Scaling the Hierarchy: How and Why Investment Banks Compete for Syndicate Co-Management Appointments [*] [†]

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Abstract

We investigate why banks pressured research analysts to provide aggressive assessments of issuing firms during the 1990s. This competitive strategy did little to directly increase a bank's chances of winning lead-management mandates and ultimately led to regulatory penalties and costly structural reform. We show that aggressively optimistic research and even the mere provision of research coverage for the issuer (regardless of its direction) attract *co*-management appointments. Co-management appointments are valuable because they help banks establish relationships with issuers. These relationships, in turn, substantially increase their chances of winning more lucrative lead-management mandates in the future. This is true even in the presence of historically exclusive banking relationships. If recent regulatory reforms compromise this entry mechanism, they may have the unintended consequence of diminishing competition among securities underwriters.

1. Introduction

A substantial literature documents research analysts' systematic tendency to issue optimistic recommendations (see Hong and Kubik (2003) and the citations therein). Such optimism is widely believed to be solicited by investment bankers within an analyst's firm to gain advantage in competition for underwriting mandates, and this problem is perceived to have been more severe during the late 1990s. But Ljungqvist, Marston, and Wilhelm (LMW, 2006) demonstrate that banks competing to lead manage U.S. debt or equity offerings between 1993 and 2002 did not systematically gain *immediate* competitive advantage when their research analysts provided aggressively positive assessments of the issuing firm's prospects in close proximity to the offering at hand. Instead, the strength of prior underwriting and lending relationships and the bank's reputation were the strongest determinants of issuers' choice among lead-bank candidates. These results beg the question why some banks apparently encouraged the behavior that led to penalties and structural reforms imposed under the 2003 "Global Settlement."[1]

LMW (2006, pp. 337-8) conjecture that "banks knew they stood little chance of being selected as lead manager in the absence of a prior relationship with the issuer, but nevertheless pressured their analysts into making aggressive recommendations in the hope of being included in the underwriting syndicate." In this paper, we directly test this conjecture by examining whether analyst behavior favorably influences the issuer's choice of *co-managers* and thereby enables the co-managers to compete more effectively for more lucrative lead-management opportunities *in the future*. Co-managers appeared with increasing frequency during the 1990s as some issuers sought wider analyst coverage and market making capacity (Corwin and Schultz (2005)). Although co-managers exercise little influence over the transaction and enjoy modest immediate financial gains

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[1] In large part, the Settlement aimed to further separate investment banking from research functions. For details, see the Securities and Exchange Commission press release at http://www.sec.gov/news/press/2003-54.htm.

compared to lead managers, they do have contact with the issuer. Such contact might serve as a stepping-stone to more lucrative lead-management opportunities in the future if, as LMW show, issuers tend to award lead management mandates to their relationship banks and co-management is a meaningful step toward building a relationship.

Our analysis proceeds in three steps. First, we test whether co-management opportunities induce aggressive analyst behavior. We then test whether aggressive research increases the likelihood that an analyst's bank wins a co-management mandate. Finally, we investigate whether relationships established through co-management eventually increase the likelihood of winning lead-management mandates in the future.

We find that co-management opportunities do induce aggressive analyst behavior: Analysts issue relatively more bullish recommendations and upgrades ahead of equity and debt transactions that offer good prospects of future rewards. Importantly, they do so only if the issuer is planning to hire co-managers for the transaction; otherwise, analyst behavior is unchanged. Aggressive recommendations and upgrades, in turn, increase a bank's chances of winning co-management appointments. This contrasts with LMW's finding that aggressive research undermined efforts to win *lead* management mandates. It is consistent with LMW's conjecture that banks may have put pressure on their analysts to provide flattering research, not in the hope of becoming lead manager but of becoming co-manager. Banks engaging in such behavior were typically second-tier equity underwriters or large debt underwriters, a group of banks which overlaps to a large extent with the commercial banks that entered the underwriting business during the 1990s.

Even the mere provision of coverage – regardless of its direction – can help a bank. Ahead of equity transactions, for instance, the likelihood of becoming co-manager increases from 2.3% to 17.3% when the bank provides research coverage, all else equal. This result is consistent with the oft-heard conjecture that issuers "buy" analyst coverage with co-management appointments.

Does aggressive research pay off? We estimate a lead-manager selection model similar to that used by LMW but also conditioning on the prospective lead manager's past co-management relationships with the issuer. Banks that have established co-management relationships with the issuer enjoy a significant advantage in the competition for lead management mandates, increasing their expected probability of being selected as equity lead manager by 49% compared to a bank with no relationship. The result holds even in cases where the issuer previously maintained an exclusive relationship with another bank.

We believe that these findings are important for two reasons. First, they shed light on the mechanism by which banks gain entry to securities underwriting. The evidence suggests that less reputable banks, having less to lose than their more reputable competitors, risk their credibility to gain entry. Perhaps such risk-taking is simply a way for these banks to capture the attention of issuing firms. Issuing firms might have little to lose from identifying them as co-managers while gaining a low-cost means of boosting their share prices. If by doing so, the issuer grooms a credible competitor for future mandates, it diminishes the threat of being "captured" by its existing relationship bank(s). This remains very much an open question but one worthy of further exploration.

Second, this competitive dynamic suggests a paradoxical policy implication. Issuers have incentive to engage a reputable lead manager to enhance their credibility when prospective investors are less well informed. But a strong reputation is not easily established or transferred. Thus, the reputation-intensive nature of investment banking creates a substantial barrier to entry, and the industry has drawn criticism for anti-competitive behavior throughout its existence.[2] The 1990s were noteworthy in this regard for the large number of commercial banks seeking to enter securities

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[2] See Morrison and Wilhelm (2004) and Levin and Tadelis (2005) for models of reputation development and transfer, and Morrison and Wilhelm (2007) for applications to investment banking.

underwriting during the transition to the repeal of the Glass-Steagall Act. Even the most prominent commercial banks were not immediately credible competitors upon entering the securities underwriting business, especially on the equity side. If co-management is an important mechanism for clearing the reputational entry barrier, and analyst optimism is an effective means of gaining such opportunities, our findings suggest a pro-competitive effect that should be weighed against concerns for any distortion that might arise from investors relying on optimistic research.

Our findings complement recent research on syndication practices. Pichler and Wilhelm (2001) view syndicates as a response to moral hazard in teams when investment banks engage in information production. Corwin and Schultz (2005) provide support for this interpretation as well as a detailed characterization of IPO syndicates during the late 1990s. Our analysis of both new and seasoned issues of debt and equity reinforces Corwin and Schultz's conclusions regarding the importance of reciprocity in selecting syndicate members using measures of connectedness derived from social network analysis.[3]

2. The Evolution of the Co-management Function

Using data from Thomson Financial's SDC database, Figure 1 shows considerable variation in the frequency with which underwriting syndicates were co-managed between 1970 and 2003. The long-run trend reflects an increasing (decreasing) tendency toward co-management of equity (debt) deals. Both saw an increase in co-management in the early 1970s. From the mid-1970s until the late 1980s, co-management was less common. This pattern reversed in 1990, perhaps not coincidentally in parallel with the growing participation by commercial banks in securities underwriting shown in Figure 2. Deregulation began in 1987, culminating in the repeal of the Glass-Steagall Act in 1999. Commercial banks now act as co-managers in virtually all debt transactions and around two-thirds of equity transactions (conditional on the deal involving co-managers). This is clear evidence of

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[3] Robinson and Stuart (2006) and Hochberg, Ljungqvist, and Lu (2007) apply social network analysis to finance.

entry into underwriting co-management involving well-capitalized competitors.

The 1990s also saw declining exclusivity in relationships among lead- and co-managers. Figure 3 plots the average annual number of co-managers with which a lead bank worked (weighted by the lead bank's market share so that the experience of more active banks is given greater weight). In 1970, the average lead bank in equity deals had only 5.3 unique co-management partners. This rose sharply during the 1990s peaking at 46.3 in 2000. Debt syndicates followed a similar pattern.[4]

Assuming that lead managers prefer not to share fees and prestige with co-managers (as Corwin and Schultz (2005) suggest), it appears that market conditions during the 1990s forced banks to share control over syndicate structure with issuing firms. Increasing competition from commercial banks is one plausible explanation for this change. But it is worth noting that the 1990s were a period of extremely heavy securities issuance, especially during the dot-com era, in which case capacity constraints might have forced prominent banks to share the burden more widely with co-managers. Figure 3 sheds light on this point by also plotting real annual aggregate proceeds raised by non-financial U.S. issuers. The correlation between the average number of unique co-management partners and issuance activity is especially strong for equity offerings.

3. Data and Methodology

3.1. Sample and Data

We use SDC to identify all debt and equity offerings by U.S. issuers completed between December 1, 1993 and June 30, 2002. We begin in 1993 because the I/B/E/S database tracks analyst recommendations only from Q4 1993. We end in June 2002 because the NYSE and the NASD introduced new rules in July 2002 aimed at reducing conflicts of interest between investment research and investment banking (see Kadan et al. (2005) for an overview of these changes).

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[4] The rising number of co-management partnerships reflects a fundamental change in exclusivity rather than the persistence of a small number of strong syndicate relationships alongside a large number of incidental partnerships.

We exclude deals that a) were not underwritten, b) involved no co-managers, c) in SIC 60-69 (financial institutions, etc.) or SIC 90-99 (government agencies, etc.), and d) by non-U.S. issuers. To keep the sample size manageable, we include only deals lead-managed by one of the 50 largest underwriters (by market share) during the deal year. These banks account for 93.9% of deals in SDC. Applying these filters yields 8,303 transactions. The distribution of different transaction types is reported in Table 1. Public common stock and public nonconvertible debt offerings account for 58.4% and 35.0% of sample deals, respectively, but public debt dominates in dollar terms.

LMW's sample contains 16,625 offerings. It is constructed like ours, except they include offerings that do not involve co-managers (accounting for 52% of their deals). Compared to their sample, we have relatively fewer private offerings (reflecting the fact that these rarely involve co-managers) and relatively more common stock offerings.

3.2 Sample of Candidate Banks Competing for Co-management Positions

Estimating a bank's chances of becoming co-manager requires data for both the successful bank and its competitors. In the case of a debt (equity) transaction, we treat as co-management candidates the 50 banks with the largest debt (equity) underwriting market share that year (ignoring the bank(s) chosen to lead-manage the transaction).[5,6] Over the 1993-June 2002 sample period, the Top 50 banks had a combined 94.9% market share of equity co-management and a 98.1% market share of debt co-management.

3.3 Bank-firm Relationships

Like LMW, we measure the strength of bank-firm equity, debt, and lending relationships as the bank's share of the firm's equity, debt, and loan proceeds over the five years preceding quarter t, respectively (see Table 2 for all formal variable definitions). The sample period saw a substantial

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[5] This contrasts with LMW's model of the lead manager choice, which focuses on the 16 largest banks as of 2002 (and their respective predecessor banks in the case of mergers). Our results are robust to their sample restriction.
[6] By construction, a commercial bank competes for a co-management mandate prior to the repeal of the Glass-Steagall Act only if it had a Section 20 subsidiary with Tier II securities underwriting authority.

number of mergers and acquisitions among banks, so we allow underwriters to inherit their predecessors' relationships. For instance, after its November 1997 merger, Salomon Smith Barney is treated as having relationships with both Smith Barney's and Salomon Brothers' former clients.

Table 3 reports summary statistics, broken down by whether or not the candidate bank was chosen as co-manager for the deal in question. Compared to LMW's statistics for lead manager candidates, it is rare for co-management candidates to have worked for the issuer. The average successful candidate bank had lead-managed 3.1%, 3.7%, and 3.4% of the issuing company's equity, debt, and loan transactions by value over the prior five years, respectively. By comparison, the unsuccessful candidate banks had significantly weaker relationships with the issuing company.

