THE USE OF BROKER VOTES TO REWARD BROKERAGE FIRMS' AND THEIR ANALYSTS' RESEARCH ACTIVITIES

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ABSTRACT: In traditional markets, the price mechanism directs the flow of resources and governs the process through which supply and demand are brought into equilibrium. In the investment-research industry, broker votes perform these functions. Using detailed clinical data from a midsized investment bank for the years 2004 to 2007, we present evidence that institutional investors use broker votes to budget future aggregate commission payments across brokerage firms; that these votes are responsive to actions that brokerage-house analysts take to communicate with client investors; and that brokerage firms use client-supplied votes as a quasi allocation base to indirectly reward individual analysts for contributions to brokerage-wide commission payments. Overall, our results suggest that broker votes function as the nexus for a set of implicit contractual relationships between sell-side brokers, their affiliated analysts, and their buy-side clients.

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I. INTRODUCTION

This paper investigates the determinants and consequences of broker votes, one of the most pervasive but least understood reporting practices in the investment-research industry. Broker votes are ratings of the value of brokers' research services, and are produced by institutional investors (the "buy side") and solicited by broker dealers (the "sell side"). Although widespread on Wall Street, there is little academic research on broker votes and their economic function. We posit that broker votes are the nexus for a set of implicit contractual relationships between sell-side brokers, their affiliated analysts, and their buy-side clients. Using clinical data gathered from a mid-sized broker dealer (henceforth, the sample bank), we examine how broker votes are related to institutional investors' commission payments and analysts' client services and compensation.

We begin our investigation at the brokerage level. Because there is little academic research on the broker-voting process, we first establish and clarify some basic facts regarding the relation between institutional investors' votes for a sell-side broker's research department and their commission payments to that broker's trading desk. Sell-side services are rarely exchanged through direct sale (Brennan and Chordia 1993). Instead, institutional investors commit to allot their overall trading volume (across all stocks) to brokers that provide valuable service and pay a fixed five-to-six-cent per-share commission fee that exceeds the typical marginal cost of trading (Goldstein et al. 2009). Using a combination of practitioner interviews and archival data from over 50 of the bank's institutional clients, we examine whether broker votes are related to these commitments and thus brokerage-wide commission revenue. Consistent with practitioners' claims that broker votes function as a generally accepted basis for the buy-side's commission-budgeting and order-routing routines, we find that changes in institutional investors'

votes for the bank's research department explain approximately one eighth of the annual percentage change in their subsequent year's commission payments to the bank.

Because broker votes govern the allocation of institutional order flow across full-service and discount brokers, it is important to understand how money managers exercise their voting rights. Regulators have long been concerned that the portfolio managers and buy-side analysts who cast broker votes treat the process as a check-the-box compliance function, popularity contest, or means to extract private benefits unrelated to legitimate service (e.g., SEC 1998; SEC 2006). To shed light on the exchange relationship between buy- and sell-side firms and further understand how money managers allocate their votes (and thus the assets of endowments and pension funds), our primary tests investigate the responsiveness of institutional investors' voting decisions to changes in sell-side analysts' services.

Rather than perform these tests at the brokerage level, we exploit a unique feature of the broker-voting process that enables us to perform higher-powered and more nuanced analyst-level tests. Sell-side brokers collect not only department-wide voting outcomes, but also supplemental data that apportion these departmental scores into analyst-specific contributions. Brokers then aggregate these data to produce an index of each analyst's contribution to aggregate brokerage-wide commissions. We use these signals to examine the responsiveness of aggregate voting outcomes (and thus aggregate brokerage-wide commissions) to changes in analysts' client-service activities.

In designing these tests, we also exploit another unique feature of our field-based setting: direct and comprehensive measures of analysts' public and private client-service offerings. To transmit information, analysts use three modes of service delivery: (i) *published research*—i.e., widely disseminated written communications with no personal contact or interaction; (ii) *concierge services*—i.e., scheduled communications that arise from the collocation of client investors and corporate managers; and (iii) *high-touch services*—i.e., private, personalized, and interactive communications between analysts and client investors. Each interface offers a different client experience and thus has potentially different implications for broker-voting outcomes. By exploiting direct and comprehensive measures of analysts'

client service activities, we obtain not only greater statistical control, but also a more holistic and informed view of the value that investors ascribe to analysts' services through the broker-voting process.

We document that a number of services appear to be rewarded through the broker-voting process. Notably, analysts receive a more favorable signal from the bank's broker-vote reporting system in periods that they increase their use of channels suited to conveying more fundamental, but generally less timely, insights (e.g., whitepapers, high-touch meetings, and concierge services). In addition, increases in private phone calls, a previously unexplored communication channel that provides both timely and personalized information, appear to be rewarded through the broker-voting process. That these relations remain unchanged when we control for changes in commissions from analysts' covered stocks is also important, consistent with votes capturing settling up in stocks *outside* an analyst's coverage universe.

Taken as a whole, these findings further understanding of how services and payments are exchanged *between* the buy and sell sides of the investment research industry. Broker votes are most responsive to services that provide fundamental, but not necessarily timely, insights. In contrast, we observe that trading in analysts' covered stocks is most strongly associated with services suited to providing timely and actionable investment information (e.g., notes and the forecasts therein).

Next, we turn our attention to the contracting role of broker votes *within* Wall Street's sell-side research departments. Client allocations of commission budgets to brokerage firms on the basis of *departmental* performance could induce individual sell-side analysts to free ride in providing services (Alchian and Demsetz 1972; Holmström 1982). Theory predicts that disaggregate analyst votes should mitigate this problem, particularly since votes are sensitive to valued actions that are difficult to reward through alternative performance measures (i.e., trading in analysts' covered stocks). Consequently, vote-based incentive schemes should improve incentive alignment and facilitate more productive effort (Holmström and Milgrom 1991; Feltham and Xie 1994; Datar et al. 2001). Moreover, because votes are obtained from an external party and linked to a verifiable pool of commission payments, these incentives can be high powered and credible (e.g., Bull 1987; Baker et al. 1994; Levin 2003).

For these reasons, we expect votes to be an important determinant of analyst compensation. Consistent with this prediction, we find that changes in clients' votes for individual analysts are related to changes in analysts' compensation. Notably, we document a 90th percentile change in the broker-vote signal to be associated with a fourteen-to-seventeen-percent increase in analyst pay (roughly $80,000 for a typical analyst).

In summary, our results indicate that communication activity is recognized through the broker-voting process and that this process affects how institutional order flow is routed among competing broker dealers. Moreover, we find broker votes to be an important source of commission-based client-service incentives for sell-side analysts. Broker votes are neither mere popularity contests nor a simple reflection of trading in analysts' covered stocks. They appear to be a key component of the investment-research industry's contracting technology, acting as the nexus for a set of relationships between sell-side brokers, their affiliated analysts, and their buy-side clients. The findings thus deepen our understanding of how information is exchanged on Wall Street and help to explain why the practice of collecting and aggregating client votes, a costly internal reporting procedure, has stood the test of time and been replicated across countless sell-side research departments.

Our study makes three additional contributions to the broader analyst literature. First, our findings demonstrate limitations of extant studies on sell-side analysts' commission-based incentives, which examine trading in analysts' covered stocks alone.[1] Votes and commissions from analysts' covered stocks exhibit little informational overlap. Those communications that best explain variation in voting outcomes least explain trading in analysts' covered stocks (and vice versa). Private phone calls, which are related to both payment metrics, are the sole exception. It is thus inappropriate to use one payment metric to proxy for the other. Moreover, although analyst compensation is strongly associated with broker votes, it is unrelated to banks' shares of trading volume in analysts' covered stocks, the

[1] Prior studies in this literature include Hayes (1998), Irvine (2001), Irvine (2004), Jackson (2005), Juergens and Lindsey (2009), Niehaus and Zhang (2010), Beyer and Guttman (2011), and Green et al. (2013). For a discussion of the limitations of this literature, see McNichols (1990), Michaely and Womack (1999, 660), Irvine (2001, 213–214), Jackson (2005, 584), Goldstein et al. (2009), and Niehaus and Zhang (2010, 778).

primary metric used by prior studies to infer analysts' commission-based incentives. And while we do detect a significant association between analyst compensation and commissions from trading in analysts' covered stocks, its economic and statistical significance is considerably lower than that observed for broker votes. We interpret these findings as consistent with the view that the broker votes are the primary source of analysts' commission-based incentives.

Second, as advocated by Schipper (1991, 12), Zmijewski (1993, 338), and Bradshaw (2011, 39), our study helps to place low-touch communications, such as forecasts and recommendations, in the context of a broader set of public and private services. Whereas prior research has inferred the presence (and absence) of private communications from patterns in trading data (e.g., Easley et al. 1998; Roulstone 2003; Irvine et al 2007; Juergens and Lindsey 2009; Christophe et al. 2010) and educational credentials (Cohen et al. 2010), our setting provides a rare opportunity for direct empirical measurement of analysts' private and semi-private communications and management access events, as well as a deeper understanding of how these various communication channels fit together. These findings provide valuable guidance to theorists interested in modeling the stylized facts of analyst behavior (e.g., Hayes 1998; Jackson 2005; Beyer and Guttman 2011; Cheynel and Levine 2012).

Finally, our findings inform the debate over whether large investors enjoy an advantage over small investors and, if so, through what mechanisms. Notably, we provide the first empirical evidence that top institutional clients receive privileged analyst access in the form of highly valued private phone calls, an important conjecture in the literature (e.g., Goldstein et al. 2009). That these calls are more common than previously understood (the median analyst, for example, makes 120 calls per month) furthers our understanding of how analysts in a post-Regulation Fair Disclosure ("Reg FD") world transform public information into private, informed judgments and opinions.

