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 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/advice contained in recommendations. Interestingly, 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. Our results also indicate that brokerage clients do not profit from negative recommendations.

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 that advice.[1]

Documented abnormal returns to recommendations, or recommendation based strategies, may in fact be a poor indicator of the actual profits obtained by investors. If investors are not able to react in a timely manner, as it is frequently assumed, or if bid-ask spreads, the price impact of trading, or other market frictions, impede or hamper their ability to take advantage of recommendations, those documented abnormal returns may well fail to materialize into actual profits. The same may happen if recommendations coincide with, or are closely followed by, public announcements. Here again, recommendations' value may prove limited, even if measured returns are significant.[2] At the same time, it is also possible that investors may be able to do better than what simple mechanical rules suggest. Recommendations typically contain more information than what standardized categories, such as Buy, Hold or Sell, are able to convey, and that extra information could presumably be exploited by investors in their trading strategies.

These arguments not only suggest that the leap from potential profits to actual ones is not straightforward, but also that assessing the investment value of stock recommendations abstracting from the use investors make of them may not be the best alternative. Actual profits, may indeed offer a better measure of recommendations' value. In this paper

[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.

[2] In this case the information advantage recommendations confer may be narrow, or vanish quickly. In fact, in the extreme scenario in which the information contained in recommendations becomes publicly available immediately prices will jump without anybody being able to trade on them. Abnormal returns will be positive, but the benefit of receiving the recommendations will be none.

we take advantage of a large and comprehensive dataset 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, at each point in time, we devise a measure, recommending brokers' aggregate abnormal trading 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*.[3]

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.[4] We follow two different approaches in computing these abnormal profits. In the first, we work in event time tracking brokers' net trades in a window centered on the recommendation date and computing abnormal profits as the product of the daily net position and the abnormal return of the recommended stock going forward until a month after the recommendation date. By choosing a wide enough recommendation window we can be sure we 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. At the same time we are spared of the problem of overestimating the real benefits of recommendations since even if (some) recommendations are issued after public events, or if analysts recommend

[3]These problems can be particularly severe indeed. 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, often 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 were there is not much room for trading. Noisy dating of clients' access to recommendations, on the other hand, originates in the existence 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)), and can lead to severe underestimation of recommendations' profitability by failing to account for part of the benefits that investors that receive these recommendations are able to obtain (those that occur before the recorded recommendation date).

[4]If there were considerable re-distribution of trading profits within brokers, there would be little value-added to brokers' total customer base. We have however strong reasons to think this is a minor problem. The market share of any broker in sample is relatively small. It is therefore unlikely that the uninformed investors trading against the broker's information would be customers at the very same brokerage firm.

stocks that have recently appreciated, brokers' net positions, before recommendations reach their users, are expected to be zero; and so are profits. In a second approach we also follow the investment performance of recommending brokers' actual net trades in calendar time. Every time a broker is reported adding a firm to his or her buy (sell) list, net trades carried out by this broker in an x-day window of the recommendation release date are added to a purpose built portfolio, and eventually liquidated one month after the recommendation date. 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 which can be thought of as a payment for that investment advice. These 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.[5] Interestingly, approximately half of these profits are associated with transactions that take place before the recorded 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 recommen-

[5]But the benefits they obtain seem small: annualized profits of SEK 125 million dwarf when compared to the roughly SEK one trillion managed by the mutual fund industry in Sweden during the same period (one third of that amount invested in Swedish equity).

dations signals that brokers' customers do try to take advantage of them. The reason lies elsewhere, most likely in that these recommendations are not informative, or arrive too late.

Our paper contributes to the existing literature in at least three dimensions. First, it proposes a new way of estimating the value of security research by applying trading 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, it explores 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. Lastly, it provides 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 also with alternative stories. Importantly, it points to the fact that ignoring the pre-recommendation window can result in severe underestimation of recommendations' profitability.

The rest of the paper is organized as follows. Section 2 provides a description of the data. Section 3 explores the severity of two of the problems this study focuses in, namely investability and noisy dating of actual access to recommendations. Section 4 formally discusses our methodology to evaluate recommendations' profitability, and presents the corresponding results. Section 5 analyzes abnormal returns associated to brokers' net trades around recommendation revision dates. Section 6 summarizes the main findings and concludes.

2 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

end of 2006 it had 791 listed companies, of which 417 were listed on the Stockholm section of the exchange (SSE).[6] 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.