3.4 Bank-bank (Syndicate) Relationships

We define the strength of a syndicate relationship between two banks as one bank's share of the other bank's portfolio of co-managers in the previous year *t*. We take bank mergers into account such that a lead's relationship measure with the surviving co-manager equals the sum of its relationship measures with the two pre-merger banks. We similarly account for mergers among lead managers. Our econometric models control for the candidate bank's prior-year participation in the lead manager's syndicates and the lead manager's prior-year participation in syndicates led by the candidate bank. The latter is a natural measure of the sort of reciprocity observed by Corwin and Schultz (2005) in the IPO market. As Table 3 shows, banks chosen as co-managers have significantly stronger syndicate relationships with the lead, and vice versa, than do the other banks.

Two further variables help measure a bank's position in the pecking order of syndication partners. Based on social network analysis, we view banks as better networked the more frequently they are chosen as syndication partners by other banks. A candidate bank's *indegree* equals the number of unique banks it has syndicated with in the prior calendar year, normalized by the number of possible syndication partners. It varies from zero (for a bank that has syndicated with no other banks) to one (for a bank that has syndicated with every bank). Table 3 shows that the average

successful candidate bank had co-managed deals with 7.6% of all banks; this is significantly greater than the average *indegree* of 4.0% among unsuccessful candidate banks.

While *indegree* captures a bank's popularity as co-manager, it does not allow for reputation differences among its syndication partners. For instance, a bank may achieve high *indegree* without ever working with a bulge-bracket bank. Assuming status and influence derive, in part, from being networked to others who themselves are well-networked, we construct a second measure of network position called eigenvector centrality (Bonacich (1972)). This measure weights a bank's ties to others by the importance of the banks it is tied to. As Table 3 shows, banks chosen as co-managers have relationships with significantly better-networked banks than do other candidate banks.

3.5 Bank Characteristics

To proxy for reputation, we use a bank's prior-year shares of the debt and equity underwriting markets (see Megginson and Weiss (1991)). We also compute its syndicated loan market share (using DealScan data) to proxy for a bank's capacity to sweeten its bids by tying lending to capital market transactions. (Following a merger, the surviving bank is credited with its predecessors' market shares.) Lead banks may be reluctant to work with co-managers of lower reputation, so we control for the absolute difference between the lead's market share (in the relevant type of security) and that of the candidate bank. Table 3 illustrates that successful candidate banks have, on average, significantly higher equity, debt, and loan market shares than other candidate banks, and that they are significantly closer in market share to the lead than are other candidate banks.

We include LMW's loyalty index measuring how often a bank retains its clients in consecutive deals as a control for unobserved factors that affect an issuer's choice, such as execution capability. (Banks whose clients are generally loyal likely have more desirable characteristics.) The average successful candidate bank has a loyalty index of 55%, versus 41% for unsuccessful candidate banks.

The final bank characteristic reported in Table 3 indicates that commercial banks are over-represented among successful candidate banks: They co-manage 39.8% of sample transactions and

account for 34.3% of the unsuccessful candidates. We explore several explanations for this fact in the econometric analysis but note again that commercial banks entered the underwriting business aggressively over the sample period, sometimes by acquiring an investment bank.

3.6 Research Coverage, Analyst Behavior, and Analyst Reputation

We classify a candidate bank as providing research coverage if one of its analysts has issued at least one report on the issuer in the two years preceding the transaction in hand, according to the First Call and I/B/E/S databases.[7] Successful candidate banks cover an issuing company's stock ahead of 40.9% of sample transactions, compared to only 8.1% among unsuccessful banks.

Like LMW we focus on recommendations net of consensus, by subtracting from an analyst's latest recommendation in the two-year window prior to a deal the median recommendation of all analysts covering the issuer's stock.[8] This ensures comparability across firms and provides a natural measure of an analyst's optimism. Since we reverse score recommendations such that 5=strong buy, positive values correspond to relatively optimistic recommendations. Not surprisingly, the average and median relative recommendations in our sample are nearly zero. 93.9% lie between −1 and +1, so we mostly capture recommendations that are within one notch of the consensus. On this measure, successful candidate banks are significantly more aggressive than other banks.

We also allow for the possibility that analysts upgrade their recommendations ahead of a deal in the hope of influencing the issuer's co-manager choice. Like LMW, we measure relative upgrades as the change between an analyst's two most recent recommendations, net of the median change, requiring these recommendations to be no older than nine months and 24 months, respectively.[9]

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[7] The overlap between I/B/E/S and First Call is only 46.8% over our sample period. We merge I/B/E/S and First Call by CRSP permno and standardized broker name using a 14-day window to allow for date misreporting and reversing First Call's broker code reassignments. First Call does not report analyst names. We identify analysts from adjacent I/B/E/S recommendations or the (more comprehensive) I/B/E/S earnings forecast database. We also use earnings forecasts along with the recommendations databases to code whether a bank provides research coverage of an issuer's stock.

[8] Ljungqvist, Malloy, and Marston (2007) report widespread and nonrandom problems in the I/B/E/S historical recommendations database. We correct for these problems.

[9] Absent another report in the nine months before the deal, upgrade is coded as zero. If coverage is initiated in the nine months before the deal, we assume an implicit prior neutral opinion. Our results are robust to alternative coding choices.

Positive values represent relatively aggressive upgrades. Both successful and unsuccessful candidate banks show a similar tendency to upgrade their recommendations ahead of deals.

We control for five analyst characteristics, each defined in Table 2. The first identifies all-star analysts. Table 3 shows that candidate banks are more likely to act as co-manager if they employ an all-star analyst who covers the issuer's stock. In the absence of coverage, the bank receives a boost if it employs an all-star analyst who at least covers the issuer's Fama-French (1997) industry.

The second proxy assumes that an analyst's reputation derives, in part, from forecasting ability and so measures her relative forecast accuracy (constructed as in Hong and Kubik (2003)). We also control for an analyst's tendency to issue optimistic forecasts and the intensity with which an analyst follows the stocks she covers (in each case relative to her sector peers). Economically, the differences in average relative forecast accuracy, optimism, and coverage intensity are small.

Our final proxy captures the fact that more senior analysts (measured by years since first appearance in I/B/E/S) typically make bolder recommendations (Hong et al. (2000)). Conditional on providing coverage, analysts at successful banks are more experienced than their peers.

4. The Econometric Model

Our focus is on the determinants of a bank j's likelihood of co-managing a company k's offering at time t conditional on company k having selected bank i as its lead manager. We treat the 50 largest underwriting banks for the year in which the deal takes place (excluding the lead manager) as potential candidates for the co-management assignment and estimate two types of model.

4.1 Model 1: The Effect of Aggressive Analyst Recommendations

Model 1 relates co-manager choice to the analyst's behavior, recognizing that when making recommendations, analysts trade off their private career concerns against any benefits co-operation with their investment banking colleagues may yield. Like LMW, we take into account that recommendations are observed only if the analyst decided to cover the issuer's stock:

$$Pr(\text{bank } j \text{ co-manages company } k\text{'s deal at } t \mid \text{bank } j \text{ covers } k\text{'s stock at } t) = f_M(\mathbf{R}, \mathbf{X}_M) \quad (1)$$

$$\mathbf{R} = (j\text{'s recommendation for } k\text{'s stock} \mid \text{bank } j \text{ covers } k\text{'s stock at } t) = f_R(\mathbf{X}_R) \quad (2)$$

$$Pr(\text{bank } j \text{ covers company } k\text{'s stock at } t) = f_C(\mathbf{X}_C) \quad (3)$$

The explanatory variables in matrix $\mathbf{X}_M$ were discussed in Sections 3.3-3.6. All else equal, we expect a higher probability of success among more reputable candidate banks that maintain strong relationships with the issuer and the lead bank, and which employ more reputable analysts who provide coverage for the issuer at time t. Matrices $\mathbf{X}_R$ and $\mathbf{X}_C$ contain other identifying variables as discussed below. To keep the model relatively simple, we do not model the decision whether to hire co-managers in the first place. In Section 5.3, we use variation in the presence of co-managers to help identify analyst behavior.

Equations (1) through (3) form a simultaneous equations system with endogenous switching. (See Li and Prabhala (2007) for a discussion of the LMW model.) The system is estimated in two steps. First, we estimate the reduced-form determinants of analyst behavior, $\mathbf{R} = \{relative\ upgrade,\ relative\ recommendation\}$, as a function of the costs and benefits of inflating a recommendation. Since $\mathbf{R}$ is observed only when there is coverage, we account for the resulting selectivity problem, under which OLS yields biased and inconsistent coefficient estimates, by using Heckman's (1979) selection correction. Second, we estimate equation (1) replacing $\mathbf{R}$ with the fitted values $\hat{\mathbf{R}}$ from the first step. The probit likelihood function also is adjusted for selectivity bias. Standard errors are estimated consistently following Murphy and Topel (1985). Where there is no coverage, we estimate a single-equation probit model of equation (1), again corrected for selectivity.

Since our measures of analyst behavior $\mathbf{R}$ are normalized by the recommendation behavior of other banks, their coefficients in equation (1) indicate whether a bank is more likely to win a co-management mandate if its analyst behaved more aggressively than did other analysts.

We identify the system using a priori exclusion restrictions on the parameter vector. We follow LMW's selection of instruments by including in equation (2) four proxies for the amount of pressure analysts might be subjected to. The first instrument is the underwriting fee relative to the bank's total prior-year underwriting fee income.[10,11] Presumably, banks put more pressure on their analysts when competing for deals that would make a large contribution to their underwriting revenue. To the extent that the size of the bonus pool increases with the bank's expected underwriting profits, this proxy will correlate with unobserved bonuses promised to analysts in return for inflated recommendations.

The second instrument captures variation in the value of co-management positions. More active issuers have greater fee potential and thus attract more competition, not least because the prospect of establishing a relationship and so becoming a contender for more lucrative lead-management roles in future is more tempting. We proxy for future issue activity using the firm's deal history, measured as its cumulative proceeds over the prior five years. Unlike our first instrument, deal history varies across firms but not across banks competing for a given deal. Thus, it is designed to capture cross-sectional variation in how aggressive analysts as a group are ahead of a given deal.

Third, LMW argue that a "loyal" client base enables a bank to compete less fiercely and thus have less need to pressure its analysts to win underwriting mandates. Finally, we expect analysts to come under more pressure when the bank's underwriting revenue is declining. To capture this, we calculate the percentage change in fee revenue relative to the previous year. Both this variable and the loyalty index vary across time and banks, but not across issuers.

In addition to the four bank pressure variables, we include the stock's price momentum, calculated as the cumulative market-adjusted return for the six months preceding the month of the

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[10] Underwriting fee information missing in SDC is filled in using the same algorithm as in LMW.

[11] To avoid distortions due to small prior-year fee revenue, relative underwriting fee $= -ln(1+$lagged fee revenue/fee on deal). We use the fee paid to the syndicate as a whole assuming co-manager shares are relatively stable across deals.

analyst's most recent recommendation before a deal. Jegadeesh et al. (2004) show that analysts tend to recommend past winners, in the sense that consensus recommendations increase in momentum. Thus, we expect a positive relation between momentum and an analyst's recommendation level or upgrade. Since analysts make recommendations at different times, momentum varies across analysts for a given deal. At the same time, there is no obvious reason to believe that issuers choose co-managers on the basis of the stock return preceding each analyst's most recent recommendation.

