firms in the issuer's Fama-French (1997) industry grouping the bank currently covers.

Ljungqvist and Wilhelm (2002) document a sharp rise from 18.2% in 1996 to 44% in 2000 in the

frequency of banks having 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.[8] Table 3 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 movement should influence the probability of receiving a mandate faced by both the firm they join and the one from which they defected.[9]

We control for this effect by tracking the movement of key bankers or teams of bankers during each quarter in the estimation period. 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 over the period of 1990-2002Q2 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

[8] The Spectrum 13f data of institutional holdings are filed with the SEC on a quarterly basis by money managers. The 13f data are aggregated from individual funds to the manager level. We match manager names to our sample banks using where necessary *Nelson's Directory of Investment Managers*. We thank Edie Hotchkiss for help in performing the match.

[9] 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.

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 responsibilities fell outside North America. This search yielded a sample of 169 records.[10]

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 joining competitors for a fixed period. In such cases, our coding procedure would not detect what may be a substantial reordering of banking relationships. To further control for this possibility, we code whether the bank was involved in a merger during the quarter in which the sample deal took place.

3.5 Analyst Behavior

We measure analyst behavior using data from the I/B/E/S "recommendations" database.[11] I/B/E/S tracks analyst recommendations from late October 1993, covering roughly 10,000 firms, 8,000 analysts, and 500 banks. We match sample firms to I/B/E/S using either CUSIPs or ticker symbols, and allow the match to be at the level of the sample firm or its corporate parent. We can match 3,570 of the 6,711 sample companies and 2,644 of the 5,368 unique corporate families to firms covered in I/B/E/S. This does not, however, mean that a sample bank provides coverage prior to their respective deals. At the

[10] A number of records involve a defection from one sample bank to another. Thus the number of independent records is much smaller. As one might expect, there is considerable clustering in banker defections. Clustering generally occurred for one of 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.

[11] Lin and McNichols (1998), Michaely and Womack (1999), and Bradley, Jordan, and Ritter (2003) report that analyst recommendations are more optimistic toward firms with which their banks have underwriting relationships. There is a larger body of research documenting positive biases in earnings forecasts (see Brown, Foster, and Noreen (1985), Stickel (1990), Abarbanell (1991), Dreman and Barry (1995), Chopra (1998)). Hong and Kubik (2003) establish a link between earnings optimism, earnings accuracy, and career outcomes. However, Lin and McNichols (1998, p. 103) suggest "studies focusing solely on near-term earnings forecasts cannot resolve the question of whether concern for reputation is sufficient to offset pressures from investment banking relationships."

transaction level, 10,998 of the 16,456 deals involve issuers that are covered by at least one sample bank prior to the deal. Issuers that do not show up in I/B/E/S at all around their deal dates are treated as not being covered by any of our sample banks.

Table 4 provides descriptive statistics for the deals and issuing firms, broken down by coverage versus non-coverage. As one might expect, for both equity and debt deals, firms receiving research coverage by our sample banks are significantly larger (as measured by deal size), have stronger relationships with the bank (as evidenced by the bank's share of their past debt and equity transactions), are more mature (as evidenced by the time from initial public offering), and are more frequently listed.

I/B/E/S codes recommendations from 1 (strong buy) to 5 (sell).[12] We reverse this order so that a larger number indicates a more positive recommendation. New 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 and its analyst will not necessarily correspond in time with the most recent recommendation from a competing bank. We resolve this time-matching problem by requiring that the most recent estimate for a given firm issuing debt or equity be no earlier than 730 days (two years) prior to the transaction date. This window balances concerns that recommendations associated with sample banks assumed to be competing for a given underwriting mandate are relatively close in time with concerns that a narrow window potentially eliminates relevant forecasts. On average, recommendations associated with a particular securities offering were recorded 270 days before the transaction date, with a median of 220 days and a standard deviation of 200 days.[13]

We use the I/B/E/S recommendations to construct two proxies for relative optimism. The first measures 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 transaction. By construction, relative recommendations lie between –4 and + 4.

[12] In our data, 25% of recommendations are strong buys, 36% are buys, 37% are holds, and only 1.4% and 0.6% are underperform or sell recommendations, respectively.

[13] All our 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.

Positive (negative) values correspond to relatively optimistic (pessimistic) recommendations.[14]

Prior literature suggests that analysts issue relatively bullish recommendations following equity offerings underwritten by their employers (Michaely and Womack (1999)), so we expect relative recommendations and banking relationships to be mutually reinforcing. Holding existing relationships constant, we might expect issuers to reward banks whose analysts make relatively positive recommendations with underwriting business, while punishing those with more negative views.

Recent allegations (such as those arising from the Congressional investigation of Salomon Smith Barney's pursuit of AT&T Wireless's IPO in 2000) have centered not on the level of recommendations but on analysts aggressively upgrading their stock recommendations prior to an underwriting mandate being awarded. We examine these allegations by constructing a second measure focusing on relative recommendation *upgrades*. For each bank with at least two recommendations for firm *i*, we calculate the change between the two most recent recommendations prior to a deal. If the analyst does not issue a new recommendation in the 275 days (nine months) before the deal, we assume the prior recommendation still stands, implying a zero upgrade. (We verify that absence of new recommendations is unrelated to coverage being dropped.) The *relative upgrade* is then defined as a bank's recommendation change for firm *i* less the median change of other sample banks. Like the relative recommendation measure, relative upgrades lie between –4 and +4, with positive values representing relatively aggressive upgrades.[15]

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".

[14] Occasionally, a bank has multiple analysts covering a given firm, so we calculate the average recommendation. (The mean number of analysts per bank making recommendations prior to a given deal is 1.08).

