Vice or Advice? Profits from Brokerage-Firm Trading around Recommendation Revision Dates

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Abstract

We devise a new profitability metric that is robust to the dating and investability problems that frequently plague stock recommendations. Using this metric, we document the existence of abnormal profits to recommending brokers' net trades around positive recommendation revision dates, showing that either the broker or its clients actually benefit from the information contained in recommendations. A sizeable part of these abnormal profits comes from transactions that take place before the recorded recommendation date. This finding, together with evidence of substantial disparities between profitability and returns of liquidity-sorted portfolios of recommendations, suggests that methods that do not address the mentioned problems may give a misleading view of recommendations' value. Even if returns around buy recommendations are strong and highly significant, we find the absolute value of profits small, as they represent an annualized return of only 1 basis point of assets under management by the Swedish equity mutual fund industry.

Keywords: stock recommendations; performance evaluation; information leakages.

JEL codes: G14; G24; J44.

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1 Introduction

This paper examines whether investors are able to profit from the investment advice contained in stock recommendations. Although several recent studies provide evidence that prices tend to move in the direction implied by analysts' recommendations (Stickel (1995), Womack (1996), Barber, Lehavy, McNichols, and Trueman (2001), Jegadeesh, Kim, Krische, and Lee (2004), Green (2006)), suggesting that sell side security research could be a valuable source of information, no study so far has explored whether investors *actually* manage to take advantage of such advice.[1]

Documented abnormal returns to recommendations may in fact be a poor indicator of the actual profits obtained by investors. A common underlying assumption is that investors apply a static buy-and-hold rule over a pre-specified time horizon, but there are several reasons to believe that investors are unable to react in such a timely manner. If bid-ask spreads, the price impact of trading, or other market frictions, impede or hamper their ability to take advantage of recommendations, abnormal returns may well fail to materialize into actual profits. The same may happen if recommendations coincide with public announcements. The value of such recommendations' may prove limited, even if measured returns are significant. In fact, if markets are truly efficient, price reactions to new information may occur without any trading taking place at all. On the other hand, it is possible that investors may be able to do better than what simple mechanical rules suggest. Recommendations typically contain information beyond what standardized categories such as; Buy, Hold, or Sell, are able to convey. More detailed information about fair values could presumably be exploited by investors in their trading strategies.

We argue that the standard measurement of returns around recommendation events are bound to be plagued by error, and is therefore a poor proxy of real investment value. Actual profits to brokers' clients, on the other hand, offer a better measure of recommendations' economic value. In this paper we take advantage of a large and comprehensive

[1]Earlier research was not always so positive about the usefulness of stock recommendations as a source of investment ideas; see Diefenbach (1972), Bidwell (1977), and the seminal study by Cowles (1933) for example.

data set of brokers' daily transactions in the Stockholm Stock Exchange, covering the period from January 1997 to December 2006, to explore these profits. By combining stock recommendations with volumes transacted and prices paid by each broker, and at each point in time, we devise a measure of trading returns and profits, which we argue faithfully reflect the actual abnormal profits obtained by investors who trade on recommendations. This measure, we show, has the added appeal, unlike security wide abnormal return measures, of its robustness to two pervasive problems that frequently affect recommendation studies: *noisy dating of clients' access to recommendations* and *lack of investability*.

Lack of investability is most notorious among smaller, less liquid stocks, precisely those stocks were analysts' ability to detect mispricings seems to be the largest (Stickel (1985); Ivkovic and Jegadeesh (2004); Green (2006)). Its immediate consequence is that even large return reactions to recommendation revisions, widely documented in previous studies, may not be economically very significant if they are inferred from a pool that contains a substantial amount of small companies with low liquidity. Noisy dating of clients' access to recommendations, originates in the existence of information leakages before recommendations' public release, and of dating imprecision in commercial databases (Womack (1996); Mikhail, Walther, and Willis (2004); Irvine, Lipson, and Puckett (2007)). Reporting lags and leaks can lead to severe underestimation of recommendations' profitability by failing to account for part of the benefits that some investors are able to obtain. In addition, recommendations are often released after the release of public information, such as earnings announcements, such that errors in dating could be magnified (Altinkiliç and Hansen (2007); Ivkovic and Jegadeesh (2004)).

Brokers' aggregate abnormal trading profits are indicative of how much value recommendations *actually* add to brokers' client base, as opposed to the value they could *potentially* add if it were possible to trade at given closing prices. We compute abnormal profits as the product of the daily net position and the abnormal return of the recommended stock. These profits are attributed to broker-specific information, since the market always clears for all stocks. Even if some recommendations are issued after public

events, or if analysts recommend stocks that have recently appreciated, brokers' net positions are expected to be zero in the absence of any valuable broker-specific information. In addition, by measuring the profitability of actual positions, we naturally control for the issues surrounding investability and price impact of trading. By choosing a wide enough recommendation window, we also avoid the problem of underestimating recommendation profits that arises from missing part of the gains obtained by investors that benefit from early tips and leakages. We follow two different approaches in computing abnormal profits and returns. In the first, we evaluate profitability in event time and compare them to the common returns measure. In a second approach, we follow the investment performance of recommending brokers' actual net trades in calendar time. We compare the equal- and value- weighted returns to a dynamic portfolio rule which mimic actual broker net flows. This strategy is certainly not implementable or replicable in real time by an outside observer, but that is precisely the defining characteristic of private information. Instead, this portfolio, and its profits, is representative of that of some aggregate insider (broker customers and perhaps the broker himself) in possession of the information.

In the ten-year period we study, we find abnormal profits to brokers' net trades around positive recommendation revision dates of SEK 515,700 (USD 77,300) per day, or SEK 487,000 (USD 73,000) per recommendation. These profits are net of costs derived from the bid-ask spread and the market impact of trading, although not of brokerage commissions, and could be thought of as the net surplus to be divided by brokers and their clients. Our results support the idea that recommendations are a valuable source of investment information, for which brokers should be compensated, and that investors actually take advantage of them. We find that approximately half of measured profits are associated with transactions that take place before the official recommendation date. This fact, coupled with the finding that recommending brokers' market shares and net trades increase prior to the release of recommendations, and of substantial disparities between profits and returns to size and liquidity sorted recommendations, show that inaccuracies in dating access to recommendations and lack of depth are important factors when it comes

to assessing the profitability of recommendations. Our results also indicate that broker clients do not profit from negative recommendations. Their inability to do so does not obey to lack of action on their part; the existence of substantial selling activity around these recommendations signals that brokers' customers do try to take advantage of them. The reason, we believe, is that these recommendations are not informative, or arrive too late.

Our paper contributes to the existing literature in at least four dimensions. First, we propose a new way of estimating the value of security research by applying trade data. We stress that a reasonable and conservative measure of recommendation profitability should account only for the net purchased amount by the recommending broker. Secondly, applying this prescription, we explore the actual profits obtained by investors who trade on recommendations issued on stocks listed in the Stockholm Stock Exchange, finding contrasting results between positive and negative revisions. Third, we provide evidence of substantial abnormal, and profitable, activity before the recorded recommendation date. This activity, which anticipates the coming recommendation, is consistent with the existence of tipping, which by anecdotal accounts from the brokerage industry is an important device for rewarding customers. But since we do not know to which extent there are lags in the dating of our recommendations, we have to acknowledge that some of the pre-recommendation profits actually may belong in the post-recommendation window. In any case, our results points out that ignoring the pre-recommendation window can result in severe underestimation of recommendations' profitability. Finally, our methodology makes it possible to measure the economic value of stock recommendation to broker customers in the aggregate. Even if profits are difficult to benchmark, we find that annualized profits only represents around 1 basis point of assets under management by Swedish equity mutual funds, which is puzzling given that stock recommendations are given so much attention by the industry.

The rest of the paper is organized as follows. Section 2 describes our methodology, and how we infer profits from trading data in general, and Section 3 summarizes the

data we use. Section 4 presents the results in three parts. First, we establish that there is abnormal net buying around recommendation events. Secondly, we calculate profits and returns in event-time, and finally we construct calendar-time portfolios in order to assess the economic value of stock recommendations. Section 5 summarizes the main findings and concludes.

2 Using net broker flows to infer profitability

Traditionally, the most commonly used measure of recommendation performance is the abnormal return associated to the recommendation. Abnormal returns are easy to compute and not excessively demanding in terms of data, but on the other hand, there are at least three important caveats with this methodology which may bias the result. First, since the exact date, and time, in which recommendations become available is usually not known with certainty, abnormal returns can provide at best an approximation to the real expected returns of investing in the recommended stocks. Second, recommendations are often issued after the release of public information, such as earnings announcements, which could magnify the error of misdating (see Altinkiliç and Hansen (2007) and (Ivkovic and Jegadeesh (2004)). Third and last, some firms may trade at low volumes, making it difficult to capture any returns associated with stock recommendations. When calculating buy and hold returns, it is impossible to infer in which direction these biases eventually materialize.

Figure 1 illustrates the case in which there is tipping or a reporting delay from the issuing broker. The official release of a buy recommendation is at time $t = 0$, but this information is available to some investors at $t = *$. Since the actual window when information is available is wider, and prices start to increase before the official date, the traditional approach will underestimate profits and returns. Figure 2 illustrates the case in which there is public information causing the buy recommendation to be initiated. Measured returns from the window that include days before $t = 0$ clearly overestimates actual profits. In both cases, cumulative profits can be estimated by inferring net buys in

the period surrounding the initiation. Moreover, net buys also implicitly takes investability into account, since broker trading profits can be inferred from broker net buying.

Our approach relies on analyzing performance and profits based on actual net buying by the stock broker who issues the recommendation. We infer abnormal broker trading by measuring net buying (*NB*) around recommendation revision dates. For each broker b, stock i and day t, net buying is defined as follows,

$$NB_{b,i,t} = B_{b,i,t} - S_{b,i,t}, \tag{1}$$

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.

This measure provides us with a natural benchmark for detecting abnormal trading activity, since market clearance implies that (unconditionally) expected net buying, for any broker, stock and time is zero, i.e.

$$E(NB_{b,i,t}) = 0 \quad \forall b, i, t. \tag{2}$$

Conditioning net buying on recommendation releases for some broker k at time, τ, we hypothesize that,

$$E(NB_{k,j,t}|I_{k,j,\tau}) \neq 0 \quad \forall t \in [\tau; \tau + \delta], \tag{3}$$

where $I_{k,j,\tau}$ denotes both the recommendation and the information it is based on (if any), and δ is the length of time the recommendation is expected to affect trading.[2] In our framework, τ is the date when investors act upon any information that we attribute to the broker-specific information contained in stock recommendation for firm j. This means that we do not need to rely on the official date of the release of the recommendation. This is an advantage if tipping and misdating of recommendations is widespread. Since equation (2) holds for all t, the expected value of equation (3) is by construction also zero

[2]We assume that there is no reverse causality, brokers signal clients and not the opposite. This seem to be a reasonable assumption, informal discussions with practitioners reveal that it is unlikely that financial analysts observe detailed enough order flow information, less of all that they take advantage of it in making their recommendations. Besides, if there were a real chance of analysts free ridding on certain traders' information it would certainly be wise for them to channel their trades through discount brokers or other non-recommending brokers.

when there is no broker specific information, that is when $t \notin [\tau; \tau + \delta]$. In expectation, we can rely on the data to tell us when there is abnormal activity.