4.2 Model 2: The Effect of Providing Research Coverage

Model 2 relates co-manager choice to the analyst's decision whether to cover the issuer's stock – regardless of the recommendation level – treating the coverage decision, **C**, as endogenous:

$$Pr(\text{bank } j \text{ co-manages company } k\text{'s deal at } t) = f_M(\mathbf{C}, \mathbf{X}_M) \tag{4}$$

$$\mathbf{C}^* = Pr(\text{bank } j \text{ covers company } k\text{'s stock at } t) = f_C(\mathbf{X}_C) \tag{3}$$

The star indicates an unobserved latent variable whose realizations are observed as binary outcomes. Equation (3) is the same as in Model 1. As is standard in simultaneous equations models where both dependent variables are dichotomous, equations (3) and (4) are estimated as a seemingly unrelated bivariate probit model (Greene (2003)). To ensure identification, we include five instruments in equation (3). The main one is the fraction of company k's Fama-French (1997) industry that the bank's analysts provide coverage for. The broader a bank's existing coverage of an industry, the lower the cost of covering company k's stock, and so the more likely it is that the bank's analyst will publish research about company k. In addition, we control for the size of the fee on the deal in hand and the company's capacity for generating future fee income, both of which presumably increase the economic benefit to providing coverage if issuers base their co-manager choice on the provision of research. Finally, we control for whether and where the company's stock is listed and how long it has traded.

5. Estimation Results

5.1 The Coverage Model

Table 4 estimates equation (3) separately for equity and debt deals. Similar to LMW, we find that a firm's stock is more likely to be covered prior to a deal, the stronger its relationship with the bank, following a bank merger, when the bank's analyst already covers a large fraction of the firm's sector, if that analyst is an all-star, the larger the firm's fee-generating capacity, and the more mature the firm. Ahead of debt (but not equity) deals, coverage is less likely for unlisted firms and the larger the fee relative to the bank's prior-year underwriting fee revenue. In many instances, especially in the debt specification, the magnitude of these effects is smaller for commercial banks, which, all else equal, were less likely to provide coverage. These coverage models condition whether we observe analyst behavior ahead of equity and debt deals, which we turn to next.

5.2 The Analyst Behavior Models

Table 5 presents estimation results for equation (2) in structural form, for each of the two analyst behavior proxies and separately for debt and equity deals, conditioned on the coverage decision (i.e., equation (3)). As in LMW, candidate banks with strong equity underwriting relationships with the issuer are associated with less aggressive upgrades ahead of equity deals. The effects of prior relationships with the lead, *eigenvector* centrality, and equity market share are similarly negative, suggesting that strong standing among syndication partners and a high reputation in general diminish the need to compete for underwriting business via aggressive analyst upgrades. A bank's lending capacity provides a second dimension on which it might compete. The negative effect of a bank's prior-year loan market share suggests that lending capacity substitutes for any benefits derived from aggressive analyst upgrades.

In the debt sample, in contrast, strong client (especially debt) relationships, high standing in the syndication network, and large debt market shares are associated with more aggressive analyst

behavior among co-management candidates. Why would such well-regarded banks promote aggressive analyst behavior ahead of debt, and why not also ahead of equity deals? One plausible explanation is that aggressive research might have been perceived as providing a competitive edge to the sub-bulge bracket investment banks with relatively strong client and peer relationships. These investment banks faced the greatest initial exposure to commercial bank competition, especially in the debt markets, which were the primary focus of commercial bank entry.

As in the equity markets, a strong reputation for equity underwriting is associated with less aggressive analyst behavior in the debt markets which – if the greatest prestige in securities underwriting derives from success in equities underwriting – provides a rationale for some candidate banks' apparent reluctance to sacrifice their reputations by pressuring their analysts toward producing biased research.

All-star analysts are less likely to be associated with aggressive upgrades ahead of both equity and debt deals as one would expect if analysts value their reputations, though as in LMW there is evidence that the sign flips during the bubble years. More accurate forecasting ability is associated with more aggressive recommendation behavior in all specifications suggesting that aggressive behavior reflects, at least in part, legitimate boldness among more competent analysts. We also find that analysts who have a tendency to be optimistic make more aggressive recommendations, as do analysts who tend to cover their stocks relatively more intensively.

The Staiger and Stock (1997) tests suggest that our instruments are strong in both debt models and borderline strong in the equity models. When the payoff to aggressive behavior is potentially larger, as measured by the relative fee size and the log of the issuer's proceeds from issuance during the preceding five years, both analyst recommendations and upgrades are statistically more aggressive in advance of debt offerings. In the case of equity offerings, recommendations are statistically more aggressive when the relative fee size is larger and upgrades are statistically more

aggressive when the log of proceeds variable is larger. Greater client loyalty and rising fee income are associated with less aggressive behavior in the debt models, while the momentum variable is significant in only one of the specifications, suggesting that individual recommendations are less sensitive to momentum than are the consensus recommendations studied by Jegadeesh et al. (2004).

5.3 Do Co-management Opportunities Induce Aggressive Analyst Behavior?

The evidence in Table 5 is consistent with the interpretation that (some) analysts adjust their behavior ahead of securities offerings in the hope that their banks will be chosen as co-managers. An alternative interpretation is that a securities issue signals information that causes analysts to revise their opinions for reasons unrelated to their banks' potential involvement in the deal. To discriminate between these alternatives, we exploit the fact that around half the offerings in the U.S. employ no co-managers (see Figure 1). Variation in the existence of co-management opportunities permits identification of whether such opportunities influence analyst behavior. We should observe an analyst responding to the bank pressure instruments (such as the prospective fee income) only to the extent that the bank foresees a co-management opportunity.

We test this prediction by first building a probit model of the decision to have co-managers. This rules out the possibility that analyst behavior is unchanged ahead of a lead-only offering simply because the company has characteristics (such as its size) that render co-management unnecessary. The results, reported in Table 6, suggest that co-management is significantly more likely for larger deals, when the lead manager has a strong debt underwriting relationship with the issuer, and when the lead is well networked (as measured by *eigenvector*) but does not often serve as co-manager (as measured by *indegree*). In addition, equity deals are less likely to be co-managed if the lead and the issuer have a strong equity underwriting relationship, if the lead is a large equity or debt underwriter but a small lender, if the lead is a commercial bank, and the more equity the issuer has raised over the prior five years. Debt deals lead-managed by large lenders with

particularly loyal clients are less likely to be co-managed, as are deals by infrequent issuers.

Next, we use the probit models to identify "false positives" or transactions classified as strong co-management candidates that were not in fact co-managed. We refer to these cases as "co-manager-eligible" deals. By construction, the main difference between co-manager-eligible deals and sample transactions is that the former did not offer co-management opportunities while the latter did. If analysts simply react to information conveyed through the issuer's decision to raise capital, we expect no difference in analyst behavior in the two samples. If instead the prospect of a co-management mandate induces (some) analysts to make more aggressive recommendations, we expect to see such behavior concentrated among sample deals only.

Using a 50% predicted probability cut-off, there are 956 equity and 879 debt co-manager-eligible deals. How do analysts at the 50 largest banks behave ahead of these deals? As Table 7 shows, there is no evidence that they adjust their behavior in response to the bank pressure instruments, as judged by the insignificant Staiger-Stock instrument tests (ranging from 1.3 to 4.1). In fact, the equity models have minimal explanatory power. Recommendations are relatively more aggressive if the analyst has a history of being relatively optimistic and works for a brokerage house with a small investment banking operation. Upgrades are relatively more aggressive if the stock's momentum at the time of the ratings change was stronger (in line with Jegadeesh et al. (2004)). Other than that, analyst behavior at the 50 largest banks not involved in an equity transaction that offers no co-management opportunities is essentially random.

The debt specifications have better explanatory power – for instance, banks seem to recommend their clients' stocks aggressively ahead of debt deals in which they do not participate – but again there is no evidence that analyst behavior is influenced by co-management opportunities. Quite the opposite: Deals that are ostensibly more lucrative (as measured by the fee on the deal relative to the bank's prior-year fee revenue) are associated with *less* aggressive recommendations.

These findings contrast starkly with those shown in Table 5 for analyst behavior ahead of deals that did involve co-managers and so provide support for our interpretation of Table 5. The prospect of co-management opportunities does indeed seem to induce aggressive analyst behavior.

5.4 How Do Issuers Choose Co-managers?

5.4.1 Equity Transactions

Table 8 summarizes the results from estimating the equity co-manager choice models. The first three columns relate to Model 1, the simultaneous equations system with endogenous switching described in Section 4.1, which is analogous to LMW's lead manager choice model. Conditional on a bank providing research coverage, we estimate two specifications, one for each measure of analyst behavior, shown in columns (1) and (2). Column (3) completes Model 1 by reporting parameter estimates in the absence of coverage. Column (4) reports results from estimating Model 2, the bivariate probit model described in Section 4.2. Here, we relate co-manager choice to the analyst's decision to cover the issuer's stock – regardless of the strength of the analyst's recommendation – treating the coverage decision as endogenous. The explanatory power for each model (measured by the pseudo-R^2) varies between 20.1% (column (3)) and 24.9% (column (4)).

Conditional on a bank providing research coverage, Model 1 indicates that both aggressive recommendations and upgrades increase a bank's chances of becoming co-manager significantly, both statistically and economically: Increasing relative recommendations and upgrades by one standard deviation from the mean increases the likelihood of becoming co-manager by 2.6 and 5.2 percentage points, respectively, from the conditional expectation given coverage of 34.1%. This provides direct support for LMW's conjecture that aggressive analyst research may have been motivated by the hope of becoming co-manager rather than lead manager.

The results from Model 2 in column (4) show that simply covering the issuer's stock – regardless of the direction of opinion – has a positive and statistically significant bearing on a

candidate bank's chances of winning a co-management appointment.[12] The effect is large economically: Coverage provision increases the likelihood of becoming co-manager from the unconditional mean of 2.3% to 17.3%.[13] Taken together, these results suggest that equity co-managers are selected both for their willingness to cover the issuing firm and for providing excessively optimistic coverage.

The strength of bank-firm relationships has a positive and significant effect on a candidate bank's chances of being appointed co-manager in all four models, for instance by up to 5.6 percentage points for a one standard deviation increase in the strength of prior equity relationships. Thus, having an underwriting or lending relationship with the issuer increases one's chances of being appointed a co-manager in the event that the lead-management mandate goes to another bank.

In all four columns, the coefficients for the candidate bank's participation in the lead bank's prior-year syndicates are positive and significant. This is consistent with lead managers having favorable influence at the margin on the issuer's decision whether to select a co-manager with whom the lead manager has worked frequently in the past. The positive (and sometimes significant) coefficients for the lead bank's participation in the candidate's previous syndicates suggest an element of reciprocity of the sort identified by Corwin and Schultz (2005) for IPOs in the late 1990s. Economically, these effects are comparable in magnitude to those of bank-firm relationships.

The coefficients for *indegree* and *eigenvector* centrality indicate that both syndicate relationships with a wide variety of different banks and those with the most prominent banks have independent, positive, and statistically significant effects on a candidate bank's chances of being appointed a co-manager. *Eigenvector* has the larger economic effect, with a one standard deviation increase nearly doubling the likelihood of becoming co-manager in column (4).

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[12] This recalls earlier findings that the provision of coverage influences the lead manager choice of recent IPO firms for their first SEO; see Cliff and Denis (2005) and Ljungqvist and Wilhelm (2005).
[13] The unconditional expectation is a little higher than 1 in 50 as some deals involve more than one co-manager.

The control variables for candidate-bank and lead-bank characteristics shed light on potential tensions among issuers, lead managers, and prospective co-managers. A candidate bank's debt and equity underwriting market shares do not affect its chances of becoming co-manager (other than in the absence of coverage). Assuming that issuers always prefer more reputable banks, other things equal, this result suggests that lead managers exercise influence in the co-management decision that cuts against their more reputable competitors. However, such efforts are undermined when the candidate bank has significant lending capacity, which has a positive and generally significant effect on the probability of being selected as co-manager. Since commercial banks were the predominant source of loans during the sample period, this finding is consistent with the idea that commercial banks used their lending capacity to gain co-management appointments.