[15] Our results are unaffected if we instead subtract the *mean* recommendation or upgrade of sample banks, if we define the peer group to include all banks (rather than sample banks), or if we define relative recommendations and upgrades as dummies equal to one if the sample bank is relatively more aggressive (positive values) than its peers.

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 recommendation was already a "strong buy", so that a further upgrade would have been impossible. 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 5 shows that by either measure, analysts at winning banks were significantly more aggressive in their recommendations prior to both equity and 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.

Table 5 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 which we match to I/B/E/S 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 among the top four analysts in her industry) in the most recent poll preceding the deal.[16] Among equity (debt) deals, 37.2% (43.3%) of winning banks have an all-star analyst covering the issuer versus only 28.8% (37.2%) 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). Absolute forecast errors are sorted by size, and the "best" (most accurate) analyst is assigned a rank of 1, the second best a rank of 2, and so forth.[17] To address possible biases in rank due to variation across firms in the number $N_{i,t}$ of analysts providing coverage, the

[16] In cases where the analyst is ranked in more than one industry, we assign the highest ranking.
[17] In the even of ties, we proceed as follows. If, for example, the fourth and fifth rated analysts had the same forecast error, each receives the fourth ranking and the next analyst is ranked sixth.

analyst's rank is then scaled as follows:

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

With this formulation, 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 5 reveals relative forecast accuracy to average around 50. Its distribution is similar to that in Hong and Kubik.

Finally, we measure the analyst's seniority as the number of years in which she appears in the I/B/E/S database. Hong, Kubik, and Solomon (2000) find that analysts are less bold early in their careers and more likely to exit the profession following inaccurate or relatively bold forecasts. For both equity and debt deals, analysts at winning banks are more senior and, as shown previously, more aggressive.

4. Estimation Results

Estimation results are reported in three steps. In Section 4.1, we provide a summary of the results from estimating the switching criterion given in (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 4.2 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 predicted values for the measures 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 4.3. Throughout, we split the sample into equity and debt transactions. Later, we report results for the 1993-1997 and 1998-2002 separately, under a hypothesized regime shift associated with the "dot-com bubble" and the de facto demise of the Glass-Steagall Act associated with Citicorp's 1998 acquisition of Salomon Smith Barney.

4.1 Stage 1: The Bank Coverage Model

The bank coverage model (6) is estimated separately for equity and debt deals and interacts each explanatory variable with a dummy variable equal to 1 for commercial banks. In the interest of brevity we do not report detailed results from this stage of estimation.[18]

For both debt and equity deals, bank *j*'s shares of issuer *i*'s equity proceeds and debt proceeds raised during the prior five years are positively related to the bank's probability of providing analyst coverage for the firm at time *t*. The interaction terms indicate that the effect is significantly stronger among commercial banks. Similarly, banks with equity stakes in issuing firms are more likely to provide analyst coverage for both equity and debt issuers, though the effect is significantly weaker among commercial banks. These results are consistent with the natural interpretation that the likelihood of analyst coverage is a direct function of the strength of a firm's banking relationship. In both the equity and debt samples, banks were more likely to cover an issuer when they provided relatively broad coverage for the issuer's Fama-French industry. Presumably the incremental cost of covering an issuer is smaller when the bank already has an analyst in place covering the industry. The effect is significantly weaker among commercial banks for equity transactions and stronger for debt transactions.

Among issuer characteristics, the evidence for both equity and debt deals supports the hypothesis that the issuer's fee-generation 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) increases the likelihood of coverage. Size apart, coverage is more likely (for both debt and equity transactions) as the issuer matures beyond its initial public offering of equity, among U.S. firms, and for exchange-listed firms.

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

[18] Ljungqvist, Marston, and Wilhelm (2003) study the linkage between investment-banking relationships and research coverage and provide a detailed analysis of the bank coverage model used here. In general, the explanatory power is quite high in both the equity and debt samples, with pseudo R^2 in excess of 35%.

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.

4.2 The Analyst Behavior Models

The primary purpose of the analyst behavior models is to generate instruments for use in the lead bank probability model, so we confine our discussion to the most noteworthy findings. Table 6 presents estimation results for the analyst behavior model in structural form, for each of the two proxies for analyst behavior. (The reduced forms used to generate the instruments include also the exogenous variables from the lead-bank equation and are not shown.) The models are estimated separately for debt and equity deals. The coefficients almost always have the same signs in the two samples, though there are differences in magnitude and significance. The relative upgrade specifications include a dummy equaling one if the last-but-one recommendation was already a "strong buy", ruling out a further upgrade (not shown).

Consistent with prior evidence regarding IPO underwriters, we find that analysts are relatively more aggressive when their bank has a strong relationship with the issuer. Specifically, relative recommendations and relative upgrades are more aggressive, the greater the bank's shares of the issuer's past debt and equity proceeds and among banks with equity stakes in the issuing firm. The effects are present in both equity and debt transactions and generally highly significant.[19]

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

[19] 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 make more aggressive relative recommendations for firms with which they already have strong relationships begs for further consideration. If institutional investors do not take such upgrades 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 econometric modeling to incorporate the relationship between banks and institutional investors.

recommendations, especially for the debt sample. In reconciling these apparently conflicting effects, it is useful to recall that equity transactions 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 capital market would be less inclined to liquidate reputation capital via overly aggressive recommendations. Indeed, the more reputable banks (as measured by their overall *Institutional Investor* rank) were associated with significantly less aggressive recommendations ahead of debt deals. On the other hand, during the estimation period, commercial banks gained considerable 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.[20] 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.

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 both debt and equity deals, the coefficients associated with the bank's shares of the issuer's past debt and equity proceeds and with bank stakes are significantly smaller than in the relative recommendations specification.