2.1 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 1 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 SEK value of shares traded was 8.8 Trillion, or USD 1.3 Trillion, approximately one third of the dollar volume traded in NASDAQ that same year.[7]

Competition among brokers is stiff and has increased during the later years, as can be inferred from the declining market concentration shown in Figure 1. The dark grey area of that figure 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

[6]The OMX Nordic exchange is only surpassed in size by the London Stock Exchange, Euronext, Deutsche Börse, BME Spain, and the Swiss Exchange.

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

the exchange, of which the top 10 accounted for 73% of the total value of share trading.[8] 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 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 only four of the top 10 brokers in 2006 were Swedish, down from nine at the beginning of the sample: SEB, Carnegie, Swedbank, and Handelsbanken.[9]

2.2 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 rec-

[8]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.

[9]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.

ommendation 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 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, to the point that there seems to be no significant correlation between the number and type of revisions and the general market conditions (see Figure 2). 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 (including all the major players). 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).[10] 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.

Researchers are usually careful about excluding recommendation changes issued in

[10]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).

the proximity of company earnings announcement dates. In addition to that, it is also common to eliminate observations with current share prices lower than a certain threshold (less than U$S 5 or U$S 2) to avoid penny stocks since extreme outliers are usually concentrated among them. Since our approach explicitly takes into account these problems so no further action is taken at this point.

2.3 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 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).

3 Broker Trading around Recommendation Dates: Dating and Depth

In this section we explore broker trading around recommendation revision dates. The purpose of this analysis is, first and foremost, to establish whether there is statistical evidence of significant abnormal broker activity associated to the release of recommenda-

tions. And second, to document the timing and cross sectional variation of recommendation related trading, in as much as it relates to the two problems we emphasize, dating and investability.

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, 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.[11] It is easy to see that if the conditioning information is irrelevant, (3) reduces to (2), and we should observe zero net buying.

Like in other event studies, there is an inherent caveat in determining the length of the event window in which a broker has information that is used in trading, i.e. δ. In addition to that the noisy dating of recommendations implies that τ itself can only be known

[11]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.

approximately. But since equation (2) holds for all t, the expected value of equation (3) is by construction also zero when there is no broker specific information, that is when $t \notin [\tau; \tau + \delta]$, and therefore we can basically rely on the data to tell us when abnormal activity, and the recommendation that motivates it, starts and ends. Figure 3A builds on, and illustrates, this idea. It displays the sample average of cumulative net buying in event time, 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 the sample. The most interesting aspect of Figure 3 is that it makes evident 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 3B, which conveys a similar idea, also illustrates the vast dispersion in net buying between large and small companies. This figure shows average abnormal trading per recommended stock, broken up on firm size. 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,

$$NB_{i,b,\tau,w} = \sum_{w=-4}^{4} \alpha_w^B D_w^B + \alpha_w^S D_w^S + e_{i,b,\tau,w}, \tag{4}$$

where we have aggregated net purchases over trading weeks, w, and 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 a buy one (sell one), 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.[12]

All in all, our findings so far reveal that recommending brokers execute an abnormally high number of transactions in the direction of the recommendation, even prior to the recommendation release. This indicates that some individuals are informed about the

[12]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. The amounts involved are, in any case, 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.

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 Recommendation Profitability: Methodology and Results

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 negative side they are very sensitive to the dating and investability problems that frequently affect recommendations. 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. Unfortunately, the estimate this measure offers is likely biased, and the direction of the bias unknown. This is because choosing a conservative window when computing returns, i.e. assuming recommendations become available to their users the day they appear in most databases, is likely to miss part of the profits obtained by investors who benefit from early tips and leakages, therefore underestimating their gains. On the other hand, trying to avoid the above mentioned problem by choosing a wide pre-recommendation window will likely result in this measure overestimating the real benefits of recommendations.[13] This overestimation can be especially severe if recommendations are issued after public events, or if analysts recommend stocks that have recently appreciated (because it will inappropri-

[13]The widespread nature of this practice (see Womack (1996); Mikhail, Walther, and Willis (2004); Sorescu and Subrahmanyam (2006); Martinez (2007)) is indeed indicative of the level of agreement in the profession regarding information leakages/misdating of recommendations.

ately attribute pre-recommendation abnormal returns to the recommendation).[14]

An additional disadvantage of using abnormal returns to assess recommendations' profitability is that much of the returns thus identified may not be attainable by investors. This problem can be particularly severe for small, illiquid stocks, precisely those stocks where the measured ability of analysts to detect mispricings, if we trust abnormal returns-based studies, seems to be the largest.