Abnormal profits capture the excess profits made by investors who channel their recommendation-motivated trades through the broker making the recommendation. They are defined as the product of trades on the recommended stock executed by the recommending broker and the abnormal return obtained by that broker on these trades. Formally, for trades executed by broker b, on stock i, on any given day t:

$$\Pi_{b,i,t} = \left[B_{b,i,t} \cdot R^B_{b,i,t} - S_{b,i,t} \cdot R^S_{b,i,t} \right], \tag{4}$$

where $B_{b,i,t}$ is the amount the broker issuing the recommendation purchased in the recommended stock measured in SEK (Sweden's currency), $S_{b,i,t}$ is the amount the broker issuing the recommendation sold in the recommended stock, $R^B_{b,i,t}$ is a broker-specific return for purchases and $R^S_{b,i,t}$ is a broker-specific return for sells.

If the average transaction price for sells equals the average transaction price for purchases, (4) conveniently reduces to:

$$\Pi_{b,i,t} = NB_{b,i,t} \cdot R_{b,i,t}. \tag{5}$$

We use market-adjusted returns in our analysis of profits, which then measures profits in excess of what could have been obtained by investing in the value weighted benchmark. Such abnormal profits exploit the fact that, at any given time, brokers' expected net purchases on any stock are zero. Recommendation-motivated net purchases and profits are both superimposed on a zero mean random stream of noisy trade which cancels out in expectation.[3] Therefore, as long as recommendation-motivated trades are carried out through the broker releasing the recommendation, measured abnormal profits will accurately reflect the benefits of recommendations. A small part of the order flow instigated by recommendations will be matched internally with abnormal volume of the opposite sign (every time on the aggregate for every buyer there has to be a seller) therefore wash-

[3]Even if some transactions are privately informed, this poses no problem to the argument as long as they are equally likely to be channeled through any of the brokers that run an essentially symmetric businesses. If that is the case their contribution to brokers' expected net purchases, and profits, will cancel out.

ing away part of the measured recommendation-motivated volume and profits. But this effect is bound to be negligible. The average broker's market share (recommendation-weighted) is only 4.6% in the sample, which means that the expected dilution is minimal. And even then it could be argued that what should matter is the net value brokerage research contributes to brokers' entire customer base.

The main advantage of broker-specific abnormal profits is that, by exploiting information from broker trades, it overcomes the dating problem that affects abnormal returns. This is because, absent any broker-wide signal, expected net purchases are zero, and therefore profits too. In our example of Figure 1, we can measure profits in a pre-recommendation window, and avoid underestimating recommendation profits that results from missing part of the profits obtained by investors that benefit from early tips and leakages. Similarly, as in Figure 2, we avoid taking public information into account, since there is no broker-specific signal that is channeled exclusively to their clients. Moreover, only when the broker-specific signal is truly informative, conferring broker clients a real advantage in the market, those positions will be profitable.

It is also important to note that abnormal profits are free of the investability problems that may affect abnormal returns, especially in illiquid stocks. Broker-specific abnormal profits are, after all, actual profits obtained by those who invested in the information contained in the recommendation.[4]

3 Data Description

This study uses Swedish equity data from the OMX Nordic Exchange. The OMX Nordic Exchange comprises companies in Sweden, Finland, Denmark and Iceland and was in 2006 the sixth largest stock market in Europe, measured by market capitalization. At the

[4]Abnormal profits' main weakness, on the other hand, is that its computation requires that recommendation related trades be channeled through the broker that releases the recommendation. Although conversations with practitioners indicate that this is usually the case, and that there is indeed strong evidence that investors tend to trade with the broker whose analyst has provided them with an influential recent report on a stock (Hayes (1998), Irvine (2001) and Irvine (2004), Jackson (2005)), this may still be a strong assumption sometimes. If brokers' clients were to channel part of their trades through competing brokers, abnormal profits would offer a downwardly biased estimate of recommendation profitability. We believe that this bias is less important in the pre-recommendation period, because a too wide-spread "misuse" of private information would be seriously detrimental to the broker-customer relation in the long-run.

end of 2006 it had 791 listed companies, of which 417 were listed on the Stockholm section of the exchange (SSE). The Nordic Exchange is a fully electronic market where members (broker firms) pay both fixed and transaction based fees for matching of order flow. The members of the exchange include many of the major brokerage firms present in U.S. and the rest of the European markets.

Our study combines three data sets: stock recommendations, trading data and stock prices and returns. We collect recommendations of stocks listed on the Stockholm Stock Exchange from the Institutional Brokers Estimate System (I/B/E/S), and the SSE trading data is provided by the owner of the exchange, the OMX Group. Each of these data sets is described in detail below.

3.1 Broker Trading Data

The daily trading data spans the period from January 1997 to December 2006. 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 SEK (Swedish currency), all of them broken up on purchases, sales, and internal trading.

Figure 3 depicts the yearly value of shares traded during the sample period. Trading increased heavily during the boom years preceding 2001, but then fell sharply as values declined, only to recover again after 2003. In the last year of the sample, the value of shares traded was SEK 8.8 Trillion, or USD 1.3 Trillion, approximately one third of the dollar volume traded in NASDAQ the same year.[5]

Competition among brokers is stiff and has increased during the later years, as can be inferred from the declining market concentration shown in Figure 3. The dark grey area shows the SEK value traded by the top 10 brokers (based on SEK volume) in 1997, whereas the value traded by the top 10 brokers year on year is captured by the sum of the two gray areas (dark and light). 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.[6] In contrast, in

[5]The dollar volume traded in the NYSE and NASDAQ in 2006 was USD 15.4 and 3.9 Trillion respectively.

[6]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

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 foreign competition. By 2006, Morgan Stanley, Goldman Sachs, Lehman Brothers and Merrill Lynch, together with Icelandic Glitnir bank, had broken into the top 10, even when none of these international brokers were in that group in 1997. At the same time, nine of the top 10 brokers at the beginning of the sample were Swedish, but only four remained in 2006: SEB, Carnegie, Swedbank, and Handelsbanken.[7]

3.2 Stock Recommendations

We obtain data on financial analysts' stock recommendations from the Institutional Brokers Estimate System (I/B/E/S) database for the period January 1997 to June 2006. 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), Jegadeesh, Kim, Krische, and Lee (2004), Sorescu and Subrahmanyam (2006)). To construct the recommendation revision variable we rely on I/B/E/S recommendations' classification. I/B/E/S 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: positive recommendation revisions (also labeled "added to buy" revisions) and negative recommendation revisions (labeled "added to sell"). Positive recommendation revisions are defined as those buy or strong buy recommendations issued by an analyst who had previously issued another recommendation for the same stock that was not as positive as the new one. A negative recommendation revision on the other hand is a sell or strong sell recommendation made by an analyst whose previous recommendation for that same stock was less negative. Defining recommendation revisions this way implies that the analyst issuing the recommendation is required to have an outstanding or previous recommendation on the same stock in order

group as a unit.

[7]The 2006 ranking by value of traded shares is: SEB, Handelsbanken, Carnegie, Morgan Stanley, Goldman Sachs, Glitnir Bank, Lehman Brothers, Swedbank, Merrill Lynch, and UBS.

to consider the current recommendation as a revision. Unlike most studies on financial analysts' recommendations we do not make a distinction based on the strength of the recommendation, that is we do not distinguish between buy and strong buy or sell and strong sell revisions. This is because many of the larger domestic brokers in Sweden use a three point scale incompatible with that distinction, or changed to it at some point during the sample period.

Our sample consists of 7,624 recommendation changes. Of those 2,793 are positive revisions as defined above and 1,952 are negative revisions. These revisions are more or less evenly distributed along the 10 year period we study, as there seems to be no significant correlation between the number and type of revisions and the general market conditions (see Figure 4). These recommendations cover 296 firms, which means that an average of 25.7 recommendation changes are made for each firm during the 9.5 year period of the sample. The sample includes recommendations by 929 analysts and 51 brokerage firms. There is an average of 8.2 recommendation changes per analyst and the median recommendation change is made by an analyst who makes a total of 4 recommendation changes. The 10 largest brokers in the sample, defined again according to trading volume, are responsible for slightly more than 50% of all recommendation revisions (3,877 recommendation changes).[8] Table 1, which shows the recommendation transition matrix, provides additional information about the dynamics of recommendation revisions. It is evident from that table that buy and strong buy recommendations are more frequent than sell and strong sell recommendations (3,473 vs. 2,088). The number of recommendation upgrades (3,670 in this sample) and downgrades (3,954) on the other hand is quite similar.

3.3 Stock Prices, Returns and Supplementary Information

Stock prices (adjusted and unadjusted), returns, market values and complementary information is collected from Datastream. This data is matched to the trade data from the

[8]The number of recommendations used in some tests may be smaller due to data availability on other variables, or interest in some particular type of revisions. As a benchmark Womack's (1996) study comprises 1,573 recommendation changes on 822 different firms, made by 14 US Brokers (during the 1989 - 1991 period).

Stockholm Stock Exchange using securities' ISIN codes. The matching to I/B/E/S recommendations is subsequently done using I/B/E/S Tickers. In the cases 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 one is typically the only security for which there is Datastream information available, and usually the one identified by I/B/E/S as the recommended security.

The use of Datastream as a provider of individual stock returns may raise a number of concerns (see Ince and Porter (2006)). For example, Datastream sometimes replaces missing values or pads values with the last available value indicating stale price problems or outright data errors, or fails to correctly account for stock splits. To address these concerns we manually inspect the 296 series of stock returns. Possessing average transaction prices from the OMX Nordic Exchange provides us with a natural benchmark to compare Datastream data. We uncover only one case where the information in both samples is clearly conflicting and opt to exclude that observation (recommendation).

4 Results

Our results are presented in three subsections. First, we establish that there is indeed abnormal trading activity surrounding recommendations by the issuing broker. Second, we infer the profitability of these trades in event-time. We analyze the difference between the commonly used static event-time returns versus our proposed measure of trading profits. Third, we construct portfolios in calendar time in order to assess the statistical significance of returns and profits. Instead of measuring portfolio performance using only a static buy and hold portfolio rule which is the standard in the literature, we compute the return of a dynamic portfolio that utilizes data of net buying. We also use trading data to compute the profits in absolute terms in calendar time where we carefully adjust for intra-day trading, since we also seek to measure the monetary value to broker customers. If markets are in information equilibrium, we are tempted to interpret the aggregate expected profit to brokers' customers as the total surplus available for equity research by our brokers in

sample.

4.1 Net buying

Figure 5A displays the sample average of cumulative net buying in event time for buy and sell recommendations separately, beginning 20 days before the recorded recommendation date and ending 20 days after it. During the first two weeks of the window, days -20 to -10, it shows no noticeable sign of recommending brokers taking a position on the recommended stock. But starting on day -10, net buying starts to diverge from zero in the direction implied by the recommendation. And, by the end of the window, cumulative net buying represents almost 3% of the cumulative value of shares traded by all brokers in the same period, for "added to buy" recommendations. For "added to sell" recommendations, on the other hand, cumulative net selling by the end of the window is around 2% of that value. Perhaps unsurprisingly, the majority of these abnormal flows can be attributed to the top 10 (year on year) brokers in sample. Most notable in Figure 5 is that there is significant net buying (selling) 5 to 10 trading days prior to the recommendation release, with as much as 40% of the total net buying buildup already accomplished before the recorded recommendation date.