Of course, it is important to recognize that our results are based on data for a single firm, and therefore may not generalize. While we recognize this limitation, confidence in our findings is strengthened by discussions with executives and analysts at other brokerage firms and investment banks,

who report that the system of broker votes employed at the sample firm are ubiquitous in the industry.[2] This shouldn't be surprising: as noted earlier, through these reporting systems, sell-side brokers outsource their commission-attribution problems to their clients (e.g., AllianceBernstein, Fidelity, and Wellington) and these clients route orders and submit broker votes to most reputable sell-side research departments. We therefore have no reason to believe that our sample firm is unique in the behavior or application of its broker votes.

The remainder of the paper is structured as follows. In Section II, we provide an overview of important institutional considerations and discuss the scope of our inquiry. Our research site and sample are described in Section III; summary statistics are reported in Section IV. In Sections V, VI, and VII we present our methodology and the empirical results of our statistical tests. Section VIII concludes.

II. INSTITUTIONAL BACKGROUND AND MOTIVATION OF TESTS

In this section we provide an overview of the market for investment information and the economic function of broker votes in buy- and sell-side firms. We base this discussion on interviews with buy- and sell-side practitioners as well as an extensive review of related practitioner literature and regulatory pronouncements. To confirm and test the validity of these assertions, we exploit supplemental data provided by the sample bank for over fifty of its institutional clients.

The Market for Investment Information and the Flow of Brokerage Commissions

End clients (e.g., pension funds) hire the buy side to manage their investment portfolios. Buy-side institutions rely on sell-side research provided by integrated broker dealers (i.e., banks) to fulfill their fiduciary responsibility to end clients. A buy-side firm that makes explicit payments for these services (or provides them internally) must bear the cost from its own capital and charge a management fee that makes the cost explicit to investors. But if the cost of research and other services necessary to manage

[2] See also, Groysberg (2010), Groysberg and Healy (2013), and Brown et al. (2013).

client funds are embedded in trading commissions, they are paid out of end clients' investment returns. Not surprisingly, almost all buy-side firms purchase sell-side services using "soft dollars" (i.e., trading commissions).

Bundling trade execution and research service costs is permitted under Section 28(e) of the Securities and Exchange Act. These safe harbor provisions allow a buy-side institution to pay per-share commissions that exceed the cost of order execution without breaching its fiduciary duty to end clients (SEC 1998; Goldstein et al. 2009). But to achieve safe harbor, the buy-side firm must have a mechanism to ensure its clients' commission dollars flow through its network of brokerage relationships in a manner that is aligned with the services received through that network. Practitioners indicate that broker votes are the generally accepted means to achieve these ends.

Broker Votes as a Buy-Side Budgeting Tool

As part of their periodic commission-budgeting and order-allocation routines, buy-side institutions survey their portfolio managers, analysts, and traders on the value of sell-side brokers' research services. These broker votes are used to set commission targets for each broker. We posit that by embedding broker votes within the commission-budgeting routines of buy-side firms, Wall Street has institutionalized the practice of ex post settling up for sell side service. That is, we expect brokers who provide excellent service to be rewarded with more votes and larger *budgeted* allocations in period *t* and thus larger *actual* commissions in period *t +1*.

To confirm this relation and provide some indication of its strength, we exploit voting and commission data for 54 of the sample firm's institutional clients (e.g., AllianceBernstein, Fidelity, MFS, Putnam, and Wellington) collected during the 2004–2006 period. Each client-year observation contains values for (i) total commissions the sample bank received from the client during the calendar year, aggregated across all stocks including those without analyst coverage, and (ii) the average voting outcome, expressed as the total number of votes cast for all of the bank's analysts divided by the maximum possible number of votes, as illustrated in the rightmost column of Figure 1.

As expected, clients' votes appear to capture their intentions to settle up ex post; the correlation between changes in votes and changes in one-year-ahead log commissions is 0.34 ($p < 0.01$). Changes in clients' perceptions of a bank's research services thus explain about one eighth of the variation in the percentage change in their commission payments to the bank. In contrast, the correlations between changes in votes and contemporaneous and lagged changes in log commissions are 0.10 and 0.01, respectively (not significantly different from zero).

Broker Votes as a Sell-Side Joint Revenue Allocation System

Consistent with Goldstein et al.'s (2009) aggregate-payment hypothesis, the settling-up process described above occurs at the brokerage level. As noted by Niehaus and Zhang (2010, 778), this payment model has the potential to create moral-hazard problems *within* sell-side research departments. If managers at a brokerage research department observed only the aggregate trading volume (across all stocks) generated by a particular client, they would not know which analysts in the group were primarily responsible for the department's performance. Without some way of assessing individual analyst quality, free-riding problems would likely arise, resulting in less than optimal effort from the analysts.

Consistent with economic and accounting theory (e.g., Alchian and Demsetz 1972; Zimmerman 2013), banks have addressed this metering problem by instituting measurement systems to credit individual analysts for their contributions to brokerage-wide client outcomes. In addition to votes for the research department as a whole, banks collect supplemental data that apportion department-wide scores into analyst-specific contributions. These scores are then aggregated across clients, with weights based on clients' contributions to brokerage-wide commission revenue. As a result, votes received from Fidelity will typically be ascribed greater weight than votes received from, say, Neuberger Berman.

In sum, rather than attempt to subjectively attribute clients' brokerage-wide commission payments to individual analysts, our interviews indicate that sell-side brokers use the broker-voting process to outsource this task to the clients that make these payments. In so doing, sell-side firms

substitute a verifiable signal for a non-verifiable signal, facilitating the provision of credible, high-powered incentives (e.g., Bull 1987; Baker et al. 1994; Levin 2003).

Settling Up for Sell-Side Services: Primary Tests

We exploit signals from the bank's broker-vote reporting system in the design of our primary tests. Our first test examines the responsiveness of these signals to changes in analysts' various client services. As noted earlier, analysts transmit information through their published research, concierge services, and high-touch services. By testing the incremental economic and statistical significance of analysts' various client services for broker-voting outcomes, we deepen understanding of information exchange *between* buy- and sell-side firms.

Prior research indicates that, at least for some client services, *traded commissions in covered stocks* provide a mechanism for clients to reward analysts and their employers for timely and actionable analyses (e.g., Irvine 2004; Juergens and Lindsey 2009; Niehaus and Zhang 2010). In contrast, we hypothesize that *broker votes* provide a viable way for clients to recognize information that is less timely and actionable but also valued by institutional clients. Of course, votes could also supplement the use of traded commissions to reward timely research if clients are reluctant to direct all trades in a recommended stock to the broker for proprietary reasons.[3] Tests of the relation between broker votes and various analyst research activities are reported in Section V.

Our second set of tests examines the incremental economic and statistical significance of broker votes for analyst compensation (vis-à-vis commissions from analysts' covered stocks and the bank's share of trading volume in analysts' covered stocks). These tests shed light on the employment relationship *within* sell-side firms and whether broker votes are used to reward analysts for trades generated *outside* of their covered stocks. To the extent that broker votes convey important information about analyst

[3] Related theory and empirical work, for example, suggests that institutional money managers may prefer to execute analyst-informed trades through a number of broker dealers to minimize front-running costs and hide their trading strategies from the communicating analyst and broader market (e.g., Kyle 1985; Admati and Pfleiderer 1988; Chan and Lakonishok 1993; 1995; Goldstein et al. 2009). In such instances, a money manager may decide to settle up ex post through the broker voting process.

performance, we hypothesize that they will be an economically significant driver of analysts' compensation, thereby affecting analysts' incentives. These tests are reported in Section VI.

III. RESEARCH SETTING AND DATA

Research Site

Our research site is one of the larger, mid-sized, full-service broker dealers.[4] During the 2004–2007 sample period, the bank typically employed around 30 analysts and maintained an active equity-trading desk. Each of the approximately dozen market makers who covered Nasdaq stocks and dozen traders who covered NYSE-listed stocks during the sample period traded roughly 50 stocks and generated volume in two ways: order-taking driven by research (i.e., institutional equity block trading) and market making. The bank also employed an institutional sales force that served as its primary contact with buy-side analysts and portfolio managers. Each of the approximately 30 sales force members employed during the sample period had a strong relationship with an average of 10 buy-side accounts.[5]

The sample bank provides a promising research setting for a number of reasons. First, it maintains rich information on communications and payments, facilitating our tests. Second, it offers a clean, powerful research site: like other mid-sized banks, it derived the bulk of its order flow from its research offerings and did not engage in proprietary trading or use client commission arrangements (CCAs).[6] In contrast, bulge-bracket banks,[7] which have large research operations, attribute much of their

[4] Firms within this category include Cowen, FBR, Jefferies, JMP Securities, Lazard Capital Markets, Piper Jaffray, Raymond James, Robert W. Baird, Stifel, and William Blair. The research, sales, and trading operations of these firms are similar to those of the largest Canadian banks analyzed by Irvine (2001; 2004).

[5] Although most accounts were serviced by one salesperson, large accounts were often serviced by two (and, in rare cases, as many as four) institutional salespeople.

[6] Client commission arrangements (CCAs) enable the buy side to obtain research and execution from different sell-side firms. Under a CCA agreement, the investment manager trades with the brokerage that provides the best execution and instructs that brokerage to set aside a portion of the commission to pay the research provider. Like many mid-sized, U.S.-based banks during our sample period, the sample bank expected payment for its research to take the form of order flow (i.e., it did not accept payment through CCAs).

[7] Cowen et al. (2006, 140) define bulge banks as "the six largest and most reputed banks on Wall Street (Credit Suisse First Boston, Goldman Sachs, Merrill Lynch, Morgan Stanley Dean Witter, Salomon Smith Barney, and Lehman Bros)." Other

transaction volume to their order-execution capabilities and algorithms (D'Antona 2011; Healy and Groysberg 2013). Finally, as indicated in Section IV, the sample bank approximates the employment conditions faced by the median I/B/E/S analyst.