Both these problems suggest that using abnormal returns, either in their event time or calendar time flavors, as a measure of recommendation profitability can be very misleading.[15] To overcome the shortcomings that affect them we propose in this study an alternative measure of recommendation performance: broker-specific abnormal profits. 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:

$$\Pi_{b,i,t} = \left[B_{b,i,t} \cdot AR^{B}_{b,i,t} - S_{b,i,t} \cdot AR^{S}_{b,i,t} \right], \tag{5}$$

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, $AR^{B}_{b,i,t}$ is a broker-specific abnormal return for purchases and $AR^{S}_{b,i,t}$ is a broker-specific abnormal return for sells. Profits are therefore calculated in excess of what could have been obtained by investing in the pre-defined benchmark.

An expression, 5, that if the average transaction price for sells equals the average trans-

[14]There is indeed evidence that recommendations tend to chase past returns (Altinkiliç and Hansen (2007)), and that they are frequently revised on the earnings announcement date and on days closely following that date (Ivkovic and Jegadeesh (2004)).

[15]Abnormal returns may not be very suitable for cross broker/analyst comparisons either. If there is heterogeneity among brokers regarding the policies or procedures they follow when releasing recommendations, or regarding the type of stocks they cover, using abnormal returns measured during a fixed recommendation window may make some brokers look better than others even when there is no real difference among them.

action price for purchases, or with transaction level data, conveniently reduces to:

$$\Pi_{b,i,t} = NB_{b,i,t} \cdot AR_{b,i,t}, \tag{6}$$

Abnormal profits exploit the fact that, at any given time, brokers' expected net purchases on any stock are zero. In expectation then it is easy to measure the wave of net purchases (positive or negative depending on the recommendations) triggered by recommendations, and once multiplied by the appropriate stock prices, the net profits attributable to them. Recommendation-motivated net purchases and profits are both superimposed on a zero mean random stream of noisy trade which cancels out in expectation. [16] 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 washing 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 precisely because absent any broker-wide signal (and unconditionally in general) expected net purchases are zero, and therefore profits too. This means that even if prices are increasing before the recommendation is released (as would happen if analysts recommend stocks that have recently appreciated) and that run-up is included in the pre-recommendation window, measured profits will still not be positive if the recommenda-

[16] 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.

tion signal did not reach its users and nobody is taking advantage of it. By choosing a wide enough recommendation window then we can be sure we avoid the problem of underestimating recommendation profits that results from missing part of the profits obtained by investors that benefit from early tips and leakages (see Figure 4). And at the same time we are spared of the problem of overestimating the real benefits of recommendations (see Figure 5). Only in the presence of broker-specific information that we can condition on expected net positions will diverge from zero. Moreover, only when that broker-specific signal is truly informative conferring broker clients a real advantage in the market, those positions will be profitable.

Not less important for the suitability of this measure is the fact 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.[17]

4.1 Event Time Analysis

We implement this methodology both in event time and calendar time. In event time we compute Broker Abnormal Profits (BAPs) for each recommendation as follows:

$$BAP_{b,i,\tau} = \sum_{t=\tau-x}^{\tau+x} \left[B_{b,i,t} \cdot AR^{B}_{b,i,t:T} - S_{b,i,t} \cdot AR^{S}_{b,i,t:T} \right], \tag{7}$$

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

[17] 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. In this scenario finding that broker trades surrounding recommendation revisions are profitable, and in line with those revisions, would still be strong and unambiguous evidence that analysts possess some meaningful, and exploitable, stock picking ability. At the same time finding the opposite would be indicative of either analysts having no stock picking ability, or of clients not following or not channeling their trades through the recommending broker (both of these last two alternatives against what is normally believed to be the case).

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, some post-event day in which the profitability of the position is measured.[18] [19]

Equation (7) is the exact event time analogous of equation (5) 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.[20]

We report the results of using these two measures of recommendation performance,

[18] To be precise: $AR^B_{b,i,t:T} = \frac{P_{i,T} - P^B_{b,i,t}}{P^B_{b,i,t}} - \frac{P^M_T - P^M_t}{P^M_t}$, where $P^B_{b,i,t}$ is the broker-specific adjusted price of firm i paid by broker b for purchases and P^M is the adjusted price of the benchmark. And similarly for sales.

