Measuring the added value of stock recommendations

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Abstract

Using data from the Stockholm Stock Exchange we study the value added by (as distinct from the abnormal returns to) analysts' recommendations. Recommending brokers' clients trade profitably around positive recommendations at the expense of other brokers' clients. Significant profits come from transactions before recommendation dates. Value added is greatest for upgrades to large caps, and largely insignificant for downgrades and recommendations of small caps, despite high abnormal returns. Brokers making profitable recommendations generate abnormally high commission income, recouping much of their clients' abnormal profits, and their abnormal commission income varies in line with the abnormal profits for their clients.

Keywords: stock recommendations; performance evaluation; information leakages.

JEL codes: G14; G24; J44.

I. Introduction

Equity research is an expression of investment expertise. Research analysts deploy this expertise by evaluating and recommending stocks in an effort to help their clients outperform the market. In return, brokers providing this expertise are typically rewarded by trading commissions which are a cost to those who act on the investment advice.

The recommendation literature, starting with Cowles (1933), has traditionally assessed the value of recommendations to investors by measuring price reactions or abnormal returns to recommendations (see, e.g., Diefenbach (1972), Bidwell (1977), Stickel (1995), Womack (1996), Barber, Lehavy, McNichols, and Trueman (2001), Jegadeesh, Kim, Krische, and Lee (2004) and Green (2006)). These studies tend to show the existence of substantial abnormal returns to recommendation revisions or revision-based strategies. However, as Berk and van Binsbergen (2015) argue in connection with mutual funds, abnormal returns do not measure value added any more than the internal rate of return measures the value added by a project. Abnormal returns and price reactions are certainly relevant, but so are the quantities that can be traded at each price.

In this paper we analyze the value added of recommendations and seek to identify who captures it. We measure the value of recommendations, including any information released by the analyst related to the recommendation or specific to the stock being recommended, in terms of the abnormal profits obtained by those who trade on them. We compute abnormal profits as the product of the daily net trades of the recommending brokers' clients in the recommended stock and the abnormal return of the recommended stock. Thus, these trade- based abnormal profits capture the profits made by investors trading in recommended stocks in excess of what they could have made had they invested in a broad market index instead. Measuring value added in this way presents its challenges. Berk and van Binsbergen (2015) similarly define the value added by a mutual fund as the fund's gross excess return over benchmark multiplied by its assets under management (AUM). Mutual fund excess returns can be calculated straightforwardly using the daily prices at which everyone deals, and these prices, together with the funds' AUM, are a matter of public record. For stock recommendations we require volume and price data for

individual stocks, but we also need a way of separating the trading which is generated by a stock recommendation from that which is not.

To address these challenges, we combine recommendations with volumes transacted and prices paid by each broker on the Stockholm Stock Exchange (SSE). The SSE, a pure limit order book market with brokerage firms as members, is a particularly suitable exchange on which to analyze broker trading flows, counterparties, and profits. As client trades are executed between members without passing through dealers or specialists, we can establish a direct link between the trades executed by a brokerage firm and the stock recommendations it issues. For every day and each stock, our data reveal the volumes and prices as well as the broker identities behind the trades. This allows us to calculate daily positions at the broker level for each stock and the actual price paid (obtained) to open (close) those positions and, in turn, infer the excess profits made by the clients of recommending brokers without having to make assumptions about the investability of the stocks being recommended or the prices investors could trade at. By relying on trading data to infer investors' response to recommendations, the analysis is also less sensitive to any timing mismatches between clients' access to recommendation information and the reported date of the recommendation. These mismatches could reflect information leakages, postdating of recommendations, or tipping to selected clients – all of which are observationally equivalent in our analysis.

In the ten-year period covered by our study we find abnormal profits to upgrades to buy or strong buy for the clients of recommending brokers of SEK 510,200 (USD 76,500) per recommendation. The abnormal profits we identify are concentrated around days on which analysts are reported to release upgrades. We do not detect abnormal profits for the clients of recommending brokers outside the narrow recommendation window. These profits are matched by identical negative profits obtained by the rest of the market.

In order to control for possible clientele effects, we segment brokers into three categories for each stock and each recommendation window. We call brokers which issue a change of recommendation on that stock during the window "recommending brokers." We call the other brokers who cover the stock and have an outstanding recommendation on it but do not change that recommendation during that window

"informed." The only difference between these categories is that, for a given stock, brokers in the first category make a recommendation in a given window and those in the second do not. The informed category is thus an appropriate control group for recommending brokers (they are, in fact, the same brokers but with different labels at different times). We call the third category, which consists of brokers with no coverage of the stock in question, "uninformed."

Clients of the control group of informed brokers (i.e. brokers with coverage of the stock which do not make a recommendation on it during the analyzed window) do not execute profitable transactions during the recommendation window, and it is the clients of uninformed brokers (i.e. those with no coverage of the recommended stock) who tend to stand on the other side of recommendation-motivated trades. The concentration of abnormal profits for the clients of recommending brokers within a narrow +/- 5-day window around the recommendation change (and nowhere else) and the fact that the control group of informed brokers do not deliver profits for their clients, suggest that the abnormal profits we identify are related to analysts' recommendations and are not just the result of existing differences in broker clients' ability or information. An analysis of isolated recommendation revisions, alternatively defined as those issued away from earnings announcement dates or other recommendations, provides further support for this conclusion.

Approximately half of the profits we identify are generated by transactions that take place before the recorded recommendation date. Our results also indicate that broker clients profit from upgrades to buy or strong buy but not from downgrades to sell or strong sell. Their inability to profit from these downgrades does not reflect inaction on their part: the substantial selling activity around downgrades signals that brokers' customers do try to take advantage of them. Our analysis suggests, instead, that downgrades to sell or strong sell do not contain as much exploitable information, and may in some cases simply be a response to recent news. We also find that, for small-cap stocks, profits from both upgrades and downgrades are insignificant, reflecting low levels of recommendation- motivated trading volumes in these stocks.

The reported profits made by the clients of recommending brokers are net of the costs of the bid-ask spread and the price impact of trading, although not of brokerage commissions, which can be thought

of as a payment for that investment advice. Our results show that abnormal brokerage commission income generated by brokers from recommendation-motivated trades is (as a lower bound) around 40% to 60% of the abnormal profits made by the clients who follow their recommendations (the commission rate we have is for institutional clients only, which corresponds to the main target audience of brokers' recommendations). Moreover, abnormal commission income to brokers varies in line with abnormal profits to their clients. Thus both brokers' commission income and clients' profits are larger for upgrades than downgrades, larger for trades before rather than after recommendation changes, and greater for large cap stocks than small cap stocks. In these respects, brokers can be seen as recouping a significant fraction of the profits their clients make by following their recommendations.

Our paper makes a number of contributions to the existing literature. We propose a new way of estimating the value of security research by using trading data. Like Barber et al. (2001), we take an investor-oriented, calendar-time perspective, but, in line with Berk and van Binsbergen (2015), we also stress that a measure of recommendation value should account only for the trading profits obtained by those who receive recommendations.

We apply this approach to the profits made by investors who trade on recommendations issued on stocks listed on the SSE and we obtain results that are not always consistent with those of traditional abnormal return methodologies. The discrepancy can be seen along three dimensions: the timing of recommendations, the direction of recommendations, and the size of the stock recommended. The fact that half of the abnormal profits in our analysis are made before the recommendation is released, coupled with evidence that recommending brokers' market shares and net trades increase before the release of recommendations, points to pre-record date access to recommendations. Our finding that the clients of recommending brokers profit from upgrades but not downgrades suggests that downgrades are uninformative, arrive too late, or are communicated in a way that does not allow customers to easily take advantage of them. The result that abnormal profits to both upgrades and downgrades of small caps are negligible, despite the large abnormal returns to these recommendation changes, points to the lack of

investability and the large cost of trading in small caps, which are well documented in the literature (see e.g., Keim and Madhavan (1997), Stickel (1985), Ivkovic and Jegadeesh (2004), and Green (2006)).

The abnormal profit methodology we use allows for the fact that it may be difficult to pinpoint the time when recommendations are accessible to clients, due to information leakages and pre-release of their content to selected clients (see e.g., Irvine, Lipson, and Puckett (2007), Juergens and Lindsey (2009), Christophe, Ferri, and Hsieh (2010), Busse, Green, and Jegadeesh (2012), and Kadan, Michaely, and Moulton (2018)) and imprecise dating in commercial databases (see e.g., Womack (1996) and Hoechle, Schaub, and Schmidt (2015)). This is particularly relevant since the first practice, known as tipping, was not, during our sample period, explicitly prohibited in Sweden (see Internet Appendix for details) and dating imprecision, although it varies depending on the data provider and country, is generally significant in non-US data. Our methodology also allows naturally to control for the release of contemporaneous public news (Altinkiliç and Hansen (2009)).

Finally, our paper is the first to compare the realized profits of equity research with the extra commissions arising from these recommendations for the brokers that make them. The fact that recommending brokers capture extra commission revenues of (at a lower bound) some 40% to 60% of the value of the profits made by their clients and that the extra commission revenues vary in line with the profitability of recommendations parallels the findings of Berk and van Binsbergen (2015) that the gains from mutual fund management accrue to the managers themselves. In both cases the rewards to investment expertise are captured to a large extent by those who possess it. Our findings are also consistent with Grossman and Stiglitz (1980) and Gârleanu and Pedersen (2018): brokers are rewarded for gathering and processing information as this information allows them to exploit (small) inefficiencies in securities prices. In our case the brokers are rewarded indirectly, that is, via commissions, and share the rewards with their clients.

The rest of the paper is organized as follows. Section 2 provides a description of the data used in the study. Section 3 formally discusses the methodology to evaluate the value added by recommendations, and presents our results on trading and profits. Section 4 summarizes the main findings and concludes.

II. Data Description

Our study combines three main data sets: stock recommendations, trading data and stock prices and returns. We collect recommendations of stocks listed on the Stockholm Stock Exchange (SSE) from the Institutional Brokers Estimate System (IBES), and the SSE trading data is provided by the owner of the exchange, Nasdaq OMX. We obtain stock return and supplementary information from Datastream. Each of these data sets is described in detail below.

A. Broker Trading Data

This study uses proprietary Swedish equity trading data sourced directly from the Stockholm Stock Exchange. The SSE is a fully electronic limit order book market where members (broker firms) pay both fixed and transaction based fees for matching of order flow. The daily trading data we obtain spans the period from January 1997 to June 2006 (later data has not been made available by the SSE). For each trading date, stock and member of the exchange we observe the number of trades executed, the number of shares traded (volume) and the value of those trades, measured in Swedish kronor (SEK), all of them broken up on purchases, sales, and internal trading.