Data

Our primary analyses use three proprietary analyst-panel datasets. The first contains *monthly* information on commission revenues, trading volume, and a comprehensive set of client-service metrics for the years 2004–2007. We supplement these data with annual earnings forecasts from I/B/E/S[8] and firm-level trading volume[9] from CRSP and Datastream that we link to our primary analyst-month data file using a set of coverage/recommendation files supplied by the bank. All variables in this dataset are aligned contemporaneously in calendar time.

The second dataset contains *semiannual* broker votes for the five periods spanning January 1, 2004 to June 30, 2007. Each year, the bank collects votes over two windows. The first tallies votes from January to June, the second from July to December. The vote awarded by each client to a given analyst is then normalized to a 0–5 scale. Next, point allocations across all clients are weighted to generate an overall measure of the value of each analyst's research. Consistent with practice at many other banks, the sample bank weights votes using a system of tiers. Votes from first-, second-, and third-tier clients are weighted by factors of four, two, and one respectively.[10] Finally, each analyst's score is normalized by the maximum possible outcome, with the resulting amount expressed as a percentage. This process is

common definitions during our 2004–2007 sample period include not only the six banks cited by Cowen et al., but also Bear Stearns, Deutsche Bank, and UBS.

[8] Consistent with the arguments and evidence in Groysberg et al. (2011), the sample bank did not track analyst forecasts.

[9] Firm-level trading volume indicates the volume of, say, Wal-Mart shares traded across all broker-dealers. Broker-firm-level trading volume, on the other hand, captures the volume of Wal-Mart shares traded through a given broker dealer, for example, Morgan Stanley or Goldman Sachs. Prior studies often examine brokers' market share of trading volume in analysts' covered stocks, which is computed by dividing broker-firm trading volume by firm-level trading volume (e.g., Irvine 2004; Niehaus and Zhang 2010).

[10] To confirm that votes are weighted based on client importance, we exploit annual commission and vote-weight data for each of the sample bank's clients (more than 800 institutions per year). As expected, we find a strong monotonic relation between commissions and voting tier, with mean (median) commissions ranging from $69,000 ($14,500) for non-voting clients to $7 million ($1.65 million) for top-tier (i.e., quadruple weighted) clients. Non-parametric tests performed by year and for the entire 2004–2006 sample indicate that inter-tier differences in commissions are statistically significant at the 1% level.

summarized in Figure 1. We merge these data with the aforementioned monthly communication file using the approach recommended by the bank's research staff. Specifically, for each semiannual analyst observation in the voting file, we compute the total communication activity for the six months beginning three months before the voting window. Thus, votes from the first (second) window are matched to communication activity from October to March (April to September). Figure 2 provides a graphical representation of the voting and communication windows for our second analyst-level dataset.

The third dataset contains *annual* analyst compensation for the years 2004–2006. We merge these data with our commissions and voting data using the approach employed by the sample bank. Specifically, for calendar year 2004, we average the January–June 2004 and July–December 2004 broker-vote signals by analyst. We then cumulate monthly commissions and trading data over the January–December 2004 period by analyst. We repeat this process for years 2005 and 2006. Finally, we merge the voting, commissions, and compensation data by analyst and year.

Our final monthly communication-commission and semiannual communication-voting datasets contain 1,414 analyst-month and 170 analyst-period observations, respectively. The former spans the entire range of the first data file—i.e., January 1, 2004 to December 31, 2007. The latter, because it requires communication data for the three months preceding each voting window, begins six months later, on July 1, 2004, and ends on June 30, 2007, the close of the final vote window. Our annual compensation-commission-voting dataset contains 83 observations and spans the period January 1, 2004 to December 31, 2006.

In addition to the primary files discussed above, the bank supplied several supplemental spreadsheets that provide information on characteristics of the communications and payments tracked in our main data files. These include a spreadsheet that provides detailed information on the bank's specialty client services during 2006 and a spreadsheet that tracks client-level telephone calling activity by analyst-month for the first three quarters of 2007. These data are discussed in greater detail in the next two sections.

IV. DESCRIPTIVE STATISTICS

Analyst Demographics

Demographic data for the bank's analysts for the period 2004–2006 are reported in Panel A of Table 1. The analysts appear to be representative of the median I/B/E/S analyst. The average sample analyst is approximately 35–37 years old and has 5–6 years experience as a senior (i.e., I/B/E/S-tracked) sell-side analyst. Seventy percent of the analysts have an MBA, thirty-one percent have a CFA, and approximately 20 percent (ten percent) have been recognized by the *Wall Street Journal* or *Starmine* (*Institutional Investor*) at some point in their careers.[11]

Also consistent with the bank approximating the average analyst employer, we find its analysts to be paid less handsomely than those employed by the high-status bank investigated by Groysberg et al. (2011). In our sample, average salary and total compensation are approximately $150,000 and $511,000, respectively. The corresponding statistics from Groysberg et al. for 2005 (the final year of their sample) are $173,00 and $797,000, respectively. This differential persists even after we match analysts on year and industry and remove obvious outlier comparisons.[12] Panel B reports the median matched-pair, inter-bank compensation differential to be approximately $250,000 (i.e., about 50% of average analyst compensation at the sample bank), which is both economically and statistically significant ($p < 0.001$). These differences are consistent with predictions by earlier studies that analyst compensation is increasing

[11] None of the analysts were *Institutional Investor (II)* rated during our sample period. For related statistics for the broader I/B/E/S population, see Clement (1999), De Franco and Zhou (2009), and Brown et al. (2013). Starmine, a division of Thomson-Reuters, in conjunction with the *Financial Times* produces annual rankings of analysts based on the accuracy of their forecasts and performance of their stock recommendations (see http://excellence.thomsonreuters.com/award/starmine). The *Wall Street Journal (WSJ)* produces a similar rating based on analysts' stock picking performance. *II* magazine rates analysts based on a poll of institutional investors. Casual empiricism and the memoirs of former analysts (e.g., Reingold and Reingold 2006) indicate that *II* ratings are strongly influenced by the size of a bank's institutional sales force (see also, Emery and Li 2009). Analysts at mid-sized banks thus rarely place at the top of *II*'s poll. In contrast, the *Starmine* and *WSJ* awards are based on purely quantitative factors. Consequently, analysts from banks outside of the bulge are better represented in these awards (Emery and Li 2009).

[12] To match analysts, we used *Nelson's Directory of Investment Research*, web and Lexis-Nexis searches, I/B/E/S, *Institutional Investor* magazine, and various documents supplied by the banks' research directors. Specifically, for 2004 and 2005 we examined the two banks' analyst rosters and looked for overlapping analyst coverage and industry specialization using Nelson's and I/B/E/S. Once a match was obtained, we examined the similarity of the paired analysts. With regard to experience, we did not use a specific caliper, but rather exercised judgment based on the specific comparison. For example, we did not retain a match if one analyst had, say, five years of experience and the other had less than one year of experience. We did, however, retain the pair if one analyst had 15 years of experience and the other analyst had 20 years of experience and they were similar in other regards. Our matched sample thus includes analysts that are conceivably (albeit imperfectly) substitutable.

in bank status (e.g., Hong and Kubik 2003; Ke and Yu 2006; Call et al. 2009; Groysberg et al. 2011; Jung et al. 2012; Rees et al. 2013).

Measures of Analyst Impact on Brokerage Revenues

Table 2 reports summary statistics on broker votes. The median analyst received approximately 50%–51% of the maximum number of votes, with voting outcomes ranging between 35% at the 10th percentile and 63% at the 90th percentile. Voting outcomes across the sample analysts appear to vary over time, presumably in response to changes in analysts' actions. For example, ten percent of analysts were able to increase their annual (semiannual) score by at least 15.2% (9.6%) of the maximum number of votes.

The trading data summary statistics, reported in Table 2, indicate that trading patterns at the sample bank approximate those for the median I/B/E/S analyst. During our sample period, the bank's median share of trading volume in analysts' covered stocks was around 2% and the median year-over-year decline in trading share was 0.4%. Niehaus and Zhang (2010, Table 3) document that in 2004 (the first year of our sample and final year of their sample) the median market share of trading volume in analysts' covered stocks was 1.6% (down from 1.9% in 2003), and between 1996 and 2005 the median percentage of trading volume executed through full-service, analyst-affiliated broker dealers declined at a rate of 0.54% per year (from 5.9% to 1.6%). Our bank was therefore subject to the same broad economic forces and market pressures documented in related research (e.g., Goldstein et al. 2009; Niehaus and Zhang 2010).

Client-Service Activities

Analysts use three modes of service delivery to transmit information: published research, concierge services, and high-touch services.

Published Research. Analysts supply two kinds of written communications that differ in content and form. Notes, the primary method used to disseminate timely, company-specific information (such as

forecasts, recommendations, and price objectives), are short written commentaries. Reports, lengthier and supplied less frequently, are more comprehensive communications generally written over several weeks or months. Because they are subjected to a lengthier editorial and publishing process than notes, the content of reports is typically less transaction oriented and more likely to emphasize deeper industry- and topic-specific concerns (Michaely and Womack 1999, 659). Thus, "if analysts have new information, notes, with their short production cycle, represent the more likely means to distribute this news" (De Franco and Hope 2011, 232).

As reported in Table 3, in a typical month the median analyst issued twelve new notes that contained five new forecasts. Only 22% of analyst months included at least one report. Whitepapers, the longest and most insightful types of reports, are particularly infrequent, occurring in only 3% of analyst-month observations (Panel A) and 13% of analyst-six-monthly observations (Panel B).

High-Touch Channels. Analysts' supply two forms of high-touch communications that differ in form and content, client meetings and telephone calls.

