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BROKERAGE COMMISSIONS AND INSTITUTIONAL TRADING PATTERNS

by

MICHAEL GOLDSTEIN, PAUL IRVINE, EUGENE KANDEL and ZVI WIENER

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CENTER FOR THE STUDY OF RATIONALITY

Feldman Building, Givat-Ram, 91904 Jerusalem, Israel
PHONE: [972]-2-6584135 FAX: [972]-2-6513681
E-MAIL: ratio@math.huji.ac.il
URL: http://www.ratio.huji.ac.il/

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Michael Goldstein
Babson College

Paul Irvine
University of Georgia

Eugene Kandel
Hebrew University and CEPR

Zvi Wiener
Hebrew University

April 7, 2004

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Abstract

Why do brokers charge per-share commissions to institutional traders? What determines the commission charge? We examine commissions and order flow for a sample of institutional orders and find that most per-share commissions are concentrated at only a few price points, primarily 5 and 6 cents per share. Further, we find that the prior-period commission, rather than execution costs, is the strongest determinant of next period's commission. These results are inconsistent with negotiation of commissions on an order-by-order basis or with the impression of a continuous transaction cost that is deduced from the distribution of percentage commissions, suggesting that commissions are not a marginal cost of execution. We also find that institutional clients concentrate their order flow with a small set of brokers, and that small institutions concentrate more than large institutions. Collectively, our results suggest that brokers and their institutional clients enter into long-term agreements where the per-share commission is constant, and the order flow routed to a particular broker is used to maintain the required payment for an institution's desired level of service. Commissions, therefore, constitute a convenient way of charging a predetermined fixed fee for broker services.

1 Introduction

The choice of per-share commissions for the execution of institutional trades is puzzling. Execution costs, unlike commissions, are not proportional to trade size. Further, Constantinides (1986), and Vayanos (1998) show that as with any marginal transaction cost, commissions significantly reduce turnover and thus do not appear to be the most profitable way for brokers to charge for order execution. Yet, per-share commissions are the dominant form of payment for institutional execution. Despite significant changes in the market such as investments in technology by discount brokers, and the growth of electronic trading with low execution costs, total commission revenues have been steadily increasing over time. Total commission revenues grew from $1.74 billion from all sources in 1974 to $12.7 billion paid by institutional investors alone in 2002 (Oster and Lauricella, 2003). Moreover, institutional commission rates have been remarkably stable. Since 1991, per-share commissions average between five and six cents per share (Greenwich Associates, 2002), despite Sofianos' (2001) finding that institutional commissions are considerably higher than the marginal cost of trade execution.

Clearly, commissions are not determined by the marginal cost of execution. Instead, we conjecture that rather than representing a marginal transaction cost, per-share commissions constitute a convenient way of charging a predetermined fixed fee for broker services. Services provided to institutional clients include difficult order execution, access to initial public offerings and high-quality timely information provision. Such an arrangement would explain the stability of average commissions per share. In addition, if commissions do not represent a variable cost, then theoretical models of institutional trading can be simplified and empirical estimates of total trading costs are inflated. Viewing commissions as a predetermined fee also severs the link between the characteristics of an order and the commission applied to it.

If institutional commissions represent a predetermined fixed fee for broker services, then this arrangement determines how institutions allocate their commission dollars. Brokers must choose how to allocate a fixed supply of valuable services. We contend that brokers allocate services based on the total revenue generated by the client. Brokers and their institutional clients enter into long-term agreements where the brokers provide a higher level of service to their highest revenue clients;

these premier clients receive disproportionately valuable services, while the regular clients receive a standard package. The competition for brokers' services occurs through the allocation of order flow to various brokers.

Using a proprietary database of institutional trades, we examine the distribution of institutional commissions and find that the majority of institutional client-broker pairs use only one or two different per-share commissions for all their transactions. In fact, there is relatively little variation in the distribution of per-share commissions across all transactions, regardless of the broker or institution. Further, we find that the most important determinant of the per-share commission on an order is the prior-period commission paid by an institutional client to that same broker. Factors potentially affecting the execution cost of an order, such as the order size or trade difficulty, are relatively unimportant in determining the per-share commission. These results are consistent with the conjecture that commissions are an average, not marginal, cost for broker services in a predetermined long-term agreement.

We find that institutions concentrate their order flow with only a few important brokers, and that small institutions concentrate their order flow more than do large institutions. The largest institutions, such as Fidelity, are able to spread their trades across many brokers and still provide enough total revenue to receive premier service from each broker. Most institutions, however, are faced with the decision to trade off the benefits of hiding their trading strategy by trading through many brokers against the benefits of concentrating their order flow with a small set of brokers in order to become important clients to this smaller set. The smaller the institution, the more they must concentrate their trades. The concentration of institutional trading has implications for the frequency of frontrunning in the market and for the ability of institutions to hide their trading strategies. Finally, we document that the recommending broker's clients execute more profitable trades when a broker's services are likely to be particularly valuable; at the time sell-side analysts change their recommendations.

Section 2 outlines how per-share commissions act as a mechanism to measure the broker's total revenue from a client and how clients will make their trading decisions in this environment. Section 3 describes the data and examines institutional commission rates. Section 4 examines the implications of predetermined commissions for institutional trading patterns and Section 5 concludes.

2 The commission contract

Institutions buy services from brokers, and the value of these services may be subject to economies of scale, encouraging institutions to concentrate their order flow to become important clients to a subset of the brokers with which they deal. This argument, however, does not explain why the payment for these services takes the form of per-share commissions. While fixed-fee contracts for non-broker research services are occasionally observed, per-share commissions are the dominant form of payment between brokers and their institutional clients.[1]

Per-share commissions have strong historical and regulatory roots. Minimum per-share commissions were mandated for over 100 years, until the industry was deregulated in the 1975 amendments to the Securities and Exchange Act of 1934. In response to industry lobbying efforts, Congress included the Section 28 (e) safe harbor provisions in the 1975 amendments. Under the Section 28 (e) provisions, managers can allocate trade to a particular broker for reasons other than execution costs.[2] Thus, Section 28 (e) permits institutions to pay for broker services with trading commissions, implicitly treating the commission as a marginal trading cost.

The consequences of deregulation have been profound in the retail brokerage industry. Two alternative retail contracts, the marginal per-trade commission charged by the discount broker and the fixed percentage of assets fee employed by full-service brokers, successfully coexist with the commission contract. Somewhat surprisingly, the per-trade execution contract provided by the retail discount broker and their institutional counterparts has not driven out commission contract in either the institutional market or the full-service retail market. In fact, the market share of the per-share commission contract remains particularly high in the institutional market.

An important reason for the survival of the commission contract, as opposed to alternative fixed-fee arrangements, is the regulatory treatment of commissions paid by buy-side institutions. If an institution pays cash for broker services, it must increase its management fees to cover the payment, or reduce the manager's profits. Since commissions are charged directly to the customers of institutional managers, procuring broker services through commission payments does not necessitate increasing the management fee and does not affect managerial compensation. This bundling

[1] For example, in the market for information provision a multitude of newsletters are distributed to paying subscribers. Value Line offers several subscription rates for varying levels of service: higher subscription fee ensures earlier information delivery.

[2] Blume (1993) and Conrad, Johnson and Wahal (2001) discuss Section 28 (e) in more detail.

arrangement not only makes paying commissions for broker services attractive to institutional managers, it reduces the focus of the managers on the marginal cost of execution services.[3]

Per-share commissions can also be considered a solution to the client-broker agency problem under three different frameworks: (i) a risk-sharing agreement, (ii) a linear incentive contract similar to those in the principal-agent literature, or (iii) a product quality assurance agreement.

Brennan and Chordia (1993) model per-share commissions as an optimal risk-sharing contract between investors and brokers. They find that in many cases commissions dominate fixed fees and indirect sales through mutual funds as the most efficient way for a brokerage-firm to sell their analysts' information. In their model, brokers wish to sell information with an uncertain value to their clients. Brennan and Chordia (1993) conclude that the less risk-averse broker should give the information away to the more risk-averse client. If, *ex-post*, the information is useful to the client, the resulting trades reward the broker through commission dollars. Thus, the risk-neutral broker bears the risk over the value of the analyst's information. As Brennan and Chordia (1993) note, their model assumes that the broker is able to cheaply monitor their clients' trading, otherwise clients can cheat and execute their trades through less expensive providers of execution services such as discount brokers or electronic crossing networks (ECNs).

The Brennan and Chordia (1993) model, however, is unlikely to explain institutional commissions. Unlike most retail clients, institutions execute trades with a large number of brokers, which implies a high cost of monitoring institutional clients' trading. Institutions would find it easy to cheat in a *quid pro quo* trading arrangement and execute many of their trades through inexpensive brokers rather than the information provider. Moreover, since it is not clear whether a broker is less risk averse than the institutional client, the optimal risk sharing contract may actually involve a large institution bearing most of the risk by purchasing information for a fixed fee. Thus, the question as to why brokers charge per-share commissions, particularly to institutions, remains open.[4]

[3] Davis (2004) reports that Fidelity recently petitioned the SEC for separate disclosure of the prices of trading costs and other broker services included in bundled commission charges. It is notable that they did not request the unbundling of trading costs and other services into separate commission charges.

[4] However, alternative explanations of per-share commissions must explain the stylized facts incorporated by Brennan and Chordia (1993), such as the dominance of per-share commissions and the fact that the information seller gives away the information to the buyer without receiving an immediate payment.

Alternatively, one can view commissions as a linear incentive contract. In many principal-agent environments, the principal pays a commission based on performance measures that inform him *ex-post* of the effort being exerted by the agent *ex-ante*. Holmstrom and Milgrom (1987) show that linear contracts are optimal in situations where contracts are long-lived. However, the incentive provision arising from a linear contract is unlikely to explain brokerage commission contracts, since the order size, which determines the size of the payment, is determined solely by the principal (institutional client) and is unlikely to serve as a performance measure of the agent (broker).

Instead one can view commissions as a long-term agreement where the provider of a service chooses its quality and the customer chooses the amount he pays for it, as in the product quality assurance argument of Klein and Leffler (1981). In their model, a high-quality producer prices the product above its marginal cost. The customers are willing to overpay (relative to cheaper substitutes), as long as the quality is maintained above some predetermined level. The producer could cheat and produce a cheaper product, but this would stop the stream of future positive profits associated with producing the high-quality good and receiving the premium price. Thus, in equilibrium both party's strategies are optimal and maintain a high-quality, high-price market even in the presence of low-cost substitutes. Applied to the institutional commissions market, the Klein and Leffler (1981) model suggests that institutional clients can choose how much of the broker's service they wish to receive by adjusting the amount of commission dollars they send to that broker. In equilibrium, full-service brokers provide a premium level of service, for which the client is willing to pay a premium price, per-share commissions are only used to facilitate the payment.[5]

Viewing institutional commissions in the Klein and Leffler (1981) framework effectively extends the Brennan and Chordia (1993) model because it removes the necessary condition that the broker must monitor all of their client's trading. Because per-share commissions are relatively constant, each broker need only measure the total number of shares received from an institution to ensure that it receives enough revenue to continue providing the agreed upon level of service. Where these institutions execute the rest of their trades is immaterial, as institutions have no incentives to

[5] Another puzzling example of a linear contract based on a measure unrelated to performance is found in advertising. Advertising agencies receive revenues proportional to total media billings for their campaign. As in brokerage services, the quality of a single campaign is hard to quantify and contract upon, and thus the parties cannot base a payment on an objective performance measure. Instead, payments are based on an easily measurable variable that is under the full control of the client, who, therefore, determines the total payment. It is well known that firms frequently change their advertising agencies in search of better creativity. What is less known, is that it is not uncommon for an agency to dismiss the firm if its billings are too low for the required effort.

reduce their level of trade with a broker unless they are dissatisfied with the services they receive.