The key advantage of using Swedish trading data is that it allows us to identify the brokers executing the trades over a relatively long period of time (almost ten years). The SSE seems also a particularly suitable exchange on which to measure broker trading flows. As client trades are executed between members without passing through dealers or specialists, we can establish a direct link between the trades handled by a brokerage firm and the stock recommendations it issues. Sweden also has a well-developed and competitive stock market. At the end of our sample period, the total market capitalization of the 417 companies listed in the SSE was SEK 3,507 (USD 438) billion, making Sweden the 12th largest stock market in the world at the time, according to the World Federation of Exchanges. The members of the SSE include large domestic brokers such as Enskilda Securities, Swedbank, and Carnegie, as well as major U.S. and European firms such as Goldman Sachs, J.P. Morgan, Deutsche Bank, and UBS. Domestic and international brokerage firms compete for trades in several large companies such as Ericsson, Nokia, Volvo, Astra Zeneca, and H&M. Many companies have cross-listings on foreign stock exchanges, and are

therefore of interest to a wide group of international investors. Competition among brokers is stiff and increased during our sample period. In 1997, there were 50 unique members of the exchange, of which the top 10 accounted for 73% of the total value of share trading.[1] In contrast, in 2006 there were 70 members, of which the top 10 had only 58% of the market share. This development has been primarily driven by a higher degree of competition from international brokers.

B. Stock Recommendations

We obtain data on financial analysts' stock recommendations from the Institutional Brokers Estimate System (IBES) database for the period January 1997 to June 2006.[2] We concentrate on recommendation revisions, as opposed to recommendation levels. Revisions are discrete and salient events and previous research generally finds that they have significant information content (Womack (1996), Francis and Soffer (1997), Jegadeesh et al. (2004), Sorescu and Subrahmanyam (2006)). To construct the recommendation revision variable we rely on IBES recommendations' classification. IBES classifies recommendations into five categories, from 1 to 5, which are usually interpreted along the following lines: (1) strong buy, (2) buy, (3) hold, (4) sell and (5) strong sell. We concentrate on two types of recommendation revisions: upgrades to buy or strong buy (upgrades) and downgrades to sell or strong sell (downgrades). An upgrade (downgrade) is defined as a buy (sell) or strong buy (strong sell) recommendation issued by an analyst whose previous recommendation on the stock was not as positive

[1] Several members of the exchange have foreign subsidiaries registered also as members. We define unique members by identifying the brokers who belong to the same company or group and treating the group as a unit.

[2] We work with a recent download of IBES to avoid the issues raised by Ljungqvist, Malloy, and Marston (2009). To check the timing accuracy of the IBES data, we compared IBES recommendation dates with dates from analyst reports on Investext. Where we had data from both sources, the majority of the dates matched; unmatched dates suggested coding errors or batch reporting. Almost all the differences were such the Investext dates were within +/- 3 days of the IBES dates, well within our narrowest window of +/- 5 days. The discrepancies we found between IBES and Investext are similar to those found by Jegadeesh and Kim (2006) for other major markets.

(negative) as the current recommendation. Upgrades and downgrades defined in this way are unambiguous in the sense that both the change in recommendation and the level after the change point in the same direction; thus Hold to Buy counts as an upgrade, whereas Strong Sell to Sell (where the change points up but the level after the change points down) does not. Note also that the analyst issuing the recommendation is required to have an outstanding or previous recommendation on the same stock in order to consider the current recommendation as a revision.[3]

The original sample consists of 10,935 recommendations of which 2,883 are upgrades and 2,038 are downgrades. These recommendations revisions cover 296 firms. The sample includes recommendations revisions by 699 analysts or teams of analysts and 42 brokerage firms (of which just over 30% are Swedish). The 10 largest brokers in the sample, defined according to trading volume, are responsible for slightly more than 50% of all recommendation revisions.

The distribution of recommendations in our sample is broadly similar to the distribution of recommendations in G7 countries during a similar period (excluding the U.S.), as reported by Jegadeesh and Kim (2006). In particular, Buy and Strong Buy recommendations outnumber Sell and Strong Sells, but not as noticeably as in the U.S. during the same sample period. Table 1 reports the recommendation transition matrix. Revisions in our sample are more or less evenly distributed along the 10-year period we study, to the point that there seems to be no significant correlation between the number and type of revisions and the general market conditions.

[3] Positive and negative recommendation signals have been defined using a number of alternative criteria in the literature. Our definitions of upgrades to buy or strong buy and downgrades to sell or strong sell are broadly similar to those employed by Elton, Gruber, and Grossman (1986), Stickel (1995), and Womack (1996) among others, with other studies basing their classifications instead on the direction of the recommendations change (regardless of the level), the level of the change (regardless of the direction), or a different combination of both. In the Internet Appendix we report abnormal profits to recommendation revisions using some of these alternative definitions. Results vary from definition to definition but are, in general, qualitatively similar to those presented later in the paper.

C. Stock Prices, Returns and Supplementary Information

Stock prices (adjusted and unadjusted), returns, market values, and complementary information are collected from Datastream. We also collect earnings announcement date information for a series of robustness analyses from the Swedish House of Finance FINBAS database. These data are matched to the trade data from the Stockholm Stock Exchange using securities' ISIN codes. The matching to IBES recommendations is subsequently done using IBES tickers and company names (each match is manually checked). Where a company has more than one share class traded in the exchange, the matching is to the most broadly traded security (typically B shares), as identified in the trade data. This is typically the only security for which there is Datastream information available, and is usually identified by IBES as the recommended security. After matching all three data sets we are left with 2,507 upgrades and 1,730 downgrades across 270 firms (representing 45% of the 606 firms listed in the SSE at some point during our sample period, and 91% of the 296 firms with recommendation information). Table 2 reports features of these revisions, which tend to be concentrated among the largest most liquid firms.

III. Methodology and Results

We split our analysis in four parts. First, in Section III.A, we examine broker trading activity around recommendation revision dates. Second, in Sections III.B and III.C, we make use of broker clients' positions on recommended stocks to estimate the profits obtained from trading on recommendations. We do this for our entire sample of recommendations as well as for a number of subsamples defined based on the proximity of recommendations to other recommendations and to earnings announcement dates. Third, in Section III.D we estimate the abnormal trading volumes and commission rates associated with recommendations. Finally, in Section III.E, we build on the previous results to estimate the abnormal commission income generated by recommending brokers from their recommendations and compare this with the abnormal profits made by the clients who follow them.

A. Trading by Brokers' Clients around Recommendation Revision Dates

To measure abnormal directional trading we establish a benchmark of normal trading. We do so by using the fact that market clearing implies that, unconditionally, expected net buying for any broker, stock, and time equals zero.[4] For each broker *b*, stock *i* and day *t*, net buying (*NB*) is defined as follows,

(1) $$NB_{b,i,t} = B_{b.i.t} - S_{b,i,t},$$

where $B_{b,i,t}$ and $S_{b,i,t}$ are the values of purchases and sales of stock *i* executed by broker *b* at day *t*.

Conditioning net buying activity on recommendation releases, we hypothesize that, around such releases, net buying will not be zero, i.e.,

(2) $$E(NB_{b,i,t}|I_{b,i,\tau}) \neq 0 \quad \forall t \in [\tau; \tau + \delta],$$

where $I_{b,i,\tau}$ denotes both the recommendation and the information conveyed with it, τ is the recommendation release day, and δ is the length of the period during which the recommendation affects trading. In common with other studies, we do not know in advance the length of the window in which broker information affects trading, i.e. δ, or whether tips, information leakages, or imprecise dating results in recommendation-motivated trading prior to the official recommendation release, but since in the absence of broker-specific information expected net buying is zero, we can use the data to infer when abnormal activity, and the recommendation information that motivates it, starts and finishes.

Figure 1, which builds on this idea, shows the sample average of cumulative net buying in event time, beginning 20 days before the recorded recommendation date and ending 20 days after it. The solid black line in Panels A and B depicts the average cumulative net position of the recommending brokers' clients around positive recommendation revision dates for big (decile one) and small (deciles two to ten) firms, respectively. During the first two weeks of the window, days $\tau - 20$ to $\tau - 10$, it shows no noticeable sign of recommending brokers' clients taking a position in the recommended stock. From day $\tau - 10$ on, net buying starts to diverge from zero in the direction implied by the recommendation. By the end of the

[4] Particular groups of brokers could sustain non-zero levels of net buying for some stocks and time periods, so later on we test whether this condition holds for recommending brokers and recommended stocks, outside recommendation periods.

window, cumulative net buying amounts to SEK 25 million (SEK 47 million for big recommended firms and SEK 7 million for small ones) per recommendation. Since aggregate positions must sum to zero, we know that the rest of the brokers on the market, on average, must be net selling the recommended stock.[5]

To make sure that we are not simply capturing clientele effects we form two additional groups of brokers for comparison with our recommending group. We label brokers that cover the same stock as the recommending broker, but with no current recommendation revision in the analyzed window, as "informed" (on that stock), and brokers with no research coverage of the recommended stock as "uninformed" (on that stock).[6] This classification implies that at a given point in time some brokers with research coverage of a given stock will be recommending brokers for that stock (if they have issued a new recommendation in the stock in a +/-20-day window of that day) and the others informed brokers (if they have not), but at other points in time the roles will reverse. Informed and recommending brokers are therefore the same brokers carrying different labels at different points in time. As a result, informed brokers are an ideal control group for recommending brokers. The uninformed broker category, on the other hand, includes full service brokers who do not cover the specific stock, regular brokers without local research departments, and discount (online) brokers, which cater to potentially different investor clienteles.

The dashed line in Figure 1 depicts the average cumulative net position of the clients of informed brokers (total informed brokers' clients net purchases divided by the number of recommendations). The clients of informed brokers maintain a fluctuating and slightly positive net position during much of the

[5] Although net buying continues until day τ + 20 following an upgrade, large trades are tightly focused around the recorded recommendation date. If we segment trades into those above SEK 100,000 (some USD 12,500 during our sample period) and those below, we find that those above the threshold spike sharply in the +/-5-day window, while those below show no such pronounced pattern (see Internet Appendix). This points to the spike in recommendation-motivated trading likely reflecting institutional, rather than retail, investors.

[6] The coverage period is assumed to begin two months before the first recommendation released in our dataset and ending twelve months after the final observation.

window, but unlike those of recommending brokers do not seem to increase it in the neighborhood of the recommendation release date. These results suggest that the net buying activity we observe through recommending brokers is related to their customers having specific knowledge of the information contained in the stock recommendation rather than being the result of clientele effects. Figure 1 also shows that it is mainly the investors trading through uninformed brokers who sell their stocks to investors trading through the recommending brokers.