When there is a wide gap between its reputation and that of the lead bank, a co-management candidate appears less viable: All else equal, a one standard deviation increase in the absolute difference in equity market shares is nearly enough to reduce the bank's chances of becoming co-manager to zero. When we interact this variable with a dummy variable indicating whether the lead bank is a top ten equity underwriter, we find that the most reputable banks are either more willing or have little choice but to work with substantially less reputable co-managers. The latter explanation is more plausible if the most reputable banks are less inclined to play second fiddle when a highly reputable competitor is chosen ahead of them to lead a deal.

Finally, there is evidence in columns (3) and (4) that banks can to some extent buy deal flow through acquisitions.

As for analyst characteristics, candidate banks employing more reputable analysts are more likely to be chosen as co-manager. In columns (1) and (2), the effect of the all-star status and seniority of the analyst who provides coverage for the issuer's stock is positive and significant. In columns (3) and (4), where we include cases of noncoverage, we recode the all-star variable to

capture whether an all-star analyst at the candidate bank provided coverage for the issuer's Fama-French industry at the time of the deal in hand. This significantly improves the chances of becoming co-manager, and the economic magnitude of the effect in column (4) is similar to that of strong bank-firm relationships. Interestingly, issuers seem to avoid analysts with a reputation for intensive coverage, whereas neither forecast accuracy nor forecast optimism affect co-manager choice.

In sum, the determinants of equity co-manager choice likely reflect both the issuer's preferences and those of the (pre-determined) lead manager. All else equal, covering the issuer's stock appears to serve co-management candidates well, as do aggressive recommendations and upgrades – in marked contrast to the negative effects found by LMW. This may explain why banks appear to have inflated their recommendation levels ahead of equity deals, even though doing so did not boost their chances of serving as lead manager. Instead, the "reward" may have been selection as co-manager. Other things equal, more reputable banks are not more likely to be appointed co-manager except in so far as their reputation derives from lending capacity, as would more typically be the case for a commercial bank. Though rare, some issuers maintain multiple bank relationships and appear to "rotate" through their relationship banks from deal to deal, with the non-winning banks being selected as co-managers. Co-manager choice also appears to be influenced by the extent to which a candidate bank is well connected among its peers in general and the lead manager in particular.

5.4.2 Debt Transactions

As in the equity models, aggressive recommendation levels and upgrades significantly increase a bank's chances of becoming co-manager in Table 9, by 3.1 and 1.2 percentage points from the 7.1% probability conditional on coverage, respectively. By contrast, LMW find that aggressive recommendations significantly *reduce* a candidate bank's chance of becoming *lead* manager in debt offerings. Again, a greater probability of being appointed co-manager may explain LMW's finding.

Compared to the equity sample in Table 8, providing research coverage ahead of debt

transactions (column (4)) yields a more modest increase in a bank's chances of becoming co-manager, from the unconditional likelihood of 3.4% to 7.0%, all else held equal.

The effects of the other covariates in Table 9 largely mirror those shown in Table 8, with two notable exceptions. The first is that the all-star dummy is negative and significant in the noncoverage (column (3)) and endogenous coverage specifications (column (4)). One interpretation is that the most reputable banks, employing the top analysts, will not stoop to co-managing debt deals. This seems plausible given that narrower spreads on debt transactions make co-management for them even less attractive in this context than in equity deals. The second exception is that debt issuers show some tendency to avoid analysts with a history of optimistic earnings forecasts.

5.4.3 Co-manager Choice by Lead Manager Type

We briefly investigate how the determinants of co-manager choice differ in deals lead-managed by investment banks versus commercial banks. In untabulated tests, we find that the beneficial effects of providing coverage and of aggressive analyst behavior are largely concentrated in the 4,102 equity deals and 2,647 debt deals that are lead-managed by an investment bank rather than in the 778 equity deals and 776 debt deals lead-managed by a commercial bank. If syndicate choice is largely up to the lead manager, as some of our previous evidence suggests, investment banks appear to choose their co-managers partly on the basis of their demonstrated willingness to put pressure on their analysts, while other considerations matter more to commercial banks.

Consistent with this interpretation, we find in unreported tests that commercial banks are significantly more likely to choose investment banks as their co-managers in equity deals that they lead-manage, while the reverse is true in debt deals. Since commercial banks entered the debt markets earlier and more successfully than the equity markets, this suggests that distribution capacity and access to investor networks matter more to commercial bank leads than do any boosts they may derive from a co-manager's analyst stimulating demand for the stock.

5.5 Does Co-management Yield Lead-management Opportunities?

We now investigate whether co-management opportunities serve as a stepping-stone to more lucrative lead-management opportunities. To do so, we estimate a version of Model 2 for the *lead*-management choice while controlling for a candidate bank's past *co-management* relationships with a prospective issuer.[14] We do so in the complete sample of deals lead-managed by the 50 largest banks during 1993-2002, that is, we include deals that did not *themselves* involve co-managers.

The results in columns (1) and (3) of Table 10 show that banks are indeed more likely to win lead-management mandates if they have previously established strong ties with the issuer through co-management. This is true for both equity and debt transactions, and in each case, banks benefit both from having previously acted as debt and as equity co-managers. To illustrate the magnitude of the effect, note that the predicted probability of becoming equity lead manager for an *otherwise average* bank without an underwriting relationship with the issuer is 1.1%. By how much can the bank boost its chances of becoming lead manager by first establishing a co-manager relationship? From Table 8, the predicted probability of becoming co-manager, conditional on providing coverage, is 17.3%. The predicted probability of subsequently becoming lead-manager, conditional on having been a co-manager in the past and on coverage, is 9.5%. The expected increase in the probability of becoming lead-manager in the future is hence $0.173 \cdot 0.095 / 0.011 - 1 = 49\%$.

The remaining coefficients confirm LMW's conclusions in the context of our Model 2 specifications. Banks are more likely to win both equity and debt lead-management mandates, the stronger their lead-management underwriting relationships, the larger their market share in the respective market, the greater their presence in the syndicated loan market, and following mergers. Providing research coverage is especially beneficial ahead of debt transactions, while employing an

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[14] We could equally estimate the effect of co-management relationships on lead appointments in the context of Model 1. However, Model 2 adds nuance to the results reported in LMW's version of Model 1 by including coverage.

all-star analyst who covers the issuer's sector helps win equity mandates. In addition, banks that are well-connected in terms of high *indegree* or *eigenvector* centrality are more likely to be chosen as lead-managers. Economically, the *eigenvector* measure has the largest effect, nearly doubling the probability of selection in the equity sample and increasing it by more than 50% in the debt sample.

5.6 Scaling the Hierarchy in the Face of Exclusive Relationships

These results may be misleading if issuers "rotate" through a set of relationship banks from deal to deal, with the non-winning banks being selected as co-managers, because then the same banks will have strong lead *and* strong co-management ties to the issuer. In columns (2) and (4), we restrict the samples to the 1,870 equity and 1,910 debt deals in which the issuer had a *single* lead-management relationship and ask whether strong co-management ties help a candidate bank "crack" such exclusive firm-bank relationships. Consistent with LMW, we find persistence in relationships in the sense that the relationship bank is significantly more likely to be chosen as the lead. But there is switching: Fully 711 of the 1,870 equity mandates and 975 of the 1,910 debt mandates are won by a bank other than the sole relationship bank, and the positive and significant coefficients in columns (2) and (4) confirm that a candidate bank is more likely to become lead manager in an equity (debt) deal if it has served as co-manager on the issuer's prior equity (debt) deals.[15]

These results provide a plausible explanation for why banks compete for the apparently modest rewards associated with co-management mandates. In a setting where reputational considerations impose substantial barriers to entry, success in attracting co-management appointments provides an effective means of scaling the hierarchy, even in the presence of strong bank-firm relationships.

6. Conclusion

We began the paper by asking why banks pressured their analysts to provide aggressively

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[15] The unconditional means tell a similar story: Ahead of equity deals, successful candidate banks had average equity co-management relationships of 0.158, compared to 0.013 for the unsuccessful banks. The corresponding means ahead of debt deals are 0.090 and 0.006. The differences are significant with *t*-statistics of 44.1 and 45.8, respectively.

positive assessments of issuing firms during the 1990s when doing so apparently had little positive effect on their chances of receiving lead-management appointments and ultimately led to penalties and costly structural reform. Following the conjecture offered by Ljungqvist, Marston, and Wilhelm (2006) we explore whether such behavior improved a bank's chances of being appointed co-manager which, in turn, might have opened the door to more lucrative lead-management appointments in the future. Our findings support this conjecture.

Consistent with the belief that issuers buy analyst coverage with co-management appointments, simply providing coverage has a strong positive effect on a bank's chances of being appointed a co-manager. Aggressive recommendations or upgrades also significantly increase the chances of being appointed co-manager, for both equity and debt offerings. Finally, banks that attract an issuer's co-management appointments, and so establish ties with the issuer, are more likely to win more lucrative lead-management mandates in the future. This is true even in the hardest-to-win cases where the issuer has traditionally maintained an exclusive relationship with another bank.

In summary, our findings suggest a causal chain consistent with the reputation-intensive nature of the securities underwriting business. Aggressive analyst behavior appears to have played some role in attracting co-management appointments. Aggressive behavior was concentrated most heavily among lower-reputation banks at a time when heavily capitalized commercial banks were aggressively pursuing securities underwriting business. The effect was strongest in the debt markets where commercial banks first gained their toehold.

If there is merit in this interpretation, our results suggest a potential unintended anti-competitive effect that might arise from the Global Settlement's separation of research and investment banking. Specifically, if separation of these functions compromises the ability to compete for co-management appointments via analyst coverage, this provision of the Settlement potentially bears most heavily on marginal competitors fighting to climb the securities underwriting ranks.