Per-share commissions facilitate the allocation of valuable broker services to the brokers' most valuable customers. An analogous market mechanism is the airlines frequent-flier programs. Airlines possess valuable assets they cannot always sell outright, such as empty first-class seats that are often allocated to valuable customers based on the number of miles the customer has flown with the airline. The airline is unconcerned with the number of miles the traveler flies on another airline, as long as the traveler's miles on their airline are sufficient to receive premium services. The traveller tends to fly often on their frequent-flier airline to ensure continued access to the airline's premium services. Both miles flown and total commissions represent easy to compute (for both parties) metrics that efficiently measure the importance of a client to each business.

2.1 Brokerage Services

Basic execution is a commodity and thus must be competitively priced. Sofianos (2001) reports that discount brokers and ECNs dominate the market for basic execution. This market is highly competitive: commissions in this market are one to three cents per share, and in some cases institutions can get even cheaper execution.

2.1.1 Difficult trades

To charge a premium commission, brokers must provide more than basic execution services. Providing additional services requires brokers use additional resources to satisfy the client. For example, the quality of execution for difficult trades, where the potential price impact is greater, often depends on the search costs the broker expends and the capital committed to the trade. Moreover, a broker's inherent quality (the skill of the trading desk) affects execution quality. Consequently, this segment of the industry provides a differentiated service in a less competitive environment.

Commission rates could be negotiated on a per-order basis for difficult trades, but execution quality for difficult orders is best evaluated over time, which argues against order-by-order negotiation. Previous empirical studies contrasting commission costs with execution costs consistently find no significant correlation between these two costs (Berkowitz, Logue and Noser, 1988; Chan and Lakonishok, 1993, 1995; Conrad, Johnson and Wahal, 2001), arguing against an environment where

higher per-share commissions are negotiated on an order-by-order basis for difficult trades. Aitken, Garvey and Swan (1995), using Australian data, find that larger clients pay higher percentage commissions to brokers who provide capital to facilitate trades, a result they contend is consistent with long-term client-broker agreements for difficult executions. Further, the sheer number of variables that could potentially affect execution costs on a particular trade suggest that a per-order evaluation of execution quality is difficult. While various measures of per-order execution quality are available (such as value-weighted average price used by Berkowitz, Logue and Noser, 1988), these inevitably rely on strong assumptions about the trading environment, and can be disputed by the parties involved. Moreover, difficult order execution has a time-sensitive component, which may induce the broker to provide better service to some clients at the expense of others. Imagine, for example, two institutions submitting large sell orders in the same security to the same broker at the same time. Regardless of the broker's skill, these trades will have a price impact, imposing a negative externality on each other. The trade to be executed first will get a better price than the second one.

Ascertaining execution quality on an order-by-order basis is difficult, but institutions can determine the quality of service it gets from a broker over a longer period. The idiosyncratic variables affecting execution quality on a particular trade tend to cancel out over time, thus the precision of estimates of broker performance improves over longer horizons. Indeed, the use of such firms as Abel/Noser, Elkins-McSherry, or Plexus, which specialize in providing comparative analysis of broker's execution costs over time, suggests that the agreements based on execution cost measures are likely long term as well.

2.1.2 Information and IPOs

Timmons (2000) reporting a conversation with an anonymous sell-side analyst quotes the analyst as saying: "I kept my Buy rating, but I told my favorite investors to sell". Clearly, some clients are getting better information than other clients from this analyst. However, to an outside observer, information quality is difficult to define. On the surface it would appear that information is a public good, and thus no single individual would be willing to pay enough for its generation. This impression, however, is misleading. From any single client's perspective, the *value* of information the client receives crucially depends on the *timing* of its transmission from the broker. In reality,

information is supplied sequentially; not all clients receive it at the same time. As a result, the broker has discretion on whom to call first. In financial markets, information is most valuable to those who receive it the earliest. As prices adjust to reflect information imbedded in trades (Glosten and Milgrom 1985, Kyle 1985, and Easley and O'Hara 1987), information loses its value upon receipt by additional market participants. Thus, the scarce resource in this context is the client's place in the queue: the client who is called first by the broker gets the most valuable information.[6] Once the information is widely disseminated, it becomes practically useless for any single client.[7] This feature of information provision implies that clients have strong incentives to purchase a place at the head of the queue.

Another service is access to IPOs, which can be viewed in this context as a simple rebate program. A broker's best institutional clients get larger allocations of 'hot' IPOs, and since these IPOs usually yield significant short-term returns, these clients get larger profits (Nimalendran, Ritter and Zhang, 2004).[8]

2.1.3 Long-term agreements for broker services

A feature of these broker services is that the quality of service is hard to quantify on an order-by-order basis, which suggests that long-term agreements are appropriate in the broker-institutional client market. Long-term agreements fix the level of service and the required payment over a long period, rather than a varying order-by-order payment. Consequently, it is likely that there is relatively low variability of per-share commissions across orders of the same broker-client pair.

If per-share commission rates are predetermined in long-term agreements, the indivisibility of broker services has important implications for how institutions allocate their order flow. Broker services are often indivisible: some clients will always get better service than others. As a result,

[6] Historically, information was delivered by telephone and the broker determined the ordering of the queue. Hence the name *First Call* for a well-known research distribution network. More recently, electronic dissemination of analysts' research notes ensures that most clients receive some information at approximately the same time. Today's queue revolves around a race to receive elaboration from the analyst on the brief *First Call* note: enabling clients to form a more precise idea of the value of the analyst's information.

[7] An example is presented in Green (2003) who examines the transitory trading profits available to *First Call* subscribers.

[8] There is a consensus in the IPO literature that underwriters compensate institutions that consistently provide them with information about the fundamental values of the issuing firms (Jenkinson and Ljungquist, 2000). Production of this information requires institutions invest in research capabilities, which is not economical if institutions are awarded small positions in IPOs. Consequently, there are imbedded economies of scale in the IPO pre-issue market.

most clients receive a standard package of services and pay for it accordingly. However, if an institution is willing to pay a sufficient amount to become one of the premier clients of a particular broker, it receives more than a proportional increase in the value of services in return. This institution receives early access to analysts, priority in difficult trade executions, more capital committed to its trades, and a disproportionately larger share of IPOs. To increase the average volume sent to each broker, institutions will reduce the number of brokers with whom they do business. Institutional trading patterns will also reflect a concentration of order flow, institutions will 'bunch' their trades with particular brokers. Rather than allocating their volume equally across brokers with whom they choose to work, clients will strategically allocate the volume so as to obtain premier status at as many service-providing brokers as possible.

2.2 Costs

Taken in isolation, the above arguments suggest that institutions should strive to become premier clients with as many brokers as they can. However, the concentration of institutional order flow cannot be taken to extremes as there are significant costs to concentration, which can offset the benefits. We consider four types of costs that institutions must take into account when allocating their order flow to brokers:

1. The cost of front-running: an institution may not want to send too much trading volume to a broker to prevent the broker from front-running (interpreted here in the broadest possible sense). Any concentration of orders naturally increases potential frontrunning costs because larger orders are more likely to move prices.[9] We assume that this cost is increasing in the volume allocated to a particular broker, thus the marginal cost of bunching with a particular broker is increasing. This cost induces the client to distribute volume more evenly across brokers and to increase the number of brokers used. Thus, potential front-running costs reduce the bunching of institutional order flow.

2. The cost of trade identification: institutions do not want their trades to be associated too closely with a particular broker because any identifiable trading patterns help the market to

[9] Shwartz and Steil (2002) survey 27 major investment management firms and conclude that that front-running costs are important to buy-side institutions; such costs are a primary contributor to the buy-side's demand for trading immediacy.

determine their identity, potentially increasing their price-impact costs. Chan and Lakonishok (1993, 1995) make this point when they conclude that the most important determinant of the price impact of an institutional trade is the identity of the institution behind the trade.[10] Thus, holding broker size equal, we assume that this cost is increasing in the amount of trade sent to a particular broker. To avoid this cost institutions will tend to increase the number of brokers used.[11]

3. The fixed cost of a relationship between the institutional client and the broker. The fixed cost of adding an additional broker to a client's list of brokers due to electronic connections, billing, clearing, and other back-office services. This cost reinforces the desire of clients to limit the number of their brokers.

4. Finally, the cost (commission) that brokers charge could affect institutional allocation. If brokers offer volume discounts, due to fixed costs on the part of the broker, these discounts could encourage institutions to concentrate their trading with particular brokers.

These costs will affect institutional bunching strategies in several ways. For example, front-running costs and the exposure of trading strategies to the market induce institutions to work with as many brokers as possible. However, the fixed costs of setting up a relationship with a broker suggest that institutions with high trading volumes can more easily afford to allocate their trading to many brokers. Thus, fixed costs alone limit the number of brokers with which a given client will choose to work, but they do not predict bunching.

Although the cost-based predictions are potentially important determinants of institutional allocation of order flow, cost-based explanations are incomplete explanations of institutional trading patterns observed in the data.[12] An alternative hypothesis is therefore required to explain the patterns of institutional trade that we observe.

[10] An interesting case is provided by Fidelity, who can easily dominate any broker's volume, but then the market will know that this broker's trades have a high probability of being Fidelity trades. Market participants actively try to determine Fidelity's trading patterns. Pethokoukis (1997) discusses the specific problems Fidelity faces hiding their trading strategies from the market.

[11] Clearly, it is easier to hide a trading strategy among the trades of a broker with higher volume. Later, we show that institutions concentrate their trading with the largest brokers, consistent with their desire to hide their trading strategies.

[12] We constructed a 'cost-only' model where the optimal strategy for allocation of order flow is determined *solely* through minimization of the costs outlined below. Unfortunately, the model provides only weak 'straw-man' testable predictions, which are trivial to refute. The reason for the lack of precise predictions in a cost-minimization model is that a general model cannot be solved analytically. The Operations Research literature has developed algorithms for numerical solutions of such problems; however; these solutions are not useful for our purposes.

2.3 Our view of the commission contract

Commissions are important to the literature on institutional trading costs. Berkowitz, Logue and Noser (1988), Chan and Lakonishok (1993; 1995), Keim and Madhavan (1997), and Conrad, Johnson and Wahal (2001) empirically estimate institutional trading costs by including commissions as a marginal execution cost. These studies find that commission costs, while smaller than price impact costs, are still quite significant.[13] Treating commissions as a marginal cost is natural because there is an explicit per-share commission cost tied to every institutional trade on the NYSE. Yet, given the actual commission contract in the institutional market, the costs of commissions are not a marginal execution cost.[14]

Alternatively, institutional commissions represent an average cost for a high-quality alternative in the Klein and Leffler (1981) framework. This alternative requires that brokers can provide a high-quality product; there must be more in the bundle of broker services than basic execution. Institutional clients can choose how much of the broker's service they wish to receive by adjusting the amount of commission dollars they send to that broker. In this interpretation, commissions provide a convenient way to collect the predetermined fee for the institution's desired level of service. The commission is negotiated once, and then the institution directs enough order flow to the broker to deliver the total payment required to obtain the chosen service level. Thus, there will be relatively little variation in the average per-share commission charge. Bunching or aggregating order flow with a few brokers increases the brokers' revenues through the volume component of total revenue providing the institution access to valuable services from these brokers.