Figure 5B plots the average abnormal trading per recommended stock broken up on firm size, and illustrates the vast dispersion in net buying between large and small companies. The average cumulative net buying for recommendations issued on the 20% largest firms in the sample, 20 trading days after the recommendation release date, is close to SEK 70 million (approx. USD 10 million). Whereas the same statistic for recommendations issued on the 20% smallest firms, is only about 1/15th of that figure, or SEK 5 million. This implies that gross profits of acting upon recommendations are bound to be sensitive to firm size. The results are less clear for sell recommendations, but still in the same direction, with cumulative net sales for the largest firms roughly 10 times larger than those of the smallest ones, at the end of the event window.

In order to explore the statistical significance of these findings we employ a regression approach across event weeks. We begin by summing daily net buying, $NB_{b,i,\tau}$ into weekly

flows for event weeks -4 to 4 for each recommendation in our window,

$$NB_{b,i,w} = \sum_{\tau \in w} NB_{b,i,\tau}, \qquad w = (-4,-3,-2,-1,1,2,3,4). \tag{6}$$

We then perform a regression on weekly flows according to

$$NB_{b,i,w} = \sum_{w} \alpha_w^B D_w^B + \sum_{w} \alpha_w^S D_w^S + e_{b,i,w}, \qquad w = (-4,-3,-2,-1,1,2,3,4), \tag{7}$$

where D_w^B (D_w^S) are indicator variables that take the value 1 if net buying is measured in week w and the recommendation being considered is an "added to buy" ("added to sell"), and 0 otherwise. There are therefore 16 regression coefficients to be estimated in this completely determined equation, which returns the weekly sample average of net buying for sell and buy recommendations separately. The point estimates could easily be retrieved by taking means separately over the observations, but 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, summarized in Table 2, broadly confirm that flows from buy recommendations peak on the week when the recommendation is released, but they are also statistically significant two weeks prior to this event. For sell recommendations, negative flows are largest the week prior to the issuance of the recommendation revision, and statistically significantly negative 3 weeks prior to the recommendation release. There is on the other hand no evidence that brokers continue to be net sellers for a very long time after the issuance of sell recommendations; net buying in weeks 2 to 4 is negative, but not significant.[9]

All in all, our findings reveal that recommending brokers execute abnormal net buying in the direction of the recommendation, even prior to the recommendation release. This

[9]There seems to be some difference between the timing of net buying for large and small firms, for sell recommendations. Brokers recommending sales of small firms are significantly net selling stocks during the whole window. This result may seem to suggest that there is information leakage further back in time than we find reasonable to expect. But the amounts involved are very low (SEK 225,000 to SEK 648,000), and unlikely to influence profits in any significant way. For big firms, on the other hand, net sales are only significant the week prior to the recommendation release.

indicates that some individuals are informed about the content of the recommendations before the recorded recommendation date, and most importantly that they act on that information. This finding provides a hint about the severity of the misdating problem, whichever its cause (tips, leaks or postdating), and the problems of assuming that all action starts on the recorded recommendation date. At the same time, the finding of notable differences in the size of the positions taken following recommendations on large vs. small firms suggests that not all recommendations are equally investable, and that lack of market depth may be an issue for recommendations on the smaller, less liquid stocks.

4.2 Event time returns and profits

In event time, we compute Broker Abnormal Profit (BAP) for each recommendation as follows:

$$BAP_{b,i,\tau} = \sum_{t=\tau-x}^{\tau+x} \left[B_{b,i,t} \cdot AR^{B}_{b,i,t:T} - S_{b,i,t} \cdot AR^{S}_{b,i,t:T} \right], \tag{8}$$

where τ is the recommendation date, x is the window-width (for transactions), $B_{b,i,t}$ is the SEK amount the broker issuing the recommendation purchased in the recommended stock at time t, $S_{b,i,t}$ is the SEK amount the broker issuing the recommendation sold in the recommended stock at time t, and $AR^{B}_{b,i,t:T}$ and $AR^{S}_{b,i,t:T}$ are broker-specific buy and hold abnormal returns for purchases and sales respectively. These abnormal returns are computed from broker-specific quantity weighted average transaction prices (not just closing prices) and measure the normalized change in price from t, the day in which the transactions take place, to T, the post-event day in which the profitability of the position is measured. We set $T = 20$ in our analysis, such that we measure profits and returns 20 trading days after the release of the recommendation. [10] Formally,

$$AR^{B}_{b,i,t:T} = \frac{P_{i,T} - P^{B}_{b,i,t}}{P^{B}_{b,i,t}} - \frac{P^{M}_{T} - P^{M}_{t}}{P^{M}_{t}}, \tag{9}$$

[10] Even when we only have the number of stocks bought and/or sold in each day by each broker and the quantity-weighted prices paid and/or received for them, this is as good as having transaction level data for our purposes, since it allows us to compute profits with the same level of accuracy.

where $P^B_{b,i,t}$ is the broker-specific adjusted price of firm i paid by broker b for purchases and P^M is the adjusted price of the benchmark. The approach is identical for sales.

Equation (8) is the exact event time analogous of equation (4) and as such captures the aggregate profitability of all transactions carried out by the recommending broker in an x-day window of the recommendation date, where profitability is 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 at some post event date T (in our case one month after the recommendation date), in excess of the profits that could have been obtained by investing the same amount of money in the market index.

By comparison, buy and hold abnormal returns (BHARs), the standard profitability measure in event studies of recommendation performance, try to capture the return that can be attained by investing in the recommendation in the day it is first released, in excess of what could have been obtained by investing in a portfolio of firms of similar risk. Using the notation introduced before, $BHAR_{i,\tau} = AR_{i,\tau:T}$, where the absence of subindex b indicates that abnormal returns are computed from closing prices instead of transaction prices. Since there is usually uncertainty about the day recommendations reach their users it is common in the literature to use as the opening day of the window $\tau - x$ instead of τ.[11]

We report the results of using these two measures of recommendation performance, abnormal profits and returns, in Table 3 and Figures 6 and 7. As widely established in the existing literature, we find positive and significant abnormal returns following (and preceding) positive recommendations, and negative abnormal returns following (and preceding) negative ones. Depending on the window chosen, abnormal returns go from 2.63% to 3.78% for positive recommendation changes, and from -1.91% to -2.14% for negative ones. Most of these abnormal returns, however, take place in the pre-recommendation window (approximately 60% to 65% of the documented abnormal

[11] An alternative, more traditional, way of expressing buy and hold abnormal returns is the following:

$$BHAR_i = \prod_{t=\tau+1}^{T} (1 + R_{i,t}) - \prod_{t=\tau+1}^{T} (1 + R_{M,t}) .$$

where $R_{i,t}$ is the raw return on stock i on day t, and $R_{M,t}$ is the raw returns on the matching portfolio M for day t.

returns, both for positive and negative recommendation revisions), with only a small fraction of them clearly set in the post-event period (approximately 20% to 25% of the abnormal returns).[12]

A conservative estimate of recommendations' performance would clearly ignore pre-event returns, but given that we find evidence of brokers building positions in the pre-event window, it is natural to entertain the possibility that at least part of those abnormal returns can be captured by investors who follow financial analysts' advice. It is hard to tell whether that is the case just by looking at average abnormal returns. In general, the presence of measured average abnormal returns coupled with average abnormal net buys in the pre-event window is not enough to guarantee that investors are in possession of valuable information at that point in time.

We document the existence of broker-specific abnormal profits on days immediately preceding and following positive recommendation announcements in Table 3 and Figure 7. We find that broker clients possess an informational advantage both before and after the recommendation release, and that they can translate this signal into profits. This is something beyond what can be inferred by just looking at abnormal returns, and coupled with the finding of significant broker-specific net buying in the vicinity of the recommendation release dates, confirms that recommendations are more than a mere sideshow. Taken together, broker clients make an average of 487,000 SEK per positive recommendation, and interestingly roughly half of those profits are associated with transactions that take place before the recorded recommendation date. The same is not true of negative recommendations, where brokers, their clients indeed, seem unable to execute profitable transactions. In fact — if anything — we observe negative, but small, abnormal profits on those dates, suggesting that either these recommendations do not confer an information advantage or that that one is not exploited.[13]

Table 3 also reveal evidence for the other big problem that usually plagues abnormal

[12]Both for profits and returns we use relatively wide windows since Jegadeesh and Kim's (2006) results suggest that they may be more appropriate for European markets. In any case, window-width should not matter much for profits' computation, as long as it is enough to capture all recommendation related trades, but can be critical for abnormal returns. Profits are computed using a reference date $T = \tau + 20$.

[13]We leave an analysis of the statistical significance of these results for next section.

returns: lack of investability. Consistent with previous research (Stickel (1985) and (1995), Ivkovic and Jegadeesh (2004) and Jegadeesh and Kim (2006)) we find that, on average, stock prices react more to stock recommendations for small firms than for large firms (6.63% vs. 1.29% for positive revisions and -3.76% vs. -1.22% for negative ones). Yet abnormal profits fail to replicate this pattern. Smaller stocks have larger price responses, but they also typically have higher transactions costs, and lack of liquidity, as revealed by the meager cumulative net purchases (sales) at the end of the recommendation window.

4.3 Calendar-time returns and profits

In order to assess the returns obtained by investors who trade on the information contained in recommendations and compare them to the potential returns reported in previous studies, we use a portfolio approach similar to that of Barber, Lehavy, McNichols, and Trueman (2001). We highlight the differences in performance from three different trading strategies, H, based on the same recommendation signals. Calendar-time portfolio returns for each day t, are either weighted equally (I), according to market capitalization (MC), or according to the actual cumulative investment in each of the recommended stocks by the brokers issuing recommendations (CNB). The portfolio weights are determined at time $t-1$, and returns, $R_{i,t}$, are calculated at closing prices between $t-1$ and t. We therefore assume that the portfolio is purchased at closing prices at the end of the previous day. Formally,

$$R_{H,t} = \sum_{i}^{I} w_{i,t-1}^{H} R_{i,t}, \qquad w_{i,t-1}^{H} = [w_{i,t-1}^{I}, w_{i,t-1}^{MC}, w_{i,t-1}^{CNB}], \tag{10}$$

where each of the weights, $w_{i,t-1}^{H}$, are defined by:

$$w_{i,t-1}^{H} = \begin{cases} w_{i,t-1}^{I} &= \frac{1}{I_{t-1}} \\ w_{i,t-1}^{MC} &= \frac{MC_{i,t-1}}{\sum_{i}^{I} MC_{i,t-1}} \\ w_{i,t-1}^{CNB} &= \frac{\sum_{b}^{B} CNB_{b,i,t-1}}{\sum_{i}^{I} \sum_{b}^{B} |CNB_{b,i,t-1}|} \end{cases} . \tag{11}$$

The equally and value-weighted portfolios are straightforward in interpretation. The portfolio rule that weights stocks based on brokers' cumulative net buying is a dynamic

rule in which portfolio weights are determined by the cumulative net buying of each recommending broker in each recommended firm, normalized by the total absolute value of all brokers cumulative net buying. Cumulative net buying is defined as $CNB_{b,i,t-1} = CNB_{b,i,t-2}(1 + R_{i,t-1}) + NB_{b,i,t-1}$ and the first day of the recursion is set to be the first day of the chosen trading window. By normalizing by the summation of the absolute value of cumulative net purchases, we require that a negative position of broker b in firm i at time t must be covered, and do not allow these investors to sell short between brokers or firms. This is because we cannot observe the brokers' customers individual portfolios. We therefore assume that the aggregate individual investor, at the broker level, must cover their short positions at all times. We find this procedure sensible. Since our objective is to risk adjust these figures later on, this allows us to measure brokers' customers average returns independently of whether their positions are positive or negative.[14]

We expect the equally weighted trading scheme to be the most profitable of the three, since as it has already been argued that analysts' ability to detect mispricings is largest in smaller firms. Value-weighted portfolios partly overcome this problem by means of attaching more weight to stocks where supposedly there is more room for investment. Still, this may not be the best way to properly account for the price impact of trading. Our third, trade-based strategy, avoids this problem since it reflects a portfolio that is actually selected and held each day of the sample period. It is not clear that this trading strategy should be inferior to the value-weighted portfolio though; it is possible that investors may obtain more information from recommendations (and the analysts that issue them) than what a simple mechanical rule can. For instance, investors may be able to assess the quality of investment advice and invest only (or mostly) in better recommendations, or be able to close their position after the price has adjusted to the new information equilibrium.