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Figure 1. Fraction of equity and debt deals that involve co-managers.
The graph shows the fraction of equity and debt transactions that involve one or more co-managers between 1970 and 2003 as reported by Securities Data Corporation, after excluding transactions by firms classified as SIC 60-69 (financial institutions, etc.) or SIC 90-99 (government agencies, etc.).
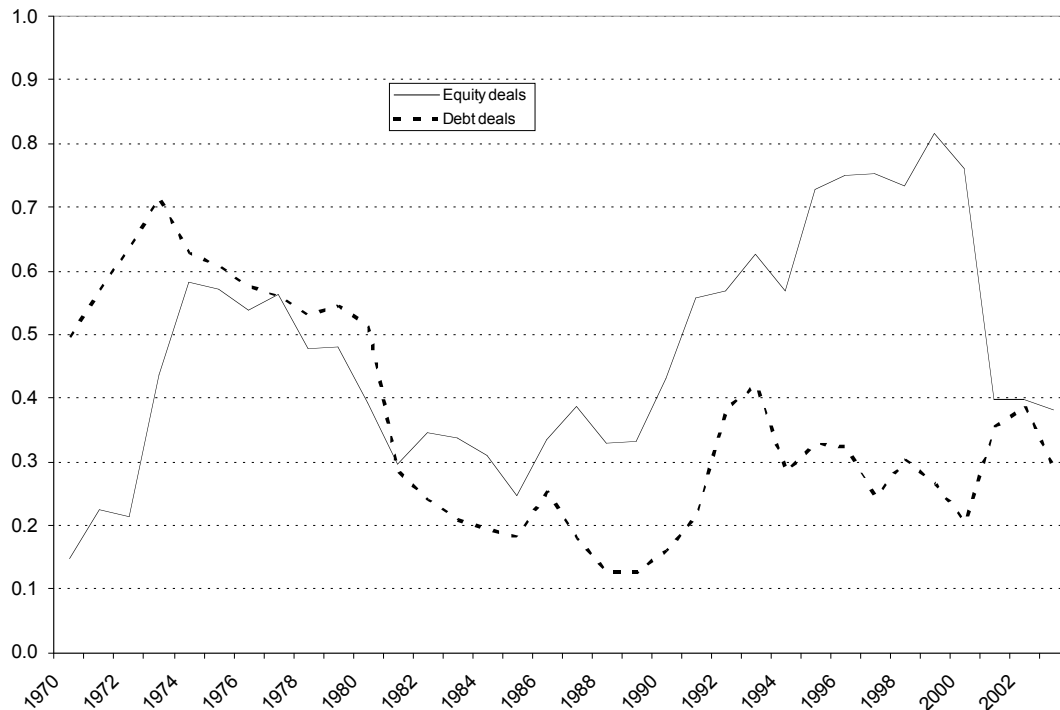
Figure 2. Fraction of equity and debt deals that involve commercial banks as co-manager.
The graph shows the fraction of equity and debt transactions that involves one or more commercial banks as co-managers between 1970 and 2003 as reported by Securities Data Corporation, after excluding transactions by firms classified as SIC 60-69 (financial institutions, etc.) or SIC 90-99 (government agencies, etc.) as well as deals that do not involve co-managers. Some commercial banks had grandfathered underwriting privileges, allowing them to co-manage underwritten securities offerings in the 1970s and early 1980s.
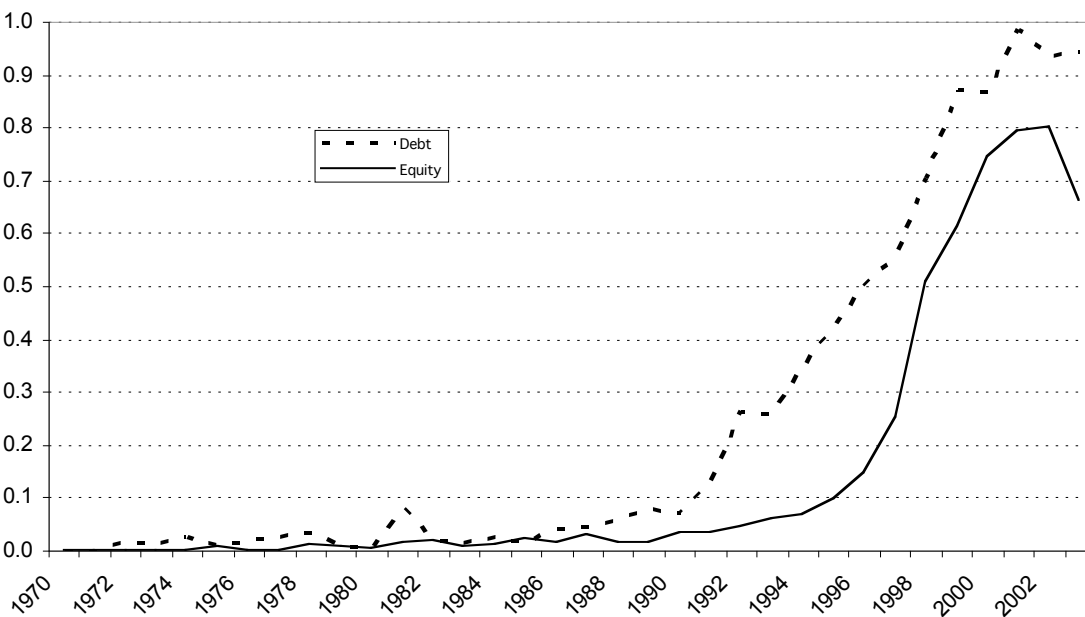
Figure 3. Weighted average number of co-management partners.
The figure plots the number of unique co-managers that the average bank has syndication relationships with in a given year against the real aggregate proceeds raised by non-financial issuers in the U.S. (in dollars of 2005 purchasing power, deflated using the GDP price deflator). We compute a weighted average of co-management partners using each bank's underwriting market share as weights. This gives more weight to the number of partners of the most active underwriters.
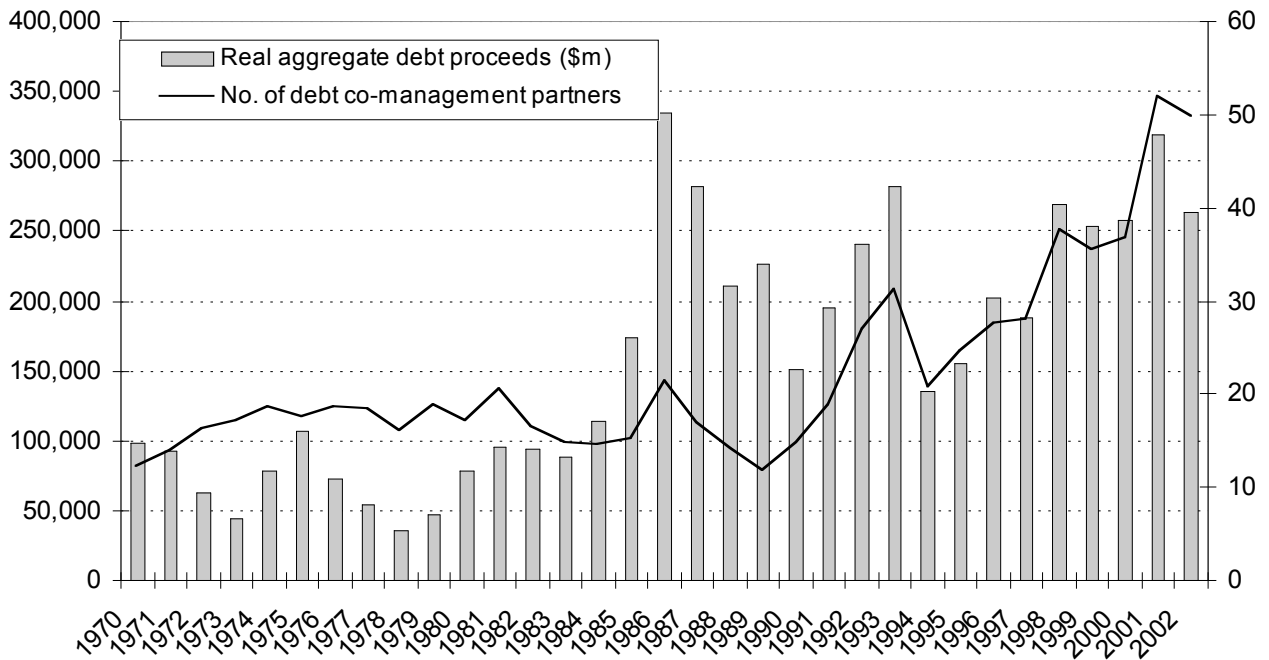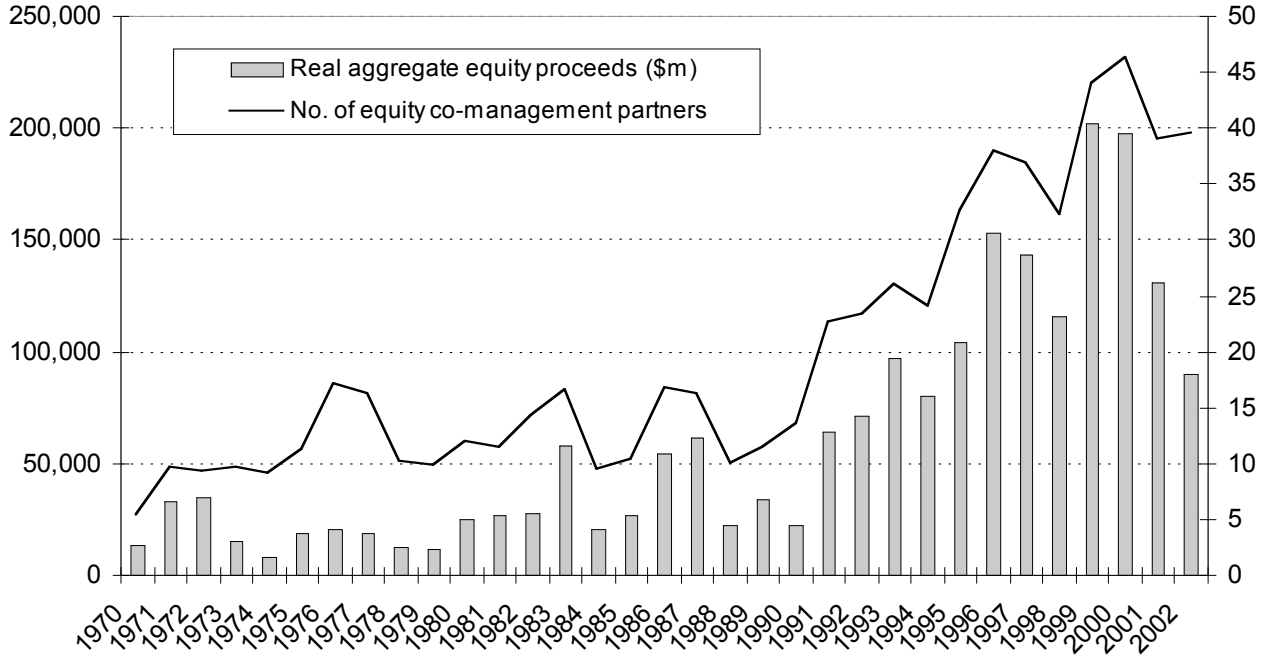
Table 1. The Sample of Capital-Raising Transactions.

The sample consists of 8,303 capital-raising transactions completed between December 1, 1993 and June 30, 2002 as reported by Securities Data Corporation, after excluding non-underwritten issues; offerings that did not involve co-managers; transactions by firms classified as SIC 6000-6999 (financial institutions, etc.) and SIC 9000-9999 (government agencies, etc.); and offerings by non-U.S. corporations. We also require that each deal was lead-managed by one of the 50 largest underwriters active that year. Research coverage in the last column requires that the lead manager's research department publish at least one research report about the issuing company in the two years preceding the transaction, based on the First Call and I/B/E/S recommendations databases or the I/B/E/S earnings forecast database. All currency amounts are in nominal terms.

					Co-managers				Lead manager		
	No. of deals	% of deals	Aggregate amount raised ($m, nominal)	% of amt.	Mean number	Median number	Range	Fraction of deals with multiple co-managers %	Mean under-writing market share %	% comm-ercial banks	% covering issuer's stock prior to the deal
Equity											
Common stock	4,851	58.4	665,747	42.8	2.2	2	1 – 22	70.7	5.9	15.8	39.6
Private common	29	0.3	3,552	0.2	1.7	1	1 – 6	41.4	2.5	41.4	44.8
Debt											
Non-convertible debt	2,910	35.0	784,258	50.5	3.8	3	1 – 24	78.3	9.3	22.2	62.7
Convertible debt	136	1.6	40,038	2.6	2.8	2	1 – 11	77.9	7.8	8.8	81.6
Private non-conv. debt	142	1.7	11,218	0.7	1.3	1	1 – 10	18.3	3.8	64.8	16.2
Private convertible debt	8	0.1	1,071	0.1	2.0	2	1 – 4	62.5	5.8	25.0	75.0
Non-convertible preferred	107	1.3	15,205	1.0	3.4	3	1 – 16	77.6	11.2	6.5	37.4
Convertible preferred	98	1.2	30,739	2.0	3.1	2	1 – 14	68.4	9.4	7.1	84.7
Private non-conv. preferred	9	0.1	618	0.0	1.4	1	1 – 2	44.4	3.1	55.6	11.1
Private conv. preferred	13	0.2	1,460	0.1	1.1	1	1 – 2	7.7	2.2	38.5	23.1
All deals	8,303	100.0	1,553,905	100.0	2.8	2	1 – 24	72.4	3.6	18.7	48.5

Table 2. Main Variable Definitions.