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 attenuated during the 1999-2000 period usually associated with the "dot-com bubble" during which the

[20] Merrill Lynch, Goldman Sachs, and Morgan Stanley were the top three debt underwriters between 1992 and 1998 (except in 1996, when Salomon Brothers and CSFB displaced Morgan Stanley). During this period, their market share varied between 39% (1994) and 44% (1998). Among our sample commercial banks, debt market share grew from less than 10% in 1992 to 39% in 1998. By 2001, Citicorp (Salomon Smith Barney) and JP Morgan Chase took over the top two slots.

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 market share (computed separately for debt and equity deals). As market-wide issuance activity increases, analysts upgrade stocks more aggressively when their bank is more likely to capture a large share ($p<0.001$). Similarly, large deals attract more aggressive upgrades, consistent with analysts trading off reputational concerns and the bank's ability to generate fee income. Among debt transactions, recommendations are more aggressive for the less active issuers. We conjecture that this reflects more aggressive competition for less active issuers under the assumption that more active issuers had stronger banking relationships in place.

Finally, more accurate forecasting ability is associated with more aggressive behavior in each debt specification, with much weaker evidence in the equity specifications. 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.

Instrument Validity

To ensure our empirical models are identified, the first-step (analyst behavior) equations include a set of six instruments that are excluded from the second-step (lead bank) probits, namely relative forecast accuracy, analyst seniority, 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. We first 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 the case for three of the four analyst behavior models, with *p*-values of 0.1% or better. 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 is low ($p=0.076$). They are thus "weak" instruments in the sense of Staiger and Stock (1997). 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.

4.3 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 7 summarizes the results from estimating the underwriting mandate model for equity transactions. There are two specifications in the table, one for each measure of analyst behavior. Within each specification, we report two systems corresponding to cases where the bank in question provided research coverage (system (4) in Section 2) and cases where it did not (system (5)).

The first striking result is that among equity transactions, relative upgrades *reduce* the likelihood that the bank will win the deal ($p<0.001$). This finding runs counter to the spirit of previous research and the arguments embodied in recent allegations.[21] 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 relative recommendation measure, on the other hand, carries the expected positive coefficient but the effect is not statistically significant. Recall however that our instruments for this specification are weak, so the two-step estimator may not 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

[21] 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 ($p<0.0001$).

effect aggressive recommendations have on a bank's likelihood of winning an equity mandate.

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 debt and equity raised during the preceding five years, has a strong, direct effect on the likelihood of the bank winning the issuer's current underwriting mandate. Judging from the magnitude of the coefficients, relationships derived from prior equity deals influence the choice of equity underwriter more than those based on prior debt deals. 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. Whether a bank holds an equity stake in the issuer provides further evidence favoring this interpretation. Among banks providing research coverage for the issuer, equity ownership does not have a significant marginal impact on the bank's likelihood of winning the issuer's mandate. By contrast, in the absence of research coverage, an ownership stake, which we interpret as strengthening the bank-issuer relationship, increases the bank's likelihood of winning.

The coefficients associated with bank and analyst research reputation provide further evidence that issuers value research capability in equity offerings. In the absence of direct coverage of the issuer prior to an equity deal, the bank's overall *Institutional Investor* ranking has a positive effect on its likelihood of winning the mandate. When coverage is provided, the marginal effect of a strong, broad research reputation remains positive but is significantly weaker. What matters more in these cases is having an all-star analyst providing research coverage for the issuing firm, which 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 is associated with a lower likelihood of winning the issuer's mandate when the bank's analysts do not cover the

issuer's stock. Once again, we interpret this as evidence of a degree of bank specialization in either debt or equity and consistent with the increasing role of commercial banks (which provided limited research coverage during much of the estimation period) in the debt markets.

Notwithstanding repeated allegations that commercial banks attempted to tie lending capacity to securities underwriting, we find no evidence that a bank's loan market share during the preceding year influenced the likelihood of winning an equity mandate. In fact, in the absence of coverage, commercial banks were less likely on the margin to win equity underwriting mandates. Taken together, these results suggest that any leverage commercial banks may have gained via their larger balance sheets had little influence on the equity markets, at least from the perspective of the entire estimation period.

Finally, we find little evidence that movements of key bankers influence the likelihood of winning an equity mandate.[22] On the other hand, banks involved in mergers during the quarter preceding an issuer's transaction are more likely to win mandates, perhaps because banks acquire the target's relationships in a merger. The effect is strongest in the absence of coverage, maybe because issuers expect the merger to result in broader research coverage (including the issuer).

Debt Transactions

Table 8 reveals that just as in the equity case, more aggressive recommendations and recommendation upgrades significantly *decreased* the likelihood of winning debt-underwriting mandates ($p<0.001$ and $p=0.068$, respectively). The main difference from the equity results rests with the effects of our proxy for a bank's lending capacity. Here we find that a larger share of the corporate loan market increased a bank's probability of winning debt-underwriting mandates ($p<0.001$), 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

[22] It is worth emphasizing again that we believe that our coding of equity bankers is less precise than for debt bankers. The result might also reflect greater specialization among equity bankers of the sort associated with Frank Quattrone's efforts at Deutsche Bank and then CSFB. In this specific case, it is clear that movement of a key banker and his team had a dramatic influence on each bank's market share of technology IPOs. It is less clear that Quattrone's move influenced either bank's likelihood of winning mandates outside of his area of expertise.

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.

As in the equity sample, prior relationships play a strong and important role in determining issuers' choices of debt underwriters. This is true for both prior debt and equity deals, though consistent with specialization and mirroring the results for the equity sample, relationships derived from having underwritten an issuer's prior offerings of like securities are most effective. 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 in either debt or equity. Banks with larger debt market share were more likely to win subsequent debt mandates. This result reveals an effect similar to the direct effect of equity market share on the likelihood of winning subsequent equity mandates. However, it is noteworthy that the magnitude of the effect in debt markets is substantially larger. By contrast, banks with larger equity market shares were less likely to win debt-underwriting mandates, other things equal.