This alternative does not preclude the possibility that the average commission component can vary to some extent across clients, similar to other product markets. Large institutions may receive volume discounts and therefore pay smaller average commissions, yet still maintain a position as one of the broker's most important clients. On the other hand, smaller institutions may voluntarily agree to pay higher average per-share commissions because their total volume is not large enough to insure them access to the level of broker services they desire.

[13] Commissions costs also have a significant impact on the cost of owning mutual funds. Hechinger (2004) reports that Lipper Inc. studied 2,000 funds for the *Wall Street Journal* and found that brokerage commissions can more than double the cost of owning fund shares.

[14] Strictly speaking, there are always marginal commission costs, but execution of an institution's marginal trades can be accomplished very cheaply at execution-only venues, which charge considerably less than the typical full service broker. Commissions above these execution-only costs, therfore, cannot represent marginal costs of trading.

While transaction costs induce inefficiencies and reduce trading volume, if commissions are largely predetermined then the effect of commissions on volume and order size is minimal when basic execution is available at competitive prices. As long as an institution can trade with a discount broker or an ECN, its desired trading volume should be set using the ECN's low transaction costs, since the higher commissions that include the payment for other services are inframarginal for the institution. Consequently, the detrimental effect of charging for broker services through higher commissions is small. In fact, it is possible commissions may actually increase the volume of trading to the detriment of investors. If institutional investors do not bear the cost of trading directly, they might trade too much to get the desired amount of service. This problem is particularly relevant for smaller institutions that may want to increase their service above the level they would receive based on their size.

Treating commissions as an average cost in a long-term agreement allows us to make predictions about the allocation of institutional order flow and to highlight the fact that commissions have minimal effects on trading volume and order size, unlike the predictions obtained by treating commissions as a marginal cost of execution. Suppose that broker services were provided separately from basic execution. In such a world, all brokers would charge 1-3 cents per share for basic execution and, according to the traditional view, marginal execution costs would be lower. As a consequence, trading volumes and order sizes would increase. Under our view of commissions, per-share commissions in excess of 1-3 cents, since they are payments for broker services that are essentially fixed on an order-by-order basis, should have a minimal effect on volume and order size.

2.4 Empirical Predictions

The above arguments can be summarized as testable hypotheses.

Hypothesis 1: Since brokers and their institutional clients determine commissions in a long-term agreement, the best predictor of the per-share commission on any order is the prior commission on all orders between the same institution-broker pair. In an environment with little or no order-by-order negotiation over commissions, variables usually used to proxy for the execution cost of a trade will be relatively unimportant in determining per-share commissions.

Hypothesis 2: Institutions disproportionately 'bunch' their order flow with particular brokers

to gain a premier level of service from brokers who provide services other than basic execution. The alternative would be a fairly even distribution of order flow across brokers.

Hypothesis 3: Smaller institutions bunch more than the larger institutions due to their desire to gain premier status with at least a few brokers. The alternative would be no difference in bunching across institution size. Moreover, it is possible that small institutions may be willing to pay a higher per-share commission to achieve their goals.

Hypothesis 4: Larger institutions employ more brokers than smaller institutions to reduce exposure to the market and to prevent front-running. The alternative would be a fairly even distribution in the number of brokers used across institution size.

Hypothesis 5: Similar size brokers get vastly different allocations from the same client. Alternatively, if the desire to hide their trading strategies is the driving force behind institutional trading patterns, similar size brokers would receive similar trading allocations from the same client.

Hypothesis 6: Smaller institutions may be willing to generate unnecessary trading to get additional services from their brokers.

3 The institutional commissions market

3.1 Data

The data used to test our hypotheses consists of 651,183 orders for NYSE-listed stocks by 306 institutional investors executed between January 1, 1997 and March 31, 1997. The data is obtained from Abel/Noser Corporation, a NYSE member firm and a leading provider of transaction cost analysis to institutional investors. Information in the database consists of several unique items including: an executing broker code, an institutional client code that permits us to track orders associated with each of the 306 institutions, and a buy or sell order indicator. In addition, the database contains the commission cost of each order, its date, size, and the average execution price of each order.[15]

[15] The institutional orders in the data base cannot be decomposed into individual trades. Thus, a particular order could have been executed with one trade or with multiple trades.

With proprietary records from Abel/Noser we identify the broker used for each order. There are 1,064 brokers in the database; however many of the brokers appear infrequently. In order to concentrate on the most important market participants, we restrict the sample to brokers who execute at least 50 orders in our three-month database; after imposing this restriction 267 active brokers remain in the Abel/Noser data. This restriction does not materially affect the sample as the resulting active-broker subsample consists of 611,826 orders, or 94 percent of the original observations.[16]

3.2 Institutional commissions

Figure 1 presents the distribution of commissions as a percentage of the price (solid line). This representation reflects the conventional treatment of commissions as a marginal transaction cost denoted in percentage terms (Chan and Lakonishok, 1993, 1995; Conrad, Johnson and Wahal, 2001). The distribution appears continuous, with the greatest frequencies at transactions costs of between 5 and 15 basis points of the stock price. This distribution has a long right tail which gradually dies out (we truncate at 33 basis points for ease of presentation). In this graph, institutional commissions appear to be continuous transaction cost which could vary as a function of the characteristics, such as execution difficulty, of a particular order.

However, this representation of commissions is misleading. The variation in Figure 1 comes primarily from price variation, rather than from commission variation. To illustrate this point, we reproduce the same graph using a single 5 cents per-share commission for all orders divided by the corresponding price (dashed line). The fixed 5 cent commission/price line tracks the actual commissions/price line quite well, particularly in the long right tail. Since, apparently, a reasonable first approximation of institutional commissions is obtained with a fixed estimate of 5 cents per share, the continuous distribution of percentage commissions is an artifact of price variability, and thus has little to do with the determination of actual per-share commissions.

The actual pattern of institutional commissions is more complex than the simple 5 cents per share presented in Figure 1, as the distribution of commissions is complicated by the use of cheaper execution venues such as ECNs for some orders. Figure 2 presents commissions in cents per share,

[16] We also truncate the data by deleting commissions above 10 cents per share, to reduce the influence of outliers on our tests, and observations where a zero commission is reported.

which, in our opinion, is the appropriate way to look at institutional commissions. For clarity, we round commissions per share to the nearest one-tenth of a cent, so one hundred different price points are available to institutional brokers. In fact, brokers use only 12 percent of the 100 available price points: except for some minor exceptions at 0.1 cents and 0.5 cents, all commission prices are in exact cents per share. Commissions of 5 and 6 cents contribute the majority of observations to our sample, with the bulk of the rest executed at 2, 3 or 1 cents per share, respectively.[17]

It is difficult to reconcile the distribution of commissions in Figure 2 with the idea that commissions are a marginal cost charged on a order-by-order basis. Anecdotal evidence suggests that commissions are determined by the broker, perhaps subject to small negotiated changes for particular orders. Institutions control their total commissions cost by adjusting the volume routed to each broker rather than by costly order-by-order negotiation.

There is some variation in commissions as a function of order size. Figure 3 decomposes the relative frequency of commissions charged by five different order size categories. For small orders of under 500 shares, low cost commission execution is relatively more important: 18.4 percent of all small orders are executed at 2 cents per share, while 59.9 percent of small orders are executed at 5 or 6 cents per share. For large orders of over 10,000 shares, only 7.2 percent are executed at 2 cents per share, while 71 percent of these orders are executed at 5 or 6 cents per share. A 3 cents commission is observed more often for large orders than for small orders; market share of 3 cents commissions increases from 4.9 percent of the total for 500 share orders to 14.3 percent for orders over 10,000 shares. According to Sofianos (2001), the increase in 3 cents per-share commissions for large orders represents a substitution of floor broker execution for electronic execution for these orders. Thus, the variation in commission rates across order size is a choice made by the client when deciding what type of broker to use for a particular order and not the result of client-broker negotiation over the commission rate on a particular order.

The distribution of commissions presented in Figures 2 and 3 suggests that there are essentially two types of orders in the database. High-cost or full-service executions, that usually cost 5 or 6 cents per share and low-cost execution-only orders charging 3 cents per share or less. We expect bunching to be more apparent in the high-cost market where broker services are allocated, while

[17] Sofianos (2001) claims that 3 cents per share trades are primarily executed by floor brokers and the cheaper commission trades by ECNs. Principals at ITG inform us that their POSIT trade-matching system executes primarily at 2 cents per share during this period.

the low-cost market provides only basic execution. Thus, in our empirical work we examine these orders separately.

3.3 What determines commissions per share?

Hypothesis 1 contends that if commissions are determined in a long-term agreement, the best predictor of the commission on any order is the prior commission on all orders between the same institutional client-broker pair. In contrast, the variables usually used to proxy for marginal execution costs of a trade, will be relatively less important in determining per-share commissions. This hypothesis implies that commissions are predetermined rather than negotiated on a order-by-order basis. Paying a commission determined in advance of the actual transaction is attractive to institutions relative to negotiating commissions on an order-by-order basis. Negotiation takes time, which impacts immediacy of execution. Kavajecz and Keim (2003) describe how the negotiating process imposes additional costs on institutions because they must reveal details about each particular order; the broker must know the terms of the order to enter into a meaningful negotiation. Once the details of an order are revealed to a broker, the institution cannot withdraw the information if they are unhappy with the commission charge the broker proposes. A predetermined commission charge avoids these costs, and therefore represents a tenable alternative to order-by-order negotiation.

We examine the validity of Hypothesis 1 with two empirical tests. Both tests divide the sample into two periods: (i) January 1997, the first month of the sample (prior period) and (ii) February and March 1997, the last two months of the sample (the post period). We proceed to identify client-broker trading in January where the number of transactions between a particular client and a particular broker is at least 25. In this period we identify the mode of the commission distribution for each client-broker pair. If a long-term contracting framework is the correct way to interpret institutional commissions, we expect to see the modal commission dominate traditional measures of execution costs in explaining commissions in the February-March period.

3.3.1 The prior commission

We first examine the mode of the commission distribution for a client-broker pair in January against all commissions generated by that same pair in the February-March period. To do this, we separate the distribution of commissions into high-cost and low-cost orders. As the actual

commission distributions in Figures 2 and 3 exhibit a relative paucity of trades at 4 cents per share, we define high-cost orders as those which charge more than 3 cents per share. The validity of separating commission charges into these two groups is confirmed by conversations with full-service brokers who maintain that their commission structure often consists of a single high-cost price and a second low-cost price.

Panel A of Table 1 presents the transition matrix in the low-cost market between the mode of a client-broker pair in the prior period and actual commissions observed between the same client-broker pair in the post period. Post-period totals for each commission price are presented below the transition matrix. The percent row at the bottom of the panel reports the percent of all post-period orders that execute at a particular commission and therefore represents the unconditional probability of a particular commission in the post period. If commissions are negotiated on an order-by-order basis, then the distribution of post-period commissions along each prior commission row should correspond to the unconditional probability. The actual transition probabilities, conditional on the prior period distribution mode, are dramatically different from the unconditional probabilities. A client-broker pair that has a modal commission of 1 cent in the prior period executes 80.7 percent of its post-period orders at 1 cent. Similar percentages are observed for prior period modes of 0.1 cents, 2 cents and 3 cents. The only exception is the relatively unimportant subset of 0.5 cent prior-period orders which execute frequently (85.8 percent) at 1 cent per share in the post period.