Bank-firm relationships	
bank's share of firm's equity deals/debt deals/loans	Let $P_{j,k,t}^d$ denote the aggregate proceeds company k raised in deals lead-managed by bank j over the five years preceding quarter t in deals of type $d = \{loan, equity, debt\}$. The strength of company k's type-d relationship with bank j is $R_{j,k,t}^d = P_{j,k,t}^d / \sum_j P_{j,k,t}^d$. The equity and debt relationship variables are constructed from data for all transactions in SDC, including those without co-managers. Lending relationships are based on data from the DealScan database.
Bank-bank relationships	
bank's participation in lead's syndicates	The strength of syndicate relationships between every pair of banks i and j is $S_{i,j,t}^d = P_{i,j,t}^d / \sum_j P_{i,j,t}^d$ where $P_{i,j,t}^d$ is the aggregate proceeds from deals of type $d = \{equity, debt\}$ that were lead-managed by bank i and that involved bank j as co-manager in the calendar year preceding year t. (For deals involving multiple co-managers, each is given equal credit.) By construction, $\sum_j S_{i,j,t}^d = 1$, so $S_{i,j,t}^d$ is bank j's share of bank i's portfolio of co-managers in year t-1.
lead's participation in bank's syndicates	$= S_{j,i,t}^d$
indegree centrality	The number of unique banks a bank has syndicated with in the prior calendar year, normalized by the number of possible syndication partners. Formally, $indegree_{j,t}^d = \sum_i I(S_{i,j,t}^d > 0)/(N-1)$ where $I(\ )$ is an indicator function evaluating whether bank j ever served as co-manager in deals lead-managed by bank i in year t-1, and N is the number of banks active as lead manager that year.
eigenvector centrality	A recursive measure of *indegree* that weights syndication ties by how well networked each syndication partner is. Formally, $eigenvector_{j,t}^d \equiv E_{j,t}^d = \sum_i p_{i,j,t}^d E_{i,t}^d$. The weights are the reciprocal of the principal eigenvector p_t^d of a square and symmetric matrix $A_{i,j,t}^d$ whose cells (i,j) record whether or not banks i and j syndicated one or more transactions of type $d = \{equity, debt\}$ in the preceding year.
Bank characteristics	
bank reputation	A bank's share of the equity/debt/loan markets during the prior calendar year. Following a merger, the surviving bank is credited with both predecessors' market shares. Equity and debt data come from SDC; loan market data come from DealScan.
loyalty index	Measures how often a bank retains its clients in consecutive deals as a control for unobserved factors such as execution capability that affect an issuer's choice. Let I_{ck} and $I_{rk} = 1$ if bank j managed k's penultimate and most recent deals, respectively, in the five years to quarter t, and 0 otherwise. Then j's loyalty index $= \Sigma_k I_{ck} I_{rk} / \Sigma_k I_{ck}$ (the number of retained clients over the total number of clients).

Research coverage and analyst behavior

coverage	= 1 if the bank's research department has published at least one research report about the issuing company in the two years preceding the transaction, based on the First Call and I/B/E/S recommendations databases or the I/B/E/S earnings forecast database.
relative recommendation	= analyst's latest recommendation in the two-year window prior to a deal minus the median recommendation of all analysts covering the issuer's stock. Recommendations are reverse-scored so that 5=strong buy. Positive values denote relatively aggressive recommendations.
relative upgrade	Change between an analyst's two most recent recommendations, net of the median change. We require these recommendations to be no older than nine months and 24 months, respectively. Positive values denote relatively aggressive upgrades.

Analyst reputation

all-star analyst	Analyst ranked top-three or runner-up in the October *Institutional Investor* issue preceding the deal in hand.
relative forecast accuracy	The analyst's scaled rank (relative to other analysts covering the same stocks) of deviations between forecast and subsequent earnings realization.
relative forecast optimism	The analyst's scaled rank (relative to other analysts covering the same stocks) based on a dummy variable = 1 if the analyst's forecast for a stock exceeds consensus.
relative coverage intensity	The analyst's scaled rank (relative to other analysts covering the same stocks) of the number of reports published per annum.
	Each of the three preceding measures is averaged across stocks the analyst covers in years t-2 through year t and ranges from 0 to 100, with a higher number indicating greater forecast accuracy, optimism, and coverage intensity, respectively; see Hong, Kubik, and Solomon (2000) and Hong and Kubik (2003).
analyst's seniority	Years in I/B/E/S database.

Table 3. Descriptive Statistics.

The unit of observation in this table is a bank-deal pair. The dataset consists of 8,303 deals, for each of which the 50 largest banks are deemed to compete to be chosen as co-manager (except for debt deals in 2002, when there were fewer than 50 banks in the market). This gives a sample of 414,760 bank-deal pairs. The column headed 'co-managers' refers to the 20,106 bank-deal pairs involving banks that were awarded co-management assignments, while the column headed 'other candidate banks' refers to the 394,654 bank-deal pairs involving banks that were eligible to compete for but were not chosen as co-manager. For each bank-deal pair, we report the main explanatory variables used in the econometric models. See Table 2 for variable definitions. The issuer's industry is based on the 48 Fama-French (1997) industries. We lose some observations for relative forecast accuracy, coverage intensity, optimism, and seniority because not all analysts disclose their name in the I/B/E/S recommendations file. The last column provides t-tests of differences in means/fractions comparing winning to losing banks.

	Co-managers	Other candidate banks	t-test
Bank-firm relationships			
mean bank's share of firm's equity deals prior 5 years (%)	3.1	0.2	-73.1***
mean bank's share of firm's debt deals prior 5 years (%)	3.7	0.3	-89.5***
mean bank's share of firm's loans prior 5 years (%)	3.4	0.4	-74.7***
Bank-bank relationships			
mean bank's participation in lead's prior-year syndicates (%)	5.1	1.5	-128.6***
mean lead's participation in bank's prior-year syndicates (%)	4.5	2.0	-52.2***
mean *indegree* centrality (%)	7.6	4.0	-146.1***
mean *eigenvector* centrality (%)	23.8	13.0	132.7***
Bank characteristics			
mean bank's equity market share prior calendar year (%)	3.8	1.6	-88.3***
mean bank's debt market share prior calendar year (%)	4.3	1.6	-105.0***
mean bank's loan market share prior calendar year (%)	0.5	0.1	-36.7***
mean abs(lead's market share – bank's market share) (%)	6.3	6.7	11.5***
mean loyalty index (%)	55.0	41.0	-57.0***
fraction commercial banks (%)	39.8	34.3	-16.0***
Research coverage, analyst behavior, and analyst reputation			
fraction with coverage (%)	40.9	8.1	-158.3***
mean relative recommendation	0.112	-0.030	-13.6***
mean relative upgrade	0.108	0.101	-0.6
fraction of issuers covered by all-star analysts (%)	10.7	1.5	-92.3***
fraction with all-star analyst covering the issuer's industry (%)	51.6	24.7	-85.4***
mean relative forecast accuracy	50.6	50.0	-30.7***
mean relative forecast optimism	49.8	49.9	5.7***
mean relative coverage intensity	49.8	50.0	7.7***
mean analyst's seniority (years in I/B/E/S database)	5.9	4.3	-79.5***

Table 4. Strategic Coverage Decisions.

We estimate the determinants of the coverage decision using probit MLE (equation (3)). The coverage decision determines whether or not we observe the analyst's behavior in subsequent tables. Therefore, the estimation results in subsequent tables are conditioned on the coverage decision using the Heckman (1979) MLE framework, where the coverage decision, analyst behavior, and co-manager choice are jointly estimated. For the purpose of illustrating what determines coverage, this table shows the results of two stand-alone probits, for equity and debt deals respectively. The dependent variable is an indicator equal to one if the bank's analyst covers the issuer's stock at any point during the two years preceding the deal, based on the First Call and I/B/E/S recommendations databases or the I/B/E/S earnings forecast database. Since commercial banks in our sample period are generally less likely to provide research coverage, we interact the main explanatory variables with a dummy equaling one for commercial banks. Banks that cover a larger fraction of an issuer's industry are more likely to cover the issuer as well. We control for this using the fraction of the issuing firm's Fama-French (1997) industry that is covered by bank j, measured over the three-year window ending in the year of the deal. The dummy for mergers is coded 1 in the quarter of the event, and ½, ⅓, and ¼ in the next three quarters. Intercepts and year effects are not shown. Standard errors are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively. The number of observations is 244,624 in the equity model and 170,136 in the debt model.

	Probit 1: Equity deals		Probit 2: Debt deals	
		× commercial bank dummy		× commercial bank dummy
Bank-firm relationships				
bank's share of firm's debt deals prior 5 years	1.028***	-0.603***	0.489***	-0.829***
	0.097	*0.187*	*0.056*	*0.132*
bank's share of firm's equity deals prior 5 years	2.162***	-0.526***	1.029***	0.189
	0.064	*0.127*	*0.064*	*0.165*
bank's share of firm's loans prior 5 years	1.186**	-0.389	0.085	0.455
	0.418	*0.426*	*0.306*	*0.313*
Bank characteristics				
bank's equity market share prior calendar year	0.359	3.788***	0.022	8.023***
	0.344	*0.955*	*0.233*	*0.616*
bank's debt market share prior calendar year	-1.761***	-0.990	0.285	-1.683***
	0.334	*0.563*	*0.272*	*0.461*
bank's loan market share prior calendar year	-1.870	5.000	2.159	-1.452
	4.356	*4.368*	*2.910*	*2.932*
=1 if bank involved in merger	0.329***	0.006	0.295***	-0.271***
	0.047	*0.060*	*0.038*	*0.047*
fraction of firm's Fama-French industry covered	4.773***	-0.208	2.970***	1.964***
	0.079	*0.138*	*0.054*	*0.084*
=1 if bank has all-star analyst covering Fama-French industry	0.185***	-0.152***	0.599***	-0.307***
	0.018	*0.032*	*0.015*	*0.025*
Firm characteristics				
underwriting fee on deal / bank's prior-year fee income	0.047***	-0.028**	-0.021***	0.058***
	0.006	*0.011*	*0.004*	*0.006*
log firm's $ equity or debt proceeds prior 5 years	0.190***	-0.013***	0.044***	-0.021***
	0.003	*0.004*	*0.002*	*0.002*
log time since IPO	0.426***		0.065***	
	0.009		*0.006*	
=1 if firm is not listed	0.037		-0.697***	
	0.084		*0.027*	
Diagnostics				
LR test: all coefficients = 0 (χ^2)	22,274***		34,378***	
Pseudo-R^2	26.4 %		24.6%	

Table 5. Analyst Behavior.
The dependent variables are relative recommendations and relative upgrades. These are observed only when the bank covers the stock, so we estimate Heckman (1979) selection models using joint MLE. Representative results for the associated selection equation are shown in Table 4. The estimation results in this table are reported in structural form. The reduced forms used to generate instruments for the models in Tables 6 and 7 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. Analyst characteristics are defined as in Table 2. *Indegree* and *eigenvector* are orthogonalized against each other to avoid multicollinearity problems. The bubble dummy equals 1 for deals completed in 1999 and 2000. The four 'bank pressure proxies' measure the size of potential rewards for liquidating reputation capital, or equivalently the amount of pressure that might be put on an analyst to deliver a favorable recommendation. These are the instruments we use to identify the system. The more lucrative the client – as measured by the fee on the deal in question relative to the bank's prior-year fee pool, and by the firm's deal history – the more tempted the analyst to inflate the recommendation. Banks with more 'loyal' clients are less likely to resort to inflating analyst forecasts. We also control for time-variation in the bank's underwriting fee revenue, on the assumption that decreases in fee income (relative to the previous year) may prompt more aggressive analyst behaviour in an effort to reverse the decline. The momentum variable equals the stock's cumulative market-adjusted return for the six months preceding the month of the analyst's most recent recommendation before the deal date. It is calculated as in Jegadeesh et al. (2004, page 1120). Intercepts are not shown. Standard errors are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% (two-sided), respectively. The Staiger and Stock (1997) test is a test of the strength of the instruments. It is based on an *F*-test of the joint significance of the instruments in the reduced-form models. The critical value for strong instruments is 10. The number of observations where the bank provides research coverage is 8,891 in the equity model and 22,066 in the debt specifications.