Unlike in the equity sample, owning an equity stake in the issuing firm has little effect on the likelihood of winning debt mandates when the bank provides coverage, and a negative effect if it does not. Commercial banks and non-bulge-bracket investment banks account for the bulk of the cases where no research coverage is provided and 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, as noted previously. The negative coefficient for the commercial-bank dummy variable suggests that any remaining factors associated

with commercial banks for which we have not controlled only weakened their competitive stance.[23]

A bank's overall *Institutional Investor* research ranking increases its likelihood of winning a mandate, with a somewhat larger effect if it provides coverage for the issuer's stock. However, having an all-star analyst covering the issuer's stock does not influence whether the analyst's bank is awarded the debt-underwriting mandate. Similar to the equity case, the positive and significant coefficient estimated for the merger dummy variable in the absence of coverage might suggest an expectation of broader research coverage ultimately favoring the issuer. Movements of key professionals, which to some extent coincide with mergers, have the expected effect: the bank's chances of winning the mandate are lower if it has recently lost key members of its debt team and higher if it has poached debt professionals from other banks. This suggests that deals follow people to some extent.

Differences Across Time

Table 9 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 now suppress all but the analyst-behavior variables. 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.

The results across the two sub-periods for the equity sample are remarkably stable. There is no evidence that analyst behavior positively influenced the likelihood of winning an equity-underwriting mandate, even in the post-1997 period. On the contrary: banks whose analysts upgraded issuers' stocks more aggressively were less likely to win mandates in either period, with a larger (more negative) effect

[23] It is noteworthy on this count that when the bank loan market share variable is excluded, the commercial bank dummy coefficient is positive and statistically significant under each model specification.

post-1997. 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 change over time for the equity sample concerns the increasing importance of a highly-rated analyst and a strong overall research reputation. In fact, neither measure of reputation significantly influenced the likelihood of winning equity mandates in the pre-1998 period.

The picture is somewhat different for debt deals. The relative recommendation specification reveals a significant *positive* effect on the likelihood of winning a debt-underwriting mandate during the post-1997 period ($p<0.001$). Similarly, the relative upgrade specification no longer suggests that aggressive upgrades undermined a bank's efforts to attract debt mandates. There are two additional significant differences across the two time periods. In contrast to the equity model, the presence of an all-star analyst *reduced* the likelihood of winning debt mandates during the post-1997 period. Second, 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.

5. Conclusion

We examine 16,456 U.S. debt and equity offerings sold between December 1993 and June 2002 for evidence that research analyst behavior influenced the issuer's choice of bank to underwrite its offering. This is precisely the motivation suggested by recent allegations that analysts succumbed to pressure from investment bankers. Our findings provide at best modest support for this argument but, more importantly, they draw attention to the complexity of the situation and some unique features of the sample period.

In the equity markets, we find no evidence that banks gained competitive advantage via aggressive recommendation behavior among their analysts. In fact, aggressive recommendation upgrades undermined the analyst's bank's chances of winning equity mandates. In general, the state of bank-issuer relationships and the bank's and analyst's reputations had far more influence over the outcome of

competition for equity mandates. This is consistent with the notion that equity transactions are subject to significant information frictions that are best resolved by a credible intermediary.

We find some evidence that aggressive recommendations helped to attract debt-underwriting mandates but only during the post-1997 period. Prior to 1998, commercial banks won substantial market share at the expense of non-bulge bracket investment banks regardless of their willingness to liquidate reputation capital via aggressive recommendation behavior. The debt markets were a natural point of entry for commercial banks because the primary entry barriers, bank reputation and relationships, are less central to effective representation of debt issuers. Moreover, commercial banks had considerably larger lending capacity and appear to have used this effectively in competition for debt underwriting mandates. In the post-1997 period, as commercial banks increasingly challenged even the top investment banks for market share, there may have been some return from investment banks temporarily following a strategy of liquidating reputation capital.

The conflict of interest between investment banking and research is longstanding and yet only recently has it come under heavy criticism. In light of calls for heavier regulation or even separation of research from investment banking, it is important to note that our econometric model embodies both the market forces that moderate the conflict and more recent, inflammatory factors. 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. Building and preserving reputation capital served banks well in competition for equity mandates, in particular. There is some evidence that competition for the massive fee pool available in the late 1990s overwhelmed the moderating effect of reputational concerns and may even have served the interests of banks seeking debt mandates.

But even with an unusually large fee pool at stake, banks should not grossly misrepresent their beliefs about issuers (and thereby liquidate reputation capital) unless they expect misrepresentations to favorably influence investor behavior. Again, the late 1990s were unusual for witnessing a temporarily high level of participation among, presumably less sophisticated, retail investors.

Success in securities underwriting has long depended heavily on reputation and the strength of the bank's relationship with a potential issuer. Unless there is reason to believe that the fundamentals of securities underwriting have changed, we contend that preservation rather than liquidation of reputation capital is more characteristic of equilibrium behavior.