Client Meetings. Private, face-to-face meetings between analysts and client investors are an important part of the sell-side analyst's job. They are generally scheduled well in advance and often involve significant travel time (sometimes to different cities or countries), making them poorly suited to communicating timely, transaction-oriented information. Consequently, these meetings typically emphasize less urgent educational topics ranging from broad discussions of industry themes to interactive debates over information already reflected in security prices. Post-meeting synopses from 2006 indicate that these meetings also provide an opportunity for clients to use the bank's analysts as a sounding board for their longer-term investment theses. Such interactions are likely to cause investors to rethink and potentially avoid some trades. Table 3 documents that this form of high-touch client service occurs regularly. For example, 71% of analyst-month observations included at least one such meeting, and in these months the median analyst held eight meetings.

Telephone Calls. Telephone conversations are a convenient channel for personalized client communication well suited to transmitting both timely actionable insights and longer-term fundamental

information. Table 3 reports that the median analyst made 120 client calls per month (i.e., around 5–6 calls per weekday). Additional analyses based on detailed calling data obtained for the first three quarters of 2007 indicate that calling activity was not uniform; it was concentrated among the bank's top accounts. For example, 36% (12%) of all calls were made to just ten (two) of more than 800 clients.

Concierge Services. As part of their regular activities, analysts provide clients with selective access to the managers of covered companies. Like high-touch meetings, these communications are generally scheduled well in advance and often involve significant travel time. They are thus poorly suited to imparting timely, trade-relevant information. As part of its analyst evaluation and development process, the bank generates a single-dimensional score based on analysts' participation in these activities. As reported in Table 3, this score is non-zero in 57% of analyst-months (Panel A) and 100% of analyst-six-monthly observations (Panel B), indicating that, collectively, these events are relatively common.[13] The channels within this broader categorization include conferences, non-deal road shows, field trips, and management meetings.

Conferences. During the sample period, the bank held around five annual conferences for large investors. These were concentrated in major money-centers (e.g., Boston, New York, and San Francisco), ranged in length from one to four days, and included presentations from as few as 50 to as many as 200 public and private firms (consistent with statistics reported by Markov et al. 2011). Each presenting company would be scheduled for 30 minutes, including time for a management presentation and questions. Because analysts participate in the same regularly scheduled conference(s) year after year, we do not expect a significant within-analyst relation between conferences and broker-voting outcomes. Instead, we expect analysts who host large conference sessions to have higher baseline voting outcomes. We discuss this point in greater detail in Section VII. As reported in Table 3, in 14% of analyst-months (Panel A) and 71% of analyst-six-monthly observations (Panel B), analysts moderated a conference session for at least one of their covered companies.

[13] Points assigned to the main categories are as follows: conferences = 3 points for each presenting company; non-deal road shows = 9 points per day; field trips = 12 points per event; meals with corporate executives = 3 points per meal.

Non-Deal Road Shows (a.k.a. "investor office meetings"). Sell-side analysts arrange non-deal road shows that allow for one-on-one meetings between corporate managers and buy-side clients over one or more days. According to investor relations (IR) professionals, "the non-deal road show is the most effective forum to develop interest in a stock because the portfolio manager can ask questions, look management in the eye, and share concerns in a private setting" (Ryan and Jacobs 2005, 205). Five to eight 45–60 minute meetings are typically scheduled per day. The events are held at the offices of current and potential investors and therefore generally occur in major money-centers. Although sell-side analysts arrange these events and accompany managers on their travels to investor offices, they do not usually participate in the meetings.[14] As reported in Table 3, analysts took companies on the road in 36% of the sample months, which required them to be away from the office for between one (10^{th} percentile) and four (90^{th} percentile) days.

Field Trips (a.k.a. "company tours"). Analysts also take institutional investors to covered companies' headquarters and production and distribution facilities. Sometimes a series of short site visits is organized as a one or two day tour. Descriptive statistics reported in Table 3 indicate that analysts hosted a field trip in 9% of months (i.e., a typical analyst hosted around one field trip per year), and that it was virtually unheard of for an analyst to host more than one field trip in a given month.

Management Meetings (a.k.a. "meals with managers"). In conjunction with many of their formal management access events (i.e., conferences and field trips), analysts often arrange smaller, private gatherings for buy-side and company managers, typically (around 90% of the time) involving meals (breakfasts, lunches, dinners). As reported in Table 3, 16% of analyst months (Panel A) and 60% of analyst-six-monthly observations (Panel B) involved at least one analyst-hosted management meeting.

Other Concierge Services. Analysts occasionally engage in other forms of client-service activity, including in-house access events (events that include more than one covered company are often referred

[14] For example, according to the former director of U.S. research for Capital Guardian Trust Co., "A lot of investors leave the analyst or the salesperson at the door. . . . If we think it's an important meeting, we'll ask them to wait outside, too, because we can pick up a lot more information without them. . . . As a general practice, Fidelity Investments discourages sell-side analysts from attending meetings during non-deal road shows. American Century Investments, Prudential Investments, and Putnam Investments are just a few of the firms that do the same" (Institutional Investor 2000).

to as in-house conferences), retreats (e.g., fishing or golfing trips), meetings at major sporting events (e.g., box seats at a Yankees' game), and informational sessions (often in the form of a conference call). Because these types of communications are relatively infrequent, we aggregate them into a single variable using the set of weights supplied by the bank (see footnote 13). As reported in Table 3, only 9% of months and 32% of six-monthly observations involve one such event.

Batch-Level Client Notifications (Control Variables). Analysts also communicate with clients through blast voicemails and by making presentations to the bank's institutional sales team, which relays analysts' messages to important clients (often with additional commentary). Unlike the other communications discussed in this section, these channels are used primarily to alert investors to the content and existence of analysts' published research (Valentine 2011). As reported in Table 3, blast voicemails are infrequent, occurring in only 16% of months. Sales presentations, on the other hand, occur regularly. Analysts typically participated in between three (10^{th} percentile) and ten (90^{th} percentile) sales presentations per month (median = six). Because these communications are used mainly to inform clients of the existence of other communications, we treat them as proxies for dissemination (i.e., control variables).

V. THE RELATION BETWEEN VOTES AND COMMUNICATION ACTIVITY

In this section, we investigate the relation between broker votes and the actions that analysts take to communicate with client investors.

Pairwise Association Tests

Table 4 presents Pearson correlations between pairs of communication and analyst performance variables. Associations above (below) the main diagonal reflect semiannual (month-to-month) changes. Our primary focus is the pairwise voting-communication correlations reported in the rightmost column.

Consistent with votes reflecting client recognition of valued research, we observe a positive association between changes in broker votes for a given analyst and increases in the analyst's supply of

published research (notes, reports and forecasts), high-touch services (client meetings and private phone calls), and certain concierge services (non-deal road shows and other concierge services).[15] Interestingly, the largest correlation is observed for private phone calls (0.44, $p < 0.001$), a previously unexplored communication channel.

The bottom two rows of Table 4 report Pearson correlations between short-term trading variables and communication activities. Because these tests use a narrower, contemporaneous one-month communication-trading window, they provide some indication of the timeliness of analysts' various communications (e.g., Beaver 1968). They also round out our simple correlation analysis and connect our work to prior studies of client payment for sell-side service (e.g., Irvine 2004; Juergens and Lindsey 2009; Niehaus and Zhang 2010).

Consistent with prior research, there is a positive association between contemporaneous changes in commissions from analysts' covered stocks and changes in their supply of research, specifically notes, forecasts, and private phone calls. These relations do not appear to be confounded by market activity in analysts' covered stocks: we observe similar relations between these communications and the bank's *share* of trading volume in analysts' covered stocks.[16] The correlations are consistent with trading commissions from covered stocks (or market share of trading volume) being used to reward the bank and its analysts for providing timely, actionable information to clients, such as notes, forecasts and private phone calls. In contrast, we observe no such relation for less timely and actionable forms of communication, such as analysts' reports, high-touch meetings, or concierge services.

The hypothesized relations between communication activity and client payment are based on the assumption that other communications are held constant. But as one would expect if analysts combine communications in a complementary fashion, we detect positive associations among several channels of

[15] It is worth reiterating that communication activity is partially lagged relative to voting-signal realizations (see Figure 2).

[16] Of course, based on these associations we cannot conclusively discriminate between two competing hypotheses: (i) communication activity drives abnormal trading; and (ii) communication activity is a response to abnormal trading activity. That said, it is unclear why the bank's clients would, for some exogenous reason, develop an abnormally strong interest in trading a particular analyst's stocks *through the sample bank* (as opposed to all other trading platforms) and why this interest would, for example, cause the analyst to issue more earnings forecasts *in that same month.*

communication activity (particularly in the monthly data reported below the main diagonal). For example, we find the use of private telephone calls, sales presentations, and note production to be positively correlated, consistent with the view that analysts combine these channels in a mutually reinforcing (i.e., complementary) fashion.[17] The *negative* associations among communication variables are also interesting. For example, consistent with the hypothesis that time-consuming out-of-office communications (e.g., non-deal road shows and conferences) incur sizable informational opportunity costs, we find month-to-month changes in these communications to be negatively associated with changes in published research and more traditional forms of client service.

Regression Results

Given the non-zero correlations among several pairs of the communication variables, inferences from simple correlations may be misleading. Table 5 therefore reports results from the following empirical model estimated on our sample of 132 first-differenced, semiannual analyst observations:

$$Broker\text{-}Vote\ Signal_{i,t} - Broker\text{-}Vote\ Signal_{i,t-1} = a_t + \sum_{j=1}^{J} b_j \left(Channel_{i,j,t} - Channel_{i,j,t-1} \right) + e_{i,t}$$

where the subscripts *i*, *j*, and *t* denote analyst *i*, communication channel *j*, and semiannual period *t*, respectively.[18] We use this regression to assess the incremental effect of each communication holding other communication activity constant.