Panels C and D show the sample average of cumulative net buying around downgrades. The overall pattern is similar to that already described for upgrades, with only minor differences. The average aggregate position taken by the clients of recommending brokers is considerably smaller than for upgrades. Cumulative net selling by the end of the window is around SEK 17 million (31 million for big recommended firms and SEK 6 million for small ones). Most of the build-up of total net positions at the end of the window occurs in the five days prior to the recommendation release date. As with upgrades, we do not observe informed brokers' clients' net purchases reacting to recommendations.

In order to explore the statistical significance of these findings we employ a regression approach across event periods. We estimate two separate OLS regressions of net purchases (NB) on indicator variables, one per event period–broker type pair,

$$(3) \qquad NB_{b,i,w} = \sum_{b_C} \sum_{w=-4}^{4} D_{b_C,w} + e_{b,i,w} \qquad b_c = (b_R, b_I, b_U),$$

where we have aggregated net purchases over week-long periods, *w*, defined relative to recommendation dates τ, and $D_{b_C,w}$ are indicator variables that take the value 1 if net buying is measured in period *w* and the broker executing the trades belong to the b_C category (recommending (b_R), informed (b_I), or uninformed (b_U)), and 0 otherwise. Regressions are conducted separately for upgrades and downgrades.

The results of performing these estimations are presented in Table 3. We obtain eight regression coefficients for each of the three broker categories (recommending, informed, and uninformed) and recommendation types. The coefficients correspond to the sample means of net purchases executed by the clients of recommending, informed, and uninformed brokers in the recommended stock in each period,

expressed in millions of Swedish kronor (SEK). The regression specification allows us to calculate standard errors clustered at the broker level. In this way we allow for a completely arbitrary correlation structure within each broker firm across recommendations and event time. The regression results confirm that recommending broker net purchases from upgrades peak in the week-long period starting on the date these brokers release the recommendation (days τ to $\tau + 5$), but they are also significantly different from zero one week prior to this event (days $\tau - 5$ to $\tau - 1$). On average, recommending brokers' net buying is SEK 7.1 million in the (τ to $\tau + 5$) period and is about half that size but still significantly positive in the following three week-long periods after the event. SEK 5.7 million of the build-up in the total position occurs in the week prior to the recommendation date. By comparison, recommending brokers' net buying outside the recommendation windows (shown at the bottom of the table), a period during which we class them as informed brokers, is economically and statistically insignificant, at only SEK 0.02 million per week. Informed brokers' net purchases do not follow the same pattern as recommending brokers' net purchases during recommending brokers' recommendation window, as revealed by the insignificant coefficients for this group during the weekly periods surrounding the revision date. For downgrades, negative net purchases for the recommending broker are largest in the five-day period prior to the issuance of the recommendation revision. Recommending brokers' clients take a negative position of SEK 7.2 million in this period, which represents about half of the cumulative position at the end of the window. The clients of informed brokers generally take insignificant positions during this period.

In the Internet Appendix we report separate results for recommendations issued in the neighborhood of an earnings announcement (+/-5-day window around the announcement date), a period in which substantial information about the firm is typically produced and disseminated (in addition to the information produced and disseminated by the analyst), and recommendations issued outside this window. Our analysis shows that recommending brokers' clients respond to recommendation revisions in both subsamples, and that the response is qualitatively similar, with positive net purchases following but also immediately preceding recommendation upgrades and negative net purchases following and preceding downgrades. We also report the results of an additional falsification test in which we create a number of

placebo recommendation upgrades (downgrades), on the day of maximum (minimum) return for a stock in the 12-month period centered on the day a broker has issued a recommendation on the stock, but outside its +/-20-day recommendation window. We find no significant reaction following or preceding these placebo recommendations.

All in all, our findings reveal that recommending brokers execute an abnormally large number of transactions in the direction of the recommendation, even prior to the recommendation release date. This indicates that recommendations not only have a substantial following among investors (see Irvine (2000) and Niehaus and Zhang (2010)), but also that some investors are likely informed about the content of the recommendations before the recorded recommendation revision date, and most importantly that they act on that information. These results, which are broadly consistent with those of Irvine et al. (2007), Juergens and Lindsey (2009) and Christophe et al. (2010), provide additional evidence of the severity of the recommendation misdating problem, whichever its cause (tips, leaks, or postdating of recommendations), and of the problems of assuming that investors can only act on recommendations starting on the recorded recommendation date. Our findings also indicate that brokers' clients tend to take larger positions when the recommendation is for a big firm, reflecting the fact that these are the firms whose shares are typically more liquid and have greater market depth.

B. Abnormal Profits

We define abnormal profits (Π) as the product of trades in the recommended stock executed by the recommending broker and the abnormal return obtained on those trades. Formally, for trades executed by broker *b*, on stock *i*, on any given day *t*:

$$\Pi_{b,i,t} = [B_{b,i,t} \cdot AR^{B}_{b,i,t:T} - S_{b,i,t} \cdot AR^{S}_{b,i,t:T}], \quad (4)$$

where $B_{b,i,t}$ is the amount the clients of the broker issuing the recommendation purchased in the recommended stock measured in SEK, $S_{b,i,t}$ is the amount the clients of the broker issuing the recommendation sold in the recommended stock, $AR^{B}_{b,i,t:T}$ is a broker-specific abnormal return for purchases, and $AR^{S}_{b,i,t:T}$ is a broker-specific abnormal return for sales. Broker-specific abnormal returns are

computed from broker-specific, quantity weighted, average transaction prices and measure the normalized change in price from *t*, the day on which the transactions take place, to *T*, some post-event day on which the profitability of the position is measured. Formally, $AR^{B}_{b,i,t:T} = \frac{P_{i,T} - P^{B}_{b,i,t}}{P^{B}_{b,i,t}} - \frac{P^{M}_{T} - P^{M}_{t}}{P^{M}_{t}}$, where $P^{B}_{b,i,t}$ is the volume-weighted average price paid by the clients of broker *b* for purchases of the stock of firm *i* at time *t*, $P_{i,T}$ is the closing price of firm *i* at a reference date *T*, and P^{M} is the price of a pre-defined market benchmark.[7] $AR^{S}_{b,i,t:T}$ is similarly defined. Profits are thus calculated in excess of what could have been obtained by investing in the market benchmark.

An attractive feature of this measure is that it is relatively insensitive to noisy dating of clients' access to recommendations. In computing it, we include all transactions executed by the recommending broker's clients within a window around the recorded date of the recommendation change. As long as the window is wide enough to include all recommendation- motivated trades, the abnormal profits measure will be unaffected by imprecision about the date on which clients access recommendations. Some trades that pass through the recommending broker may not be recommendation-motivated (responding instead to life cycle or liquidity needs, or even to information not generated by the broker or its analysts), but to the extent that transactions unrelated to recommendations are on average as likely to outperform as the non-recommendation related transactions passing through other brokers in the exchange, their contribution to recommending brokers' abnormal profits should cancel out. This would be the case if the matching of clients and brokers is not significantly correlated with client information or trading skill. Results presented later in the paper suggest that this is indeed a reasonable assumption.

Trade-based abnormal profits are free from investability problems. This is because they are calculated using the prices the clients were able to trade at (instead of closing prices) and the quantities they were able to transact at those prices (instead of assuming constant levels of investability or market depth, or proportionality to market capitalization). As a result, abnormal profits reflect the actual aggregate excess

[7] All prices are adjusted for dividends and splits.

profits made by the clients of recommending brokers net of the impact of bid-ask spreads, the price impact of trading, and other trading frictions.

Abnormal profits are also unaffected by confounding contemporaneous public signals. If recommendations merely reproduce public announcements (e.g., earnings announcements) their value may prove limited, even if measured abnormal returns (the abnormal returns to public news) are significant. In efficient markets, public news should not confer an advantage to any particular group of investors. As a result, trades directly or indirectly triggered by public news should not be particularly profitable. Notice, however, that if there are inefficiencies related to public announcements, and analysts help their clients exploit them, their profits will naturally be included in this measure of value added.

Finally, recommendations typically contain more information than what can be conveyed by the standard categories of Buy, Hold and Sell, and the extra information might be exploited by investors in their trading strategies (see, e.g., Asquith, Mikhail, and Au (2005), Huang, Zang, and Zheng (2014)). The value of that extra information, to the extent it is exploited by investors in their trading strategies, will be reflected in abnormal profits.

Figure 2 shows cumulative abnormal profits, as well as returns, in event time, for transactions from 20 trading days before the broker releases an upgrade (downgrade) until 20 trading days afterwards. Cumulative abnormal profits measure the cumulative profitability of all transactions carried out by the recommending broker's clients in the chosen window. For each transaction, abnormal profits are measured as the difference between the price paid (obtained) for the stock when it was acquired (sold), at day t, and the market price for that stock one month after the recommendation revision date (the reference date, T). Abnormal profits are computed in excess of the profits that could have been obtained by investing the same amount of money in the value-weighted Swedish SIX index. Cumulative abnormal returns are defined in the traditional way, and measure the return that can be obtained by investing in the recommendation at the beginning of the window in excess of what could have been obtained by investing in the value-weighted Swedish SIX index. Returns and profits thus measured are short-term, and they could in principle increase or decrease if measured at longer horizons.

In common with most of the literature, Figure 2 shows positive abnormal returns following (and preceding) recommendation upgrades, and negative abnormal returns following (and preceding) downgrades. In the 40-day window shown, abnormal returns to upgrades equal 4.0%, and those to downgrades -1.6%. Most of these abnormal returns, however, occur in the pre-recommendation window, with only a small fraction occurring in the post-event period. A conservative estimate of the performance of recommendations would ignore pre-event returns, but given the evidence of brokers' clients building positions consistent with those brokers' recommendations several days before the recommendation release, it is natural to believe that at least part of those abnormal returns can be captured by investors who follow financial analysts' advice.

The solid black line in Figure 2, which measures the aggregate cumulative profitability of all transactions carried out by the clients of recommending brokers in a 20-day window around the recommendation date, takes the analysis a step further. By documenting the existence of broker-specific abnormal profits on days immediately preceding and following positive recommendation announcements it reveals that brokers' clients possess an informational advantage at that point and make use of it.[8] This goes beyond what could be inferred just by looking at abnormal returns. Altogether, recommending brokers' clients make an average of SEK 514,300 per upgrade. These abnormal profits are concentrated around the dates on which the analysts are recorded as releasing upgrades and are matched by negative profits obtained

[8] An alternative interpretation is that, rather than conveying information to their clients by their recommendations, analysts extract information from clients trades in forming their recommendations. This reverse causality explanation seems unlikely (although it cannot be completely ruled out). An analysis of commission data in the Internet Appendix reveals that recommending brokers' commission rates are high in the pre-revision period. Since commission discounts are typically not provided on trades related to recommendations, this would be consistent with revisions driving the (undiscounted) trades in the pre-recommendation window, rather than vice versa. Notice also that, in a pure limit order book, order flow is public information available to any analyst or trader in the market, and unlikely to confer an informational advantage on the analysts of a particular firm.

by the rest of the brokers (the abnormal profits measure we use here is indeed a zero-sum measure; this means that any positive profits for a broker have to be exactly balanced by negative profits for another). Roughly half of those profits are associated with transactions that take place before the recorded date of the upgrade. The same is not true of downgrades, for which brokers do not appear to execute profitable transactions for their clients.