To verify the importance of the prior-period commission on the frequency of post-period commissions a likelihood ratio test appropriate for percentages (Greene, 1997) is constructed from an unrestricted estimate of the probability (conditional on the prior period) and a restricted estimate which imposes the unconditional probability. In each case, the hypothesis that the conditional probabilities are equal to the unconditional probabilities is rejected. For example, under the null that the unconditional probability of a 1 cent commission in the post period is 21 percent; the conditional probability of a 1 cent commissions, which is 80.7 percent when the prior-period commission is 1 cent, produces a $\chi^2(1)$ statistic of 335.66, rejecting the null hypothesis with a p-value < 0.001. Thus, the observed frequencies of post-period commissions conditional on the prior-period commissions are significantly different from the unconditional probabilities.

Panel B of Table 1 reports the transition matrix for high-cost orders. Although there are

more pricing nodes observed than in the low-cost subsample, orders of 5 and 6 cents per share predominate. Again, the transition matrix is heavily weighted along the main diagonal, with conditional probabilities of up to 90 percent for 5 cent commissions, a significant departure from the unconditional probabilities.[18] Likelihood ratio tests are constructed for the entries in Panel B. These tests strongly reject the hypothesis that the observed frequency of commissions is independent of the prior-period commission. For example, under the null that 5 cent commissions should occur with the unconditional frequency of 53.77 percent, when they actually occur 90 percent of the time when the prior commission is 5 cents, the $\chi^2(1)$ test statistic is 35,329, clearly rejecting the null hypothesis.

The prior-period commission between a client-broker pair has strong predictive power for future commissions between that client-broker pair, a finding consistent with Hypothesis 1, which hypothesizes that per-share commissions represent average costs in long-term client-broker agreements. We extend our tests of this hypothesis below by contrasting the ability of the prior-period mode to predict future commissions, against the ability of standard measures of execution costs to predict future commissions.

3.3.2 Average cost or marginal cost?

Table 2 presents regressions which use different sets of independent variables to explain the variation of commissions per share in the post period. The regression specification includes standard measures of execution costs including stock price, order size and the percent of daily volume in a particular stock represented by each order (a measure of order difficulty). In addition to the execution cost measures, the regression specification includes the January modal commission between a client-broker pair and proxy variables which control for institution and broker size. The OLS regression specification is:

$$Comm = \alpha + \beta_1 Price + \beta_2 Shares + \beta_3 MKT\% + \beta_4 Mode + \beta_5 CVOL + \beta_5 BVOL + \eta. \quad (1)$$

[18] The one notable exception to the main diagonal rule occurs when 7 cents per share is the prior-period mode. For these orders, while 7 cents is still observed much more frequently (36.38 percent) in the post period than the unconditional probability of 7 cent orders (2.55 percent), even more orders at this prior mode go off at 6 cents per share (41.18 percent).

In Equation (1), $Comm$ is commissions per share on an order, $Price$ is the execution price, $Shares$ is the order size in log shares, $MKT\%$ represents the order size as a percentage of that day's trading volume in the stock. $Mode$ is the mode of the prior-period commission distribution for each client-broker pair, $CVOL$ is the volume-based quintile size rank (smallest (1)-largest(5)) of the institutional client and $BVOL$ is the volume-based quintile size rank (1-5) of the executing broker.

The explanatory power of the prior-period $Mode$ relative to the explanatory power of the execution cost variables - $Price$, $Shares$ and $MKT\%$ - is key to interpreting Equation (1). We expect the $Mode$ to be strongly positively correlated with the post-period commission. Alternatively, if the execution costs of a particular order affect commissions, we expect that proxies for the costs of order execution - $Price$, $Shares$ and $MKT\%$ - will influence the post-period commission. The impact of $Price$ on commissions per share is unclear; high-priced stocks may require higher capital commitments from the facilitating broker and therefore a positive coefficient could be expected. Conversely, Conrad, Johnson and Wahal (2001) find that inverse price is positively related to percentage execution costs, a finding they conclude reflects the fact that percentage spreads are smaller for high-priced stocks. Larger orders may be more difficult to execute, so $Shares$ should be positively related to commissions per share. $MKT\%$ is a measure of order difficulty: the larger the order relative to daily volume, the greater total liquidity the order demands. Hence, $MKT\%$ may be positively related to commissions per share. $CVOL$ and $BVOL$ are included as control variables that measure potential effects in commission rates related to the size of the client or the size of the broker.

The first two regressions in Table 2 present two specifications of Equation (1) for all 329,813 orders in the post-period subsample that have the necessary data available (All). Under the null hypothesis that commissions can be represented as a continuous distribution of marginal transactions costs, OLS estimation is appropriate. However, as we show in Figure 2, the distribution of commissions per share is not continuous, but discrete. Given this result, we also present the log likelihoods from ordered Logit regressions to confirm the OLS inferences about the economic significance of each regression specification using a technique that is appropriate for the empirical distribution of commissions presented in Figure 2. To save space we do not report the coefficient

results from the Logit specification.[19]

The first regression uses only execution-cost variables to predict commissions. The performance of this specification is poor. Although order size (*Shares*) has the predicted sign, order difficulty (*MKT%*) does not, and the regression only manages an R^2 of 1.25 percent. However, adding the prior *Mode* as an additional explanatory variable increases the R^2 increases substantially to 88.97 percent. In this specification, the execution cost coefficients have the same signs as in the first regression and the coefficient on the prior mode is close to one. The striking result in these regressions is that standard measures of execution costs do not explain much of the variation in commissions per share. Consistent with Hypothesis 1, our long-term agreement proxy variable - the prior *Mode* - explains institution commissions extremely well.

However, it is possible that the prior mode simply proxies for differences between high-cost brokers and low-cost brokers. To confirm our results, we examine three regression specifications estimating commissions per share for high-cost and low-cost markets separately. Again, we are primarily interested in the relative explanatory power of execution costs against our long-term agreement proxy (*Mode*) across different commission markets. In the low-cost market the execution cost variables do relatively well, obtaining an R^2 of 10.74 percent. In the low-cost market *Shares* and *MKT%* are positively related to commission costs, as expected. The low-cost commission market has an important execution cost component, consistent with the low-cost market being more closely related to marginal execution costs than the high-cost market. However, the long-term contracting proxy, the *Mode*, is a more important explanatory variable than the execution cost variables, even in the low-cost market. Adding the *Mode* to the specification significantly increases the explanatory power of the regression to an R^2 of 53.56 percent. A third regression specification adds *CVOL* and *BVOL* to the regression, but both variables are insignificant in the low-cost market.

In the high-cost regressions, execution-cost variables have little explanatory power, by themselves they produce an R^2 of only 0.16 percent. In this regression, the coefficients on *Shares* and *Price* are positive, but the coefficient on *MKT%* is negative. Adding the prior-period *Mode* to the high-cost commission regression improves the R^2 to 53.85 percent. A third regression specification adds *CVOL* and *BVOL* to the regression. In contrast to the result in the low-cost regression, the

[19] The coefficient results are similar and the ordered logit results are available by request from the authors.

coefficients on client size and broker size are negative and significant in the high-cost commission market. Consistent with Hypothesis 3, the negative coefficients indicate that large clients pay lower average commissions and further, large brokers tend to offer lower average commissions. Although a likelihood ratio test shows that $CVOL$ and $BVOL$ statistically increase the explanatory power of the regression relative to the second specification, the effect of these variables is small relative to including the $Mode$.

Thus, while the low-cost commission market has an execution cost component, the high-cost commission market does not. The commission charge in both markets is best explained by the prior modal commission between a client-broker pair.

The prior-period mode explains post-period commissions well because commissions are rarely negotiated on an order-by-order basis. To investigate this contention, Figure 4 presents the frequency distribution of commissions between client-broker pairs in the post period. Overall, 27.1 percent of all client-broker pairs in the sample pay a *single* commission price on all the orders they transact. An additional 31.7 percent of client-broker pairs pay only two commission prices, a frequency which often represents a single low-cost commission and a single high-cost commission. Thus, over 50 percent of our sample's client-broker pairs use two or fewer commission prices and almost 90 percent of all client-broker pairs use four or less commission prices. These results suggest that the order-by-order negotiation of commissions play a relatively minor role in the institutional market.

4 Institutional Trading Patterns

4.1 Institutional trading activity

The size of the institutional client is important to several of our hypotheses, particularly in the number of brokers chosen to execute orders and in how different size institutions allocate their trading to their brokers. To understand more about the how institution size affects our sample, we sort the clients into five quintiles, ranked by trading volume, and examine aggregate trading statistics by quintile in Table 3. Table 3 shows that trading activity is skewed towards the largest clients. The high-volume quintile dominates the other quintiles in terms of total trading volume, total orders and total commissions paid to brokers. As a robustness check, we verify that the

average stock price in an order is roughly equal across quintiles, which indicates that different size institutions are not trading vastly different stocks, at least as defined by stock price. Clearly, the largest institutions are going to be desired customers for all brokers.

The average per-institution trading statistics in Table 3 show that the smaller institutions are at a considerable disadvantage in terms of total commission dollars spent. Dominated in terms of size, how do the four smallest quintiles compete for broker services? Hypothesis 3 suggests that smaller institutions will concentrate their orders more than larger institutions in order to obtain adequate levels of broker services from relatively small trading volumes. Hypothesis 3 also suggests that to increase their importance to their brokers, smaller institutions may pay a higher per-share commission. Consistent with Hypothesis 3, the average commissions per share for the smallest quintile institutions is higher than that charged to larger institutions. However, the difference in average commissions per share across size quintiles is relatively modest, especially compared to the large differences across quintiles in average trading volume and consequently, average commissions per order. Thus, total revenue to a broker is not primarily determined by the size of the per-share commission. Instead, the only way for small clients to compete for broker services is to allocate a larger share of their order flow to particular brokers.

Since the clients' choice of broker rather than negotiation on a order-by-order basis determines both a client's total commission charge and a broker's total commission revenue, we examine how the five institution size quintiles distribute their trading across broker types. Full-service brokers execute the majority of institutional orders. Separate unreported analyses indicate that institutions, regardless of size, tend to concentrate their trading with the full-service brokers as all five client quintiles execute between 62 and 66 percent of their trading with full-service brokers. This result reflects institutions desire to obtain full-service brokers' services in return for the stream of commission revenue sent to these brokers. For all institutions and all broker types, commissions per share is relatively stable and order size is the primary determinant of the overall commissions paid on an order. Given these results, we aggregate trades by all broker types in our empirical tests of institutional trading patterns.[20]

[20] Using information from the Securities Industry Association, company websites and other published information we classified our 267 active brokers into five types: full-service, discount, ECN, wholesaler and other brokers. Full-service brokers (141) are the most frequent broker type. Discount brokers, ECNs and wholesalers generally do not provide broker services, while other brokers usually provide a single service. Tests of institutional trading patterns using only full-service broker trades produce similar results to those presented below that use the entire sample.

4.2 Evidence on concentration of institutional trading

Viewing institutional commissions as a convenient way of paying for broker services rather than a payment for execution has important implications for institutional trading patterns. The fact that order flow is the primary determinant of broker revenue has consequences for an institution's trading decisions: Hypothesis 2 predicts that institutions will concentrate their trading with a subset of their service-providing brokers, despite the advantage a more disperse trading pattern provides for hiding their trading strategies from the market. Hypothesis 3 predicts that smaller institutions will concentrate their trading more with their most important broker(s) than large institutions will trade with their most important broker(s). Large institutions have the flexibility to become premier clients to many brokers, while smaller institutions are forced to concentrate their trading with only a few brokers. To the extent that broker revenue can be increased by paying higher commissions, Hypothesis 3 further speculates that smaller institutions may pay higher average commissions than larger institutions. Finally, Hypothesis 4 predicts that larger institutions can more easily afford to pay the fixed costs of using additional brokers and therefore will tend to use more brokers than smaller institutions. We examine these hypotheses by presenting evidence on institutional trading patterns for each institution size quintile. Specifically, we examine the average number of brokers used by institutions in each quintile, the pattern of concentration - bunching - with an institution's most important brokers and the average commissions paid by the institutions in each quintile.