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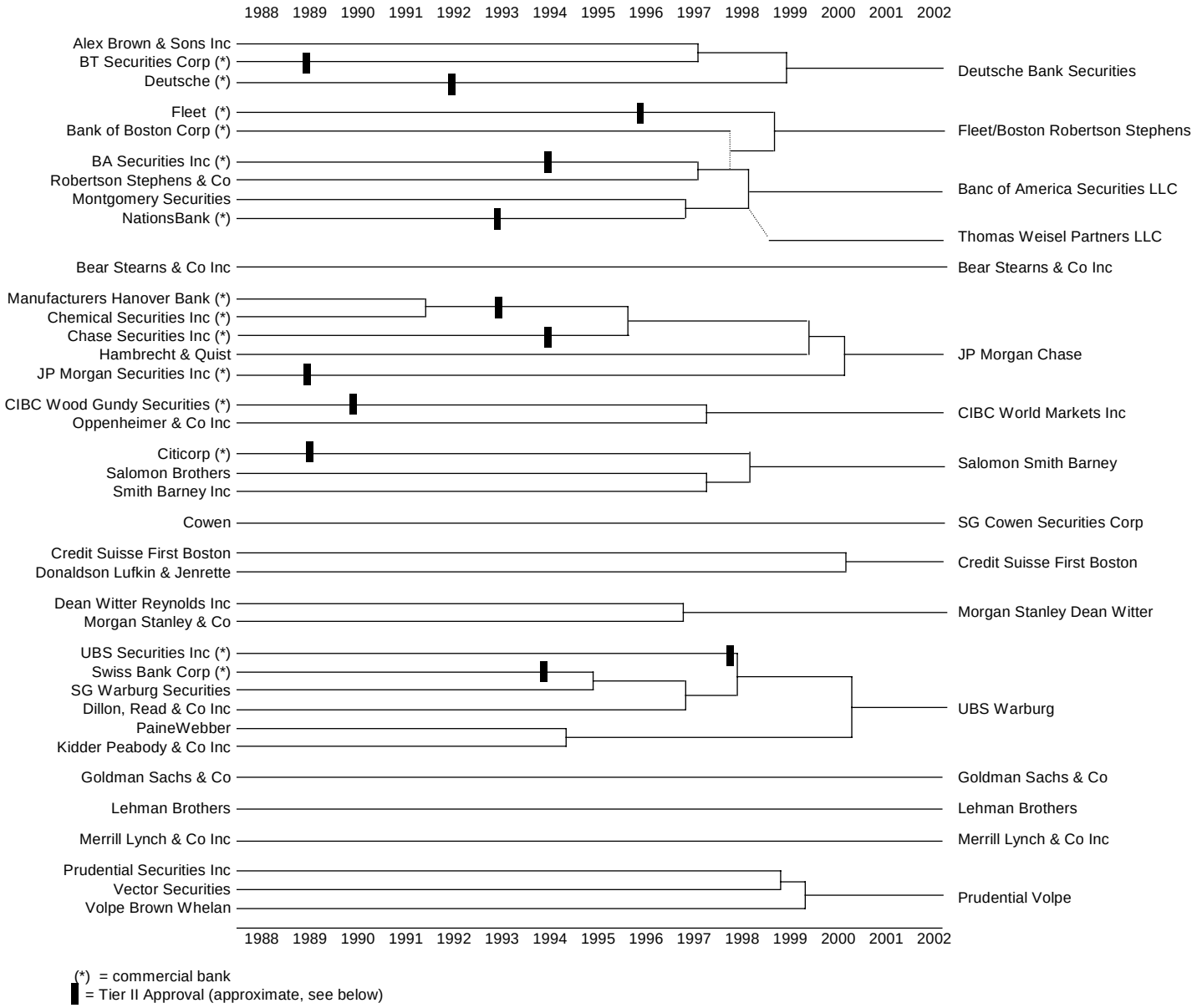

Figure 1. Principal bank mergers, 1988-2002.

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. 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 in 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).

Table 1. 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 firms 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 2); and b) purely-foreign issuers or families of issuers (we do include corporate families that have at least one U.S. member). The estimation period sub-sample, shown in the final two columns, contains 16,456 transactions.

		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	5,192	743,693
	Private common	1,981	68,305	662	28,726
Debt:					
	Non-convertible debt	10,638	1,836,942	6,561	1,155,088
	Convertible debt	533	111,231	214	72,442
	Private non-convertible debt	9,510	557,167	2,618	147,511
	Private convertible debt	280	8,538	99	5,374
	Non-convertible preferred	555	73,402	217	35,357
	Convertible preferred	309	68,762	142	49,306
	Private non-convertible preferred	555	21,414	231	8,613
	Private convertible preferred	867	36,600	520	26,377
All deals		36,173	4,012,401	16,456	2,272,485

Table 2. 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 percent 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	38,710	4.6	123,521	4.0	162,232
Bear Stearns & Co Inc	2.0	26,154	1.6	43,052	1.7	69,207
CIBC World Markets Inc	0.8	10,250	0.3	6,760	0.4	17,009
Credit Suisse First Boston	14.0	181,579	11.0	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	13,511	0.2	4,764	0.5	18,275
Goldman Sachs & Co	17.5	227,333	13.7	371,736	14.9	599,069
JP Morgan Chase	4.5	58,613	9.4	259,253	7.9	317,866
Lehman Brothers	5.0	64,458	6.5	175,387	6.0	239,845
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	0.7	8,441	0.3	8,830	0.4	17,270
Salomon Smith Barney	8.4	108,928	14.1	381,816	12.2	490,744
SG Cowen Securities Corp	0.6	7,616	0.1	1,589	0.2	9,205
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)	**90.5**	**1,172,603**	**92.2**	**2,498,767**	**91.3**	**3,671,370**

Table 3. Bank-issuer Relationships and Bank Characteristics.

The dataset consists of 16,456 deals. The unit of observation is a bank-deal pair. Occasionally, banks co-lead a deal, so there are a total of 17,818 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 23.3 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 except for the losing banks' loan market shares.