Several results are noteworthy. First, column 1 documents a positive and statistically significant ($p < 0.001$) association between changes in broker votes and changes in concierge services. Column 2 shows that this association is driven primarily by non-deal road shows and field trips to covered companies: the coefficient on non-deal road shows is 0.291 ($p = 0.002$), indicating that an additional day of non-deal road shows is associated with a 0.29% increase in the broker-vote signal (e.g., from 50% to

[17] This pattern is consistent with Goldstein et al.'s (2009, 5193) assertion that top clients demand "elaboration from the analyst [and sales team] on the brief First Call note to ascertain the value of the analyst's information."

[18] The broker-vote signal is a proportion, and thus bounded by 0 and 100. For ease of interpretation and because the values do not approach either extreme (see Table 3), we opted for the simple functional form shown above. As a robustness test, we examined the change in the logit-transformed broker-vote signal (i.e., ln[B.V.S/{1–B.V.S}]) as a dependent variable. Our inferences remained unchanged.

50.29%); the coefficient on tours is 0.74 (p = 0.060), implying that a site visit to the facilities of a covered company (or set of related companies) is associated with a 0.74% increase in the broker-vote signal.

Second, column 1 documents a positive and statistically significant association between changes in high-touch services and favorable signal realizations from the bank's broker-vote reporting system (p < 0.001). As reported in column 2, this association is driven by both forms of high-touch service: the coefficient on phone calls is 0.013, which indicates that an additional call is associated with a 0.013% increase in the broker-vote signal; the coefficient on face-to-face meetings is three to four times as large, implying that an additional meeting is associated with a 0.046% increase in the broker-vote signal.

Third, we find the previously documented positive association between reports (broadly defined) and broker votes to be driven by whitepapers, the lengthier, less timely form of communication. As shown in column 2, the coefficient on whitepapers is 1.848, implying that an additional whitepaper is associated with a 1.85% increase in the broker-vote signal (e.g., from 50% to 51.85%). That this magnitude is equivalent to approximately three tour days, six non-deal road show days, forty high-touch meetings, or 140 phone calls, reflects the extensive work involved in preparing a whitepaper. It is also consistent with practitioners' claims that these reports are among analysts' most valuable and insightful communications (e.g., Valentine 2011).

Fourth, column 3 documents that our results are largely unchanged when we control for the contemporaneous change in commissions from analysts' covered stocks. This is further evidence that broker votes capture trades outside of the communicating analyst's covered stocks.

Fifth, the findings in column 4 indicate that broker-voting outcomes reflect an effort component (i.e., analyst activity) and an uncontrollable component (i.e., market interest in analysts' stocks that is orthogonal to analyst activity). However, the effort component appears to dominate. In unreported tests, we find that adding the communication variables to a baseline model that includes trading in analysts' covered stocks (as measured by CRSP and Datastream) increases the R^2 by approximately 0.3 (i.e., 30%). In contrast, adding the trading variable to a baseline model that includes the communication variables increase the R^2 by less than 0.02 (i.e., 2%).

Finally, when we control for the confounding effects of private phone calls, notes (and the forecasts therein) are no longer statistically significant. One explanation is that notes reflect timely and actionable information that can be rewarded through spot trades in analysts' covered stocks.[19] This is supported by the pairwise correlations reported in Table 4 and supplemental multivariate tests reported in Table 6. Changes in commissions from covered stocks and in the bank's market share of trading volume in an analyst's covered stocks are both positively and significantly related to changes in notes (and phone calls). The estimates indicate that the marginal note (phone call) is associated with a 0.8% (0.1%) increase in commissions from covered stocks, and a 0.017% (0.002%) increase in the bank's market share of trading volume in an analyst's covered stocks.

VI. THE RELATION BETWEEN VOTES AND ANALYST COMPENSATION

We next examine the relation between broker votes and analyst compensation. The univariate tests reported in Panels A, B, and C of Table 7 indicate that the *level* of analyst compensation is strongly associated with signals from the bank's broker-vote reporting system (Pearson correlation = 0.727, $p < 0.001$), moderately associated with commissions from analysts' covered stocks (Pearson correlation = 0.337, $p < 0.001$), and unrelated to the bank's share of trading volume in analysts' covered stocks (Pearson correlation = 0.024, $p = 0.830$). This latter result is noteworthy given that prior research has used associations between communication activity and banks' share of trading volume in analysts' covered stocks to draw inferences regarding analysts' commission-based incentives.

Our primary focus, however, is on the results in Panel D, which report the association between *changes* in analyst compensation and *changes* in voting outcomes and commissions from and trading share of covered stocks. When each variable is examined in isolation, the results mirror the correlations discussed above. When examined jointly, the coefficient on votes remains positive and highly significant ($p = 0.012$); the coefficient on commissions from covered stocks is positive but only marginally

[19] An alternative explanation is that the bank's analysts produce (abnormally) low-quality notes. However, this seems unlikely given that the bank's analysts generally perform well in the annual *Starmine* and *WSJ* awards (see Panel A of Table 1).

significant (p = 0.101, two-tailed test); and the coefficient on the bank's share of trading volume in analysts' covered stocks continues to be statistically indistinguishable from zero. In terms of economic significance, a 90th percentile change in the broker-vote signal (15.2% from Table 2) is associated with a fourteen-to-seventeen-percent increase in compensation, roughly $80,000 for a typical analyst; a 90th percentile change in commissions from covered stocks (0.52 from Table 2) is associated with a more modest, but nevertheless economically significant, five-to-seven-percent increase in compensation, about $30,000 for a typical analyst.[20]

Table 8 completes our investigation by connecting the elements in the communication-voting-compensation chain. Specifically, for each statistically significant coefficient from Table 5, we examine the implications of a top-decile semiannual change in communication activity for annual analyst compensation. Our estimates suggest that an additional whitepaper is associated with an average increase of $4,228 in annual compensation; 168 phone calls, 36 high-touch meetings, five non-deal road shows, and one extra tour are associated, respectively, with incremental increases of $4,893, $3,764, $3,267, and $1,737.

These findings, in conjunction with other results in this paper, provide useful empirical benchmarks to the literature on sell-side analyst incentives. For example, according to Panel B of Table 1, the median compensation differential between the mid-sized bank examined in this paper and the high-status bank examined in Groysberg et al. (2011) is around $250,000. The estimates in Hong and Kubik (2003, Table 7 column 5) imply that for a typical analyst in our sample, being among the best forecasters in one's industry increases the probability of being recruited to a high-status bank by about 0.01 (i.e. 1%). Consequently, for a typical analyst, the expected single-year gain from top forecasting performance is around $2,500 ($250,000 × 1%). Assuming that the analyst expects to remain in the profession another five years, and discounting at a modest 10% discount rate, the expected present value of this uncertain outcome is around $9,500. The above estimates suggest that a similar expected change in compensation

[20] The aforementioned percentage increases were computed as follows: $e^{0.885 \times 0.152} - 1 = 14.4\%$, $e^{1.039 \times 0.152} - 1 = 17.1\%$, $e^{0.096 \times 0.52} - 1 = 5.1\%$, and $e^{0.130 \times 0.52} - 1 = 7.0\%$.

can be achieved through many client-service actions that do not require a career transition (e.g., producing two whitepapers).

VII. ADDITIONAL TESTS

Between-Analyst Association Tests

Our primary tests examine within-analyst changes in votes and communication activity. By using each analyst as her own control, this research design controls for a host of potentially confounding factors, such as ability and industry coverage. Nevertheless, additional insight can be provided by examining pairwise between-analyst associations, computed from time-series averages of all observations for a given analyst (i.e., corr($\overline{y_i}, \overline{x_i}$)).

For brevity, the results are not tabulated. However, two points are noteworthy. First, average voting outcomes vary predictably with multiple measures of analyst quality. Analysts who are consistently more productive across a broad range of client services, have been recognized by *Starmine* or the *WSJ*, or have attained managing director status consistently receive more votes. Second, we find conferences to be positively associated with both broker votes and the bank's share of trading volume in analysts' covered stocks. Taken as a whole, it appears that banks host larger conferences in those industries/sectors that they have a dominant trading position (this is finding is consistent with the cross-sectional results in Green et al. 2013) and that analysts associated with large conferences have a higher baseline level of votes.

Security-Level Event-Time Trading Tests

Tables 4 through 6 suggest that timely information is often rewarded through trades in the communicating analyst's covered stocks while less-timely insights are rewarded through broker votes. Of course, the statistically insignificant associations in our short-term trading tests may reflect low power. To shed light on this concern, we examine trading around non-deal road shows (NDRS) using a higher-

powered security-level event-time design.[21] This test exploits data from two proprietary sources: the 2006 supplementary file, which records the date of the event and the identities of all attendees (e.g., John Doe from Fidelity and Jane Smith from JC Penney), and detailed transaction-level data obtained from Ancerno Ltd., a transaction-cost consulting firm that tracks the trades of many large money managers (e.g., AllianceBernstein and Wellington) *through all broker dealers*.[22]

The results suggest that the previously documented lack of association is driven by economic rather than purely statistical concerns. Across the 365 client-firm meetings, no attending institution traded the NDRS stock through the sample bank on the day of or subsequent to the meeting. Extending the trading window to fifteen days, we find only five instances of such trades (i.e., 1.37%). Moreover, using the pre-NDRS incidence of trade as a counterfactual outcome, only one in every twenty meetings appears to stimulate a near-term trade *through any broker dealer*.[23]

VIII. CONCLUSION

Despite market imperfections that preclude first-best contracting solutions, the brokerage industry remains a significant source of information for institutional investors (Healy and Palepu 2001; Kothari 2001; Beyer et al. 2010). This information is revealed to market participants through a variety of public and private channels. In this paper, we investigate how broker votes are used to compensate these services and govern exchange between sell-side brokers, their affiliated analysts, and their buy-side clients. Testing these relations deepens our understanding not only of analysts' incentives, but also of the

[21] We focus on NDRS for three reasons. First, unlike other specialty communications, such as high-touch meetings, NDRS can be clearly linked to a specific covered company. This allows for a more targeted security-level investigation of client trading behavior. Second, that NDRS are, as reported in Table 3, a relatively common form of specialty communication increases the power of our tests. This is important because we have only one year of detailed analyst-client-company-level data. Third, that NDRS load strongly in our voting tests suggests that clients view these communications as valuable. Consequently, it is important to resolve why they do not load in our trading tests.