We again separate institutional commissions into two markets: a high-cost market and a low-cost market. We assume that high-cost orders are priced above the marginal cost of execution and therefore represent payment of a predetermined fee for broker services. As a result, Hypothesis 2 predicts institutions will concentrate their order flow towards their most important high-cost brokers and Hypothesis 3 predicts that small institutions will exhibit more order flow concentration towards their most important high-cost brokers than large institutions. These hypotheses follow directly from the fact that brokers' commission revenues are primarily determined by trading volume.

As an alternative to paying high-cost commissions, a low-cost commission market at prices at or below 3 cents per share is available to institutions as an execution-only alternative. As the low-cost market is priced near the marginal cost of execution, this market will not necessarily exhibit the same institutional trading patterns as the high-cost market.

Panel A of Table 4 presents evidence on institutional concentration of order flow as a function of institution size (quintile). We examine Hypotheses 2 and 3 by calculating broker concentration as the average market share (percent of each client's total commission dollars) that clients in each quintile send to their highest-revenue broker (Top broker), their three highest-revenue brokers (Top 3), their top 5 brokers, their top 10 brokers and all brokers used. To check whether a small client can increase broker revenues by paying higher per-share commissions or whether significant volume discounts exist, Panel B examines average commission costs for the same client-broker combinations that measure order flow concentration.

Hypothesis 2 predicts order flow bunching: a skewed allocation of client orders towards their most important service-providing brokers. This result is precisely what we observe in the data. In the high-cost market, the largest institutions send 16.7 percent of their commission dollars to their top broker, whereas an evenly-distributed allocation, which would presumably do the most to disguise their trading strategies, allocates only 1.26 percent (87.74/69.41) of their order flow to each high-cost broker. The largest institutions concentrate their order flow with a few top brokers: 30.7 percent of their commission dollars goes to their top 3 brokers, 39.7 percent to their top 5 brokers, and 55 percent to their top 10 brokers.[21]

Hypothesis 3 predicts that this pattern of institutional bunching forces smaller institutions to concentrate their order flow to an even greater extent. Consistent with Hypothesis 3, as the size of the institution decreases, the bunching of order flow with an institution's most important brokers increases. Panel A reveals that the percentage of commission dollars executed with their top broker increases monotonically with client size, from 16.7 percent for the largest quintile to 38 percent for the smallest quintile. The alternative hypothesis that order flow executed with a top broker is independent of institution size is rejected with an F-statistic of 16.10. The top 3, top 5 and top 10 broker categories show the same pattern of institutional bunching and similar rejections of the alternative hypothesis. Thus, consistent with Hypothesis 3, we find that smaller institutions bunch their order flow with their most important brokers more than do larger institutions.

The pattern of institutional allocation of order flow is strikingly different in the low-cost market.

[21] Table 4 reports institutional averages by commission dollars spent because commission dollars represent the important economic variable, broker revenue. Similar conclusions are obtained from average share volume, but the reader should note that using commission dollars represents the high-cost market as a relatively more important execution method than it would appear from examining share volume.

The largest quintile institutions send 6.2 percent of their commission dollars to their most important low-cost broker and 9.6 percent of their commission dollars to their top 3 low-cost brokers, the smallest institutions send only 1 percent of their total commission dollars to their top low-cost broker. Overall allocation of order flow to the low-cost brokers is modest, in contrast to the bunching of institutional order-flow towards an institution's most important high-cost brokers. Effectively, smaller institutions do not use the low-cost commission market.[22] Large institutions use the low-cost market more extensively than small institutions because they have a large enough order flow to purchase their desired level of broker services. As a result, large institutions are free to execute more of their order flow in the low-cost market, reducing their overall commission bill. Smaller institutions do not use low-cost brokers because they must use most of their order flow in an attempt to become important clients to their most important high-cost (service providing) brokers.

As predicted by Hypothesis 4, the average number of brokers used by institutions in each client quintile is increasing in the size of the institution. In the high-cost commission market the smallest institutions use only 23.5 high-cost brokers on average, while the largest institutions use 69.4 brokers on average. This pattern of broker usage is also present in the low-cost market where the smallest institutions use an average of 2.3 brokers, while the largest quintile uses an average of 13.2 brokers to execute trades in this market. These results are consistent with the fact that the fixed costs of setting up a broker-client relationship help determine institutional allocation of trading. The fact that Hypothesis 4 holds in both high-cost and low-cost markets suggests that the fixed costs of setting up a broker-client relationship are not directly related to per-share commissions.

Institutions allocate their order flow in an environment where brokerage-firm revenues are generated primarily from trading volume rather than with higher commissions per share. Panel B presents average per-share commissions for the institutions in each quintile. In the high-cost market, the second smallest quintile pays slightly higher average commissions than do the three largest quintile institutions, while the smallest quintile pays an even higher average commission. F-tests of the equality of average commissions across quintiles rejects the hypothesis that commissions are equal across quintiles for each broker group. For example, the smallest quintile pays an average of

[22] Full-service brokers often offer both a high-cost commission price and a low-cost commission price. This flexible pricing schedule allows the full-service broker to capture more of a client's execution business, after the client has fulfilled their obligations and fully-paid for the broker's services. The full-service brokers' low-cost commission price is competitive with the price of ECNs' and other execution-only brokers.

6.17 cents per share to their top broker, this number is the largest entry in the panel and suggests that small institutions are willing to pay higher average commissions to their top broker in order to increase the revenue they send to that broker. However, the increase between the smallest quintile's average payment to their top broker, 6.17 cents per share, and the largest quintile's payment to their top broker, 5.83 cents per share, represents an increase of only six percent, a trivial economic difference when compared to the difference in volume across these two groups presented in Table 3. Effectively, the share volume sent to a broker determines the importance of an institution to a particular broker.

4.2.1 Broker size and institutional trading patterns

These results appear to support Hypothesis 5 which contends that similar size brokers get very different allocations of order flow from the same client, contradicting the alternative that institutional trading patterns are driven solely by the cost-based arguments outlined in Section 2.2. Ideally, institutions would like to hide their trading strategies as much as possible by dispersing their trades across the set of brokers they use. Instead they concentrate their trades with a small set of brokers.

Alternatively, it could be that institutions do disperse their trades, but broker size varies considerably so that when we observe the entire distribution of institutional trades, they appear bunched. To examine this alternative directly, Panel C of Table 4 examines the average and median broker ranks for each quintiles five most important brokers. Each broker's rank is calculated based on total commission revenue among the 267 active brokers in the sample. From Panel A we know that each institutions five largest brokers receive much larger allocations of order flow than their other brokers, with the largest share going to the institution's top broker. Yet, for all institutional size quintiles, their most important brokers are all roughly the same size. All of the average and median broker ranks in Panel C fall into the largest broker quintile. All institutions, even the smallest ones, concentrate their order flow with the largest brokers, presumably because this group provides the most valuable services. This result is not tautological. Although Table 3 indicates that the broker rank in the sample is primarily determined by the largest institutions, the four smallest quintile institutions choose to concentrate their order flow with the same set of brokers that the largest quintile trades through. These results provide direct support for Hypothesis 5 and

refute the cost-only proportional allocation explanation for the institutional bunching patterns we observe.

Given the conclusions in Chan and Lakonishok (1993, 1995) that an institution's identity is the paramount factor in determining execution costs, there must be strong reasons for institutions to deviate from a strategy of hiding in the order flow as effectively as possible. Overall, our evidence is consistent with all clients concentrating their orders to capture the benefits from moving up higher in the queue for broker services. This pattern is most pronounced for small clients, where the benefits from bunching outweigh the potential costs; and thus they tend to concentrate their trading with only a few service-proving brokers.

Panel B indicates that large institutions do not receive economically significant volume discounts on their commissions, yet Table 3 finds that they pay lower average commissions on their trades. Because they are large enough to purchase their desired level of broker services with only part of their order flow, large institutions execute proportionately more of their order flow in the low-cost commission market which lowers their average commission cost.

4.3 Turnover evidence

If small institutions cannot attract broker services with significantly higher per-share commissions, Hypothesis 6 predicts that they may attempt to increase the revenues they send to brokers by increasing share turnover. To test this contention we turn to CDA/Spectrum data which provides quarterly turnover data on all investment managers with over $100 million in assets. Although our Abel/Noser data represents a non-trivial fraction of NYSE-listed trading with over 5.6 billion shares traded in a single quarter, it is not a complete database of institutional trades. Even though Spectrum does not identify particular institutions and brokers, it has the advantage of being a more complete sample of institutional investors. Summary information for six years of quarterly 13-F filings is presented in Table 5. We summarize mean turnover across all six years by institutional size quintile in Spectrum and by the provided designations of the type of institution: banks, insurance, investment companies, independent advisors and other institutions. We then compare the mean turnover of the smaller institutions as a percentage of the mean turnover of the largest quintile institutions for each type of institutional investor. Using a t-test for differences in mean turnover, we find that for four of the five types of Spectrum institutions institutional

turnover is significantly higher for the smallest quintile institutions. For independent advisors and other institutions, quintiles two through four also have significantly higher trading than the largest quintile.

Although there may be other reasons for small institutions to have higher turnover, these results are consistent with our interpretation of the market for the finite resource of broker services. Smaller institutions who, because of their small size cannot generate large broker revenues, attempt to increase their ability to capture broker services by concentrating their trading with a few brokers and increasing their turnover to provide the required revenues to these brokers.

4.4 Trading following information events

Our hypotheses assume that tangible benefits from obtaining broker services exist. One such benefit is the timeliness and precision of sell-side analysts' information. A high level of service from a broker's research department is an ongoing effort which includes time and attention spent by the research department on the issues relevant to the client. However, to illustrate one benefit from obtaining access to a brokers' services we investigate client trading at the time analysts' change their investment recommendations. To do this, we first collect a sample of analysts' recommendation changes during the first quarter of 1997 for the stocks in our sample. We then examine the pattern of abnormal returns around our sample of recommendation changes to ensure that our results are consistent with the results reported by Elton, Gruber and Grossman (1986) and Womack (1996) who find recommendation changes to be informative events. We then examine client trading at the time of these information events to see if the recommending broker's clients receive earlier or more complete information. To test this contention, we calculate the profitability of all orders in the recommended stock at the time an analyst report is publicly released.

Our sample of analysts' recommendation changes consists of 441 upgrades or downgrades on our sample stocks that were recorded by the Dow Jones News Service in the first quarter of 1997. The Dow Jones News Service analysts' reports are time-stamped so that we know when the reports became public, although public dissemination may occur after dissemination to important clients. The analysts' reports are issued almost exclusively by brokers in the largest broker quintile.[23]

[23] This result is likely related to the censored nature of the DJNS. The service is much more likely to report recommendation changes from large, national brokers than smaller regional brokers.

Table 6 presents the average event-day abnormal returns for the analysts' recommendation changes. The event day is defined as the day the report was released if the report is time-stamped before the close of trading and the following day if the report is time-stamped after the NYSE 4:00 close. Abnormal returns are estimated using market excess returns on the event day. CRSP provides the raw security returns and the value-weighted market returns for the calculation of market excess returns. Our sample of analysts' upgrades and downgrades produces significant abnormal returns. Upgrades produce an average abnormal return of 2.27% (t-statistic = 10.14) and downgrades produce and average abnormal return of -2.98% (t-statistic = -7.80). The only statistically insignificant analysts' recommendation change is an upgrade to a hold recommendation.