In order to allow for overlapping recommendation windows in our statistical analysis, we study abnormal profits associated with recommendations in calendar time. For this we build two portfolios, an "upgrade" and a "downgrade" portfolio, using recommending brokers' clients' daily trades around recommendation revision dates. Purchases and sales of each stock and the gains or losses associated with those positions are kept in these portfolios until $T = 20$ trading days (about a month) after the recorded release date of the recommendation. In the calculations of these profits we use actual transaction prices, rather than closing prices, as we describe in the Appendix, and we also experiment with longer and shorter valuation horizons (trying to capture longer- and shorter-term profits).

We report aggregate daily abnormal profits calculated using this procedure in Table 4. These profits are computed using all trades channeled through the recommending brokers over three different windows, +/-5-day, +/-10-day, and +/-20-day, around recommendation revision dates and represent an aggregate daily profit from all the recommendations in our sample. Daily abnormal profits obtained by the clients of recommending brokers are estimated to be between SEK 466,971 and SEK 535,652, depending on the window used for measurement, in our sample of recommendations.[9] Table 4 also presents average abnormal profits per recommendation for the three recommendation windows. We calculate per-recommendation abnormal profits by aggregating daily abnormal profits over the entire sample period (about 9.5 years or 2,388 trading days for the broadest window) and dividing that number by the number of recommendation

[9] Abnormal profits computed using closing prices are, on average, between 7% and 11% (SEK 32,726 to SEK 58,073) lower than the profits obtained when using actual transaction prices. This is due to investors channeling their trades through recommending brokers trading at prices that are, on average, better than closing prices.

revisions that generated them. The resulting per window, per recommendation abnormal profits vary between SEK 442,011, for the +/-5-day window, and SEK 510,652, for the +/-20-day window.

These results suggest that profits are mostly concentrated on a narrow (+/-5-day) window around the recommendation date, as expanding the window to include four times as many days (+/-20-day window) barely has an impact on total daily or per recommendation profits. Note that, within a given calendar day, daily profits from several recommendations are aggregated, rather than averaged, so widening the window to include additional window-days in which profits are zero results in the same aggregate daily profits, or slightly larger (smaller) ones if the additional window-days include marginally profitable (unprofitable) transactions.[10] This is reasonable, as recommendations tend to be more valuable, and trades based on them more profitable, at the moment of their release or shortly after it, but their value quickly dissipates as investors act on them and their information gets impounded into prices. Expanding the window therefore tends to result in additional non-event days that dilute the statistical significance without significantly affecting the estimate. Moreover, the fact that abnormal profits are virtually zero outside the narrower recommendation window supports the assumption that the abnormal profits are attributable to recommendations; it also suggests that the results we document cannot be attributed to recommending brokers' clients being consistently better informed than other brokers' clients. As shown in the Internet Appendix, these results are not only statistically and economically significant, but they are also robust to changes in the time horizon at which positions are valued: two weeks, one month or two months after the

[10] When looking at profits in the +/-5-day window, the (upgrade and downgrade) portfolios include only positions taken within this narrow window. But when looking at one of the wider windows, the (upgrade and downgrade) portfolios include positions taken within the +/-5 window, but also positions taken in the wider window that are not part of the narrower +/-5 window. To the extent that these additional positions (taken outside the narrow +/-5 window) are not systematically profitable, profits for upgrades do not increase or vary monotonically between the +/- 5 and +/-20 day windows in Table 4.

recommendation release date, and to the inclusion or removal of recommendation initiations from the sample.[11]

The profits to clients of recommending brokers are matched by trading losses made by clients of the other brokers active in the market. Table 5, which offers a contrast between abnormal profits per recommendation obtained by the clients of recommending, informed, and uninformed brokers, shows that the clients of informed brokers do not execute profitable transactions during the recommendation window. Given that informed brokers are essentially recommending brokers who have not issued a contemporaneous recommendation on the stock in question, this observation provides further evidence that the abnormal profits we identify are most likely related to analysts' recommendations and not just the result of existing differences in broker clients' ability or information.[12]

Tables 4 and 5 also reveal that recommending brokers' clients' pre-recommendation profits, defined as those associated with transactions that take place before the reported recommendation date, are positive and significant (when we look at narrow windows) and amount to almost half of the total recommendation profits. Pre- and post-recommendation profits are computed by narrowing the trading window to $(\tau - \delta; \tau - 1)$ and $(\tau; \tau + \delta)$, respectively, but always keeping the reference horizon fixed (T = 20). This provides evidence of profitable activity taking place before the recorded recommendation date. This finding, coupled with evidence that both the net trades and market shares of recommending brokers' clients increase prior to the release of recommendations, is consistent with the evidence about pre-record

[11] This is especially true for abnormal profits to trades executed in the +/-5-day window, where most of the recommendation motivated trading is concentrated.

[12] In particular this shows that our results are not driven by a particular group of clients. For instance, institutional clients may be more likely to trade through large brokerage houses with research departments. These clients may also have an informational advantage, compared to individuals, which is unrelated to recommendations (see, for example, Barber, Lee, Liu, and Odean (2009)). Yet, since they are equally likely to trade through recommending or informed brokers (being the same brokers) they cannot be driving the reported results.

date access to recommendations (Womack (1996), Irvine et al. (2007), Christophe et al. (2010) and Hoechle et al. (2015)). It suggests that ignoring activity in the pre-recommendation window can be misleading and result in severe underestimation of recommendations' profitability (in our case roughly half of the profits dissipate if we omit the pre-recommendation window).

Most of the profits we identify are obtained by trading in the shares of relatively large firms. More than 80% of the documented abnormal profits come from trades on revisions in firms ranked in the first decile of the size distribution, with the rest coming from trading in firms classified in deciles 2 to 10, even though less than half of the recommendations are issued on decile 1 firms. This is despite the finding that stock prices increase more following upgrades, and decline more following downgrades, for small firms than for large firms (5.42% vs. 2.29% for upgrades and -1.97% vs. -0.93% for downgrades). Smaller stocks have larger price responses, but they also typically have larger transactions costs, and there is usually not much room to trade in them, as revealed by the minimal cumulative net purchases (sales) observed at the end of their recommendation windows.

The results for downgrades in the same tables suggest either that negative revisions do not contain valuable information or that investors fail to capitalize on them. This may seem surprising given the evidence of substantial selling activity around these recommendations coupled with negative average abnormal returns. Most of those returns, however, are pre-recommendation returns and they may not be exploitable by investors.

C. Earnings Announcements, Recommendation Clustering, and Abnormal Profits

We next analyze the profitability of stock recommendations issued immediately around earnings announcement dates (EADs) or other recommendations and those issued further away from them. This allows us to investigate the value added by recommendations in what are likely to be different types of information environments. Recommendation revisions issued in the proximity of earnings announcements or other recommendation changes (clustered recommendations), a situation which is more likely if recommendation changes are a response to public news, typically face more competition from information and analysis issued by other analysts and sources. By contrast, more isolated revisions, issued away from

earnings announcement dates and/or other recommendations face less (or no) competition from alternative sources, including other recommendation changes.

For this purpose, we sort recommendation revisions into those that take place within a +/-5-day window around earnings announcement dates and those revisions that take place outside of that window. At the same time, we sort recommendations into two groups using four different definitions of clustering. According to the first definition of clustering, we classify recommendation revisions as isolated if there is no other recommendation in the window of $\tau - 5$ to $\tau + 5$ days, and clustered otherwise. While this is a clean definition of isolation, it results in a measure that is highly correlated with firm size. The average recommended firm size decile of isolated recommendation upgrades (downgrades) is 2.6 (2.7) whereas the average recommended firm size decile of clustered recommendation upgrades (downgrades) is 1.6 (1.8). To address this problem we also work with three other definitions. The second definition of clustering splits recommendation revisions into two groups depending on the time to the nearest recommendation, whether before or after. Those recommendations for which the time is shortest (longest) are clustered (isolated). The third definition splits recommendation revisions into two groups based on the time from the previous recommendation only. Finally, we split recommendation revisions according to the density of the cluster, that is, we create categories of relatively isolated and relatively clustered recommendations based on the number of other recommendations included in a +/-20-day window centered on the recommendation release date. Under the last three definitions of clustering, we sort for each firm-year pair and separately for upgrades and downgrades to avoid ending up with two groups of firms whose main difference is firm size or analyst following. With these sorting criteria smaller firms are still more prevalent in the isolated group but this is because of ties and uneven numbers of recommendations in the sorting groups (single recommendation revisions for a firm-year, typically belonging to relatively small firms, are always assigned to the isolated group).[13]

[13] The formula for sorting observations into the clustered (0) or isolated (1) groups is: FLOOR(rank*2/(N+1)), where FLOOR is the FLOOR function, rank is the observation's order rank, and N is the number of observations having non-

Panel A of Table 6 shows that upgrades issued in the proximity of earnings announcements as well as those issued outside the EAD window are profitable. Abnormal profits are higher for upgrades issued close to earnings announcement dates than away from them, but differences are not statistically significant. Earnings announcements convey unprocessed information, and if equity analysts are helpful in interpreting the content of this information, as our analysis suggests, we should expect positions built up by the clients of recommending brokers around these days (and not just away from them) to be profitable. Panel B of this table shows that upgrades are also profitable regardless of whether they are issued close to other recommendations or not (using almost any definition of clustering). Abnormal profits to recommendation downgrades, on the other hand, are never statistically different from zero. They tend to be markedly negative for clustered downgrades or for downgrades issued close to earnings announcement dates, and positive but small for isolated downgrades even though negative abnormal returns are twice as large for clustered downgrades as for isolated downgrades under all four definitions, as shown in the Internet Appendix.

The results in this section suggest that recommendation upgrades are valuable to the clients of recommending brokers even in markedly different information environments, that is, those in which there is more competition from other recommendations and sources of information and those in which there is less or none at all. They also indicate that none of these potentially confounding events (announcements and competing recommendations), have a significant impact on our results. Abnormal profits to recommendation upgrades are (marginally) higher or lower in one or another situation but differences are never large or statistically different from zero.