	Winning banks			Losing banks			test: winner vs loser
	mean	*st.dev.*	median	mean	*st.dev.*	median	
Panel A: Equity - Coverage	N=2,141			N=12,628			
bank's share of issuer's equity deals over the prior 5 years (%)	45.3	*47.1*	22.4	6.6	*22.9*	0.0	59.6
bank's share of issuer's debt deals over the prior 5 years (%)	9.9	*26.9*	0.0	3.0	*14.1*	0.0	18.0
bank's equity market share prior calendar year (%)	7.1	*5.7*	5.3	5.0	*5.0*	3.2	17.2
bank's debt market share prior calendar year (%)	6.7	*5.6*	6.5	5.0	*5.3*	2.5	13.2
bank's loan market share prior calendar year (%)	1.7	*2.9*	0.5	2.0	*3.5*	0.5	-3.4
bank's overall *Institutional Investor* rank	27.2	*18.9*	31.0	21.9	*18.0*	19.0	12.4
fraction of issuer's Fama-French industry covered by bank (%)	20.8	*12.9*		19.6	*13.0*		1.2
fraction with bank stake in issuer's equity (%)	54.7	*49.8*		55.7	*49.7*		-0.9
fraction commercial banks (%)	19.3	*39.5*		26.5	*44.1*		-7.0
Panel B: Equity - No coverage	N=3,965			N=117,814			
bank's share of issuer's equity deals over the prior 5 years (%)	5.8	*22.5*	0.0	0.2	*4.2*	0.0	59.2
bank's share of issuer's debt deals over the prior 5 years (%)	3.8	*18.2*	0.0	0.3	*5.2*	0.0	35.5
bank's equity market share prior calendar year (%)	5.1	*5.7*	2.9	3.6	*4.8*	1.6	19.3
bank's debt market share prior calendar year (%)	5.0	*5.7*	1.9	3.8	*4.8*	1.5	15.2
bank's loan market share prior calendar year (%)	1.2	*2.5*	0.0	1.9	*3.3*	0.2	-14.1
bank's overall *Institutional Investor* rank	19.6	*19.8*	14.0	14.9	*16.9*	7.0	17.1
fraction of issuer's Fama-French industry covered by bank (%)	12.9	*12.1*		11.0	*10.1*		3.9
fraction with bank stake in issuer's equity (%)	14.5	*35.2*		12.8	*33.4*		3.2
fraction commercial banks (%)	15.6	*36.3*		31.0	*46.2*		-20.7
Panel C: Debt - Coverage	N=5,331			N=72,563			
bank's share of issuer's equity deals over the prior 5 years (%)	11.9	*30.4*	0.0	2.8	*15.0*	0.0	38.9
bank's share of issuer's debt deals over the prior 5 years (%)	25.7	*30.6*	14.6	4.6	*13.5*	0.0	97.7
bank's equity market share prior calendar year (%)	8.9	*5.8*	7.2	5.4	*5.4*	3.3	45.7
bank's debt market share prior calendar year (%)	10.0	*4.7*	10.6	5.3	*5.2*	3.4	64.2
bank's loan market share prior calendar year (%)	2.4	*3.8*	0.7	1.3	*2.6*	0.3	27.1
bank's overall *Institutional Investor* rank	17.0	*10.2*	17.0	11.4	*10.6*	9.0	37.0
fraction of issuer's Fama-French industry covered by bank (%)	24.1	*14.4*		22.0	*14.0*		3.5
fraction with bank stake in issuer's equity (%)	68.7	*46.4*		68.9	*46.3*		-0.3
fraction commercial banks (%)	23.3	*42.3*		20.0	*40.0*		5.7
Panel D: Debt - No coverage	N=6,381			N=163,309			
bank's share of issuer's equity deals over the prior 5 years (%)	3.7	*17.9*	0.0	0.4	*6.1*	0.0	37.3
bank's share of issuer's debt deals over the prior 5 years (%)	15.4	*30.1*	0.0	1.0	*7.4*	0.0	120.0
bank's equity market share prior calendar year (%)	4.1	*5.3*	1.6	3.0	*4.4*	1.2	19.3
bank's debt market share prior calendar year (%)	5.7	*5.7*	3.5	3.2	*4.4*	1.2	43.6
bank's loan market share prior calendar year (%)	3.7	*4.9*	0.4	2.5	*3.7*	0.5	25.4
bank's overall *Institutional Investor* rank	8.7	*10.9*	3.0	6.0	*8.8*	2.0	23.7
fraction of issuer's Fama-French industry covered by bank (%)	8.8	*12.8*		9.4	*11.6*		-1.5
fraction with bank stake in issuer's equity (%)	27.6	*44.7*		30.4	*46.0*		-4.8
fraction commercial banks (%)	40.4	*49.1*		40.3	*49.1*		0.1

Table 4. Descriptive Statistics: Issuer and Deal Characteristics.

The dataset contains 16,456 deals by 6,711 unique companies and 5,368 unique corporate families. 10,998 of the 16,456 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.

	Coverage			No coverage			test of difference in means/ fractions
	mean	st.dev.	median	mean	st.dev.	median	
Panel A: Equity deals	N=2,980			N=2,874			
deal size (in $m)	177.4	*406.9*	104.6	84.8	*196.2*	50.6	11.0
issuer's equity proceeds prior 5 years (in $m)	168.8	*505.5*	66.4	14.0	*134.1*	0.0	15.9
issuer's debt proceeds prior 5 years (in $m)	259.6	*975.1*	0.0	38.2	*547.3*	0.0	10.7
time since IPO (in years)	9.4	*12.4*	4.7	1.6	*6.1*	0.0	30.1
fraction not listed (%)	0.4			8.3			-14.9
fraction U.S. company (%)	98.5			98.9			-1.2
Panel B: Debt deals	N=8,018			N=2,584			
deal size (in $m)	163.5	*265.0*	85.1	73.2	*112.1*	31.5	16.9
issuer's equity proceeds prior 5 years (in $m)	259.4	*821.8*	0.0	55.0	*358.9*	0.0	12.3
issuer's debt proceeds prior 5 years (in $m)	2,473.0	*5,396.6*	761.7	270.2	*1,455.1*	0.0	20.5
time since IPO (in years)	27.8	*18.3*	28.4	4.8	*12.1*	0.0	59.6
fraction not listed (%)	2.2			75.2			-80.7
fraction U.S. company (%)	98.2			93.8			11.8

Table 5. 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 analyst seniority, we compute the number of years since she first appeared in the I/B/E/S database.