[19] 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 obtained 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.

[20] 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.

abnormal profits and returns, in Table 3 and Figures 6 and 7. As most of the 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 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).[21]

A conservative estimate of recommendations' performance would clearly ignore pre-event returns, but given the evidence presented in section 3 of brokers building positions consistent with their recommendations several days before the recommendation release, 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. Unfortunately 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. In fact if analysts where simply to piggyback on public information, recommending stocks with favorable news which price has just increased, we would observe the same price run up previous to recommendations. If on top of that recommendations are noisily dated, with some of them recorded several days after their release, we would also observe average abnormal net buys in the pre-event window. And yet nobody would be in possession of superior information or executing profitable trades.

In this sense Table 3 and Figure 7 go a step further. By documenting the existence of broker-specific abnormal profits on days immediately preceding and following positive

[21]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 $T = \tau + 20$.

recommendation announcements they reveal that broker clients possess an informational advantage at that point, and that they make use of it. 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.[22]

Table 3 also speaks, although indirectly, about the other big problem that usually plagues abnormal 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 increase more following upgrades, and decline more following downgrades, 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 fundamentally there is usually not much room to trade in them, as revealed by the meager cumulative net purchases (sales) at the end of the recommendation window.

4.2 Calendar Time Analysis

In order to assess the statistical significance of the findings of the previous subsection we now explore brokers' abnormal profits in calendar time. For this purpose we build two portfolios, an added to buy portfolio and an added to sell portfolio, based on both analysts' recommendation revisions and brokers' actual daily trades around those rec-

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

ommendation revision dates. 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 on an x-day window of the recommendation change are added to the "added to buy" portfolio on the date they were actually executed. As before, 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. The rational for this is, again, that we intend to capture pre-recommendation leaks while at the same time be shielded from overestimating profits by considering investments only if the broker, seen as a unit or as a collection of clients, actually invested in the stock (or shorted it).

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 T 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.[23] 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.

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

$$AP_{b,i,t} = CNB_{b,i,t-1} \cdot AR_{i,t-1} + \lambda_{b,i,t}, \tag{8}$$

with

[23]Here again we work with $T = 20$. 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 days after the recommendation is released, thus facilitating comparisons between different windows. A relatively distant window also helps avoid the effect of price pressure in our measures.

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

where $CNB_{b,i,t-1}$ is broker b's net position in stock i at the end of the previous 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).[24]

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. Its 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 into account the time value of money 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.[25]

[24] 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 (8) 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.

[25] An interesting feature of abnormal profits, especially when compared to calendar time abnormal re-

We report daily and annualized abnormal profits calculated using this procedure in Table 4. Three results are evident from this table. First, broker trades around positive recommendation revision dates are profitable, and significantly so. This result shows that, at least gross of trading fees, investors *actually* profit from analysts' recommendations.[26] Daily abnormal profits are estimated to be between SEK 458,349 and SEK 515,727 depending on the window used for measurement (that is between 114 and 128 million SEK once annualized). 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.

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.

Finally, from the results on negative recommendations in panel B we deduct that nega-

turns, is their robustness to biases related to the bid-ask bounce. 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 (or alphas) would overstate the profitability of the positions (this problem is typically severe with equal weighting of daily returns). That would not be the case for profits. For a more detailed discussion see Blume and Stambaugh (1983) and Canina, Michaely, Thaler, and Womack (1998).

[26]Without trading data the most that can be inferred is that if investors had purchased (sold) recommended stocks at recorded prices they would have obtained some abnormal return, independently of whether anybody actually managed to do that or not.

tive revisions either do not contain any valuable information or for some reason investors fail to capitalize on them. This result 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. Average post-event returns go from -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)).

We close this section with a word on risk adjustment. So far we have assumed that the risk of the average recommended stock is similar to the risk of the average stock in the market, $\beta = 1$, this seems to be a reasonable assumption. Analysts cover most of the market and constantly issue positive and negative recommendations on most of the stocks. We also know from previous studies that multifactor models typically do not add much to this picture; size and book to market usually have no impact on recommendation-based strategies' alphas, and neither do other variables that proxy for the state of the economy (this is perhaps because recommendations are more about timing covered firms than about choosing some firms for the long run). And momentum, a factor (or benchmark) that typically has a non-negligible impact on recommendations' adjusted returns, although present in most markets, is nowhere to be found in Sweden where past winners perform as well as past losers (see Rowenhorst (1998) and Griffin, Ji, and Martin (2003)).