We also assess portfolio performance *before* the recorded recommendation date. Clearly, in this case, the equally- and value-weighted strategies are not implementable, since they require conditioning on future information. They will also be contaminated by any pub-

[14]There is an additional motivation of more technical nature: Short sales could deflate the denominator of the weighting equation such that weights explode. This would seriously compromise any inference drawn from this trading strategy.

lic information that is released during the pre-recommendation window. Still, we argue, they provide a benchmark of how profitable an investment in these firms *could* have been if investors had had prior knowledge about the information contained in the recommendations. As argued in the previous section, the net buying strategy have actually been implemented by the broker (or its clients), and is unconditionally zero in the absence of broker-specific information.[15]

4.3.1 Risk-adjustment

We evaluate portfolio performance using both, a single-index model,

$$R^E_{H,t} = a^{1F}_H + b_M R^E_{M,t} + e_{H,t} \tag{12}$$

and a conditional model,

$$R^E_{H,t} = a^{4F}_H + b_M R^E_{M,t} + \sum_{k=1}^{K} b_k z_{k,t-1} R^E_{M,t} + e_{H,t}, \tag{13}$$

where R^E denotes daily returns in excess of the 30-day Swedish T-Bill.

The lower-case $z_{k,t-1}$ are deviations from unconditional means, $z_{k,t-1} \equiv Z_{k,t-1} - \overline{Z}_{k,.}$, of K instruments for common information available at $t-1$. As described in Ferson and Schadt (1996), b_M can be thought of as the average beta with b_k as linear response coefficients to the state variables chosen as instruments. Following the work of Keim and Stambaugh (1986), and Campbell (1987), we choose lagged values of a selection of money-market variables to proxy for the state of the economy: the level of the 30-day T-Bill rate, the default premium, and the term premium.[16] We refer to this four factor model as the conditional model. Our market benchmark is the value-weighted Swedish SIX index return.

[15] A difference between the profit and return portfolio approaches is that we do not allow net buying to cancel out between brokers at any time t in the weighting equation for returns.

[16] The default premium is measured by the return difference of a Corporate Bond and a Government Bond, and the term premium by the difference between a Government Bond a the T-Bill.

4.3.2 Calendar-time performance

Panel A of Table 4 presents the results for portfolios formed based on "added to buy" recommendations. The first section of this panel reports the estimated alphas for portfolios that incorporate the recommended stocks the day the recommendations are released, and hold them for 20, 10, or 5 days after their inclusion. We find that both the equally- and value- weighted portfolios are highly profitable over all three horizons. Reported alphas are 6.6 basis points per day for the shortest window considered (5 trading days), which translates to a yearly performance of approximately 16.5%. The similarity in the point estimates for value- and equally-weighted portfolios in this window suggests that there is little difference in the initial price reaction between large and small stocks. But as the horizon is extended, the value-weighted strategy becomes inferior, signaling a stronger post recommendation drift for smaller stocks (or a swifter price reaction for larger firms). The portfolios constructed based on recommending brokers' actual net trades (CNB portfolios) exhibit similar, but noisier, point estimates to those obtained with the value-weighted strategy, with the conditional and single index models delivering roughly similar results.

We also investigate the profitability of portfolios formed before, rather than after, the release of buy recommendations. Stocks are included in these portfolios 20, 10, or 5 days prior to the recorded recommendation date and liquidated on the recommendation release date. Since we can not reasonably assume that investors are in possession of the recommendation information prior to its recorded release date, the equally- and value-weighted portfolios only offer a hypothetical measure how much investors could have obtained if they had been in possession of such information. Our trade based strategy, however, reflects the actual positions taken by recommending brokers' clients during the period and its performance therefore offers a realistic measure of investors' abnormal returns before recommendation revision dates. Results for these strategies are displayed in the second section of Panel A (Table 4). Abnormal returns to the trade based portfolios are clearly pronounced in the period preceding the release of the recommendation, and larger than those recorded in the post-recommendation period. These abnormal returns

tend to be concentrated in the days immediately preceding, and including, the recommendation date, reaching an average of 10 basis points per day (or 25% once annualized) in the shortest window considered.

We carry out the same analysis with portfolios formed based on "added to sell" recommendations. The first section of panel B in Table 4 reports the estimated alphas for portfolios constructed by adding the recommended stocks the day of the recommendation release and holding them over the three chosen horizons. The equally- and value-weighted portfolios represent long positions in these stocks and are expected to be negative. The trade based strategy should, however, be positive if broker flows are, on average, negative. The results we obtain stand in sharp contrast to those of buy recommendations, with no single strategy generating significant returns. Turning to the second section of this panel, we find that there are very strong negative returns prior to the recommendation release for both the equally- and value-weighted portfolios, but that the trade based strategy delivers insignificant returns. We interpret these results as indicating that the decision to issue sell recommendations likely trails public information and does not confer investors any informational advantage. This seems the most natural explanation for investors failing to profit from these recommendations.

Taken together, our results suggest that positive recommendation revisions are a valuable source of information, but this is not true for negative revisions. For buy recommendations we find strong evidence of profitable trades both preceding and, as Barber, Lehavy, McNichols, and Trueman (2001) do, following the official recommendation date. In contrast to their study, we do not find any indications of profitability in the transactions executed either before or after the release of sell recommendations. Firms that receive recommendation downgrades tend to perform poorly immediately before the release of these recommendations, but brokerage clients seem unable to exploit this information, which we interpret as evidence that these recommendation revisions simply transcribe publicly available information.

4.3.3 Calendar-time profits

In order to assess the statistical significance of brokers' abnormal profits, we proceed with profits as with returns and build profit portfolios based on buy and sell recommendations. We make two adjustments to profits in comparison to returns.

First, in order to be able to compare profits utilizing different windows of trades, we fix the horizon at which profits are measured. Trades (purchases and sales) on each stock as well as the gains or losses that those positions give rise to are kept in the portfolio until 20 trading days after the recorded release date of the recommendation that motivated its inclusion in the portfolio, at which point all positions opened in relation with that recommendation are liquidated. This means that at the end of any given day t the added to buy portfolio will be invested in all stocks recommended in an x-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 x-day window of t) plus the net position in that stock at time $t-1$ adjusted to reflect past returns.

Second, instead of assuming that transactions take place at each day's closing prices, we explicitly calculate and include the profit of intra-day trading. Intra-day profits may be important if prices adjust swiftly, and information advantages are short lived. In this case, using closing prices will understate profits. On the other hand, if returns are relatively volatile, as would happen if the portfolio is only invested in a few illiquid assets whose closing price cycle over time between its bid and ask, a simple arithmetic mean of daily returns would overstate the profitability of the positions.[17]

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

$$AP_{b,i,t} = CNB_{b,i,t-1} \cdot AR_{i,t-1} + \lambda_{b,i,t}, \tag{14}$$

with

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

[17] Blume and Stambaugh (1983) and Canina, Michaely, Thaler, and Womack (1998) discuss this in more depth.

where $CNB_{b,i,t-1}$ is broker b's net position in stock i at the end of the previous day ($CNB_{b,i,t-1} = CNB_{b,i,t-2}\,(1 + R_{i,t-1}) + NB_{b,i,t-1} + \lambda_{b,i,t-1}$), $AR_{i,t-1}$ is day $t-1$ 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 that differ from closing prices ($P_{i,t} - P^{B}_{b,i,t}$ is the 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).[18]

To obtain a time series of aggregate daily abnormal profits we sum individual abnormal profits across all stocks and brokers in each calendar day. We then calculate average daily abnormal profits and assess their statistical significance using Newey-West standard errors. Annualized abnormal profits are computed simply by multiplying daily abnormal profits by 250 trading dates. An identical procedure is followed with downgraded stocks in the added to sell portfolio.

This procedure delivers and abnormal profits measure analogous to the one we explored before. The calendar time format helps accommodate overlapping event windows that usually make the computation of statistical significance in event studies dubious, while at the same time producing quantitatively similar results. The main difference with the event time methodology, is that profits are calculated daily (marking to market) and not compounded to the end of the event period. If we take the time value of money into account, both results are equivalent. It is important to keep in mind that both, the calendar time strategy we pursue here and the event time approach of the previous section, are not just implementable, but actually implemented (at least on the aggregate) by broker clients.

We report daily and annualized abnormal profits calculated using this procedure in Table 5. Three results are evident from this table.

First, broker trades around positive recommendation revision dates are profitable, and

[18]This, as other expressions, greatly simplify if we assume that all transactions are carried out at closing prices. In that case it is easy to see that (14) reduces to the product of cumulative net purchases and abnormal returns. But the intraday correction may be important sometimes, specially if prices adjust quickly and information advantages are short lived. In our case this correction accounts for 15% to 20% of the daily profits.

significantly so. This result shows that, at least gross of trading fees, investors *actually* profit from analysts' recommendations. Daily abnormal profits are estimated to be between SEK 458,349 and SEK 515,727 depending on the window used for measurement. The results are similar in all three windows analyzed, although their statistical significance decreases as we widen the observation period. This is reasonable 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 recedes as investors act on them and their information gets impounded into prices. Expanding the window therefore only results in additional non-event days that dilute the statistical significance without significantly affecting the estimate.[19]

Second, pre-recommendation profits, defined as those associated with transactions that take place before the reported recommendation date are also positive and significant (when we look at narrow windows) and amount to almost half of the total recommendation profits. This result provides further evidence of informed activity taking place before the recorded recommendation date (either tipping, leaks or postdating of recommendations). Pre- and post-recommendation profits are computed by narrowing the trading window to $(t-x;t-1)$ and $(t+1;t+x)$ respectively, but always keeping the reference horizon fixed ($T=20$). This means that trades executed in those windows are kept in the portfolio (plus/minus gains/loses) until 20 trading days after the recommendation is released, thus avoiding the effect of price pressure in the measures.