	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	11,591	0.014	0.654	0.000	1,895	0.170	0.516	0.000	9,696	-0.017	0.674	0.000	11.5
relative upgrade	11,719	0.038	*0.557*	0.000	1,557	0.084	*0.513*	0.000	10,162	0.031	*0.563*	0.000	3.5
fraction of issuers covered by all-star analysts (%)	11,719	29.8			1,557	37.2			10,162	28.7			6.8
relative forecast accuracy	10,965	51.8	*10.0*	52.4	1,489	52.1	*10.3*	52.8	9,476	51.7	*10.0*	52.3	1.5
analyst's seniority (years in I/B/E/S database)	11,327	6.6	*4.8*	5.7	1,523	7.1	*4.8*	6.3	9,804	6.5	*4.8*	5.6	4.2
Panel B: Debt deals													
relative recommendation	56,838	0.040	0.766	0.000	4,227	0.192	0.682	0.000	52,611	0.027	0.771	0.000	13.4
relative upgrade	69,846	0.006	*0.638*	0.000	4,766	0.035	*0.624*	0.000	65,080	0.003	*0.639*	0.000	3.3
fraction of issuers covered by all-star analysts (%)	69,846	37.5			4,766	43.2			65,080	37.1			8.4
relative forecast accuracy	66,454	52.2	*8.7*	53.1	4,526	53.1	*8.3*	53.4	61,928	52.2	*8.8*	53.0	6.8
analyst's seniority (years in I/B/E/S database)	68,204	7.1	*4.7*	6.2	4,656	7.5	*4.9*	6.9	63,548	7.1	*4.7*	6.2	5.6

Table 6. 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 MLE. The table reports estimation results in structural form. The reduced forms used to generate instruments for the models in Tables 7 and 8 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 5. 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.

	Equity		Debt	
	Relative recomm.	Relative upgrades	Relative recomm.	Relative upgrades
Bank-issuer relationships				
bank's share of issuer's debt deals prior 5 years	0.148***	0.035	0.249***	0.047***
	0.038	*0.030*	*0.021*	*0.016*
bank's share of issuer's equity deals prior 5 years	0.110***	0.049*	0.139***	0.065***
	0.027	*0.021*	*0.019*	*0.015*
=1 if bank owns equity in issuer	0.067***	0.030*	0.039***	0.000
	0.016	*0.013*	*0.008*	*0.006*
Bank and analyst characteristics				
bank's *Institutional Investor* rank	–0.001	0.001	–0.002***	0.000
	0.001	*0.001*	*0.0004*	*0.000*
bank's equity market share prior calendar year	–1.003***	–0.474**	–1.077***	–0.169*
	0.228	*0.178*	*0.105*	*0.078*
bank's debt market share prior calendar year	1.166***	–0.040	1.715***	–0.423***
	0.262	*0.209*	*0.134*	*0.103*
bank's loan market share prior calendar year	0.245	0.220	1.653***	0.953***
	0.236	*0.187*	*0.143*	*0.104*
=1 if analyst is ranked "all-star" by *Institutional Investor*	0.003	–0.056***	0.033***	–0.033***
	0.017	*0.013*	*0.008*	*0.006*
… x bubble dummy	0.025	0.089***	–0.046***	0.079***
	0.027	*0.021*	*0.014*	*0.010*
relative forecast accuracy	0.0013*	0.000	0.004***	0.001**
	0.006	*0.001*	*0.0004*	*0.0003*
log analyst's seniority (in years)	0.011	0.009	0.000	0.011**
	0.009	*0.008*	*0.005*	*0.004*
change in issue activity relative to 5-yr moving average	–0.064	–0.059†	–0.014	–0.088***
	0.037	*0.031*	*0.019*	*0.015*
… x bank's market share (debt or equity)	0.847	1.420***	0.638**	0.882***
	0.532	*0.434*	*0.251*	*0.196*
Issuer characteristics				
log deal size (in $m)	–0.021***	0.025***	–0.012***	0.012***
	0.006	*0.005*	*0.002*	*0.002*
log issuer's equity or debt proceeds prior 5 years (in $m)	0.001	0.003	–0.004*	0.000
	0.003	*0.002*	*0.002*	*0.001*
Diagnostics				
Wald test: all coefficients = 0 (χ^2)	125.6***	1,107.5***	1,143.9***	7,191.6***
Heckman's λ	–0.011	0.0004	0.030***	–0.034***
Likelihood ratio test of independent equations (ρ=0) (χ^2)	0.3	0.0	9.9**	21.4***

Table 7. 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. Specification 1 uses relative recommendations and Specification 2 uses relative upgrades to model analyst behavior. These are instrumented from the models estimated in Table 6 and so treated as endogenous. Analyst behavior is observed only if the bank provides coverage, so for each specification, we estimate two probits: one if the bank provides research coverage, the other if it does not. The 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%, 5%, and 10% level (two-sided), respectively. The columns headed "Test" show the significance of Wald tests comparing the coefficients in the coverage and no-coverage cases.