4.3 A Calendar Time Extension: Analyst Coverage

Financial analysts not only issue stock recommendations (although recommendations are likely analysts' more relevant output) 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 that were 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, defined as the period going from two months before the first recommendation on the stock until a whole year after the last one.

Table 6 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 that number in 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 Portfolio Returns

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 deploy 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,

$$R_{H,t} = \sum_{i}^{I} w_{i,t-1}^{H} R_{i,t}, \qquad w_{i,t-1}^{H} = [w_{i,t-1}^{I}, w_{i,t-1}^{MC}, w_{i,t-1}^{CNB}], \tag{9}$$

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

$$w_{i,t-1}^{H} = \begin{cases} w_{i,t-1}^{I} & = & \frac{1}{I_{t-1}} \\ w_{i,t-1}^{MC} & = & \frac{MC_{i,t-1}}{\sum_{i}^{I} MC_{i,t-1}} \\ w_{i,t-1}^{CNB} & = & \frac{\sum_{b}^{B} CNB_{b,i,t-1}}{\sum_{i}^{I}\sum_{b}^{B} |CNB_{b,i,t-1}|} \end{cases} . \tag{10}$$

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.[27] By normalizing by the summation of the absolute value of cumulative net purchases, we effectively proceed as if we were treating negative positions as a positive investment on a security that delivers the opposite return stream as the one in which the position is originally taken. We find this procedure sensible. Since our objective is to risk adjust these figures later on, this allows us to measure brokers'

[27]This recursion is almost identical to the one used in the calendar profits approach, the only difference is that there we used transaction prices instead of closing prices and therefore we were forced to introduce an intraday adjustment.

customers average returns independently of whether their positions are positive or negative.[28]

We expect the equally weighted trading scheme to be the most profitable of the three, since as it has already been argued 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 they may not do so in the best possible way, and particularly they may not 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 perfectly 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 to condition on future information. They will also be contaminated by any public 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 is not just implementable but actually implemented by broker clients. And net buying is still expected to behave like a zero mean random variable in the absence of information.[29]

[28]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.

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

5.1 Portfolio Performance: Measurement

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

$$R^E_{H,t} = a^{1F}_H + b_M R^E_{M,t} + e_{H,t} \tag{11}$$

and a conditional model,

$$R^E_{H,t} = a^{4F}_H + b_M R^E_{M,t} + \sum_{k=1}^{K} b_k z_{k,t-1} R^E_{M,t} + e_{H,t}, \tag{12}$$

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.[30] We refer to this four factor model as the conditional model. Our market benchmark is the value-weighted Swedish SIX index return.

5.2 Portfolio Performance: Results

Panel A of Table 7 presents the results for portfolios formed based on 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

[30]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.

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 therefore its performance offers a realistic measure of investors' abnormal returns around recommendation revision dates. Results for these strategies are displayed in the second section of Panel A (Table 7). 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 sell recommendations. The first section of panel B in Table 7 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 port-

folios 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 these results support the idea that while positive recommendation revisions are a valuable source of investment information the same can not be said of 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, 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 do not embody any new information and simply transcribe publicly available information.

6 Summary and Conclusions

The last 15 years have witnessed a surge in academic research on stock recommendations. These studies, for the most part, have tended to show 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 is partly because, many times, these results seem to be driven by small, illiquid stocks in which there may not be much room for investment. But also because researchers, fac-

ing poorly dated recommendations, are frequently forced to make strong assumptions regarding the time clients gain access to them.

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 infer more precisely when and to what extent recommendations 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. Our most important findings are as follows:

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

2. 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 actually benefit from the information contained in recommendations.[31] This is not the case however for negative recommendation changes, a result that contradicts the findings of most of the previous studies.

3. 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 also with alternative stories (post-dating of recommendations).

[31]These profits are gross of brokerage commissions but net of other trading costs. This seems to be the right metric if the objective is to assess the investment value of recommendations, independently of who (brokers or clients) appropriates that value. Brokerage commissions are, after all, mostly a payment for having access to recommendations.

4. 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 dissipate if we omit the pre-recommendation window). But including it without due care, especially when using abnormal returns as the profitability metric, is also dangerous. In this sense, an examination of the abnormal returns obtained by portfolios that replicate broker customers' aggregate investments around recommendation revision dates is especially revealing. These portfolios exhibit similar performance to those of static value-weighted portfolio strategies in the post-recommendation period, but their performance in the pre-recommendation window is only about half that of value-weighted portfolios.