Third, from the results on negative recommendations in panel B, we reiterate the results of the portfolio analysis. Negative revisions do not contain any valuable information after the issue of the sell recommendations, and investors fail to capture the negative returns in the pre-recommendation window. This is still somewhat 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. Average post-event returns go from

[19]This is related to that we found analyzing returns, but where returns are lower for wider windows. Even if the numerator is constant, the denominator expands in the presence of noise-trades.

-0.3% to -0.5% for the average sell recommendation and are most likely concentrated in small, illiquid stocks (abnormal returns are almost three times as large for small stocks compared to large ones, and we know from previous research that price continuation tends to be exclusively concentrated in these ones (Zhang (2006)).

Finally, a word on the magnitude of profits. Annualizing the estimated daily profits of buy recommendations, we find that they in total generate SEK 114 to SEK 128 million to broker customers. These profits seem small in comparison to the approximately SEK 1 trillion of assets under management in the Swedish mutual fund industry. It is difficult to acquire information about the cost for equity research, but we notice that the combined fee revenue for the asset management branches of the top four Swedish brokers in our sample amounts to almost SEK 8 billion. Even if all profits eventually were to be channeled to these brokers, they would still represent a negligible source of income, and not be able to compensate customers fees.

4.3.4 A Calendar Time Extension: Analyst Coverage

Financial analysts not only issue stock recommendations but they also produce other pieces of research such as earnings forecasts and industry analysis that can be of further use to their clients. It is then natural to ask whether the relationship between analysts and investors translates into additional information being transferred to the latter, in addition to the recommendation related one. If this is the case, we would expect to find that the difference between the profitability of trades on research departments' covered and non-covered stocks is not exclusively confined to narrow recommendation windows. We study this possibility using the abnormal profits methodology introduced in the previous section, but extending the window to comprise not just a specific event, such as a recommendation release but the whole period the broker kept coverage of each stock. We define the period going from two months before the first recommendation on the stock until a whole year after the last one.

Table 7 shows the results. Although we find that trades by brokers on stocks covered by their research department outperform trades on those stocks by brokers that do

not cover them by 3.5 billion SEK in the ten-year period we study, that difference is not statistically significant for the whole sample. In fact, even when this figure seems three times larger than the aggregate profitability of all added to buy recommendations during the same period (which it includes), we must keep in mind that it is obtained by aggregating a far larger number of stock-broker-days. To put this number into perspective, the SEK value of stocks traded by the so called informed brokers is roughly 100 times larger than the SEK value traded by recommending brokers in the narrow window of the recommendation change, $(t-5; t+5)$, where most of the recommendation-related abnormal profits seem to be concentrated. This means that when normalized by the amount of money traded, abnormal profits outside the narrow recommendation window amount to only SEK 10,000 per day (compared to almost SEK 500,000 around added to buy recommendation dates). In short, financial analysts' contribution only acquires significance when we look at very specific periods such as those in which the broker releases positive recommendations.

5 Summary and Conclusions

The last 15 years have witnessed a surge in academic research on stock recommendations. The majority of these studies have shown the existence of substantial abnormal returns to recommendation revisions or revision based strategies. Yet, in spite of this evidence, a large part of the profession remains unconvinced of recommendations' value. This criticism is justified in that profitability is — at least by part — driven by small, illiquid stocks in which there may not be much room for investment. In addition, researchers who do not observe brokers' trades and are facing poorly dated recommendations, must make strong assumptions regarding the time clients gain access to them.

The novelty of our approach resides in the use of trade data where 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 infer more precisely when and to what extent recommen-

dations are used. To take advantage of this data we devise an "abnormal profits" metric that is robust to the problems of noisy dating of recommendations and investability that often plague abnormal returns. We have five important findings.

First, broker clients tend to trade in the direction suggested by their recommendations, thus offering evidence that recommendations are not just a sideshow in financial markets but that are capable of garnering substantial following.

Second, transactions executed by recommending brokers on recommended stocks around positive recommendation revision dates are on average profitable (abnormal profits amount to roughly half a million SEK per buy recommendation), showing that either brokers or their clients benefit from the investment advice contained in recommendations.[20] This is not the case, however for negative recommendation changes, a result that contradicts the findings of most previous research.

Third, a sizeable part of the abnormal profits found for positive recommendations are associated with transactions that take place before the recorded recommendation date. This fact, 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 tipping provided by Irvine, Lipson, and Puckett (2007), but may also be due to post-dating of recommendations.

Fourth, ignoring activity in the pre-recommendation window can be misleading, and will likely result in severe underestimation of recommendations' profitability. In our case roughly half of the profits and portfolio returns dissipate if we omit the pre-recommendation window. We find that the portfolio which replicates the investment of actual broker flows have similar performance to that of a static value-weighted portfolio strategy after recommendation initiation, but broker investors are only able to capture about half of the available value-weighted performance in the month before the recommendation is released.

Fifth and finally, our estimated yearly profits from acting upon buy recommendations

[20]Since we analyze brokers and their customers jointly we do not take into account trading fees, which are for the most part a transfer between them.

comprise about 1 basis point in yearly performance of total Swedish equity funds' assets under management. Profits are also small in comparison to revenue and costs for the largest stock brokers in sample. This we find puzzling, since we believe that the production of equity research is costly, is often stressed by retail brokers in their customer relation — and last but not least — also undoubtedly generate substantial trading.

References

Altinkiliç, Oya, and Robert Hansen, 2007, On the information role of stock recommendations, Working Paper, University of Pittsburgh and Tulane University.

Barber, Brad, Reuven Lehavy, Maureen McNichols, and Brett Trueman, 2001, Can investors profit from the prophets? Security analyst recommendations and stock returns, *Journal of Finance* 56, 531–563.

Bidwell, Clinton, 1977, How good is institutional brokerage research?, *Journal of Portfolio Management* 3, 26–31.

Blume, Marshall E., and Robert F. Stambaugh, 1983, Biases in computed returns: An application to the size effect, *Journal of Financial Economics* 12, 387–404.

Campbell, John Y, 1987, Stock returns and the term structure, *Journal of Financial Economics* 18, 373399.

Canina, Linda, Roni Michaely, Richard Thaler, and Kent Womack, 1998, Caveat compounder: A warning about using the daily crsp equal-weighted index to compute long run excess returns, *Journal of Finance* 53, 403–416.

Cowles, Alfred, 1933, Can stock market forecasters forecast?, *Econometrica* 1, 309–324.

Diefenbach, R., 1972, How good is institutional brokerage research?, *Financial Analysts Journal* 28, 54–60.

Ferson, Wayne E., and Rudi W. Schadt, 1996, Measuring fund strategy and performance in changing economic conditions, *Journal of Finance* 51, 425–462.

Green, Clifton, 2006, The value of client access to analyst recommendations, *Journal of Financial and Quantitative Analysis* 41, 1–24.

Hayes, Rachel, 1998, The impact of trading commission incentives on analysts' stock coverage decisions and earnings forecasts, *Journal of Accounting Research* 36, 299–320.

Ince, Ozgur S., and R. Burt Porter, 2006, Individual equity return data from Thompson Datastream: Handler with care, *Journal of Financial Research* 29, 463–479.

Irvine, Paul, 2001, Do analysts generate trade for their firms? Evidence from the Toronto Stock Exchange, *Journal of Accounting and Economics* 30, 209–226.

——— , 2004, Analysts' forecasts and brokerage-firm trading, *The Accounting Review* 79, 125–149.

——— , Marc Lipson, and Andy Puckett, 2007, Tipping, *Review of Financial Studies* 20, 741–768.

Ivkovic, Zoran, and Narasimhan Jegadeesh, 2004, The timing and value of forecast and recommendation revisions, *Journal of Financial Economics* 73, 433–463.

Jackson, Andrew, 2005, Trade generation, reputation, and sell-side analysts, *Journal of Finance* 60, 673–717.

Jegadeesh, Narasimhan, Joonghyuk Kim, Susan Krische, and Charles Lee, 2004, Analyzing the analysts: When do recommendations add value?, *Journal of Finance* 59, 1083–1124.

Jegadeesh, Narasimhan, and Woojin Kim, 2006, Value of analyst recommendations: International evidence, *Journal of Financial Markets* 9, 274–309.

Keim, Donald, and Robert Stambaugh, 1986, Predicting returns in the stock and bond markets, *Journal of Financial Economics* 17, 357390.

Mikhail, Michael, Beverly Walther, and Richard Willis, 2004, Do security analysts exhibit persistent differences in stock picking ability?, *Journal of Financial Economics* 74, 67–91.

Newey, Whitney K., and Kenneth D. West, 1987, A simple semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703–708.

Sorescu, Sorin, and Avanidhar Subrahmanyam, 2006, The cross section of analyst recommendations, *Journal of Financial and Quantitative Analysis* 41, 139–168.

Stickel, Scott, 1985, The effect of value line investment survey rank changes on common stock prices, *Journal of Financial Economics* 14, 121–143.

——— , 1995, The anatomy of the performance of buy and sell recommendations, *Financial Analysts Journal* 51, 25–39.

Womack, Kent L., 1996, Do brokerage analysts' recommendations have investment value?, *Journal of Finance* 51, 137–167.

Zhang, X. Frank, 2006, Information uncertainty and stock returns, *Journal of Finance* 61, 105–136.

Table 1: Recommendations' 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). "Added to buy" (left hand side of the table) as well as "Added to sell" revisions (right hand side of the table) appear lightly shaded. Data from January 1997 to June 2006.

Previous recommendation	Revised Recommendation: Strong Buy	Buy	Hold	Sell	Strong Sell
Strong Buy	-	680	454	**95**	**35**
Buy	**587**	-	868	**803**	**85**
Hold	**488**	**774**	-	**495**	**297**
Sell	**102**	**713**	456	-	**142**
Strong Sell	**33**	**96**	285	136	-

Added to Buy, Total	**2,793**	**Added to Sell, Total**	**1,952**

Table 2: Average Weekly Net Buy

The dependent variable in the underlying OLS regression is the weekly net buy (NB). The explanatory variables are indicator variables, one per each week-type of recommendation pair. Coefficient estimates correspond to mean weekly flows per buy or sell recommendation in event time, from 4 weeks prior to 4 weeks after the recorded recommendation date. Event week 1 includes the recommendation date. There are 32,432 observations in sample corresponding to 4,054 recommendations from which we have complete data during the period January 1997 to June 2006. Paired t-tests are computed on the difference between each event week and week -4. Standard errors are clustered on brokers. Note: T-statistics in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level.