These results also hint at a possible explanation for the low level of abnormal profits related to downgrades. Low abnormal profits are concentrated around clustered downgrades. If anything, these downgrades are also associated with larger negative abnormal returns (measured over the entire event

missing values of the ranking variable. If there are ties all tied observations are ranked in the same group depending on the mean rank of the observation.

window). To the extent that clustered recommendation revisions are more likely than isolated recommendations to be a response to public news, this is consistent with downgrades frequently being responses to prices which have already fallen and which investors cannot therefore exploit as profitably as they can upgrades. In other words, many recommendation downgrades may simply be responding to price movements (analysts responding to large price drops, and realigning their optimal level of optimism and accuracy accordingly, as argued by Conrad, Cornell, Landsman, and Rountree (2006)), rather than leading them.

D. Trading Volume and Commission Rates around Recommendation Dates

One justification for the provision of stock analysis is that it generates greater commission income for brokers. In this section we estimate the value of abnormal trading volume attributable to recommendation revisions and we examine (institutional) commission rates for recommending brokers around recommendation dates. This will allow us, in the next section, to compare the abnormal commission income made by recommending brokers around recommendation dates with the abnormal profits made by their clients in the same period.

We estimate the value of abnormal buy volume using the following model for each broker-stock-year triplet, *b, i, y*:

$$(5) \qquad BV_{b_R,i,t} = \beta^0_{b_R,i,y} + \beta^1_{b_R,i,y} BV_{b_U,i,t} + \beta^2_{b_R,i,y} BUY_{b_R,i,t} + \beta^3_{b_R,i,y} BV_{b_U,i,t} BUY_{b_R,i,t} + \epsilon_{b_R,i,t},$$

where $BV_{b_R,i,t}$ is the buy-side SEK volume of recommending broker b_R on stock *i* and day *t*; $BV_{b_U,i,t}$ is the aggregate buy-side SEK volume of uninformed brokers on stock *i* and day *t*; and $BUY_{b_R,i,t}$ is a dummy variable equal to one if broker b_R issued an upgrade on firm *i* less than 20 days away from *t* and zero otherwise. We use $\beta^2_{b_R,i,y} + \beta^3_{b_R,i,y} BV_{b_U,i,t} + \epsilon_{b_R,i,t}$, the difference between total observed buy volume and the estimated normal amount of buy volume, as our estimate of the abnormal amount of purchases executed by the recommending broker b_R on firm *i* on each day *t* in the upgrade recommendation window. We use an identical set of regressions to estimate the abnormal value of sales for downgrades. By including the buy

(sell) side trading volumes of non-recommending institutional brokers, we control in a parsimonious way for sources of common variation (public information) in trading.[14]

Table 7 shows recommending brokers' estimated abnormal trading volume in the recommended stock around recommendation revision dates. Results in this table suggest that recommendation revisions are associated with a significant increase in trading among broker clients. The average cumulative abnormal trading volume per recommendation 20 trading days after a recommendation release is SEK 56 million. Most of the effect of the recommendation revision on trading volume occurs within a narrow timeframe. For upgrades (downgrades), 74% (73%) of the abnormal trading volumes we find in the +/-20-day window is already present in the narrower +/-5-day window. Consistent with other studies (see e.g., Irvine (2004) and Jackson (2005)) the estimate for cumulative abnormal sell volume around downgrades is much smaller (SEK 24 million at the end of day $\tau + 20$).[15]

For 2002 to June 2006 (the latter part of our sample period) we examine the rates of institutional commissions charged by brokers around recommendation dates. We do so by using transaction data from Abel Noser, a firm specializing in trading cost analysis, and matching it against data from our sample.[16]

[14] The logic behind this procedure is that if trading volume on a given stock is larger for reasons other than recommendations, then it will be larger not only for recommending brokers but also for uninformed (non-recommending) ones. For comparison, in the Internet Appendix we include a table showing abnormal volumes computed as the difference between the observed buy (sell) volume and the normal level of buy (sell) volume on days away from the recommendation window (i.e., without controlling for common variation in trading). Results obtained using this procedure are qualitatively similar to those reported in Table 7 below.

[15] This has been generally attributed to individuals' reticence to short sell stocks. We find further support for this by comparing differences in abnormal trading volumes for small firms, which are typically especially difficult to short sell. While recommendation upgrades, for large and small firms, are associated with significant increases in recommending broker trading volumes, downgrades of small firms do not seem to lead to more sell volume in the downgraded stock.

[16] See Puckett and Yan (2011) for a detailed description of the Abel Noser/ANcerno data set.

The Abel Noser data set contains information on 250,291 trades in the SSE, of which 85,803 (39,397 sales and 46,406 purchases) have broker identifiers. Data before 2002 were not available.

These trades are matched to 1,559 recommendation revisions (out of 2,991 revisions in our sample during this period) issued by 16 different brokers for 52 of the 205 firms in our data set. An analysis, included in the Internet Appendix, of the distribution of trades across firms in different size deciles in the full SSE sample and the Abel Noser sample reveals that trades in larger firms are marginally overrepresented in the Abel Noser sample. A comparison of the top brokers and their market shares in both samples (again in the Internet Appendix) also reveals a higher prevalence of trades by foreign brokers in the Abel Noser sample than in the full SSE sample. The commissions estimated are therefore likely to be representative of what institutions paid for their transactions in medium to large firms (the most frequently recommended firms), which may yield a conservative estimate of the overall commission rate in the market.

Commissions in Sweden are paid as a fraction of transaction value. Brokers usually work with price lists and institutional customers negotiate discounts on trades.[17] We compare brokerage commissions paid to recommending brokers on recommended stocks around recommendation dates with commissions paid to those brokers in general. The modal commission in both cases is 20 bp, which is towards the upper end of the range of commissions. However, while this mode of 20 bp applies to just over 20% of transactions in general, it applies to 56% of transactions in the +/-5-day period around recommendation changes. This is consistent with reports by industry sources suggesting that brokers typically do not discount trades if initiated by a broker recommendation.

In line with this interpretation, and with results in Goldstein, Irvine, Kandel, and Wiener (2009), we also find that (institutional) commission rates paid to recommending brokers around recommendation revision dates are larger than those paid to other brokers. In our +/-5-day window around recommendation

[17] By contrast, retail clients generally pay fixed rather than negotiable fees, and are less likely to shop their broking business among different brokers.

dates the average commission rates paid to the former are 16.4 basis points (bp) and to the latter 13.5 bp (12.5 bp if we include brokers not issuing recommendations at all).[18]

Our data also reveal interesting patterns within the commission rates of recommending brokers themselves. In Panel A of Table 8 use the same 2002–2006 data set to explore commission rates for purchases executed around upgrades and sales executed around downgrades. The baseline in this case is the average commission rates for all purchases and sales in recommended stocks during our entire sample period: 13.7 bp and 13.6 bp, respectively. If we look at commissions paid on transactions in recommended firms' shares during our three windows, we find that average commission rates on downgraded stocks barely change (they are between 14.0 bp and 14.4 bp depending on the window), while those on upgraded stocks rise as the window narrows, increasing to 17.6 bp in the +/-5-day window, with the difference between all commission rates and commission rates in this window significant at the 2% level.

In the Internet Appendix we offer a more detailed analysis of these commission rates. In particular, we show that recommending broker commission rates in the +/-5-day window of recommendation upgrades are also significantly higher than those charged by informed and uninformed brokers in the same period. We also break down the recommending broker commissions on recommended stocks into the periods before and after a recommendation change. The average commission rates before the recommendation date are significantly higher than those after the recommendation date, likely because customers are willing to pay more for early access to recommendations. They also rise steadily as the window used in the analysis narrows, reflecting the fact that most recommendation-motivated trades are tightly concentrated around the recommendation release date. The average rates after the recommendation date are not only smaller but also show no consistent pattern. In that analysis we also include further controls for trade size, firm size, and broker fixed effects, as well as an ex-post measure of recommendation profitability, with no significant

[18] This only partly reflects the fact that recommending brokers are full-service brokers, whereas some of the other brokers provide a cheaper, execution-only, service. Across our data set as a whole, the average commission for full-service brokers and discount brokers are 14.5 bp and 11 bp, respectively.

impact on results. Overall, the patterns of commission rates identified match the pattern of profits made by clients following recommendations. Thus higher rates are paid for upgrades than for downgrades, and higher commissions are paid for trades before than after the recorded recommendation date. This is consistent with a framework in which brokers are rewarded more for recommendations which are more valuable for their clients.

E. Comparing Clients' Abnormal Profits with Brokers' Abnormal Commission Income

In the previous subsection we find abnormally large trading volumes and large commission rates for recommending brokers around recommendation dates. We now build on these results to estimate the abnormal commission income generated by recommending brokers from their recommendations and compare this with the abnormal profits made by the clients who follow them.

Panel B of Table 8 shows average abnormal commission income generated per recommendation. We estimate this by using the estimated abnormal turnover per recommendation and the point estimates for round trip commissions paid for upgrades and downgrades within each respective window. We assume that recommending brokers' clients paid the average commission rate in the relevant window to buy or sell shares and that liquidation was done at the average commission rate for the full sample. On this basis, the average abnormal commission income per recommendation change in either direction ranges from approximately SEK 120,000 in the +/-5-day window to approximately SEK 127,000 in the +/-10-day window. Estimated commission revenue per recommendation increases only marginally when going from the narrower +/-5-day window to the broader +/-20-day window, a reflection of the fact that recommendation-motivated trades, and therefore abnormal volume, are tightly concentrated around the recommendation release date. We also find that the abnormal commission income earned by brokers for large firms is over seven times that for small firms, e.g. approximately SEK 234,000 versus approximately SEK 32,000 in the +/-5-day window. Note that the greater abnormal commission income for upgrades and large firms matches the greater abnormal profits to clients for upgrades and large firms. Once again, abnormal commissions to brokers and abnormal profits to their clients vary in line.