	Equity		Debt	
Relative…	recomm.	upgrades	recomm.	upgrades
	(1)	(2)	(3)	(4)
Bank-firm relationships				
bank's share of firm's debt deals prior 5 years	0.007	-0.089	0.312***	0.098*
	0.072	*0.073*	*0.044*	*0.042*
bank's share of firm's equity deals prior 5 years	0.012	-0.170***	0.100*	-0.027
	0.055	*0.045*	*0.042*	*0.040*
bank's share of firm's loans prior 5 years	-0.032	-0.057	0.118	-0.198**
	0.097	*0.107*	*0.073*	*0.071*
Bank-bank relationships				
bank's participation in lead's prior-year syndicates	0.105	-0.562**	-0.101	0.015
	0.172	*0.180*	*0.135*	*0.131*
lead's participation in candidate's prior-year syndicates	0.163	0.112	0.147*	0.118
	0.140	*0.149*	*0.073*	*0.071*
bank's *indegree* centrality	-0.005	0.005	-0.009***	-0.004
	0.005	*0.005*	*0.003*	*0.003*
bank's *eigenvector* centrality	0.004	-0.303*	0.413***	0.031
	0.139	*0.148*	*0.090*	*0.088*
Bank characteristics				
bank's equity market share prior calendar year	0.283	0.057	-0.471*	-0.507*
	0.404	*0.425*	*0.211*	*0.204*
bank's debt market share prior calendar year	0.234	0.791*	0.401	0.780**
	0.344	*0.367*	*0.274*	*0.265*
bank's loan market share prior calendar year	-0.172	-0.931*	1.082*	0.286
	0.445	*0.437*	*0.455*	*0.440*

Table 5. Analyst Behavior (continued).

Relative…	Equity		Debt	
	recomm.	upgrades	recomm.	upgrades
	(1)	(2)	(3)	(4)
Analyst characteristics				
=1 if analyst is ranked 'all-star' by *Institutional Investor*	-0.017	-0.053[*]	0.057[***]	-0.035[*]
	0.026	*0.026*	*0.015*	*0.014*
… x bubble dummy	0.011	0.144[**]	0.041	0.018
	0.047	*0.049*	*0.030*	*0.029*
relative forecast accuracy	0.395[***]	0.265[**]	0.262[***]	0.177[*]
	0.093	*0.104*	*0.072*	*0.070*
relative forecast optimism	0.377[***]	0.173[**]	0.507[***]	0.114[**]
	0.059	*0.067*	*0.041*	*0.040*
relative coverage intensity	-0.042	0.289[***]	0.075	0.155[***]
	0.075	*0.082*	*0.046*	*0.044*
log analyst's seniority (in years)	0.006	-0.022	0.030[***]	0.000
	0.012	*0.013*	*0.009*	*0.008*
Bank pressure proxies				
underwriting fee on deal / bank's prior-year fee income	0.064[***]	-0.005	0.034[***]	0.009[*]
	0.010	*0.011*	*0.004*	*0.004*
log firm's $ equity or debt proceeds prior 5 years	0.004	0.017[**]	0.012[***]	0.009[***]
	0.007	*0.006*	*0.002*	*0.002*
loyalty index	0.008	0.020	-0.036	-0.052[*]
	0.051	*0.059*	*0.024*	*0.023*
% change in bank's fee income relative to previous year	-0.018	-0.009	-0.013[*]	0.008
	0.010	*0.011*	*0.006*	*0.006*
Momentum				
cumulative market-adjusted return prior to analyst's report	0.025	0.033	-0.037	0.124[***]
	0.025	*0.028*	*0.020*	*0.020*
Diagnostics				
Wald test: all coefficients = 0 (χ^2)	148.3[***]	106.9[***]	409.5[***]	138.1[***]
Heckman's λ (probability of non-coverage)	-0.052	-0.011	-0.091[***]	0.018
Likelihood ratio test of independent equations ($\rho=0$) (χ^2)	4.0[*]	0.3	38.0[***]	1.6
Staiger-Stock (1997) instrument strength test (*F*)	9.9[***]	9.1[**]	21.2[***]	14.8[***]

Table 6. Likelihood of Co-management.

The dependent variable is an indicator variable set equal to one if the offering involves one or more co-managers, and zero otherwise. The estimation sample thus includes not only the 8,303 co-managed offerings described in Table 1 but also the 1,193 equity and 7,633 debt transactions without co-managers that satisfy our sample criteria. Estimation uses probit MLE. Intercepts are not shown. Standard errors are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% (two-sided), respectively. "False positive" are transactions that the probits classify as strong co-management candidates based on their characteristics (using a 50% predicted probability cut-off) but that did not in fact involve co-managers.

	Equity	Debt
	Pr(co-managed)	Pr(co-managed)
Bank-firm relationships		
bank's share of firm's debt deals prior 5 years	0.427***	0.543***
	0.060	*0.057*
bank's share of firm's equity deals prior 5 years	-0.529***	-0.079
	0.089	*0.045*
bank's share of firm's loans prior 5 years	-0.034	-0.063
	0.168	*0.069*
Bank characteristics		
bank's equity market share prior calendar year	-2.736***	-0.462
	0.738	*0.517*
bank's debt market share prior calendar year	-2.056*	-0.576
	0.804	*0.426*
bank's loan market share prior calendar year	1.647*	-2.567***
	0.727	*0.502*
Bank characteristics		
loyalty index	0.170	-0.224*
	0.105	*0.113*
=1 if commercial bank	-0.224***	-0.055
	0.051	*0.042*
bank's *indegree* centrality	-0.082***	-0.031***
	0.012	*0.007*
bank's *eigenvector* centrality	3.116***	1.259***
	0.277	*0.201*
Firm/offering characteristics		
log size of deal	0.372***	0.487***
	0.026	*0.013*
log firm's $ equity or debt proceeds prior 5 years	-0.127***	0.048***
	0.012	*0.005*
Diagnostics		
Pseudo R^2	13.0 %	23.2 %
Wald test: all coefficients = 0 (χ^2)	586.6***	2,154.2***
No. of deals	6,073	11,056
No. of false positives (50% cutoff)	956	879

Table 7. Analyst Behavior in Co-manager-eligible Deals that Were Not Co-managed.
The models estimated are the same as in Table 5. The sample consists of the false positives (co-manager-eligible deals) identified from Table 6. There are 956 equity deals and 879 debt lead-only deals whose characteristics suggest they are more likely than not to be co-managed (using a 50% predicted probability cut-off in the Table 6 probits). Intercepts are not shown. Standard errors are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% (two-sided), respectively. The Staiger and Stock (1997) test is a test of the strength of the instruments. It is based on an F-test of the joint significance of the instruments in the reduced-form models. The critical value for strong instruments is 10. The number of observations where the bank provides research coverage is 3,019 in the equity model and 6,283 in the debt specifications.

	Equity		Debt	
Relative…	recomm.	upgrades	recomm.	upgrades
	(1)	(2)	(3)	(4)
Bank-firm relationships				
bank's share of firm's debt deals prior 5 years	0.042	-0.087	0.201*	-0.006
	0.106	*0.134*	*0.083*	*0.088*
bank's share of firm's equity deals prior 5 years	0.129	-0.042	0.334***	0.081
	0.087	*0.081*	*0.079*	*0.107*
bank's share of firm's loans prior 5 years	-0.041	-0.081	0.388***	0.212
	0.148	*0.184*	*0.115*	*0.164*
Bank-bank relationships				
bank's participation in lead's prior-year syndicates	-0.181	-0.037	-0.046	-0.674**
	0.260	*0.279*	*0.236*	*0.255*
lead's participation in candidate's prior-year syndicates	0.294	0.453	-0.078	0.157
	0.266	*0.277*	*0.189*	*0.128*
bank's *indegree* centrality	-0.013	0.000	0.006	0.019***
	0.009	*0.008*	*0.006*	*0.005*
bank's *eigenvector* centrality	0.001	-0.003	0.001	0.002
	0.003	*0.003*	*0.002*	*0.002*
Bank characteristics				
bank's equity market share prior calendar year	-2.130***	-0.590	-0.534	-0.299
	0.562	*0.633*	*0.394*	*0.372*
bank's debt market share prior calendar year	0.802	0.492	0.561	0.949
	0.521	*0.540*	*0.531*	*0.542*
bank's loan market share prior calendar year	0.133	-0.246	-0.524	-1.254
	0.624	*0.399*	*0.734*	*0.716*

Table 7. Analyst Behavior in Co-manager-eligible Deals that Were Not Co-managed (continued).

	Equity		Debt	
Relative…	recomm. (1)	upgrades (2)	recomm. (3)	upgrades (4)
Analyst characteristics				
=1 if analyst is ranked 'all-star' by *Institutional Investor*	0.034	-0.063	0.026	-0.039
	0.046	*0.045*	*0.029*	*0.029*
… x bubble dummy	-0.077	0.078	-0.028	-0.018
	0.074	*0.070*	*0.057*	*0.053*
relative forecast accuracy	0.285	0.075	0.470**	-0.093
	0.177	*0.184*	*0.155*	*0.147*
relative forecast optimism	0.299**	0.188	0.612***	0.096
	0.107	*0.121*	*0.090*	*0.083*
relative coverage intensity	-0.022	0.098	-0.143	0.119
	0.129	*0.146*	*0.082*	*0.083*
log analyst's seniority (in years)	0.000	-0.025	-0.016	-0.052**
	0.022	*0.025*	*0.017*	*0.017*
Bank pressure proxies				
underwriting fee on deal / bank's prior-year fee income	-0.004	-0.007	-0.024**	-0.010
	0.019	*0.019*	*0.009*	*0.008*
log firm's $ equity or debt proceeds prior 5 years	-0.012	0.006	-0.002	0.008
	0.008	*0.011*	*0.007*	*0.006*
loyalty index	-0.064	0.164	-0.068	-0.129**
	0.108	*0.113*	*0.047*	*0.048*
% change in bank's fee income relative to previous year	-0.004	0.000	-0.016	-0.008
	0.017	*0.018*	*0.012*	*0.011*
Momentum				
cumulative market-adjusted return prior to analyst's report	0.071	0.196***	-0.187**	-0.024
	0.040	*0.061*	*0.062*	*0.050*
Diagnostics				
Wald test: all coefficients = 0 (χ^2)	26.6	55.0***	133.1***	59.3***
Heckman's λ (probability of non-coverage)	0.032	-0.089*	0.048	0.017
Likelihood ratio test of independent equations (ρ=0) (χ^2)	0.6	6.3*	2.5	0.3
Staiger-Stock (1997) instrument strength test (*F*)	2.5	1.3	4.1	2.2

Table 8. Co-manager Choice, Equity Transactions.

In Model 1, we estimate the probability that a particular bank is chosen to co-manage a particular equity deal using probit MLE with sample selection correction as per Table 4. The first two columns use relative recommendations and relative upgrades to model analyst behavior, respectively, instrumented from the equations estimated in Table 5 and so treated as endogenous. Analyst behavior is observed only if the bank provides coverage, so column (3) estimates the probability of winning a mandate separately if the bank does not provide research coverage. Model 2 in column (4) pools the sample and estimates the effect of analyst coverage (irrespective of the level of recommendation) using a seemingly unrelated bivariate probit model which treats coverage as endogenous (see Greene, 2003). The first stage of the biprobit SUR model is illustrated in Table 4. The dummies for mergers are coded 1 in the quarter of the event, and ½, ⅓, and ¼ in the next three quarters. Intercepts are not shown. Standard errors are shown in italics. In the first two columns, they are based on the Murphy-Topel adjustment. In column (4), they are clustered on deal id and so heteroskedasticity-consistent. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively. The number of covered and non-covered observations in the first three columns is 8,891 and 234,485, respectively. The number of observations in column (4) is 244,624.