		Event week (days)							
		-4 [-20 to -16]	**-3** [-15 to -11]	**-2** [-10 to -6]	**-1** [-5 to -1]	**1** [0 to 5]	**2** [6 to 10]	**3** [11 to 15]	**4** [16 to 20]
All	Added to Buy	0.1	0.8	2.3	5.7	6.4	3.3	3.7	2.7
		(0.08)	(0.69)	(2.13)**	(4.58)***	(4.26)***	(2.80)**	(4.59)***	(3.21)***
	Paired t-test	-	-0.61	-1.82**	-4.11***	-4.28***	-2.77***	-3.13***	-2.11**
	Added to Sell	1.8	-2.8	-1.7	-7.2	-3.0	-1.7	-0.2	-1.1
		(1.05)	(-1.69)*	(-1.72)*	(-4.15)***	(-2.02)**	(-1.43)	(-0.16)	(-0.78)
	Paired t-test	-	2.53***	2.17**	4.61***	2.76***	2.03**	1.06	1.54
Small companies, Q5	Added to Buy	-0.1	0.4	0.4	1.5	1.5	1.5	0.6	0.4
		(-0.71)	(1.72)*	(1.53)	(4.18)***	(4.78)***	(3.21)***	(2.29)**	(1.41)
	Added to Sell	-0.3	-0.4	-0.4	-0.6	-0.6	-0.2	-0.2	-0.3
		(-2.82)***	(-3.06)***	(-2.61)***	(-3.05)***	(-3.14)***	(-2.10)**	(-1.81)*	(-2.53)**
Big companies, Q1	Added to Buy	-0.2	1.8	5.5	15.9	16.7	8.6	10.8	7.5
		(-0.06)	(0.48)	(1.40)	(3.70)***	(3.09)***	(2.65)***	(3.42)***	(2.10)**
	Added to Sell	10.00	-1.57	-1.57	-21.90	0.30	-5.44	0.26	-1.98
		(1.54)	(-1.43)	(-0.36)	(-3.05)***	(0.06)	(-1.16)	(0.04)	(-0.38)

Table 3: Abnormal Profits and Returns around Recommendation Revision Dates: Timing and Characteristics

Panel A: The first row of the table shows the average cumulative abnormal profits, returns and net purchases in three different windows of the recommendation change date, (t-20; t+20), (t-10; t+10) and (t-5; t+5), for all positive recommendations in our sample (all firms and brokers). In the second section (Timing) those profits, returns and net purchases are split into pre- post- and recommendation date figures, using the recorded recommendation date as the dividing line. Finally in the third section of the table (Characteristics) recommendations are classified according to two different criteria: recommended firm size and recommended firm yearly SEK turnover. Each row in this section reports abnormal profits, abnormal returns and net purchases for the extreme 33% of the sample in each category on the three different windows of the recommendation change date. The classification is performed two months before the recommendation date. Panel B repeats the exercise for negative recommendation revisions.

A	Added to Buy Recommendations								
		Abnormal Profits			Abnormal Returns			Net Purchases (in millions)		
Category	Obs.	(t-20; t+20)	(t-10; t+10)	(t-5; t+5)	(t-20; t+20)	(t-10; t+10)	(t-5; t+5)	(t-20; t+20)	(t-10; t+10)	(t-5; t+5)
All Recommendations	2555	487,220	433,868	430,230	3.78%	3.44%	2.63%	24.1	17.9	12.5
Timing										
Pre-Recommendation Date (t-x; t-1)	2555	244,119	157,636	206,725	2.47%	2.14%	1.57%	8.6	7.8	5.4
Recommendation Date (t)	2555	53,851	53,851	53,851	0.35%	0.35%	0.35%	2.5	2.5	2.5
Post-Recommendation Date (t+1; t+x)	2555	189,251	222,381	169,655	0.88%	0.80%	0.67%	13.0	7.6	4.6
Characteristic										
Small Firms	848	102,268	109,075	135,938	6.63%	5.70%	4.38%	5.7	4.2	2.8
Large Firms	851	1,290,979	1,047,683	981,876	1.29%	1.65%	1.23%	56.1	42.0	29.5
Small Turnover	843	137,589	93,926	71,848	6.41%	5.77%	4.19%	5.0	3.9	2.6
Large Turnover	847	1,021,617	913,216	932,049	1.56%	1.88%	1.37%	56.7	41.8	29.3

B	Added to Sell Recommendations								
Category	**Obs.**	**Abnormal Profits**			**Abnormal Returns**			**Net Purchases (in millions)**		
		(t-20; t+20)	(t-10; t+10)	(t-5; t+5)	(t-20; t+20)	(t-10; t+10)	(t-5; t+5)	(t-20; t+20)	(t-10; t+10)	(t-5; t+5)
All Recommendations	1769	-221,607	-131,669	68,578	-1.91%	-2.17%	-2.14%	-15.4	-13.8	-9.6
Timing										
Pre-Recommendation Date (t-x; t-1)	1769	-219,098	-107,832	522	-1.26%	-1.33%	-1.44%	-9.7	-8.6	-6.9
Recommendation Date (t)	1769	11,659	11,659	11,659	-0.37%	-0.37%	-0.37%	-1.5	-1.5	-1.5
Post-Recommendation Date (t+1; t+x)	1769	-14,169	-35,496	56,396	-0.57%	-0.44%	-0.31%	-4.2	-3.7	-1.2
Characteristic										
Small Firms	586	-25,007	-4,872	36,721	-3.76%	-3.73%	-3.46%	-3.7	-2.7	-1.9
Large Firms	588	-492,477	-307,343	210,906	-1.22%	-1.32%	-1.49%	-31.9	-30.1	-20.9
Small Turnover	578	-71,117	-68,575	-12,305	-2.07%	-2.45%	-2.74%	-2.9	-2.3	-1.6
Large Turnover	587	-664,821	-400,267	111,841	-1.63%	-1.65%	-1.67%	-30.9	-29.6	-21.2

Table 4: Abnormal Returns for Buy and Sell Recommendation Portfolios

This table presents the abnormal daily returns estimated from two asset pricing models. The one-factor market-model (labeled "1F Alpha"), uses the value-weighted Swedish SIX index return as the market proxy. In addition, the four-factor conditional model (labeled "4F Alpha") include the level of the Swedish 30-day T-Bill, the default premium (measured by difference between a corporate and a government bond), and term premium (measured as the difference between the Government bond and 30-day T-Bill). The portfolios are weighted either equally, by market capitalization, or by cumulative net buying by the recommending broker. Panel A shows the results for buy recommendations. Each portfolio in the first part of this panel is invested at the end of the day the recommendation is issued, and the positions kept for 20, 10, and 5 days, excluding the return on the recommendation day. Portfolios in the second part of this panel are formed 20, 10, or 5 days prior to the release of the recommendation and include the return of the recommendation day. Panel B repeats the exercise for sell recommendations. The t-statistics reported in parenthesis are based on errors robust to heteroscedasticity and autocorrelation as described by Newey and West (1987). Note: *, **, and *** denote statistical significance at the 10%, 5%, and 1% level.

A Added to Buy Recommendations

	Equally Weighted Portfolios		Value Weighted Portfolios		NB Portfolio	
	1F Alpha	4F Alpha	1F Alpha	4F Alpha	1F Alpha	4F Alpha
(t+1; t+20)	0.066***	0.063***	0.038*	0.045***	0.037	0.030
	(3.89)	(3.75)	(1.71)	(2.74)	(1.29)	(1.01)
(t+1; t+10)	0.066***	0.064***	0.052*	0.053*	0.058	0.065*
	(3.97)	(3.82)	(1.98)	(2.01)	(1.57)	(1.76)
(t+1; t+5)	0.066***	0.064***	0.065*	0.065*	0.058	0.065*
	(3.84)	(3.71)	(2.00)	(1.96)	(1.60)	(1.79)
(t-20; t)	0.116***	0.112***	0.071***	0.066***	0.084**	0.083**
	(5.03)	(4.79)	(3.28)	(3.10)	(2.37)	(2.31)
(t-10; t)	0.210***	0.209***	0.146***	0.143***	0.101**	0.098**
	(7.80)	(7.78)	(4.78)	(4.69)	(2.46)	(2.39)
(t-5; t)	0.284***	0.282***	0.254***	0.249***	0.093*	0.101**
	(8.14)	(8.09)	(6.95)	(6.80)	(2.01)	(2.23)

B Added to Sell Recommendations

	Equally Weighted Portfolios		Value Weighted Portfolios		NB Portfolio	
	1F Alpha	4F Alpha	1F Alpha	4F Alpha	1F Alpha	4F Alpha
(t+1; t+20)	-0.027	-0.003	-0.001	-0.003	-0.017	-0.012
	(-1.07)	(-1.02)	(-0.04)	(-0.13)	(-0.42)	(-0.30)
(t+1; t+10)	-0.027	-0.026	-0.010	-0.008	-0.046	0.049
	(-1.05)	(-1.00)	(-0.30)	(-0.24)	(-1.35)	(-1.38)
(t+1; t+5)	-0.028	-0.028	-0.038	-0.043	-0.046	-0.049
	(-1.09)	(-1.04)	(-1.07)	(-1.20)	(-1.34)	(-1.36)
(t-20; t)	-0.085***	-0.083***	-0.071**	-0.067**	-0.058	-0.041
	(-3.03)	(-2.85)	(-2.49)	(-2.40)	(-1.35)	(-0.97)
(t-10; t)	-0.214***	-0.209***	-0.173***	-0.171***	0.022	0.027
	(-4.91)	(-4.82)	(-3.89)	(-3.85)	(0.37)	(0.36)
(t-5; t)	-0.370***	-0.365***	-0.321***	-0.320***	-0.013	0.001
	(-7.03)	(-6.96)	(-5.89)	(-5.87)	(-0.19)	(0.39)

Table 5: Daily Recommending Brokers' Portfolio Profits

The first row of panel A shows recommending brokers daily profits around positive recommendation revision dates measured over three different windows of the recommendation date: (t-20; t+20), (t-10; t+10) and (t-5; t+5). Those profits are further decomposed in rows 2 to 4 into pre-recommendation date, recommendation date and post recommendation date profits by selecting only the transactions executed by the recommending broker before, during, or after the recorded recommendation date. Panel B repeats the exercise for negative recommendations. The t-statistics reported in parenthesis are based on errors robust to heteroscedasticity and autocorrelation as described by Newey and West (1987). Note: *, **, and *** denote statistical significance at the 10%, 5%, and 1% level.

A		**Added to Buy Recommendations**		
		(t-5; t+5)	(t-10; t+10)	(t-20; t+20)
Total Profits	Daily	458,349 (2.592)***	467,578 (2.144)**	515,727 (1.782)*
	Annualized	114,587,125	116,894,575	128,931,750
Pre-Recommendation Profits	Daily	216,874 (2.193)**	170,218 (1.079)	249,477 (1.062)
(t-x; t-1)	Annualized	54,218,550	42,554,600	62,369,350
Recommendation Date Profits	Daily	57,893 (1.668)*	57,893 (1.668)*	57,893 (1.668)*
(t)	Annualized	14,473,245	14,473,245	14,473,245
Post-Recommendation Profits	Daily	184,563 (1.729)*	239,370 (2.064)**	208,874 (1.589)
(t+1; t+x)	Annualized	46,140,625	59,842,400	52,218,600

B		Added to Sell Recommendations		
		(t-5; t+5)	(t-10; t+10)	(t-20; t+20)
Total Profits	Daily	52,428 (0.403)	-97,141 (-0.416)	-149,168 (-0.410)
	Annualized	13,107,105	-24,285,200	-37,291,925
Pre-Recommendation Profits (t-x; t-1)	Daily	-1,516 (-0.013)	-84,637 (-0.458)	-148,574 (-0.468)
	Annualized	-378,960	-21,159,143	-37,143,475
Recommendation Date Profits (t)	Daily	11,877 (0327)	11,877 (0327)	11,877 (0327)
	Annualized	2,969,303	2,969,303	2,969,303
Post-Recommendation Profits (t+1; t+x)	Daily	42,006 (0.777)	-24,093 (-0.326)	-12,097 (-0.124)
	Annualized	10,501,575	-6,023,325	-3,024,250

Table 6: Daily Portfolio Profits and Stock Liquidity

Recommendations are classified according to two different criteria: recommended firm size and recommended firm yearly SEK turnover. Each row reports abnormal profits for the extreme 33% of the sample in each category on three different windows of the recommendation change date: (t-20; t+20), (t-10; t+10) and (t-5; t+5). The classification is performed two months before the recommendation date. Panel A shows results for positive recommendations whereas Panel B does the same with negative ones. The t-statistics reported in parenthesis are based on errors robust to heteroscedasticity and autocorrelation as described by Newey and West (1987). Note: *, **, and *** denote statistical significance at the 10%, 5%, and 1% level.