In Panel C of Table 8 we make a direct comparison between the abnormal commission income generated by recommending brokers and the abnormal profits made by their clients. The percentages represent the ratio of the commission paid in Panel B of this table to the profits per recommendation implied by daily abnormal profits in Table 5. For upgrades, brokers generate commissions of around one-third of clients' profits. For downgrades the percentage is 154% in the +/-5-day window and negative in the longer windows; this reflects the fact that clients make very low abnormal profits (+/-5-day) or losses (+/-10-day and +/-20-day windows) from downgrades (see Table 4). Taking all recommendation changes together, abnormal commissions vary between 42% of clients' abnormal profits for the +/-5-day window and 57–61% for the two longer windows. A breakdown between recommendations of large and small firms shows that the percentage ranges between around 40% and 66% in both categories.[19]

The abnormal commissions we estimate are likely to understate the value added by stock analysts for three reasons. First, our sample reflects the commission rates of large institutional investors, which tend to be smaller than those of retail investors and small institutions. Second, financial analysts not only issue stock recommendations: they also produce other types of research such as earnings forecasts and industry analysis, which can also be a useful source of information for their clients which is rewarded by commissions. Third, research by Irvine (2000) and Madureira and Underwood (2008), among others, also suggests that investors reward research production by brokers on a much more general level. Brokerage houses' research departments have historically provided services to other branches, such as retail sales, investment banking, and proprietary trading desks. Since we can only speculate about the magnitude of

[19] In the Internet Appendix we present alternative estimates of abnormal commission revenues and of the fraction of total profits captured by brokers, based on a number of different model assumptions and sample periods. These show that the numbers presented in the paper are robust to alternative specifications. In particular, models for commission rates designed to offer alternative solutions to identified tilts in the commission data, have only a small impact on estimated revenues and profit splits.

trade-generation outside our sample of revisions, we simply emphasize that brokers seem to capture a considerable fraction of the measured trading profits generated by upgrades and downgrades.

IV Summary and Conclusions

In this study we benefit from a large and comprehensive dataset of brokers' daily transactions, covering a period of almost 10 years. This enables us to explore trading behavior in response to privately observed recommendations, and to infer more precisely when and to what extent recommendations are used. We provide evidence that brokers' clients tend to trade in the direction suggested by recommendations. Moreover, transactions executed by recommending brokers in recommended stocks around upgrades to buy or strong buy are on average profitable, showing that brokers' clients actually benefit from the information contained in recommendations.

A comparison between abnormal returns and abnormal profits highlights where abnormal returns can be most misleading as a measure of added value of recommendations. A sizeable part of the abnormal profits to upgrades is associated with trades executed before the recorded recommendation date. This, coupled with evidence that both recommending brokers' net trades and market shares increase prior to the release of recommendations, is consistent with the evidence about pre-record date access to recommendations. Ignoring activity in the pre-recommendation window can result in a severe underestimation of recommendations' profitability (in our case roughly half of the profits dissipate if we omit the pre-recommendation window). But including it without due care is also dangerous, as it is not always the case that investors are in possession of recommendation information at that point. Our results indicate that broker clients do not profit from downgrades to sell or strong sell. Their inability to do so cannot be accounted for by inaction on their part; rather the reason lies elsewhere, most likely in that these recommendation revisions do not contain exploitable information but simply piggyback on recent news. Moreover, we find that in contrast to abnormal returns, abnormal profits for both upgrades and downgrades of small caps are insignificant. These small profits reflect the size of positions taken in such stocks by investors, who are likely inhibited from taking larger positions by lack of investability and large transaction costs.

Estimating abnormal profits, as opposed to abnormal returns, allows us to compare the financial benefits experienced by the clients of recommending brokers with the abnormal commissions generated by those brokers. We find that brokers' abnormal commissions are, at a lower bound, around 40% to 60% of clients' abnormal profits per recommendation. In other words, a considerable fraction of abnormal profits flows back, through brokerage commissions, to recommending brokers. More than this, brokers' commissions vary in line with their clients' profits. When we measure the volume of transactions, we find that abnormal volumes are greater for (the more profitable) upgrades than for (the less profitable) downgrades. And when we measure commission rates (as opposed to volumes), we find that these also vary in line with clients' profits: commission rates are larger for (the more profitable) upgrades than for (the less profitable) downgrades and they are larger just before recommendations (when the full value of the recommendation can be captured by clients) than afterwards (when only part of that value can be captured).

In all, our findings for recommending brokers suggest a situation similar to the one which Berk and van Binsbergen (2015) identify for asset managers: the benefit of investment expertise is largely captured by those who possess it.

Appendix

In this appendix we describe the calendar time portfolio approach used in the computation of daily abnormal profits. This approach relies in building two portfolios, an "upgrade" and a "downgrade" portfolio, using recommending brokers' clients' daily trades around the dates of these changes in recommendation.

Each time a firm receives a recommendation that is both positive (buy or strong buy) and entails a positive change with respect to the previous recommendation, all trades executed by the recommending broker on the recommended stock in an δ-day window of the recommendation change are added to the upgrade portfolio on the date they were actually executed. Choosing a window centered on the recommendation date implies that transactions occurring before as well as after the recommendation date will be included in the corresponding portfolio. In this way we capture pre-recommendation leaks and avoid overestimating profits by considering investments only if the broker, on behalf of its clients, invested in the stock (or shorted it).

Purchases and sales of each stock and the gains or losses associated with those positions are kept in the portfolio until $T = 20$ trading days after the recorded release date of the recommendation that motivated their inclusion in the portfolio, at which point all positions opened in relation with that recommendation are closed. This means that at the end of any given day t the upgrades portfolio will be invested in all stocks recommended in an δ-day window of that trading date and the amounts invested in each stock will be equal to the net trade on date t in that stock by all brokers who recommended it (in an δ-day window of t) plus the net position in that stock at time $t - 1$ adjusted to reflect past returns. The portfolio therefore reflects how investors responded to the recommendations, without having to assume when or how much they traded. Keeping the horizon fixed, even when working with narrow trade windows, means that those trades are kept in the portfolio (plus/minus gains/loses) until a fixed date after the recommendation is released, facilitating comparisons between different windows. A relatively wide window also helps avoid the effect of price pressure in our measures.

Formally, for each stock i and broker b, we calculate daily individual abnormal profits in the following way:

(A1) $$AP_{b,i,t} = CNB_{b,i,t-1} \cdot AR_{i,t} + \lambda_{b,i,t},$$

with

$$\lambda_{b,i,t} = \frac{P_{i,t} - P^{B}_{b,i,t}}{P^{B}_{b,i,t}} B_{b,i,t} - \frac{P_{i,t} - P^{S}_{b,i,t}}{P^{S}_{b,i,t}} S_{b,i,t},$$

where $CNB_{b,i,t-1}$ is broker *b*'s net position in stock *i* at the end of the previous ($CNB_{b,i,t-1} = CNB_{b,i,t-2}(1 + R_{i,t-1}) + NB_{b,i,t-1} + \lambda_{b,i,t-1}$), $AR_{i,t}$ is day *t* daily abnormal return on stock *i* computed from closing prices, and $\lambda_{b,i,t}$ is an intraday adjustment that corrects for the fact that transactions may be carried out at prices other than closing prices ($P_{i,t} - P^{B}_{b,i,t}$ is the difference between difference between stock's *i* closing price on day *t* and the weighted average transaction price on that same stock for purchases (*S*, sales) by broker *b* on that same day).

To obtain a time series of aggregate daily abnormal profits we sum individual abnormal profits across all recommended stocks in each calendar day. We then calculate average aggregate daily abnormal profits and assess their statistical significance using Newey-West standard errors (the abnormal profits series is stationary in the period analyzed). Abnormal profits per recommendation are obtained by multiplying average aggregate daily abnormal profits by the number of calendar days in our sample period (2,388 trading days for the broadest window) and dividing that number by the number of recommendation revisions that generated them. We follow the same procedure for downgraded stocks in the downgrade portfolio.

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Table 1: Recommendation Transition Matrix

This table displays the number of recommendation revisions in each of the 20 categories defined by the crossing of the current recommendation level with the prior recommendation level (excluding recommendation repetitions). Upgrades to buy or strong buy (left-hand side of the table) and downgrades to sell or strong sell (right-hand side of the table) appear in bold. Data from January 1997–June 2006.

		Revised Recommendation				
		Strong Buy	Buy	Hold	Sell	Strong Sell
Previous recommendation	Strong Buy	-	684	479	**101**	**37**
	Buy	**592**	-	922	**809**	**86**
	Hold	**515**	**817**	-	**535**	**323**
	Sell	**106**	**720**	494	-	**147**
	Strong Sell	**36**	**97**	302	140	-
	Upgrades to Buy or Strong Buy, Total	**2,883**		Downgrades to Sell or Strong Sell, Total		**2,038**

Table 2: Sample Statistics

This table shows the number of recommendation revisions (upgrades to buy or strong buy and downgrades to sell or strong sell) issued on firms in each firm-size decile. It also shows the average market capitalization and average annual value of shares traded ('Total Trading') in firms in each firm-size decile, expressed in billions of Swedish kronor). Market capitalization is measured at the end of 2005, whereas the value of shares traded is measured for the entire year 2005. In these two rows, the last column, labeled 'Total', shows total market capitalization and value of shares traded for the entire market in 2005. The last two rows in the table display the aggregate market share of brokerage firms which have analysts issuing recommendations on (i.e. covering) firms in each firm-size decile, measured by share volume and number of trades between January 1997 and June 2006.

		Firm-size decile										Total
		1	2	3	4	5	6	7	8	9	10	
Upgrades to buy or strong buy	# of recommendations	1,164	505	372	245	105	67	32	14	2	1	2,507
	% of total	46.4%	20.1%	14.8%	9.8%	4.2%	2.7%	1.3%	0.6%	0.1%	0.0%	59.2%
Downgrades to sell or strong sell	# of recommendations	717	377	281	185	57	51	29	16	15	2	1,730
	% of total	41.4%	21.8%	16.2%	10.7%	3.3%	2.9%	1.7%	0.9%	0.9%	0.1%	40.8%
All	# of recommendations	1,881	882	653	430	162	118	61	30	17	3	4,237
	% of upgrades	61.9%	57.3%	57.0%	57.0%	64.8%	56.8%	52.5%	46.7%	11.8%	33.3%	59.2%
	Market Capitalization (SEK, B)	116.98	9.47	3.63	1.76	0.98	0.60	0.37	0.19	0.08	0.03	3,507
	Total Trading (SEK, B)	146.59	14.75	3.55	1.42	1.08	0.44	0.58	0.22	0.12	0.10	6,121
	Coverage, value of trading	69.5%	50.3%	48.3%	40.1%	23.7%	17.2%	13.2%	5.8%	3.8%	1.9%	66.1%
	Coverage, number of trades	58.0%	39.2%	34.7%	24.6%	14.8%	11.8%	7.0%	3.4%	1.8%	0.5%	45.5%