Similar to the results in Elton, Gruber and Grossman (1986) and Womack (1996) we find analyst recommendation changes to be informative events as measured by abnormal returns. Therefore, trading in these stocks on these days may provide better than average profit or loss avoidance opportunities. With the daily closing price as a benchmark, we can determine the profitability of orders on these high-information days. Further, we can examine whether trading profits, if they exist, are related to the nature of the client-broker relationship.

4.4.1 Institutional trading on analysts' information

Table 7 presents an analysis of client orders in the recommended stock on the day analysts' change their recommendations. We compare the execution costs of orders through the broker that issues the analyst's recommendation against trading through other brokers. This is a powerful and direct test of the informational value of being a client of a full-service broker. Clients who traded that day through the recommending broker are by definition clients of that broker.

We use the buy and sell indicator variables in our data and the price of the order to calculate order profitability. The transaction price relative to the close presents the most striking evidence of profitability. Only orders executed through the recommending broker are profitable. Institutions who trade through the recommending broker have an execution price 24.23 cents per share better than the close, while orders through a non-recommending broker received only modest price improvement of 1.46 cents per share relative to the close.

We find that orders through the recommending broker on the day of the recommendation change paid higher average commissions per share (5.59 cents), while orders in the same stock

on the same day through any other broker paid lower average commissions per share (4.68 cents). This difference reflects the fact that research providers are primarily full-service brokers who usually charge commissions of five or six cents per share. Nevertheless, for institutions who trade through the recommending broker, the price improvement received represents a gross per-order profit of $3,296, based on the average order size. Thus, clients of the recommendation changing broker paid more for their commissions but made profitable trades, despite the fact that these trades were, on average, significantly more difficult to execute, as measured by size of the order relative to that day's trading volume (market percent). In contrast, orders executed through other brokers paid less in commissions but lost money relative to the commissions paid.

The profitability of trades through the recommending broker is likely related to the fact that clients who execute through the recommending broker are more important revenue sources for the brokerage firm. On average, the clients that execute through the recommending broker have a significantly higher client rank with the recommending broker. Although not required to trade with the recommending broker, many large clients apparently do, perhaps to directly reward the analyst whose bonus is often tied to the commission revenue generated by their recommendations (Irvine, 2004). The profitability results are consistent with our assertion that brokers services are valuable, particularly for important clients. Since a large portion of the gain from trading on analysts' recommendations is likely to dissipate quickly (Kim, Lin and Slovin, 1997 and Green, 2003), access to early and precise information from the brokers' research department is a valuable asset. One of several benefits that institutions compete over through the order flow they send to particular brokers.

5 Conclusion

Timmons (2000) and Nelson (2002) claim that brokers treat their preferred institutional clients to privileged information. If this contention is true, then information services, and potentially other broker services as well, have value to a broker's customers. To allocate these services, brokers need a mechanism that determines the relative importance of an institutional client. Starting from the natural premise that the broker's preferred clients will be those providing the largest revenues to the brokerage firm, we maintain that the total revenues a broker receives from a client is a predetermined fixed fee. Clients optimally select their desired level of broker services and pay the associated fee

through per-share commissions on their orders. Thus, per-share commissions represent an average per-share cost of broker services, in contrast to the prevailing view of per-share commissions as a marginal transaction cost.

Examining the empirical distribution of institutional commissions we find that actual commissions per share are concentrated at only a few prices, predominantly rounded to exact cents per share. We then examine the determinants of institutional commissions and find that the most important determinant of institutional commissions is the prior-period commission paid by a particular client to a particular broker. In contrast, variables that are usually used to proxy for the execution costs of an order are shown to be relatively unimportant determinants of per-share commission charges. This result is inconsistent with the view of commissions as a continuous execution cost negotiated on an order-by-order basis. We conclude that commissions are a relatively low cost way for institutions and brokers to track the revenues a client sends to a broker. Both parties need only concentrate on the volume of trade directed to a broker to gauge the importance of a client to a broker. Thus, the institutional commissions are used to accumulate a predetermined fixed fee for an agreed upon level of broker services. If a client sends enough order flow to a particular broker to fulfill its long-term obligation to that broker, the client expects to receive a premier level of service from that broker in return.

Viewing commissions as an average cost has important consequences for understanding the allocation of institutional order flow and the consequent allocation of billions of dollars in trading commissions. We find that institutional clients concentrate, or bunch their orders with a subset of brokers. Smaller institutions use fewer brokers than large institutions, at least partly due to the fixed costs associated with enabling a broker-client relationship. More interestingly, institutions concentrate their order flow with a small set of the brokers. Institutions concentrate their order flow towards their most important high-cost commission brokers, precisely the market where benefits from broker services are allocated. Small institutions concentrate their order flow more than large institutions to become relatively important clients to a small set of brokers.

Bunching order flow is not an optimal strategy for hiding one's identity from the market. Therefore, if bunching partially reveals an institution's identity, it imposes significant price-impact costs on institutions (Chan and Lakonishok, 1993, 1995). These costs must be offset by benefits to a bunching strategy. One potential benefit is access to valuable broker services such as analysts'

information. Early receipt of high-quality information provides the opportunity for profit to those who receive it. Commissions represent a way for clients to pay the brokers not only for the information, but also for the its timely receipt and its precision. As position in the queue to receive information is a scare resource, brokers are more likely to provide the best information to those who pay the most. In response, clients who would otherwise try to disguise their orders by using many brokers will instead try to buy their way up the queue by concentrating their orders across a few brokers.

Empirically, we examine this idea by calculating trading profits on the days sell-side analysts change their investment recommendations. We find that institutions that transact through the recommending broker are more important clients who make profitable trades relative to institutions that trade the same stock on the same day with other brokers. This result is consistent with the hypothesis that information is being disseminated to brokers' best clients first, with clients paying more for the privilege of being higher in the queue and receiving higher-quality information than the rest of the market.

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Figure 1

Institutional percentage commission costs on the NYSE – 1st quarter 1997

The distribution of institutional commissions on the NYSE in the first quarter of 1997 as a percentage of stock price. Commissions per share are divided by the reported execution price to calculate at percentage commission transactions cost (solid line). Zero cents per share commissions are not analyzed and the distribution is truncated at 33 basis points. The distribution of percentage commissions appears continuous, however, the distribution of a fixed per-share commission of five cents per share, when divided by trade price, yields a similar distribution (dashed line).

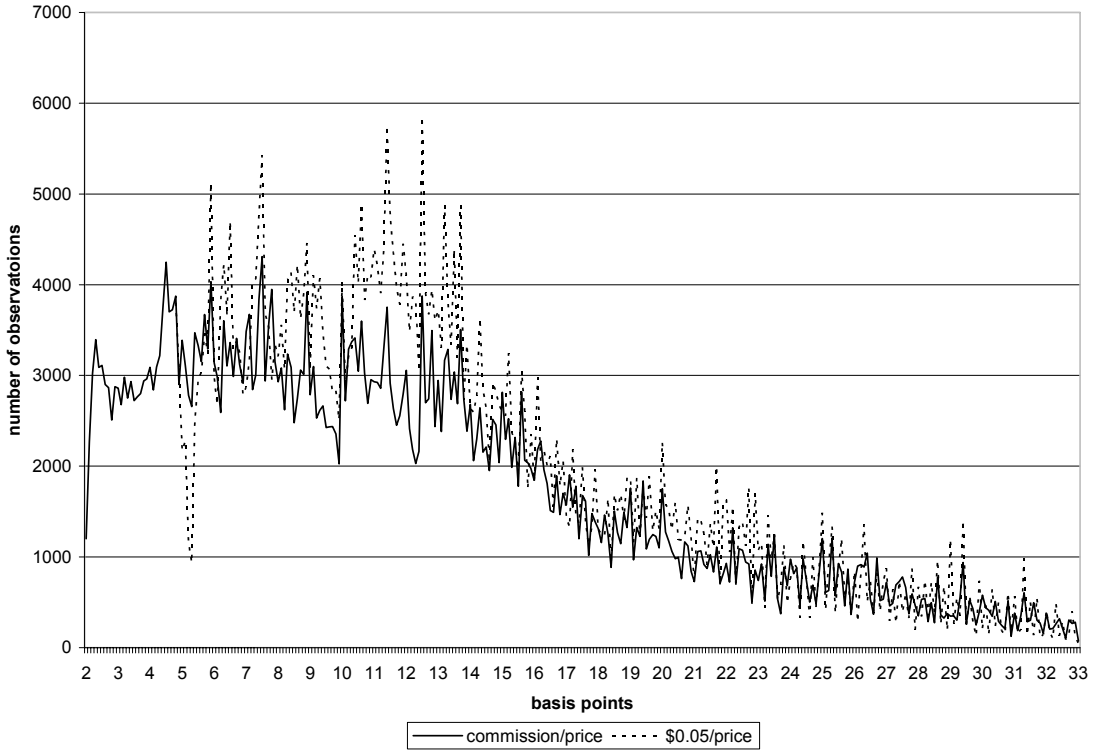

Figure 2

Commission pricing

Institutional commissions per-share cost on the NYSE in the first quarter of 1997. All commissions per share are rounded to the nearest one-tenth of one cent. Zero cents per share commissions are not analyzed in this distribution, and the distribution is truncated above ten cents per share, where only a few observations reside. The resulting distribution of commissions is presented below. Very few of the possible pricing nodes are actually used in practice, institutions rely on whole number pricing, primarily at 5 and 6 cents per share.

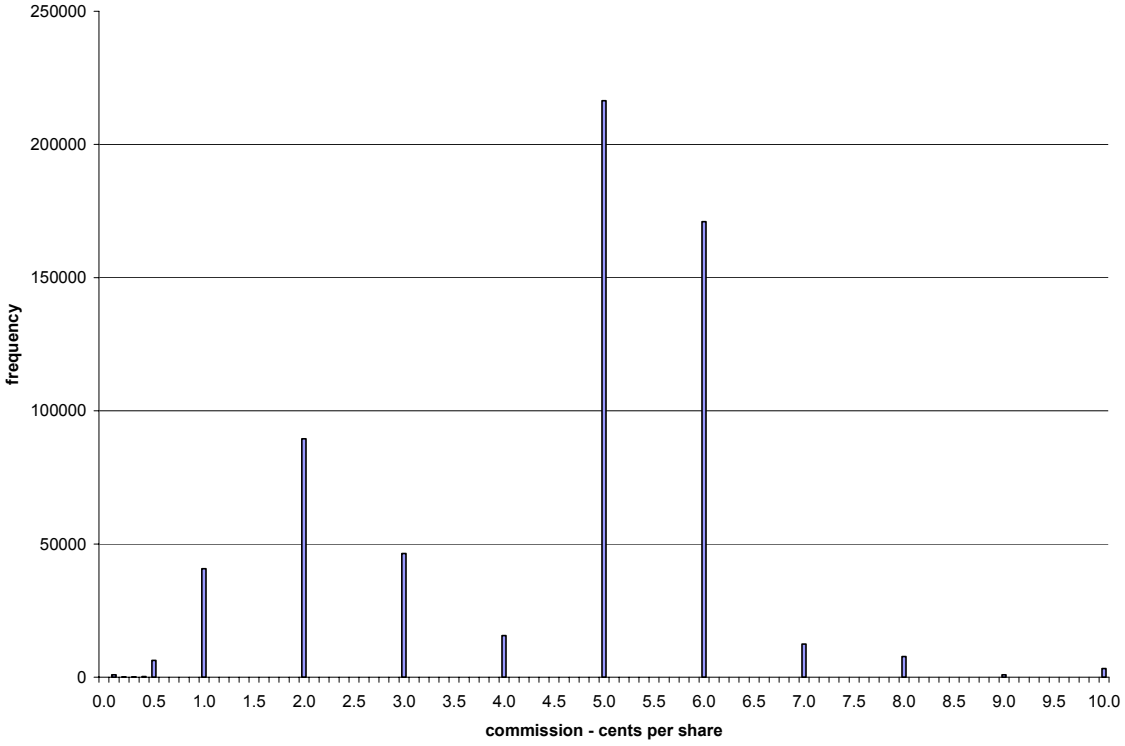

Figure 3

Institutional commissions on the NYSE – 1st quarter 1997: By cents per share and trade size

Institutional commissions per-share pricing by trade size on the NYSE in the first quarter of 1997. All commissions per share are rounded to the nearest one-tenth of one cent. Zero cents per share commissions are not analyzed in this distribution, and the distribution is truncated above ten cents per share, where only a few observations reside. Relative frequency of trades at each commission price is presented for five trade size categories.