A Added to Buy Recommendations				
Category	**Obs.**	**Daily Abnormal Profits**		
		(t-20; t+20)	(t-10; t+10)	(t-5; t+5)
Small Firms	848	35,781	39,150	49,352
		(0.634)	(0.642)	(1.302)
Large Firms	851	463,309	378,871	352,181
		(1.772)*	(2.060)**	(2.380)**
Dif		(1.605)	(-1.828)*	(2.085)**
Smaller Turnover	843	46,810	33,713	26,620
		(0.987)	(0.956)	(1.003)
Large Turnover	847	373,562	333,231	340,599
		(1.426)	(1.799)*	(2.292)**
Dif		(1.233)	(1.591)	(2.136)**
B Added to Sell Recommendations				
		(t-20; t+20)	(t-10; t+10)	(t-5; t+5)
Small Firms	586	-3,254	243	10,610
		(-0.114)	(0.010)	(0.840)
Large Firms	588	-109,774	-76,078	55,245
		(-0.299)	(-0.321)	(0.426)
Dif		(-0.216)	(-0.241)	(0.410)
Smaller Turnover	578	-14,966	-15,584	-1,519
		(-0.544)	(-0.674)	(-0.139)
Large Turnover	587	-154,427	-103,071	32,222
		(-0.412)	(-0.417)	(0.229)
Dif		(-0.375)	(-0.402)	(0.223)

Table 7: Broker Coverage and Abnormal Profits

For each stock and time brokers are divided into three groups, brokers covering or issuing recommendations on the stock, brokers not issuing recommendations in the stock but with coverage of other stocks, and brokers that do not cover stocks (this last group includes some regular brokers without (local) research departments, online brokers and Neonet). The first row of the table shows each of these groups of brokers aggregated (across stocks) daily abnormal profits along the sample period. The t-statistics reported in parenthesis are based on errors robust to heteroscedasticity and autocorrelation as described by Newey and West (1987). Note: *, **, and *** denote statistical significance at the 10%, 5%, and 1% level.

		Recommending Brokers: Covered Stocks	Recommending Brokers: Non-covered Stocks	Brokers Not Issuing Recommendations
	Daily	1,410,466 (0.301)	-64,205 (-0.006)	-1,346,261 (-0.160)
Total Profits	Annualized	352,616,415	-16,051,132	-336,565,283
	Full Sample (9.5 year period)	3,557,194,395	-161,923,822	-3,395,270,572

Figure 1: Abnormal Returns and Profits: Tips and Reporting Delays
If the recommendation is officially released, or reported to be released, on day $t = 0$, but some investors gain access to it with some anticipation, on day $t = t*$, measured returns will underestimate actual returns obtained by those who first traded in the recommendation. This problem could in principle be solved by choosing a wide enough pre-recommendation window, and computing either abnormal profits or returns in that window.

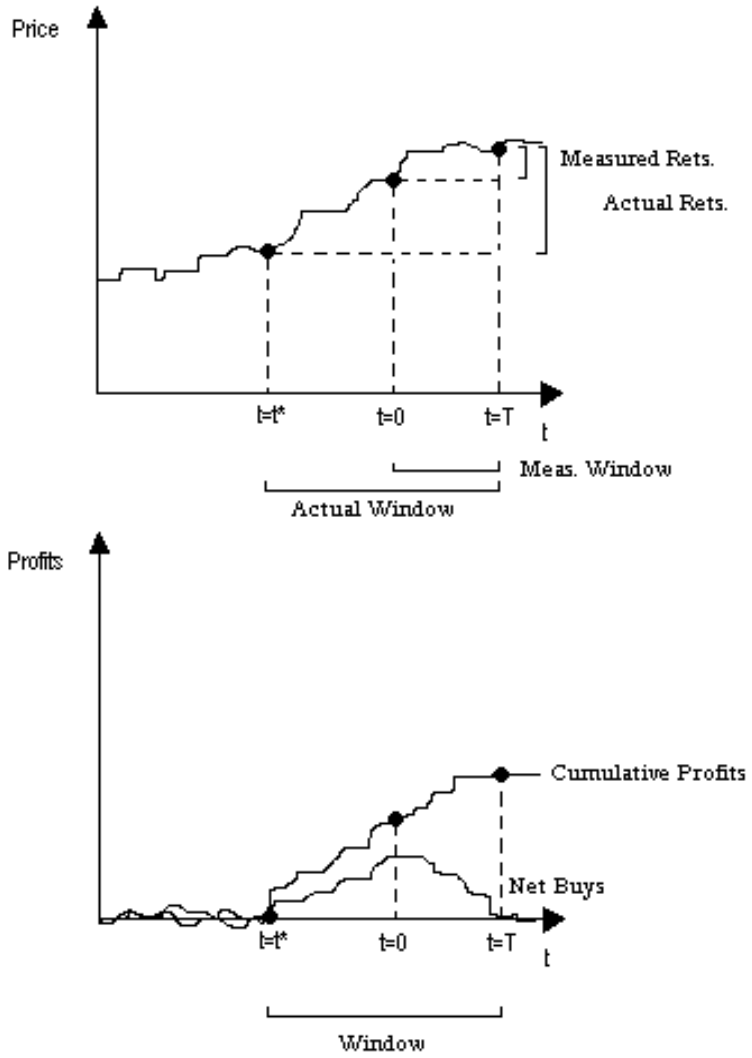

Figure 2: Abnormal Returns and Profits: Public News

If the recommendation is officially released on day $t = t* = 0$, also the first day broker clients gain access to it, but its release follows some public announcement, at time $t = -x$ (this public information observable to market participants but not to the researcher); then using a wide pre-recommendation window will result in measured abnormal returns overestimating actual abnormal returns. A wide pre-recommendation window, on the other hand will not affect abnormal profits. This is because net trades and therefore net profits, absent any broker specific information, should be statistically indistinguishable from zero if the information that prompts trades is homogeneously shared by all market participants, as is the case with public information (as opposed to broker-specific recommendations).

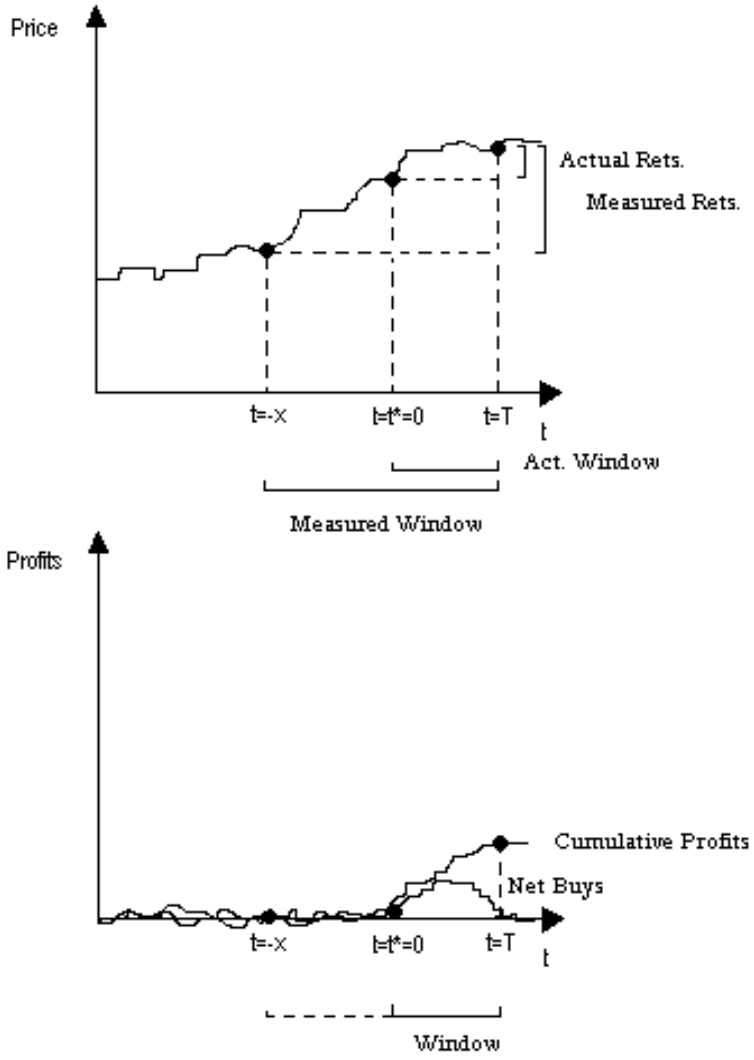

Figure 3: Yearly Value of Shares Traded on the Stockholm Stock Exchange

The value of shares traded is measured as the product of prices and quantities of all purchased, sold and internally traded (bought and sold) stocks during the period, divided by two. The dark grey area depicts the aggregated SEK volume of the 10 largest brokers in 1997. The sum of the dark and light grey areas depicts the aggregated SEK volume of the 10 largest brokers every year. The white area shows the SEK volume of all other members of the exchange. During the sample period the Swedish Krona fluctuated between 7.8 to 11 SEK per USD.

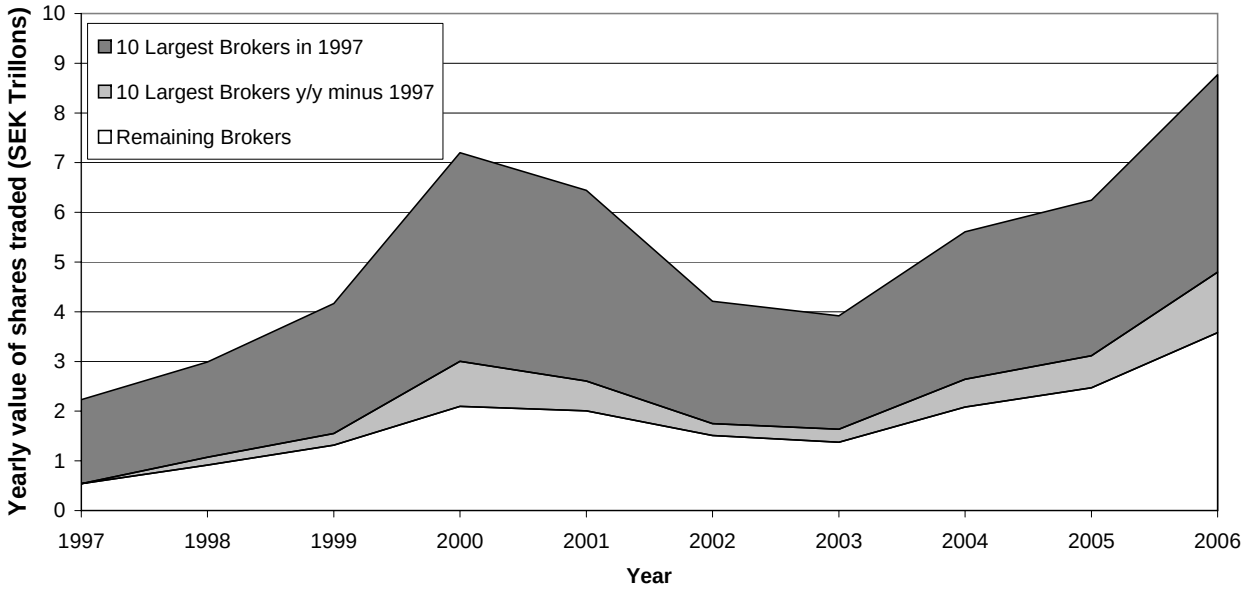

Figure 4: Distribution of Recommendation Revisions per Year

Figure 4 shows the number of positive and negative recommendation revisions (Added to Buy and Sell respectively) made each year during the sample period. It also depicts the evolution of the Affarsvarlden total return market index during the same period (right scale, base 1997=100).