	Model 1			Model 2
	Coverage		No coverage	Endogenous
	Relative recommen-dation	Relative upgrade		analyst coverage model
	(1)	(2)	(3)	(4)
Analyst behavior				
analyst variable	0.680*	1.664*		1.129***
	0.290	*0.798*		*0.049*
Bank-firm relationships				
bank's share of firm's debt deals prior 5 years	0.640***	0.703	1.195***	0.891***
	0.145	*0.371*	*0.096*	*0.092*
bank's share of firm's equity deals prior 5 years	0.871***	1.024	1.261***	0.782***
	0.168	*0.631*	*0.117*	*0.072*
bank's share of firm's loans prior 5 years	0.686***	0.668*	1.175***	1.059***
	0.173	*0.331*	*0.082*	*0.080*
Bank-bank relationships				
bank's participation in lead's prior-year syndicates	1.978***	2.937***	2.159***	2.145***
	0.308	*0.661*	*0.108*	*0.105*
lead's participation in candidate's prior-year syndicates	-0.120	-0.266	0.667***	0.576***
	0.244	*0.399*	*0.082*	*0.074*
bank's *indegree* centrality	0.045***	0.031*	0.054***	0.054***
	0.008	*0.014*	*0.004*	*0.003*
bank's *eigenvector* centrality	0.852*	0.728	2.704***	2.428***
	0.374	*0.906*	*0.088*	*0.082*

Table 8. Co-manager Choice, Equity Transactions (continued).

	Model 1			Model 2
	Coverage		No coverage	Endogenous analyst coverage model
	Relative recommen- dation (1)	Relative upgrade (2)	(3)	(4)
Bank characteristics				
bank's equity market share prior calendar year	0.416	-0.343	1.261***	-0.143
	0.671	*1.008*	*0.117*	*0.284*
bank's debt market share prior calendar year	0.361	-1.007	1.195***	-0.673**
	0.584	*1.074*	*0.096*	*0.255*
bank's loan market share prior calendar year	0.131	1.345	1.175***	2.407***
	0.768	*1.415*	*0.082*	*0.239*
abs(lead's equity market share – bank's equity market share)	-3.211***	-2.852*	-6.542***	-5.815***
	0.974	*1.338*	*0.418*	*0.410*
… x (lead is Top 10 bank)	0.979	0.264	5.968***	4.991***
	1.012	*1.558*	*0.396*	*0.386*
=1 if bank involved in merger	0.097	0.118	0.257***	0.242***
	0.078	*0.144*	*0.030*	*0.027*
Analyst characteristics				
=1 if analyst is ranked 'all-star' by *Institutional Investor*	0.189***	0.209**	0.136***	0.124***
	0.042	*0.078*	*0.016*	*0.015*
relative forecast accuracy	0.355	0.200		
	0.207	*0.310*		
relative forecast optimism	-0.213	-0.232		
	0.159	*0.207*		
relative coverage intensity	-0.375**	-0.909**		
	0.131	*0.298*		
log analyst's seniority (in years)	0.081***	0.099*		
	0.021	*0.045*		
Diagnostics				
Pseudo R^2	21.5 %	23.6 %	20.1 %	24.9 %
Wald test: all coefficients = 0 (χ^2)	495.9***	407.5***	4,330***	15,422***
Correlation of coverage and co-manager equations (ρ)	0.263***	0.129***	0.023	0.160***
Likelihood ratio test of independent equations ($\rho=0$) (χ^2)	67.6***	18.9***	0.2	34.8***

Table 9. Co-manager Choice, Debt Transactions.

In Model 1, we estimate the probability that a particular bank is chosen to co-manage a particular debt deal using probit MLE with sample selection correction as per Table 4. The first two columns use relative recommendations and relative upgrades to model analyst behavior, respectively, instrumented from the equations estimated in Table 5 and so treated as endogenous. Analyst behavior is observed only if the bank provides coverage, so column (3) estimates the probability of winning a mandate separately if the bank does not provide research coverage. Model 2 in column (4) pools the sample and estimates the effect of analyst coverage (irrespective of the level of recommendation) using a seemingly unrelated bivariate probit model which treats coverage as endogenous (see Greene, 2003). The first stage of the biprobit SUR model is illustrated in Table 4. The dummies for mergers are coded 1 in the quarter of the event, and ½, ⅓, and ¼ in the next three quarters. Intercepts are not shown. Standard errors are shown in italics. In the first two columns, they are based on the Murphy-Topel adjustment. In column (4), they are clustered on deal id and so heteroskedasticity-consistent. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively. The number of covered and non-covered observations in the first three columns is 22,066 and 145,745, respectively. The number of observations in column (4) is 170,136.

	Model 1			Model 2
	Coverage		No coverage	Endogenous analyst coverage model
	Relative recommen-dation (1)	Relative upgrade (2)	(3)	(4)
Analyst behavior				
analyst variable	2.000***	1.415***		0.381***
	0.484	*0.292*		*0.035*
Bank-firm relationships				
bank's share of firm's debt deals prior 5 years	0.489*	0.988***	0.873***	0.972***
	0.244	*0.109*	*0.072*	*0.055*
bank's share of firm's equity deals prior 5 years	0.324	0.605***	0.355***	0.408***
	0.253	*0.155*	*0.111*	*0.062*
bank's share of firm's loans prior 5 years	1.250***	1.738***	1.394***	1.398***
	0.237	*0.192*	*0.056*	*0.058*
Bank-bank relationships				
bank's participation in lead's prior-year syndicates	1.873***	1.772***	2.436***	2.423***
	0.405	*0.348*	*0.135*	*0.133*
lead's participation in candidate's prior-year syndicates	0.011	0.059	0.188*	0.177*
	0.210	*0.185*	*0.089*	*0.079*
bank's *indegree* centrality	0.081***	0.068***	0.088***	0.082***
	0.008	*0.007*	*0.003*	*0.003*
bank's *eigenvector* centrality	2.413***	2.927***	3.167***	3.166***
	0.583	*0.383*	*0.090*	*0.084*

Table 9. Co-manager Choice, Debt Transactions (continued).

	Model 1			Model 2
	Coverage		No coverage	Endogenous analyst coverage model
	Relative recommendation (1)	Relative upgrade (2)	(3)	(4)
Bank characteristics				
bank's equity market share prior calendar year	-0.699	-0.621	0.355***	-1.110***
	0.730	0.670	0.111	0.241
bank's debt market share prior calendar year	2.364**	1.390*	0.873***	2.086***
	0.751	0.662	0.072	0.280
bank's loan market share prior calendar year	0.607	1.596	1.394***	2.655***
	1.546	1.256	0.056	0.257
abs(lead's debt market share – bank's debt market share)	-5.468***	-6.604***	-5.847***	-6.048***
	1.087	0.963	0.476	0.492
… x (lead is Top 10 bank)	3.502**	6.080***	6.397***	6.356***
	1.159	0.952	0.463	0.483
=1 if bank involved in merger	0.298***	0.328***	0.059*	0.102***
	0.090	0.080	0.030	0.027
Analyst characteristics				
=1 if analyst is ranked 'all-star' by *Institutional Investor*	-0.026	0.147***	-0.122***	-0.065***
	0.071	0.041	0.021	0.019
relative forecast accuracy	-0.181	0.163		
	0.278	0.191		
relative forecast optimism	-0.856**	-0.014		
	0.272	0.105		
relative coverage intensity	-0.327*	-0.396**		
	0.133	0.126		
log analyst's seniority (in years)	-0.042	0.019		
	0.042	0.025		
Diagnostics				
Pseudo R^2	22.6 %	22.6 %	23.0 %	24.9 %
Wald test: all coefficients = 0 (χ^2)	2,063***	2,119***	6,660***	21,512***
Correlation of coverage and co-manager equations (ρ)	0.131***	0.183***	0.310***	-0.096***
Likelihood ratio test of independent equations (ρ=0) (χ^2)	16.0***	32.2***	114.1***	21.3***

Table 10. Lead-manager Choice.
We estimate the probability that a given bank is chosen to *lead*-manage a particular securities transaction. The specification is similar to Model 2, except that the dependent variable equals 1 if the bank won the lead-management mandate, and 0 otherwise. As before, we concentrate on deals lead-managed by one of the 50 largest underwriters at the time and treat the 50 largest underwriters as being in competition for each deal. Note that we include deals that do not involve co-managers here. There are 6,073 equity deals and 11,056 debt deals in the sample, resulting in 303,680 observations in column (1) and 551,765 observations in column (3). In columns (2) and (4) we restrict the samples to the 1,870 equity and 1,910 debt deals in which the issuer had an exclusive lead-management relationship with one bank and treat the 50 largest underwriters as competing for each deal. The models are estimated using a seemingly unrelated bivariate probit model which treats coverage as endogenous. The first-stage models of the biprobit SUR look similar to those illustrated in Table 4 and are not reported. Intercepts are not shown. Heteroskedasticity-consistent standard errors (which are clustered on deal id) are shown in italics. We use ***, **, and * to denote significance at the 0.1%, 1%, and 5% level (two-sided), respectively.

	Equity		Debt	
	(1)	(2)	(3)	(4)
Research coverage				
candidate bank provides coverage	-0.033	0.756***	0.094***	0.295***
	0.035	*0.062*	*0.021*	*0.047*
Bank-firm relationships (lead)				
bank's share of firm's debt deals as lead prior 5 years	1.162***	0.419***	1.832***	1.858***
	0.067	*0.115*	*0.027*	*0.042*
bank's share of firm's equity deals as lead prior 5 years	2.228***	2.082***	0.580***	0.275**
	0.046	*0.058*	*0.040*	*0.092*
bank's share of firm's loans as lead prior 5 years	0.883***	0.492**	1.273***	1.254***
	0.070	*0.161*	*0.033*	*0.077*
Bank-firm relationships (co-manager)				
bank's share of firm's debt deals as co-manager prior 5 yrs	0.275*	-0.056	1.376***	1.266***
	0.133	*0.220*	*0.052*	*0.090*
bank's share of firm's equity deals as co-manager prior 5 yrs	0.223***	0.535***	0.312***	-0.098
	0.059	*0.076*	*0.073*	*0.173*
Bank and analyst characteristics				
bank's equity market share prior calendar year	2.347***	2.002	-1.676***	-2.691***
	0.236	*0.552*	*0.171*	*0.474*
bank's debt market share prior calendar year	-0.314	0.906	4.905***	5.667***
	0.235	*0.530*	*0.195*	*0.537*
bank's loan market share prior calendar year	2.029***	0.888	1.009***	0.640
	0.246	*0.667*	*0.165*	*0.426*
bank's *indegree* centrality	0.011***	0.014*	0.026***	0.026***
	0.003	*0.006*	*0.002*	*0.004*
bank's *eigenvector* centrality	2.798***	2.274***	1.629***	1.334***
	0.091	*0.211*	*0.059*	*0.155*
=1 if bank involved in merger	0.136***	0.059	0.167***	0.212***
	0.030	*0.071*	*0.019*	*0.048*
=1 if bank has all-star analyst covering issuer's industry	0.130***	0.037	0.027*	-0.056
	0.015	*0.035*	*0.013*	*0.032*
Diagnostics				
Pseudo R^2	30.7 %	32.6 %	29.0 %	31.4 %
Wald test: all coefficients = 0 (χ^2)	20,241***	12,343***	58,353***	12,109***
Correlation of coverage and co-manager equations (ρ)	0.401***	0.088**	0.031*	-0.014
Likelihood ratio test of independent equations ($\rho=0$) (χ^2)	247.9***	7.0**	5.3*	0.2