[22] This combination of data allows us to perform a very precise test. For example, unlike Green et al. (2013), we are able to track the trades of actual attendees, rather than implicitly assuming that all Ancerno clients attend an event. And unlike Solomon and Soltes (2013), we are able to track specific trades through specific broker dealers at a transaction level (as opposed to net trades at a quarterly level).

[23] This result is broadly consistent with a recent statement by Home Depot's vice president of investor relations, who claims, "it can take 10 face-to-face meetings with management members before you can convince someone to buy into your stock" (Harrison 2010).

second-best practices that have evolved to facilitate exchange of timely and non-timely information on Wall Street.

It is well known that investors pay for sell-side service through trading commissions. Although these payments can come from timely trading in the information-disseminating analyst's covered stocks, scholars and practitioners have argued that this is generally the exception rather than the rule. Notably, Goldstein et al. (2009) argue that payment is often indirect, with clients apportioning their overall trading activity among sell-side research providers so that departments that supply more valuable communications receive greater aggregate commission payments in a subsequent period. We present evidence that broker votes facilitate this settling-up process on both the buy- and sell-sides of the investment research industry. That is, broker votes function as a nexus for a set of implicit contractual relationships between sell-side brokers, their affiliated analysts, and their buy-side clients.

Our findings show that for the sample bank, changes in broker votes reported by large buy-side clients are positively related to changes in future traded commissions allocated to the bank, but not to changes in contemporaneous or lagged commission allocations. Changes in votes computed at the analyst level are positively related to changes in white papers, high-touch and concierge activities provided by analysts, but not to changes in many potentially more timely and actionable communications such as notes or forecasts (which are related to contemporaneous trading volume in covered stocks). These findings imply that votes represent real efforts by buy-side clients to reward analysts for providing information that is difficult to reward through contemporaneous trading in analysts' covered stocks. Finally, we observe that changes in analyst-level broker votes are strongly related to changes in analyst compensation, implying that votes also influence resource allocation within brokerage divisions, aligning analysts' incentives with their clients' objectives (and hence the brokerage firm).

We expect that these findings will be of interest to academics, investors, and regulators. First, they demonstrate how voluntary contracting arrangements help to resolve inter- and intra-firm coordination problems. Second, they are consistent with prior research that suggests that institutional clients benefit from privileged access to short-lived information (Irvine et al. 2007; Juergens and Lindsey

2009; Christophe et al. 2010). Further, they show that, given their access to broker-voting arrangements, large clients are also more likely to receive longer-lived thematic insights and guidance that theoretical research has linked to improved judgment and processing of firms' public information (Kim and Verrecchia 1994). Although far from conclusive, these findings raise important new questions regarding the relation between contracting technology and information exchange, suggesting avenues for future theory and empirical work.

In closing, we acknowledge that our study is subject to the usual caveats inherent in field-based research, most notably, generalizability. Our data, being from a single bank, should be interpreted with this in mind. In particular, because we examine a mid-sized bank, some of our findings may not be generalizable to analysts at bulge-bracket banks. Nevertheless, although the economic magnitudes documented in our study are likely to be partially dependent on bank scale, we are unaware of any context-specific interactions that would render our results invalid in other settings. Indeed, the practices at the sample bank closely mirror those at many other banks, ranging from bulge-bracket banks to other mid-sized brokers.[24] Of course, only future research can address this issue conclusively.

[24] See, for example, Groysberg (2010), Groysberg and Healy (2013), and SEC (2013).

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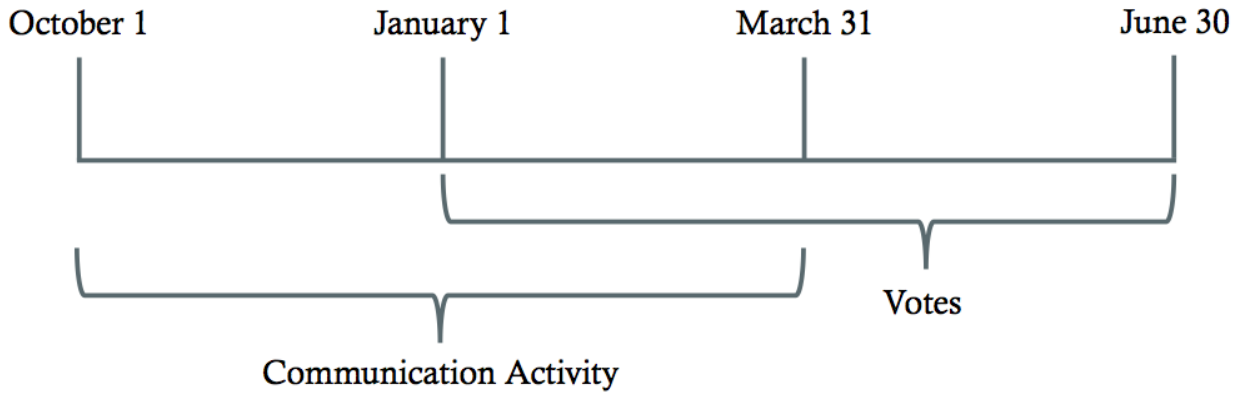
FIGURE 1
Informational Architecture of the Broker-Vote Reporting System

Weight	Client	Analyst 1	…	Analyst N	Client total	***Brokerage-wide scores***
4	C1	0	…	4	$0 + \ldots 4 = S_1$	$100 \times [S_1 \div (N \times 5)]$
4	C2	3	…	4.5	$3 + \ldots . 4.5 = S_2$	$100 \times [S_2 \div (N \times 5)]$
…	…	…	…	…		
…	…	…	…	…		
1	C59	2	…	5	$2 + \ldots 5 = S_{59}$	$100 \times [S_{59} \div (N \times 5)]$
1	C60	5	…	4	$5 + \ldots 4 = S_{60}$	$100 \times [S_{60} \div (N \times 5)]$
	Analyst-level sum	$0 + 12 + \ldots 2 + 5 = A_1$	…	$16 + 18 + \ldots 5 + 4 = A_N$		
	Total potential points	$20 + 20 + \ldots 5 + 5 = P$	…	$20 + 20 + \ldots 5 + 5 = P$		
	Analyst-level signals	$100 \times [A_1 \div P]$	…	$100 \times [A_N \div P]$		

FIGURE 2
The Measurement of Communication Activity and Client-Supplied Broker Votes

1H0X



2H0X

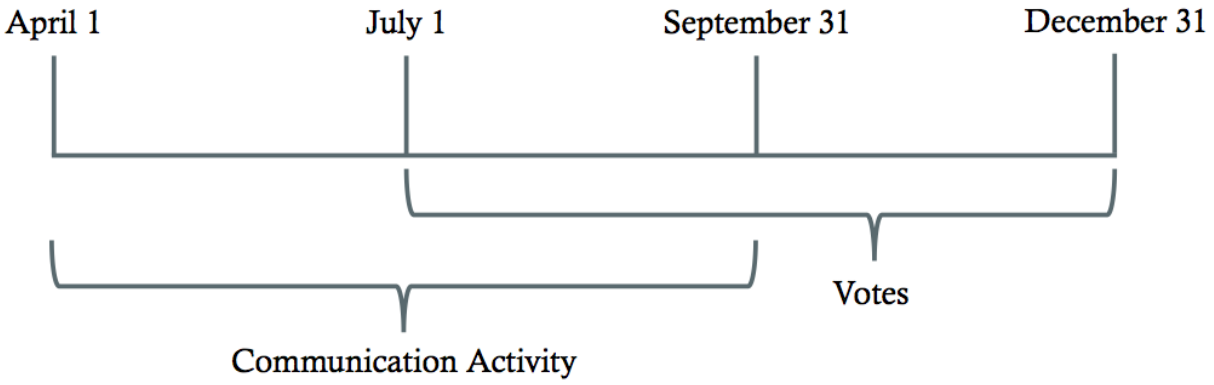


TABLE 1
Characteristics of Sample Analysts: Analyst-Year Data

Panel A: Summary Statistics

	Mean	Median
Age (in years)	36.7	35
Years of experience as a senior sell-side analyst	6.3	5.0
Has a MBA degree	70%	1
Has a CFA designation	31%	0
Has been recognized by *Institutional Investor* at some point in career	11%	0
Has been recognized by *Starmine* at some point in career	22%	0
Has been recognized by the *Wall Street Journal* at some point in career	22%	0
Salary	$149,556	$124,375
Salary and Bonus	$511,303	$525,000

Panel B: Matched Pair Comparison with Groysberg et al. (2011) sample

	Total Analyst Compensation (2004-2005)				
	10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl
[i] Groysberg et al. (2011) analysts	$375,000	$529,500	$755,000	$1,200,000	$1,600,000
[ii] Sample analysts	$323,875	$368,750	$483,125	$565,000	$662,188
[iii] Difference: [i] − [ii]	-$76,875	$50,625	$249,688	$650,000	$1,129,500
[iv] Percentage difference: [iii] ÷ [ii]	-12%	8%	51%	148%	225%

Statistical tests of [iii] = 0:

Matched-pair *t*-test *p*-values: $p_{2004} < 0.001$, $p_{2005} = 0.031$, $p_{2004\text{-}2005} < 0.001$

Wilcoxon signed-rank test *p*-values: $p_{2004} < 0.001$, $p_{2005} = 0.041$, $p_{2004\text{-}2005} < 0.001$

Statistical tests of [iv] = 0:

Matched-pair *t*-test *p*-values: $p_{2004} = 0.002$, $p_{2005} = 0.022$, $p_{2004\text{-}2005} < 0.001$

Wilcoxon signed-rank test *p*-values: $p_{2004} < 0.001$, $p_{2005} = 0.016$, $p_{2004\text{-}2005} < 0.001$

Panel A reports annual summary statistics for analysts employed by a mid-sized investment bank during the years 2004–2006 (N = 83). Panel B reports total compensation (salary and bonus) for the sample analysts and a matched set of analysts drawn from the high-status bank analyzed in Groysberg et al. for the years 2004–2005 (N = 30 pairs).