	Specification 1			**Specification 2**		
	Coverage	No coverage	Test	Coverage	No coverage	Test
Analyst behavior						
relative recommendations	1.450					
	1.300					
relative upgrades				–0.532***		
				0.096		
Bank-issuer relationships						
bank's share of issuer's debt deals prior 5 years	0.386	1.261***	***	0.825***	1.198***	***
	0.294	*0.061*		*0.086*	*0.064*	
bank's share of issuer's equity deals prior 5 years	1.681***	1.861***	**	1.582***	2.432***	***
	0.359	*0.061*		*0.077*	*0.050*	
=1 if bank owns equity in issuer	–0.077	0.164***	***	0.083	0.232***	***
	0.244	*0.026*		*0.064*	*0.025*	
Bank characteristics						
bank's *Institutional Investor* rank	0.005*	0.007***	**	0.003†	0.007***	***
	0.002	*0.001*		*0.0017*	*0.001*	
=1 if analyst is ranked "all-star" by *Institutional Investor*	0.119*			0.105**		
	0.049			*0.037*		
bank's equity market share prior calendar year	3.906*	2.513***	***	2.316***	2.636***	
	1.527	*0.253*		*0.511*	*0.252*	
bank's debt market share prior calendar year	–1.338	–0.987***		0.424	–1.277***	***
	1.892	*0.326*		*0.655*	*0.323*	
bank's loan market share prior calendar year	–0.011	0.421		0.876	0.549	
	1.203	*0.389*		*0.849*	*0.387*	
=1 if commercial bank	–0.057	–0.127***	*	–0.125*	–0.137***	
	0.105	*0.028*		*0.064*	*0.028*	
merger dummy	0.293	0.456***	***	0.195†	0.439***	***
	0.183	*0.045*		*0.103*	*0.044*	
=1 if equity staff have departed	0.044	0.005		–0.006	–0.007	
	0.093	*0.028*		*0.063*	*0.028*	
=1 if equity staff have arrived	0.059	0.006	†	0.046	0.001	
	0.070	*0.029*		*0.060*	*0.028*	
Diagnostics						
Wald test: all coefficients = 0 (χ^2)	1,683***	2,468***		1,361***	3,894***	
ρ	0.239***	–0.303***		0.223***	–0.375***	
Likelihood ratio test of independent equations (ρ=0) (χ^2)	20.0***	43.6***		30.1***	80.9***	
No. of observations	10,275	124,220		10,952	124,092	

Table 8. 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. Specification 1 uses relative recommendations and Specification 2 uses relative upgrades to model analyst behavior. These are instrumented from the models estimated in Table 6 and so treated as endogenous. Analyst behavior is observed only if the bank provides coverage, so for each specification, we estimate two probits: one if the bank provides research coverage, the other if it does not. The 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%, 5%, and 10% level (two-sided), respectively. The columns headed "Test" show the significance of Wald tests comparing the coefficients in the coverage and no-coverage cases.

	Specification 1			**Specification 2**		
	Coverage	No coverage	Test	Coverage	No coverage	Test
Analyst behavior						
relative recommendations	–1.387***					
	0.252					
relative upgrades				–0.075†		
				0.041		
Bank-issuer relationships						
bank's share of issuer's debt deals prior 5 years	2.142***	2.053***	***	1.818***	2.061***	***
	0.087	*0.033*		*0.036*	*0.034*	
bank's share of issuer's equity deals prior 5 years	0.781***	0.451***	***	0.436***	0.718***	***
	0.070	*0.046*		*0.036*	*0.046*	
=1 if bank owns equity in issuer	0.067	–0.084***	***	0.004	–0.078***	***
	0.052	*0.016*		*0.021*	*0.017*	
Bank characteristics						
bank's *Institutional Investor* rank	0.005***	0.004***		0.008***	0.0021*	***
	0.001	*0.001*		*0.001*	*0.0010*	
=1 if analyst is ranked "all-star" by *Institutional Investor*	–0.011			–0.029		
	0.023			*0.018*		
bank's equity market share prior calendar year	–2.135***	–0.706***	***	–0.268	–1.383***	***
	0.393	*0.217*		*0.239*	*0.242*	
bank's debt market share prior calendar year	8.198***	5.397***	***	5.364***	6.171***	**
	0.649	*0.244*		*0.299*	*0.262*	
bank's loan market share prior calendar year	7.522***	5.581***	***	5.356***	4.995***	
	0.780	*0.236*		*0.436*	*0.244*	
=1 if commercial bank	–0.265***	–0.037†	***	–0.232***	–0.010	***
	0.048	*0.022*		*0.036*	*0.023*	
merger dummy	0.079	0.282***	***	0.213***	0.321***	**
	0.064	*0.035*		*0.049*	*0.036*	
=1 if debt staff have departed	–0.244***	–0.090***	***	–0.134***	–0.072*	*
	0.049	*0.028*		*0.035*	*0.030*	
=1 if debt staff have arrived	0.161***	0.025	***	0.142***	0.011	***
	0.041	*0.027*		*0.033*	*0.029*	
Diagnostics						
Wald test: all coefficients = 0 (χ^2)	4,827***	8,459***		5,427***	8,134***	
ρ	0.185***	0.060*		0.092***	0.002	
Likelihood ratio test of independent equations (ρ=0) (χ^2)	49.3***	5.3*		15.2***	0.0	
No. of observations	53,172	189,486		66,434	176,478	

Table 9. Differences Over Time.

As in Tables 7 and 8, we estimate the probability that a particular bank is chosen to lead-manage a particular deal using probit MLE with sample selection correction. Here, we partition the sample into two periods, 1993-1997 and 1998-2002. To model analyst behavior, we instrument relative recommendations and relative upgrades from auxiliary models similar to those reported in Table 6, 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. We use ***, **, * and † to denote significance at the 0.1%, 1%, 5%, and 10% level (two-sided), respectively.

	1993-1997	1998 to June 2002
Equity		
Relative upgrades	–0.317*	–0.598***
	0.149	*0.122*
Relative recommendations	2.720	–0.209
	5.182	*0.693*
Debt		
Relative upgrades	–0.143*	–0.051
	0.065	*0.054*
Relative recommendations	–1.555***	1.008***
	0.329	*0.312*