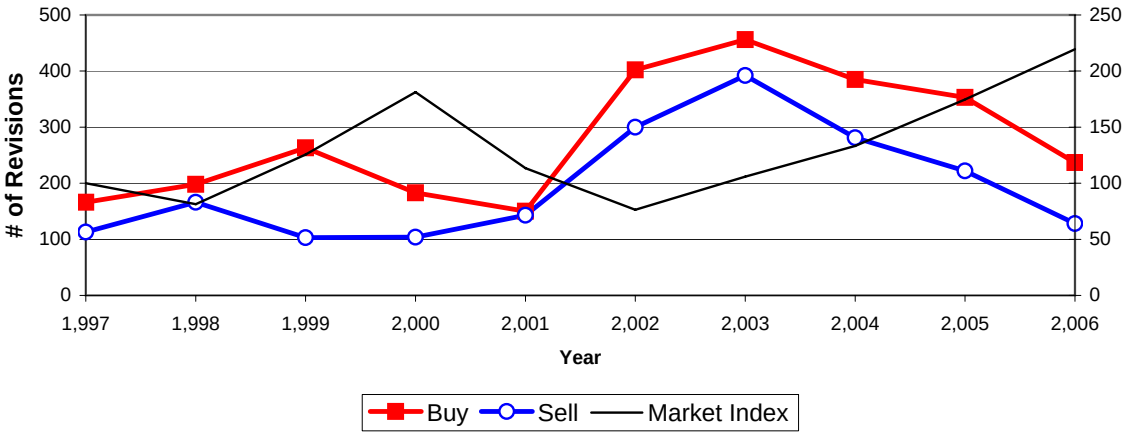

Figure 5: Cumulative Net Buy Around Recommendation Revision dates

The table shows brokers' cumulative net buying around own recommendation revision dates. Net buying is accumulated in event time for both "Added to Buy" and "Added to Sell" recommendations. Figure A shows brokers' cumulative net buy as a percentage of cumulative daily aggregate traded value for each stock. The full sample average and the average net buying of the ten largest brokers are presented separately. Figure B displays the cumulative net buy in million Swedish Krones, averaged over recommendations, for three different firm size quintiles, and classified according to the type of recommendation revision ("Added to Buy" and "Added to Sell"). Q1 denotes the largest firm-size quintile whereas Q5 corresponds to the smallest recommended firms. There are 2,793 "Added to Buy" and 1,952 "Added to Sell" revisions in the sample.

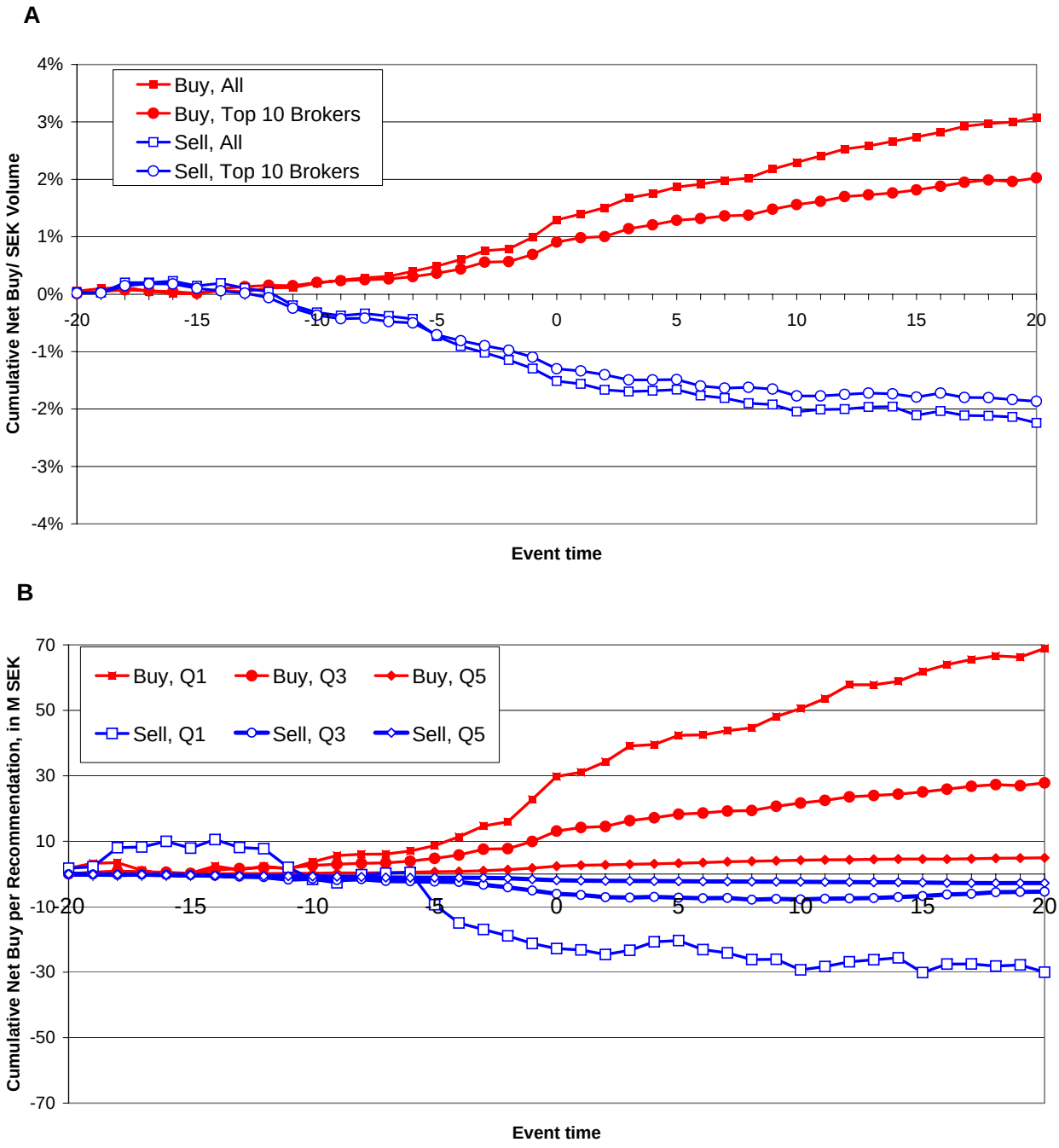

Figure 6: Abnormal Returns around Recommendation Revision Dates

This figure shows buy and hold abnormal returns from 20 days before the broker releases a "buy" or "strong buy" ("sell" or "strong sell") recommendation that positively (negatively) revises an existing recommendation and extending for as long as 20 days after that recommendation. Each point in the graph represents the abnormal return of investing in the recommended stock on day -20 and closing the position on the day of the observation. The reported figures are averages of 2555 observations for added to buy recommendations and 1769 observations for added to sell ones. Buy and hold abnormal returns are measured as the difference between raw buy and hold returns and the market return over the corresponding period.

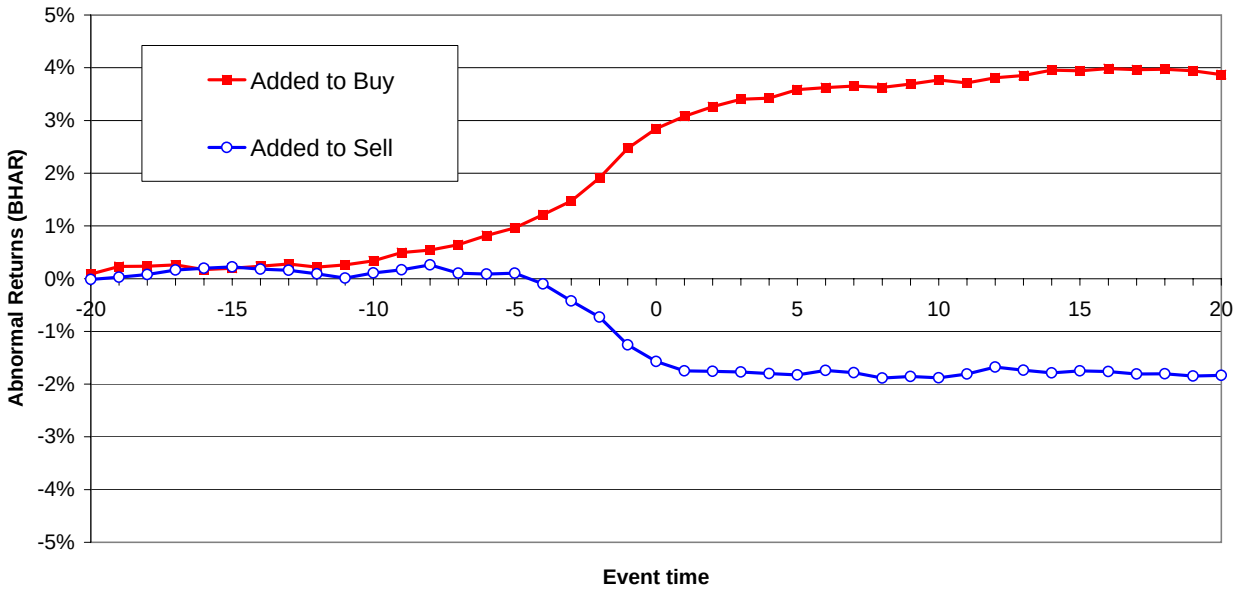

Figure 7: Brokers Abnormal Profits around Recommendation Revision Dates

This figure shows cumulative abnormal profits for transactions starting 20 days before the broker releases a "buy" or "strong buy" ("sell" or "strong sell") recommendation that positively (negatively) revises an existing recommendation and extending for as long as 20 days after that recommendation. Each point in the graph is computed as the average, across recommendations, of the cumulative abnormal profits obtained on transactions executed up until the day of the observation, using as reference prices in the profits computation those prevailing 20 trading days after the recommendation release. The reported figures are averages of 2555 observations for added to buy changes and 1769 observations for added to sell ones. Abnormal profits are measured as the difference between raw profits and the profits that investors could have obtained by investing a similar amount in the market index.