TABLE 2
Summary Statistics: Broker Votes, Commissions, and Share of Volume

	10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl
Broker Votes:					
Semiannual sample:					
Levels (Jul 04 to Jun 07, N = 170)	35%	45%	50%	56%	63%
Changes (Jan 05 to Jun 07, N = 132)	-5.5%	-1.8%	3.3%	6.9%	9.6%
Annual sample:					
Levels (Jan. 04 to Dec 06, N = 83)	36%	45%	51%	57%	63%
Changes (Jan. 05 to Dec 06, N = 49)	-3.8%	-1.3%	3.2%	7.0%	15.2%
Commissions from Covered Stocks:					
Monthly sample:					
Levels (Jan. 04 to Dec 07, N = 1,414)	$46,695	$94,000	$181,244	$330,455	$519,024
Changes (Feb. 04 to Dec 07, N = 1,369)	-$184,030	-$68,747	-$1,007	$66,992	$171,599
Change in logs (Feb. 04 to Dec 07, N = 1,369)	-0.86	-0.43	-0.01	0.43	0.82
Semiannual sample:					
Levels (Jul 04 to Jun 07, N = 170)	$353,989	$672,089	$1,171,971	$1,951,252	$2,908,177
Changes (Jan 05 to Jun 07, N = 132)	-$703,443	-$412,578	-$71,234	$213,825	$561,735
Change in logs (Jan 05 to Jun 07, N = 132)	-0.54	-0.33	-0.09	0.22	0.47
Annual sample:					
Levels (Jan. 04 to Dec 06, N = 83)	$885,560	$1,497,744	$2,600,414	$4,403,176	$6,226,723
Changes (Jan. 05 to Dec 06, N = 49)	-$2,240,966	-$882,887	-$267,552	$262,145	$955,672
Change in logs (Jan. 05 to Dec 06, N = 49)	-0.55	-0.38	-0.12	0.13	0.52
Share of Trading Volume in Covered Stocks:					
Monthly sample:					
Levels (Jan. 04 to Dec 07, N = 1,414)	0.6%	1.0%	1.8%	3.2%	5.6%
Changes (Feb. 04 to Dec 07, N = 1,369)	-1.3%	-0.5%	0.0%	0.4%	1.2%
Semiannual sample:					
Levels (Jul 04 to Jun 07, N = 170)	0.8%	1.2%	1.8%	3.1%	5.5%
Changes (Jan 05 to Jun 07, N = 132)	-1.7%	-0.7%	-0.3%	0.2%	0.7%
Annual sample:					
Levels (Jan. 04 to Dec 06, N = 83)	1.2%	1.5%	2.1%	3.5%	5.7%
Changes (Jan. 05 to Dec 06, N = 49)	-2.2%	-1.0%	-0.4%	0.1%	0.4%

This table reports summary statistics for broker votes and commissions from and trading share of covered stocks for the monthly, semiannual, and annual samples used in this paper.

TABLE 3
Summary Statistics: Client-Service Activity

Panel A: Monthly Data

	Non-zero months (% of obs.)	Distribution of non-zero obs.				
		10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl
Published Research:	100%					
No. of notes	100%	6	9	12	17	22
No. of reports	23%	1	1	1	4	4
No. of ordinary reports	20%	1	1	1	4	4
No. of white papers	3%	1	1	1	1	1
Components of Published Research:						
No. of initiations	18%	1	1	1	2	3
No. of new EPS forecasts	97%	2	3	5	8	10
No. of recommendation upgrades or downgrades	24%	1	1	1	1	2
High-Touch Services:	100%					
No. of client telephone calls	100%	47	85	120	165	210
No. of one-on-one meetings between analyst and client investors	71%	4	4	8	16	24
Concierge Services:	57%					
No. of non-deal-roadshow days	36%	1	1	2	3	4
No. of covered companies presenting at analyst-hosted conference	14%	1	3	5	9	13
No. of field trips to the facilities of covered companies	9%	1	1	1	1	1
No. of analyst-hosted management access meetings	16%	1	1	1	1	2
No. of points from other concierge services	9%	3	3	6	12	12
Dissemination Controls:	99%					
No. of presentations to institutional sales force	99%	3	4	6	8	10
No. of blast voicemails	16%	1	1	1	2	3

Panel B: Semiannual Data

	Non-zero periods (% of obs.)	Distribution of non-zero obs.				
		10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl
Published Research:	100%					
No. of notes	100%	50	61	77	94	116
No. of reports	49%	1	1	2	7	19
No. of ordinary reports	41%	1	2	3	9	22
No. of white papers	13%	1	1	1	1	1
Components of Published Research:						
No. of initiations	70%	1	1	2	3	4
No. of new EPS forecasts	100%	21	26	32	38	43
No. of recommendation upgrades or downgrades	79%	1	1	2	3	5
High-Touch Services:	100%					
No. of client telephone calls	100%	419	609	749	915	1,071
No. of one-on-one meetings between analyst and client investors	98%	16	32	44	57	76
Concierge Services:	100%					
No. of non-deal-roadshow days	91%	1	3	4	8	10
No. of covered companies presenting at analyst-hosted conference	71%	2	4	7	11	15
No. of field trips to the facilities of covered companies	36%	1	1	1	2	3
No. of analyst-hosted management access meetings	60%	1	1	2	3	4
No. of points from other concierge services	32%	3	3	12	12	18
Dissemination Controls:	100%					
No. of presentations to institutional sales force	100%	23	28	35	42	47
No. of blast voicemails	38%	1	1	3	5	10

This table reports summary statistics for communication activity for analysts employed by a mid-sized investment bank during the years 2004–2007. Panel A reports monthly statistics (N = 1,414). Panel B reports semiannual statistics (N = 170).

TABLE 4

Correlation Structure: Pairwise Changes

		Published Research					H-T Service		Concierge Service					Controls		*Broker*
		I.	**II.**	**III.**	**IV.**	**V.**	**VI.**	**VII.**	**VIII.**	**IX.**	**X.**	**XI.**	**XII.**	**XIII.**	**XIV.**	***Votes***
Published Research:																
I.	No. of notes		0.04	0.02	**0.24**	0.05	**0.38**	0.02	0.13	**-0.17**	**0.18**	**-0.16**	**0.23**	**0.35**	**0.18**	**0.31**
II.	No. of reports	**-0.07**		-0.07	0.01	0.08	**0.20**	0.03	-0.06	0.12	-0.11	**0.16**	0.02	0.13	-0.04	**0.16**
Components of Published Research:																
III.	No. of initiations	**0.07**	0.00		0.07	-0.09	0.01	-0.01	0.02	-0.14	0.08	**-0.15**	-0.08	0.03	-0.02	-0.14
IV.	No. of new EPS forecasts	**0.80**	**-0.05**	**0.08**		**0.19**	**0.23**	**0.17**	0.10	**0.19**	0.02	0.12	0.04	**0.18**	0.04	**0.20**
V.	No. of rec. upgrades or downgrades	**0.15**	0.01	-0.02	**0.10**		0.11	0.14	**-0.16**	0.04	**-0.17**	-0.10	-0.11	**0.20**	0.02	-0.01
High-Touch Services:																
VI.	No. of client telephone calls	**0.38**	0.02	0.01	**0.28**	**0.08**		0.07	-0.03	**0.18**	0.01	**0.28**	**0.17**	**0.33**	-0.04	**0.44**
VII.	No. of one-on-one client meetings	**-0.13**	**-0.07**	0.02	**-0.12**	-0.03	**-0.09**		-0.06	**0.20**	-0.11	0.05	**-0.15**	**0.26**	0.00	**0.15**
Concierge Services:																
VIII.	No. of non-deal-roadshow days	**-0.10**	-0.03	-0.01	**-0.14**	-0.03	-0.02	**0.06**		0.03	0.12	**-0.16**	0.00	-0.02	0.01	**0.28**
IX.	No. of covered conference firms	**-0.31**	0.00	0.00	**-0.26**	-0.04	**-0.09**	0.04	-0.02		-0.04	**0.35**	-0.05	**-0.17**	**-0.22**	0.08
X.	No. of field trips	**-0.09**	-0.01	-0.04	**-0.12**	-0.02	-0.01	**0.06**	-0.01	0.01		0.03	-0.04	**0.17**	-0.13	-0.01
XI.	No. of management access meetings	**-0.17**	0.01	0.03	**-0.17**	0.03	-0.03	**0.06**	**0.05**	**0.44**	0.04		-0.03	-0.03	-0.04	0.08
XII.	No. of points from other concierge services	-0.04	0.01	**-0.06**	-0.02	-0.03	**-0.08**	-0.01	**0.08**	**0.05**	0.00	**0.08**		0.00	-0.10	**0.20**
Dissemination Controls:																
XIII.	No. of presentations to sales force	**0.56**	-0.03	**0.12**	**0.39**	**0.19**	**0.37**	**-0.08**	0.03	**-0.17**	-0.02	**-0.05**	0.00		**0.17**	0.12
XIV.	No. of blast voicemails	0.01	**0.08**	0.04	**-0.05**	**0.08**	**0.11**	0.02	**0.05**	-0.02	**0.05**	0.02	-0.02	**0.10**		0.05
Market share of volume in covered stocks		**0.11**	0.00	0.02	**0.08**	0.03	**0.13**	0.02	0.01	-0.01	0.01	0.03	**-0.05**	**0.09**	-0.04	
Log of commissions from covered stocks		**0.26**	-0.01	0.02	**0.23**	**0.06**	**0.22**	0.00	-0.03	**-0.08**	-0.02	-0.02	**-0.06**	**0.24**	-0.01	

This table reports pairwise Pearson correlations for changes in analyst-investor communication activity and client payment for sell-side research. Associations below (above) the main diagonal are based on a sample of 1,369 monthly (132 semiannual) observations. Boldfaced type highlights statistical significance at the 10% level (based on a two-tailed test).