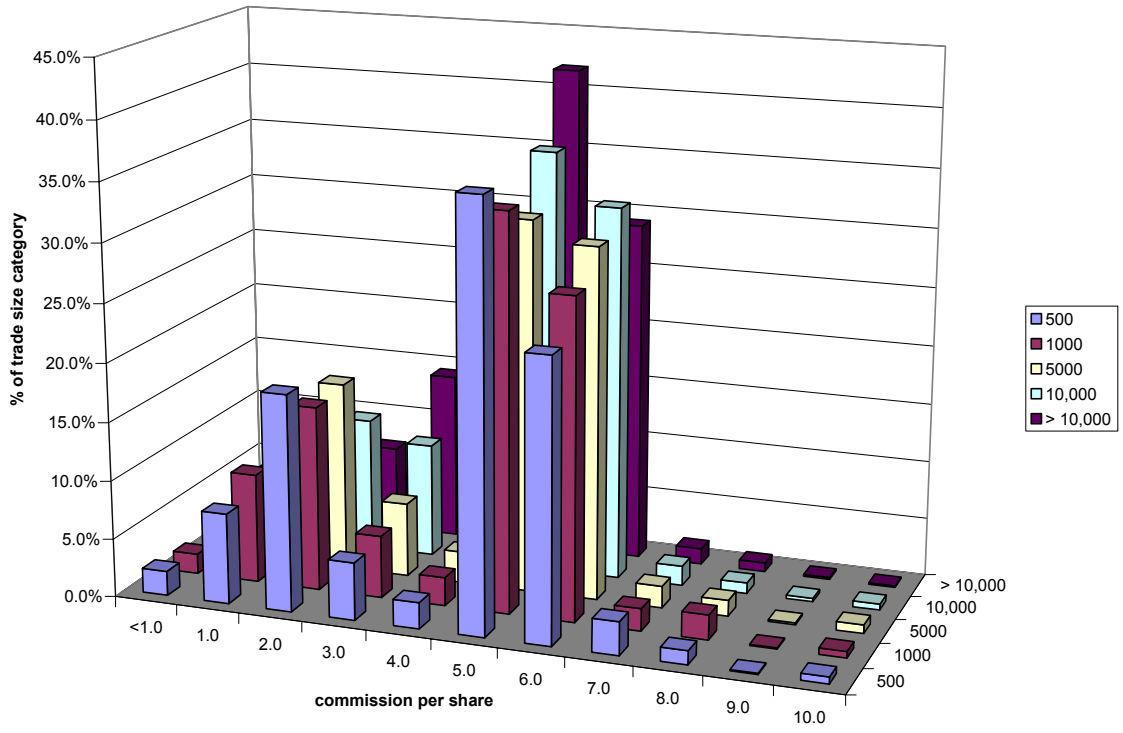

Figure 4

Frequency of different commissions per share by broker-institution pair

This graph presents a histogram of the number of different per-share commissions observed in February and March 1997 between broker-institution pairs. Each broker-institution pair executed at least twenty-five orders with each other in January 1997.

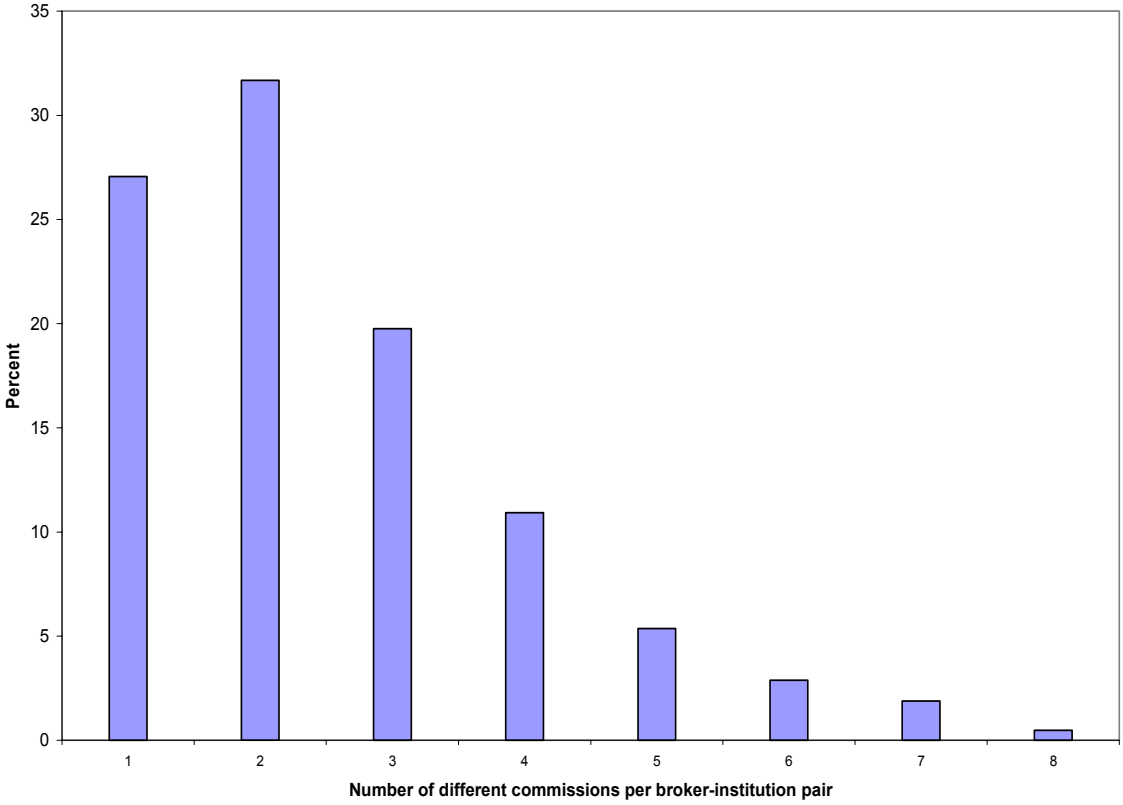

Table 1 – Panel A

Transition matrix of low-cost commissions

The table presents the probability of observing a particular commission in orders routed by a specific institutional client through a specific broker in February-March 1997, given the mode of the distribution of orders between the same client-broker pair. *Cents per share prior period* is the mode of the client-broker commission distribution from January 1997. The total number of observations for all January trades at each commission price is presented in parentheses below the commission price. *Cents per share in the post period* is the actual commissions paid between the same broker-client pairs for orders executed in February and March of 1997. Percentage market share for each particular post-period commission are presented in the rows of the transition matrix. Commission nodes with fewer than 25 total orders in the full sample are omitted, therefore the row columns may not sum exactly to one hundred. The actual number of orders represented by each node is presented in parentheses below the percentage. The percent row at the bottom of the graph represents the frequency of commissions observed in the post period.

Mode of cents per share in the prior period	Cents per share in the post period				
	0.1	**0.5**	**1.0**	**2.0**	**3.0**
0.1 (427)	84.86 (185)	0	0	14.68 (32)	0
0.5 (947)	0	0.51 (1)	85.79 (169)	0	13.71 (27)
1.0 (16,038)	0.01 (2)	0.00 (1)	80.68 (16,710)	13.34 (2,762)	5.91 (1,223)
2.0 (31,135)	0.17 (93)	1.02 (545)	6.08 (3,246)	89.60 (47,798)	3.08 (1,645)
3.0 (15,467)	0.01 (2)	1.92 (577)	6.14 (1,849)	13.65 (4,114)	79.27 (23,581)
Number of orders at that commission: post period	282	1,124	21,974	54,706	26,476
Percent	0.27	1.07	21.01	52.32	25.32

Table 1 – Panel B

Transition matrix of high-cost commissions

The table presents the probability of observing a particular commission in orders routed by a specific institutional client to a specific broker in February-March 1997, given the mode of the distribution of orders between the same client-broker pair. *Cents per share prior period* is the mode of the client-broker commission distribution from January 1997. The total number of observations for all January trades at each commission price is presented in parentheses below the commission price. *Cents per share in the post period* is the actual commissions paid between the same broker-client pairs for orders executed in February and March of 1997. Percentage market share for each particular post-period commission are presented in the rows of the transition matrix. Commissions cost with less than a total of 25 orders are omitted, therefore the row columns may not sum exactly to one. The actual number of orders represented by each node is presented in parentheses below the percentage. The percent row at the bottom of the graph represents the frequency of commissions observed in the post period.

Mode of cents per share in the prior period	Cents per share in the post period						
	4.0	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**
4.0 (4,474)	90.36 (6,757)	2.96 (221)	6.50 (486)	0.09 (7)	0.08 (6)	0.01 (1)	0
5.0 (73,464)	1.44 (1,778)	90.01 (111,304)	6.71 (8,300)	0.79 (974)	0.65 (800)	0.08 (97)	0.32 (398)
6.0 (52,219)	0.61 (531)	10.69 (9,299)	82.28 (71,548)	2.58 (2,245)	3.02 (2,625)	0.04 (35)	0.77 (670)
7.0 (3,147)	0.86 (36)	11.34 (472)	41.18 (1,714)	36.38 (1,514)	1.95 (81)	7.76 (323)	0.53 (22)
8.0 (2,581)	0.29 (4)	3.51 (48)	18.16 (248)	3.73 (51)	71.01 (970)	0.51 (7)	2.78 (38)
9.0 (232)	0	40.59 (82)	12.38 (25)	0.99 (2)	26.73 (54)	19.31 (39)	0
10.0 (937)	1.43 (20)	14.13 (197)	16.07 (224)	0.79 (11)	1.72 (24)	0.57 (8)	65.28 (910)
Number of orders at that commission: post period	9,126	121,623	82,545	54,706	26,476	510	2,038
Percent	4.03	53.77	36.50	2.55	2.01	0.23	0.90

Table 2

Determinants of institutional commissions

This table presents the results of regressions using commissions per share in February and March of 1997 as the dependent variable. Commissions per share are truncated at ten cents a share and rounded to the nearest 1/10 of a cent. Zero cent commissions are not analyzed. *Shares* is the order size, *Price* is the order price. *MKT%* is the size of the order divided by the daily volume in the traded stock. *Prior Mode* is the mode of each client-broker pairs executed commissions per share cost in January, 1997. *CVOL* is the institution's quintile rank among all institutions in the sample, *BVOL* measures the brokers' quintile rank among all brokers in the sample. Low-cost commissions are those orders with executed commissions pre share less than or equal to 3 cents per share (Low cost). High-cost commissions are those orders executed with executed commissions per share between 4 and 10 cents per share (High cost). All combines both low-cost and high-cost commissions. Log likelihood presents the goodness of fit statistic from an ordered Logit regression specification of each regression. T-statistics are presented in parentheses below the coefficient estimates.