Table 3: Net Buying around Recommendation Revision Dates

The coefficients in the first part of this table show the mean net purchases executed by the clients of recommending, informed, and uninformed brokers on the recommended stock in a number of week-long periods around the recommendation revision date, expressed in millions of Swedish kronor (SEK). These average net purchases are displayed for upgrades to buy or strong buy and downgrades to sell or strong sell revisions in event time, from 20 days before to 20 days after the recommendation revision date. Coefficient estimates and standard errors are obtained from two OLS regressions of weekly net purchases on indicator variables, one per event period-broker type pair. Regressions are conducted separately for upgrades to positive and downgrades to negative. The number of observations on each type of broker in each regression is denoted by *nC*. The second part of the table shows the mean weekly net purchases executed by the clients of informed/recommending brokers (recommending brokers are classed as informed brokers outside the recommendation window) and uninformed brokers on the recommended stock outside the +/- 20-day recommendation window. The sample period is January 1997 to June 2006. Standard errors are clustered on broker identity. USD 1 corresponds to about SEK 8 during the sample period. *t*-statistics are presented in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

		Event period								
	Broker category	(τ-20; τ–16)	(τ-15; τ–11)	(τ-10; τ–6)	(τ-5; τ–1)	(τ; τ+5)	(τ+6; τ+10)	(τ+11; τ+15)	(τ+16; τ+20)	n_c
Upgrades to buy or strong buy	Recommending	0.23 (0.28)	0.94 (0.93)	2.00 (1.74)*	5.65 (4.51)***	7.09 (4.34)***	3.10 (3.47)***	3.61 (4.32)***	2.47 (2.56)**	2,507
	Informed	0.28 (0.84)	0.28 (0.96)	-0.61 (-0.12)	-0.11 (-0.18)	-0.13 (-0.19)	-0.25 (-0.51)	0.21 (0.59)	-0.17 (-0.46)	29,092
	Uninformed	-0.14 (-0.98)	-0.16 (-0.75)	-0.03 (-0.15)	-0.18 (-0.82)	-0.18 (-0.83)	-0.04 (-0.16)	-0.27 (-0.94)	-0.07 (-0.27)	71,034
Downgrades to sell or strong sell	Recommending	1.62 (1.04)	-2.53 (-1.60)	-1.61 (-1.93)*	-7.18 (-4.41)***	-3.00 (-1.91)*	-2.27 (-2.28)**	-0.27 (-0.20)	-0.96 (-0.63)	1,730
	Informed	0.07 (0.17)	0.25 (0.53)	0.04 (0.09)	-0.18 (-0.33)	-0.09 (-0.12)	0.29 (0.81)	-0.19 (-0.48)	-0.08 (-0.17)	18,921
	Uninformed	-0.01 (-0.03)	0.09 (0.65)	0.07 (0.58)	0.34 (2.90)***	0.12 (0.70)	-0.03 (-0.25)	0.07 (0.61)	0.03 (0.18)	48,847
		Five-day period average outside of the (τ-20; τ+20) Event Window								
		Informed (Recommending)		0.02 (0.74)			Uninformed		-0.01 (-0.49)	

Table 4: Abnormal Portfolio Profits of Recommending Brokers' Clients

This table shows the aggregate daily, and per recommendation, abnormal profits of recommending brokers' clients around recommendation revision dates. Aggregate daily profits are measured using all trades channelled through the recommending broker over three different windows around recommendation revision dates: (τ - 20; τ + 20), (τ - 10; τ + 10), and (τ - 5; τ + 5). Within a given calendar day, daily profits from several recommendations are aggregated, rather than averaged, so wider windows do not necessarily result in monotonically increasing or decreasing profits if positions taken outside the narrower windows are not systematically profitable or unprofitable. Per recommendation profits are calculated by aggregating daily profits over the entire sample period and dividing that number by the number of recommendation revisions that generated them (the resulting figure represents a per window, not per day, profit). In the second part of the table abnormal profits are decomposed into pre- and post-recommendation revision date profits by selecting only the transactions executed by the recommending broker before or after the recorded recommendation revision date. The table also reports results for big (decile one) and small (deciles two to ten) recommended firms in the sample separately. Profits are expressed in Swedish kronor (SEK). USD 1 corresponds to about SEK 8 during the sample period, January 1997 to June 2006. *t*-statistics based on Newey-West (1987) standard errors, robust to heteroscedasticity and autocorrelation, are presented in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	Upgrades to buy or strong buy				Downgrades to sell or strong sell			
	Recs.	(τ-5; τ+5)	(τ-10; τ+10)	(τ-20; τ+20)	Recs.	(τ-5; τ+5)	(τ-10; τ+10)	(τ-20; τ+20)
All Recommendations	2,507	466,971 (2.70)***	477,771 (2.30)**	535,652 (1.94)*	1730	37,565 (0.28)	-106,567 (-0.45)	-152,170 (-0.42)
Per Recommendation		442,011	453,377	510,226		51,224	-145,559	-208,816
Timing								
Pre-Recommendation Date (τ-δ; τ-1)	2,507	223,292 (2.25)**	174,684 (1.12)	246,710 (1.05)	1730	-845 (-0.01)	-80,567 (-0.43)	-145,959 (-0.46)
Per Recommendation		211,446	166,393	235,000		-1,154	-110,605	-200,377
Post-Recommendation Date (τ; τ+δ)	2,507	241,606 (2.11)**	300,782 (2.48)**	278,614 (2.05)**	1730	26,052 (0.41)	-35,525 (-0.41)	6,089 (0.05)
Per Recommendation		228,596	284,826	263,834		35,751	-50,123	8,360
Firm Size								
Small Firms	1,366	82,593 (1.68)*	98,856 (1.71)*	82,364 (1.11)	1027	-6,790 (-0.35)	-21,345 (-0.70)	-46,013 (-0.86)
Per Recommendation		144,388	165,541	128,693		-15,789	-49,632	-61,763
Big Firms	1,141	384,378 (2.46)**	378,915 (1.96)**	453,288 (1.72)*	703	44,355 (0.37)	-85,222 (-0.33)	-106,157 (-0.29)
Per Recommendation		798,323	797,974	966,996		149,122	-285,697	-423,643

Table 5: Abnormal Portfolio Profits across Broker Categories

The table shows average abnormal profits per recommendation event for the clients of recommending, informed, and uninformed brokers. Abnormal profits are measured over a (τ - 5; τ + 5) window around the recommendation revision date. Daily abnormal profits for these three groups of investors in the mentioned window of a recommendation change are aggregated over the entire sample period and divided by the number of recommendation revisions and brokers that generated them. The resulting figure, reported in the table, represents a per window, recommendation, and broker profit. For informed and uninformed brokers we also provide the aggregate profits of all brokers in each of these two groups per window and recommendation. On average, there are 13 informed brokers and 30 uninformed brokers active during the recommendation window. The profits are decomposed into pre- and post-recommendation revision date profits by selecting only the transactions executed by the broker group before or after the recorded recommendation revision date. Profits are expressed in Swedish kronor (SEK). USD 1 corresponds to about SEK 8 during the sample period, January 1997 to June 2006. *t*-statistics based on Newey-West (1987) standard errors, robust to heteroscedasticity and autocorrelation, are presented in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

		Upgrades to buy or strong buy			**Downgrades to sell or strong sell**		
		Rec. Broker	Informed	Uninformed	Rec. Broker	Informed	Uninformed
Total Profits	Per Rec.	442,011	-25,792	-3,437	51,224	47,865	-21,623
(τ-5; τ+5)		(2.70)***	(-0.88)	(-0.27)	(0.28)	(0.79)	(-0.87)
All Brokers in Group			-338,569	-103,442		600,934	-652,158
Pre-Recommendation Profits	Per Rec.	211,446	-3,192	-5,634	-1,154	49,864	-20,719
(τ-5; τ–1)		(2.25)**	(-0.15)	(-0.60)	(-0.01)	(1.06)	(-1.08)
All Brokers in Group			-41,879	-169,567		625,046	-623,892
Post-Recommendation Profits	Per Rec.	228,596	-21,707	1,869	35,751	-1,901	-395
(τ; τ+5)		(2.11)**	(-1.34)	(0.38)	(0.41)	(-0.08)	(-0.05)
All Brokers in Group			-284,854	56,258		-23,859	-11,892

Table 6: Abnormal Portfolio Profits of Recommending Brokers' Clients – Earnings Announcement Dates and Clustering of Recommendations

This table shows average abnormal profits obtained by the clients of recommending brokers for recommendations classified according to whether they were issued in the neighbourhood of an earnings announcement date or not (Panel A) and, separately, according to whether they cluster with other recommendations or not (Panel B). In all cases abnormal profits are measured over a (τ - 5; τ + 5) window around the recommendation revision date. The average reported profit represents a per window and recommendation profit. In Panel A, recommendations are classified according to whether they were issued inside or outside a 10-day window centered on the earnings announcement date. In Panel B, they are classified according to their proximity to other recommendation revisions using four different definitions detailed in the paper. Profits are expressed in Swedish kronor (SEK). USD 1 corresponds to about SEK 8 during the sample period, January 1997 to June 2006. *t*-statistics based on Newey-West (1987) standard errors, robust to heteroscedasticity and autocorrelation, are presented in parentheses. The table also reports the number of recommendations in each category and the average size decile of the recommended firms in each group. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	Upgrades to buy or strong buy			Downgrades to sell or strong sell		
	Recs.	Avg. Size Decile	Abnormal Profits (τ-5; τ+5)	Recs.	Avg. Size Decile	Abnormal Profits (τ-5; τ+5)
Panel A: Earnings Announcement Dates						
Earnings Announcement Date						
Inside +/-5-day Window	637	2.3	750,300 (1.89)*	389	2.5	-206,444 (-0.48)
Outside +/-5-day Window	1,870	2.2	336,995 (1.97)**	1341	2.3	125,968 (0.58)
Diff.			[0.35]			[0.48]
Panel B: Clustering of Recommendations						
Clustered/Isolated Recommendations						
Clustered	934	1.6	342,034 (1.28)	667	1.8	-59,999 (-0.13)
Isolated	1,573	2.6	501,374 (2.55)**	1063	2.7	121,013 (1.00)
Diff.			[0.62]			[0.70]
Density of the Cluster						
High Density	842	1.8	517,892 (1.92)*	512	1.9	-433,792 (-1.01)
Low Density	1,665	2.4	403,637 (1.90)*	1218	2.6	255,105 (1.18)
Diff.			[0.75]			[0.16]
Time from Nearest Recommendation						
Short	978	2.0	503,009 (2.00)**	621	2.0	-313,437 (-0.87)
Long	1,529	2.4	402,994 (1.92)*	1109	2.6	255,420 (1.12)
Diff.			[0.76]			[0.18]
Time from Previous Recommendation						
Short	975	2.0	555,563 (1.79)*	620	2.1	-329,774 (-0.97)
Long	1,532	2.4	369,743 (2.27)**	1110	2.6	264,033 (1.11)
Diff.			[0.59]			[0.15]