TABLE 5
The Relation Between Changes in Communication Activity and Changes in Broker Votes

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	***p*-Val.**	**Coeff.**	***p*-Val.**	**Coeff.**	***p*-Val.**	**Coeff.**	***p*-Val.**
Published Research:								
Published research	0.035	0.168						
Notes			-0.004	0.913	-0.005	0.890	0.000	0.998
Ordinary reports			0.085	0.443	0.087	0.433	0.086	0.432
White papers			**1.848**	**0.005**	**1.861**	**0.005**	**1.684**	**0.010**
Initiations			-0.207	0.230	-0.216	0.204	-0.111	0.486
EPS forecasts			0.049	0.542	0.050	0.536	0.012	0.880
Recommendation changes			0.024	0.897	0.024	0.896	0.025	0.891
High-Touch Service:								
Sum of personalized, private interactions	**0.012**	**<.001**						
Phone calls			**0.013**	**<.001**	**0.013**	**<.001**	**0.013**	**<.0001**
One-on-one, face-to-face meetings			**0.046**	**0.003**	**0.046**	**0.004**	**0.051**	**0.001**
Concierge Service:								
Sum of concierge points	**0.027**	**<.001**						
Non-deal road shows			**0.291**	**0.002**	**0.288**	**0.001**	**0.275**	**0.002**
Conferences			0.012	0.772	0.010	0.813	0.012	0.762
Tours			**0.736**	**0.060**	**0.766**	**0.058**	**0.766**	**0.054**
Meetings			-0.052	0.828	-0.061	0.799	-0.057	0.819
Other			0.059	0.304	0.060	0.295	0.068	0.252
Controls:								
Presentations to the institutional sales team	0.025	0.666	-0.031	0.604	-0.034	0.570	-0.069	0.299
Blast voicemails	**0.237**	**0.077**	**0.248**	**0.068**	**0.242**	**0.081**	**0.248**	**0.075**
Ln(commissions from covered stocks)					0.421	0.647	0.190	0.838
Ln(CRSP volume of covered stocks)							**4.388**	**0.059**
Period fixed effects	Yes		Yes		Yes		Yes	
R^2	51.9%		57.5%		57.6%		59.3%	
N	132		132		132		132	

This table reports results from regressing semiannual changes in broker votes on semiannual changes in communication activity. Boldface type highlights statistical significance at the 10% level (based on a two-tailed *t*-test). Significance levels are based on heteroskedasticity-robust standard errors clustered by analyst and time (Petersen 2009) and test the null hypothesis that the respective coefficient is zero.

TABLE 6
The Relation Between Changes in Communication Activity and Changes in Trading in Analysts' Covered Stocks

	Dependent Variable: Δ Ln(Commissions from Cov. Stocks)				Dependent Variable: Δ Mkt. Share of Vol. for Cov. Stocks			
	Model 1		Model 2		Model 3		Model 4	
	Coeff.	*p*-Val.	Coeff.	*p*-Val.	Coeff.	*p*-Val.	Coeff.	*p*-Val.
Published Research:								
Published research	**0.007**	**0.060**			**0.016**	**0.048**		
Notes			**0.008**	**0.034**			**0.017**	**0.045**
Reports			-0.004	0.889			-0.004	0.938
High-Touch Service:								
Sum of personalized, private interactions	**0.001**	**<.001**			**0.002**	**<.001**		
Phone calls			**0.001**	**<.001**			**0.002**	**0.002**
One-on-one, face-to-face meetings			0.001	0.587			0.003	0.325
Concierge Service:								
Sum of concierge points	-0.001	0.434			0.002	0.404		
Non-deal road shows			-0.017	0.121			0.018	0.428
Conferences			0.006	0.324			0.002	0.855
Tours			0.009	0.821			0.036	0.649
Meetings			0.024	0.394			0.086	0.148
Other			**-0.014**	**0.023**			**-0.028**	**0.024**
Controls:								
Presentations to the institutional sales team	**0.012**	**0.048**	**0.012**	**0.048**	0.007	0.605	0.007	0.607
Blast voicemails	-0.022	0.379	-0.019	0.449	-0.082	0.120	-0.083	0.119
Benchmark	**0.660**	**<.001**	**0.665**	**<.001**				
Period fixed effects	Yes		Yes		Yes		Yes	
R^2	19.2%		19.8%		8.3%		8.9%	
N	1,369		1,369		1,369		1,369	

This table reports results from regressing monthly changes in trading activity on monthly changes in communication activity. Models 1 and 2 (3 and 4) use the change in commissions from an analyst's covered stocks (change in market share of trading volume in an analyst's covered stocks) as the measure of trading activity. Boldface type highlights statistical significance at the 10% level (based on a two-tailed *t*-test). Significance levels are based on heteroskedasticity-robust standard errors clustered by analyst and time (Petersen 2009) and test the null hypothesis that the respective coefficient is zero.

TABLE 7

The Determinants of Analyst Compensation:
Broker Votes, Commissions From Covered Stocks, and Trading Share

Panel A: Analyst Compensation and Voting Outcomes—Levels

		Salary & Bonus	
	N	**Mean**	**Median**
Bottom third of the voting distribution	28	$413,938	$358,438
Middle third of the voting distribution	27	$504,968	$500,000
Top third of the the voting distribution	28	$614,777	$602,500

Correlation between Ln(salary & bonus) and broker-vote signal: 0.727, $p < 0.001$

Panel B: Analyst Compensation and Commissions from Covered Stocks— Levels

		Salary & Bonus	
	N	**Mean**	**Median**
Bottom third of the commissions distribution	28	$441,621	$419,063
Middle third of the commissions distribution	27	$537,209	$550,000
Top third of the commissions distribution	28	$556,004	$549,375

Correlation between Ln(salary & bonus) and Ln(commissions from covered stocks): 0.337, $p = 0.001$

Panel C: Analyst Compensation and Share of Volume in Covered Stocks— Levels

		Salary & Bonus	
	N	**Mean**	**Median**
Bottom third of the trading-share distribution	28	$500,424	$512,500
Middle third of the trading-share distribution	27	$539,663	$491,250
Top third of the trading-share distribution	28	$494,835	$548,750

Correlation between Ln(salary & bonus) and share of trading volume in covered stocks: 0.024, $p = 0.830$

Panel D: First-Differenced Regression Results

	Change in Ln(Salary & Bonus)							
	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Coeff.	***p*-Val.**	**Coeff.**	***p*-Val.**	**Coeff.**	***p*-Val.**	**Coeff.**	***p*-Val.**
Change in voting signal	**1.039**	**0.002**					**0.885**	**0.012**
Change in log commissions from covered stocks			**0.130**	**0.024**			**0.096**	**0.101**
Change in share of trading volume in covered stocks					-0.852	0.765	-0.016	0.392
Year fixed effect	Yes		Yes		Yes		Yes	
R^2	21.4%		14.2%		4.4%		26.5%	
N	49		49		49		49	

This table examines the relation between analyst compensation and three measures of client payment: signals from the broker-vote reporting system, commissions from covered stocks, and the bank's share of trading volume in analysts' covered sotcks. Panels A, B, and C examine the relation between the level of analyst compensation and the levels of each of the three client payment metrics (N = 83). Panel D examines the relation between changes in analyst compensation and changes in the three client payment metrics (N = 49). Boldface type highlights statistical significance at the 10% level (based on a two-tailed *t*-test). Significance levels are based on heteroskedasticity-robust standard errors clustered by analyst and time (Petersen 2009) and test the null hypothesis that the respective coefficient is zero.

TABLE 8

The Implications of Communication Activity for Analyst Compensation: The Broker-Vote Link

	Communication-Voting Relation					Voting-Compensation Relation			
	(i)		(ii)		(iii)		(iv)		(v)
	***Semmiannual* Change in Communication Activity**	×	**Voting-Response Coefficients (Table 5)**	÷ 2 =	**Change in *Annual* Broker-Vote Signal**	× 0.885 = (Table 7)	**% Change in Pay**	× $511,303 = (Table 1)	**Dollar Change in Pay**
Published Research:									
White papers	1		1.861		0.931		0.83%		$4,227.97
High-Touch Service:									
Phone calls	168		0.013		1.076		0.96%		$4,892.73
One-on-one, face-to-face meetings	36		0.046		0.829		0.74%		$3,763.65
Concierge Service:									
Non-deal road shows	5		0.288		0.720		0.64%		$3,266.74
Tours	1		0.766		0.383		0.34%		$1,737.10

This table combines the estimates from Tables 5 and 7 to infer the implications of communication activity for analyst compensation through the broker-voting mechanism. Specifically, for each statistically significant coefficient from Table 5, we examine the implications of a top-decile *semiannual* change in communication activity for *annual* analyst compensation. For example, we find one additional white paper to increase the average annual broker-voting outcome by 0.931%. This translates into a 0.83% increase in pay, which represents around $4,227.97 for a typical analyst in our sample.