Sample	N=	Intercept	Price	Shares	MKT %	Prior Mode	CVOL	BVOL	OLS Adjusted R^2 (%)	Log Likelihood from a Logit regression
All	329,813	3.71	-0.002	0.104	-0.002				1.25	-553,577.7
		(243.43)	(-19.67)	(55.30)	(-3.74)					
All	329,813	-0.058	-0.0001	0.014	-0.001	0.986			88.97	-226,004.0
		(-10.46)	(15.96)	(22.02)	(-8.57)	(1,619.48)				
Low cost	104,607	1.20	-0.0003	0.112	0.008				10.74	-106,197.7
		(120.18)	(-5.66)	(88.68)	(27.48)					
Low cost	104,607	0.201	0.0002	0.051	0.004	0.685			53.56	-70,564.2
		(25.35)	(3.59)	(55.45)	(16.61)	(310.56)				
Low cost	104,607	0.179	0.0002	0.051	0.003	0.685	0.0004	0.005	53.58	-70,555.5
		(9.32)	(3.61)	(55.23)	(16.60)	(310.27)	(0.10)	(1.68)		
High cost	225,206	5.42	0.0009	0.003	-0.002				0.16	-235,525.4
		(622.86)	(14.95)	(2.98)	(-9.04)					
High cost	225,206	0.849	0.0008	0.007	-0.001	0.831			53.85	-147,322.9
		(79.28)	(18.80)	(9.71)	(-9.38)	(511.88)				
High cost	225,206	0.968	0.0008	0.008	-0.001	0.826	-0.021	-0.006	53.90	-147,238.4
		(65.09)	(18.58)	(11.82)	(-8.89)	(496.46)	(-14.62)	(-2.97)		

Table 3

Description of institutional client trading activity in the sample

This table presents summary information on the trading activity of 306 institutional clients in the first quarter of 1997. Institutional clients are sorted into five quintiles by total trading volume (shares executed). Total volume, total commission and the number of orders are sum totals for each client quintile. Volume per client, commissions per client and orders per client represent the average across all clients in a quintile. Average commissions per share, per order, order size and stock price per share are averages of all orders for each quintile.

	Client quintile by trading volume				
	1 = low	2	3	4	5 = high
Aggregate trading					
Total share volume (000's)	15,883	50,813	119,876	260,815	5,207,062
Total commission ($ 000's)	918	2,779	6,366	13,365	243,126
Orders	11,602	24,090	40,108	57,209	478,817
Average per client trading					
Volume per client ($ 000's)	10,683	33,777	73,560	172,202	3,602,181
Commissions per client ($ 000's)	15	46	103	219	3,986
Orders per client	190	395	647	938	7,849
Average commission/share	5.79	5.40	5.02	5.19	4.23
Average commission $/order	79.11	115.34	158.72	233.62	507.76
Average order size	1,369	2,109	2,988	4,559	10,874
Average price $/share	48.57	47.26	46.92	48.51	47.06

Table 4

Institutional concentration – bunching of order flow

This table presents institutional client trading market share statistics by commission cost. The average number of brokers per client represents the average across institutions in a quintile in a particular commission-cost market. Broker concentration is the average of the percentage of their total commission dollars each client sends to their highest volume broker(s). Commission cost is the average cost of orders sent by clients to their highest volume broker(s). Broker concentration statistics are presented separately for high-cost (> 3 cents per share) and low-cost (<= 3 cent per share) commissions in Panels A. Panel B presents average institutional commissions by broker rank for high-cost and low-cost commission markets. F-tests examine the null hypothesis of equality along each row.

Panel A: Institutional concentration of order flow

	Client quintile by trading volume					
	1 = low	2	3	4	5 = high	F-test
Commission type: High-cost						
Average number of brokers per client	23.54	37.38	47.47	52.10	69.41	
Broker Concentration (% of client commissions)						
Top broker	37.99	24.00	22.76	18.83	16.69	16.10**
Top 1-3	60.62	42.75	39.06	35.67	30.69	26.67**
Top 1-5	71.21	53.71	49.30	45.27	39.70	32.53**
Top 10	85.62	71.10	65.62	61.73	54.98	41.40**
All brokers	98.51	95.38	94.66	92.02	87.74	10.83**
Commission type: Low-cost						
Average number of brokers per client	2.32	3.62	5.26	6.96	13.21	
Broker Concentration (% of client commissions)						
Top broker	1.04	3.10	3.24	5.08	6.17	6.05**
Top 1-3	1.38	4.10	4.64	7.10	9.58	7.49**
Top 1-5	1.48	4.31	5.01	7.53	10.63	8.66**
Top 10	1.49	4.51	5.25	7.83	11.70	10.10**
All brokers	1.49	4.62	5.34	7.98	12.26	10.83**

* - variation across quintiles is significantly different from zero at 0.05 level.
** - variation across quintiles is significantly different from zero at 0.01 level.

Panel B: Institutional average commissions by institution size

	Client quintile by trading volume					
	1 = low	2	3	4	5 = high	F-test
Commission type: High-cost						
Commission Cost (cents per share)						
Top broker	6.17	5.94	5.79	5.81	5.83	2.33*
Top 1-3	6.09	5.90	5.78	5.78	5.80	6.02**
Top 1-5	6.03	5.91	5.78	5.81	5.73	8.98**
Top 1-10	5.98	5.90	5.79	5.82	5.69	15.94**
All brokers	5.90	5.82	5.73	5.79	5.64	69.96**
Commission type: Low-cost						
Commission Cost (cents per share)						
Top broker	2.29	2.18	2.16	2.14	2.29	0.63
Top 1-3	2.13	2.25	2.17	2.25	2.21	0.53
Top 1-5	2.13	2.25	2.25	2.27	2.20	0.76
Top 1-10	2.13	2.28	2.29	2.33	2.26	1.38
All brokers	2.13	2.32	2.32	2.45	2.25	5.58**

* - variation across quintiles is significantly different from zero at 0.05 level.
** - variation across quintiles is significantly different from zero at 0.01 level.

Panel C: Average broker rank for institutional clients' top brokers

This panel presents the statistics about the broker rank, out of 267, for institutional clients 5 most important brokers. Below each category's average, medians are presented in [brackets] and standard errors are presented in (parentheses).

	Client quintile by trading volume				
	1 = low	2	3	4	5 = high
Average broker rank - [median] (out of 267 active brokers)					
Top broker	43.3 [25] (6.93)	42.8 [19] (6.90)	44.5 [27] (6.17)	34.9 [19] (5.34)	27.4 [13] (4.41)
Second broker	34.1 [19] (6.16)	30.5 [18] (4.93)	22.9 [16] (3.84)	33.3 [19] (5.58)	26.6 [16] (4.59)
Third broker	24.1 [13] (4.07)	35.1 [16] (6.24)	31.6 [13] (6.11)	35.9 [18] (6.64)	28.5 [15] (4.53)
Fourth broker	29.3 [20] (4.61)	29.9 [14] (6.25)	33.3 [13] (7.18)	33.4 [14] (7.15)	29.3 [18] (5.32)
Fifth broker	43.3 [25] (7.08)	22.3 [13] (2.87)	37.5 [17] (6.32)	21.0 [11] (3.12)	23.3 [11] (5.17)

Table 5

Institution size and turnover

This table presents summary statistics of the quarterly turnover of institutional investors by their type, as defined by CDA/Spectrum, and size quintiles. Institutions with asset sizes under $100 million are excluded from the Spectrum data. The sample period is April 1994 through April 2000.

Type of Institution	Size Quintile	Number of observations (quarter - institutions)	Mean Turnover (%)	Standard Error (%)	Turnover as % of the largest quintile's turnover
Banks	5	824	22.5	0.7	100
	4	836	23	0.8	102
	3	837	24.7	2.4	110
	2	836	20.8	0.9	92
	1	827	22.5	1.0	100
Insurance Companies	5	318	26.7	1.3	100
	4	330	26.8	1.2	100
	3	331	24.7	1.6	93
	2	330	25.4	1.5	95
	1	320	32.1	1.7	120*
Investment companies and their managers	5	374	32.1	1.0	100
	4	393	29.6	0.9	92
	3	388	32.8	1.1	102
	2	393	32.6	1.5	102
	1	379	37.4	1.8	116*
Independent investment advisors	5	4347	34.7	0.4	100
	4	4362	36	0.5	104*
	3	4361	37.2	0.6	107**
	2	4362	37.6	0.7	108**
	1	4351	42.9	0.9	124**
All others	5	351	16.7	1.2	100
	4	365	22.3	1.5	133*
	3	365	26.2	1.5	157**
	2	365	26.6	1.8	159**
	1	357	34.9	3.6	209**

* - significantly different from the largest size group at 0.05 level.
** - significantly different from the largest size group at 0.01 level.

Table 6

Analyst recommendation changes

This table presents the abnormal returns for 441 NYSE-listed analyst recommendation changes that appeared in the Dow Jones News Service in the first quarter of 1997. The abnormal returns are market-adjusted returns: the difference between the raw stock return on the day the analyst recommendation is reported and the value-weighted market return on that day.

	N	Mean	T-statistic	Minimum	Maximum
All upgrades	237	2.27%	10.14	-7.61%	23.68%
upgrades to strong buy	35	3.28%	4.09	-1.90%	23.68%
upgrades to buy	187	2.21%	9.90	-5.23%	14.23%
upgrades to hold	15	0.71%	0.66	-7.61%	13.18%
All downgrades	204	-2.98%	-7.80	-28.72%	18.58%
downgrades to buy	52	-1.60%	-2.75	-22.42%	6.87%
downgrades to hold	136	-3.26%	-6.83	-28.72%	18.58%
downgrades to sell	16	-5.12%	-5.71	-12.24%	0.05%

Table 7

Institutional client trading and broker recommendation changes

This table presents average statistics on the execution of client orders on the day a brokerage analyst issues a recommendation upgrade or downgrade. The sample of brokerage recommendation changes consists of 441 analysts' recommendation changes in NYSE-listed stocks gathered from the Dow Jones News Service Broad Tape for the first quarter of 1997. The recommending brokers were matched with brokers in the Abel/Noser data. Characteristics of institutional client executed orders in the recommended stock on the recommendation day are reported. *Market percent* is order size as a percent of that day's trading volume. *CVOL* is the institutional client's size quintile, *BVOL* measures the quintile rank of the executing broker across all brokers in the sample. *Client Rank* is the institutions rank (total commissions paid) with the recommending broker. Standard errors are reported in parentheses below the mean values. T-statistics for the difference in means test are presented in parentheses below the mean difference in the Differences column. Differences that were significantly different from zero at the 0.05 percent level are bolded.

	Trade through Other Broker	Trade through Changing Broker	Difference
Number of orders	5,535	276	
Improvement over VWAP - cents	1.75 (1.122)	7.64 (0.105)	-5.89 (-1.15)
Improvement over Close - cents	1.46 (0.151)	24.23 (0.129)	**-22.77** (-3.81)
Commissions per share - cents	4.68 (0.015)	5.59 (0.017)	**-0.91** (-12.13)
Commissions paid ($)	796 (39.97)	720 (22.96)	76 (0.71)
Share volume	16,488 (773)	13,605 (183)	2,883 (1.33)
Market percent	1.01 (0.048)	1.76 (0.062)	**-0.75** (-2.67)
CVOL	4.51 (0.013)	4.48 (0.013)	0.03 (0.09)
BVOL	4.70 (0.009)	4.99 (0.001)	**0.29** (25.54)
Client Rank	86.54 (1.64)	35.34 (3.55)	**51.23** (13.09)