Table 7: Abnormal Buy and Sell Volume for Recommending Brokers

This table shows recommending brokers' average abnormal buy and sell volume in the recommended stock over three different windows around the recommendation date: (τ - 20; τ + 20), (τ - 10; τ + 10), and (τ - 5; τ + 5). The figures are further decomposed into pre- and post- recommendation revision dates abnormal buy and sell volume and according to recommended firm size. Abnormal buy volume (for upgrades to buy or strong buy) and abnormal sell volume (for downgrades to sell or strong sell) are estimated using the regression specified in Equation (5). The reported figures are abnormal volume averages per recommendation and window obtained from 2,507 upgrades and 1,730 downgrades. Abnormal buy and sell volume is expressed in Swedish kronor (SEK). USD 1 corresponds to about SEK 8 during the sample period, January 1997 to June 2006. *t*-statistics (in parenthesis) robust to heteroscedasticity and general forms of cross-sectional and temporal dependence are computed using Driscoll and Kraay (1998) standard errors. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	Upgrades to buy or strong buy				**Downgrades to sell or strong sell**			
	Recs.	(τ-5; τ+5)	(τ-10; τ+10)	(τ-20; τ+20)	Recs.	(τ-5; τ+5)	(τ-10; τ+10)	(τ-20; τ+20)
All Recommendations	2,507	43,633,183 (5.80)***	50,513,568 (5.01)***	55,769,184 (3.79)***	1730	28,372,091 (2.41)**	29,567,349 (2.20)**	24,274,341 (1.39)
Timing								
Pre-Recommendation Date (τ-δ; τ-1)	2,507	22,469,670 (4.08)***	27,597,740 (3.75)***	28,290,780 (2.80)***	1730	19,520,120 (2.15)**	22,406,440 (2.26)**	23,362,040 (1.88)*
Post-Recommendation Date (τ; τ+δ)	2,507	21,166,242 (5.72)***	22,919,787 (4.29)***	27,480,558 (3.34)***	1730	8,858,874 (1.79)*	7,172,910 (1.03)	942,011 (0.10)
Firm Size								
Small Firms	1,366	15,382,026 (6.24)***	16,515,410 (5.23)***	18,103,882 (4.14)***	1027	3,501,819 (1.78)*	163,671 (0.05)	-5,875,849 (-1.48)
Big Firms	1,141	77,495,319 (4.90)***	91,269,549 (4.20)***	100,934,743 (3.17)***	703	64,871,114 (2.30)**	72,729,846 (2.28)**	68,530,024 (1.63)

Table 8: Commission Rates and Broker Revenue around Recommendation Revision Dates

Panel A of this table presents average commission rates, in basis points (bp), calculated from 85,803 stock market transactions from January 2002 to June 2006. These transactions are classified into three time windows centered on the recommendation date: (τ - 20; τ +20), (τ - 10; τ + 10), and (τ - 5; τ + 5). The sorting is done separately for purchases executed around upgrades to buy or strong buy and sales executed around downgrades to sell or strong sell. The *p*-values of a test of differences in paid commissions between all transactions and those executed in each of these time windows is reported in square brackets. Panel B reports estimated abnormal roundtrip commissions paid based on the regressions for abnormal volume in Table 7 under the assumption that the recommended trade (purchase for upgrade and sale for downgrade) paid the average commission rate in the relevant window, and liquidation of the position was done at the full sample average commission rate. Panel C reports the estimated fraction of total profits captured by brokers by dividing total commissions by estimated profits in Table 5. *p*-values and *t*-statistics are based on robust standard errors clustered at the broker level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Commissions paid for purchases and sales during downgrades and upgrades

		All	+/-5	+/-10	+/-20
Upgrades to buy or strong buy	Commission (bp)	13.7	17.6	15.5	14.5
			[0.02]**	[0.29]	[0.63]
Downgrades to sell or strong sell	Commission (bp)	13.6	14.0	14.2	14.4
			[0.72]	[0.73]	[0.72]

Panel B: Estimated average abnormal commissons paid (SEK)

		N	+/-5	+/-10	+/-20
Upgrades to buy or strong buy		2,507	148,235	156,404	161,504
			(3.86)***	(3.09)***	(2.22)**
Downgrades to sell or strong sell		1,730	78,713	83,702	69,958
			(3.13)***	(3.04)***	(1.55)
Category	All	4,237	119,848	126,719	124,125
			(4.33)***	(3.81)***	(2.31)**
	Big firms	1,844	234,277	253,003	274,789
			(3.49)***	(2.99)***	(1.84)*
	Small firms	2,393	31,671	29,407	26,668
			(3.74)***	(3.48)***	(2.73)**

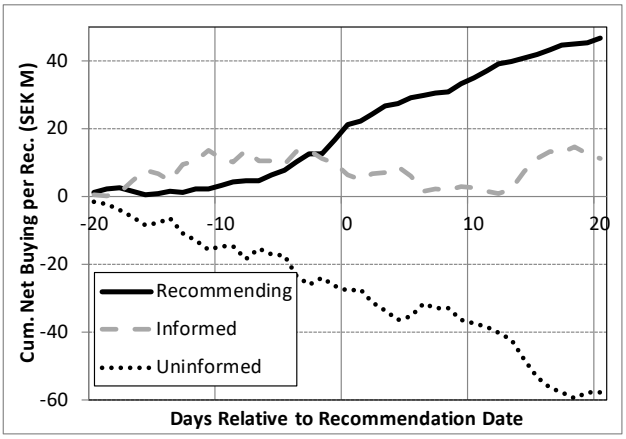
Panel C: Estimated commissons as a share of total profits

		N	+/-5	+/-10	+/-20
Upgrades to buy or strong buy		2,507	34%	34%	32%
Downgrades to sell or strong sell		1,730	154%	neg.	neg.
Category	All	4,237	42%	61%	57%
	Big firms	1,844	43%	66%	63%
	Small firms	2,393	42%	40%	57%

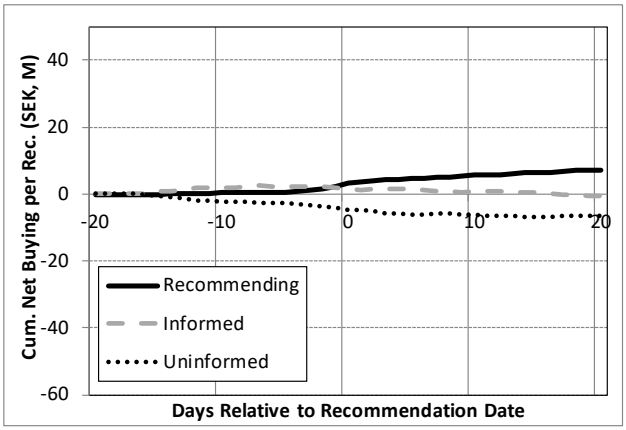
Figure 1: Cumulative Net Buying around Recommendation Revision Dates

The figures show the cumulative net buying by the clients of recommending, informed, and uninformed brokers around recommendation revision dates. Cumulative net buying is measured in millions of Swedish kronor (SEK, M) and averaged over recommendations. Net buying is accumulated separately in event time for upgrades to buy or strong buy and downgrades to sell or strong sell. Results are shown separately for big (decile one) and small (deciles two to ten) recommended firms and for upgrades and downgrades. The sample contains 1,141 big firm recommendation upgrades to buy or strong buy, 1,366 small firm recommendation upgrades to buy or strong buy, 709 big firm recommendation downgrades to sell or strong sell and 1,027 recommendation downgrades to sell or strong sell. USD 1 corresponds to about SEK 8 during the sample period, January 1997 to June 2006.

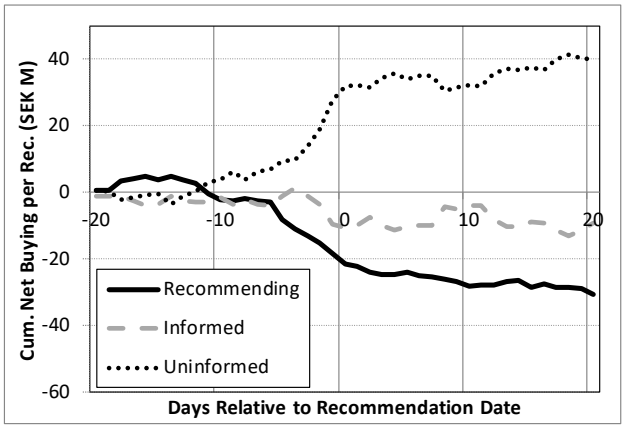
A: Upgrades to buy or strong buy, big firms



B: Upgrades to buy or strong buy, small firms



C: Downgrades to sell or strong sell, big firms



D: Downgrades to sell or strong sell, small firms

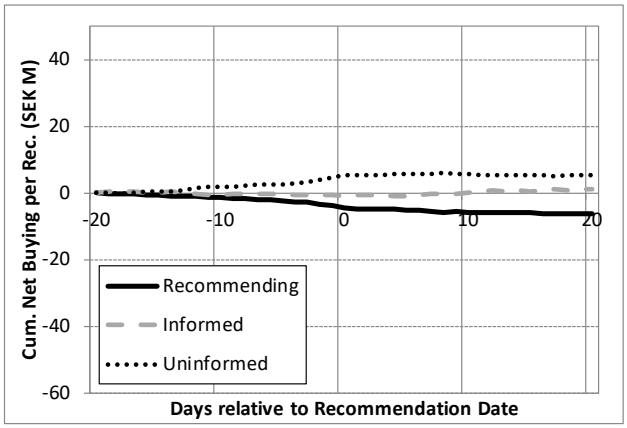


Figure 2: Abnormal Profits and Returns around Recommendation Revision Dates
This figure shows cumulative abnormal profits and returns for transactions starting 20 trading days before the broker releases a buy or strong buy (sell or strong sell) recommendation that positively (negatively) revises an existing recommendation up until 20 trading days after that recommendation. Buy and hold abnormal returns (BHAR) are measured as the difference between raw buy and hold returns and the market return over the corresponding period. Abnormal profits are measured as the difference between raw profits and the profits that investors could have made by investing a similar amount in the market index. Each point in the abnormal profits line is computed as the average, across recommendations, of the cumulative abnormal profits obtained on transactions executed up until that event day, keeping the valuation horizon fixed. The reference price in the profits computation is, in all cases, the price prevailing 20 trading days after the recommendation revision date. The reported figures are averages of 2,507 observations for upgrades to buy or strong buy, and 1,730 observations for downgrades to sell or strong sell. Profits are measured in millions of Swedish kronor (SEK, M). USD 1 corresponds to about SEK 8 during the sample period.