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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 Purchases

Each coefficient in this table shows the mean weekly net purchases executed by the recommending broker on the recommended stock, expressed in millions of Swedish Kronor. These average net purchases are displayed for buy and sell recommendation in event time, from 4 weeks prior to 4 weeks after the recorded recommendation date. Event week 1 includes the recommendation date. Coefficient estimates and standard errors are obtained from an OLS regression of weekly net purchases (NB) on indicator variables; one per each week-type of recommendation pair. There are 32,432 observations in the 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								
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	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: 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. T-statistics (in parenthesis) are computed taking advantage of the time series properties of calendar profits using the Newey-West methodology. 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 5: 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. T-statistics (in parenthesis) are computed taking advantage of the time series properties of calendar profits using the Newey-West methodology. 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 6: 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. Annualized profits (second row) are obtained by multiplying the daily profits by 250. And finally, the full sample profits (last row) are simply the sum of the daily profits during the whole sample period. T-statistics (in parenthesis) are computed taking advantage of the time series properties of calendar profits using the Newey-West methodology. 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
Total Profits	Daily	1,410,466 (0.301)	-64,205 (-0.006)	-1,346,261 (-0.160)
	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

Table 7: Abnormal Returns for Buy and Sell Recommendation Portfolios

This table presents abnormal daily returns to three different recommendation revision strategies 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. The four-factor conditional model (labeled "4F Alpha") includes the level of the Swedish 30-day T-Bill, the default premium (measured as the difference between a corporate and a government bond), and term premium (measured as the difference between the Government bond and 30-day T-Bill) in addition to the market index. 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, or 5 days, excluding the recommendation date. 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 date. 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)

Figure 1: 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.

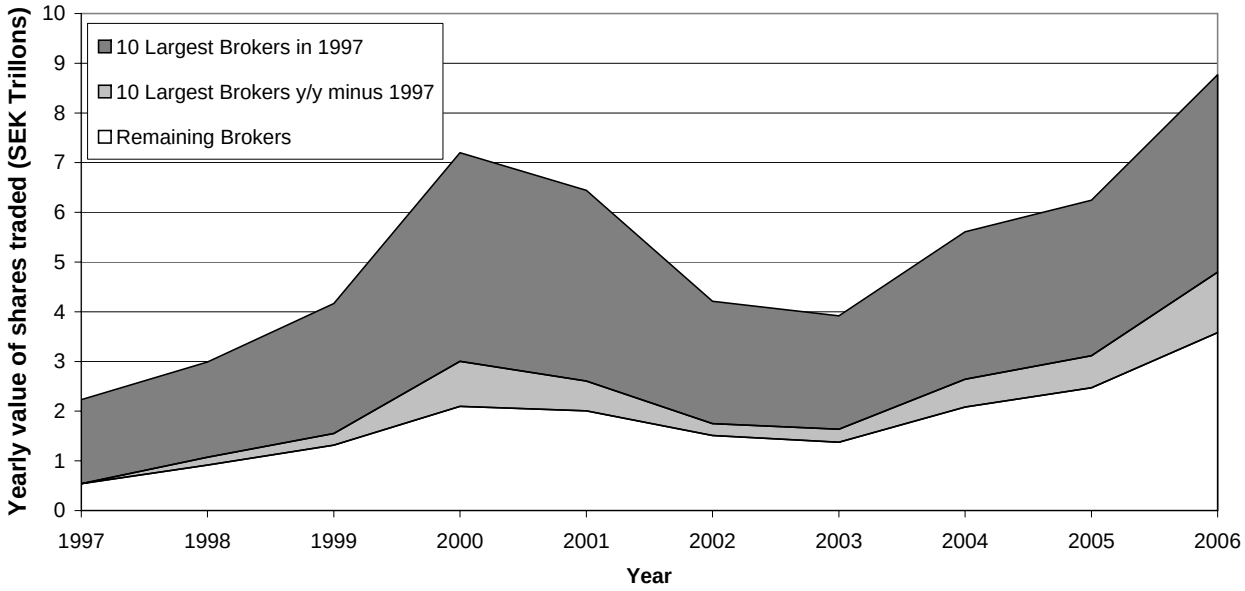

Figure 2: Distribution of Recommendation Revisions per Year

This figure 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).

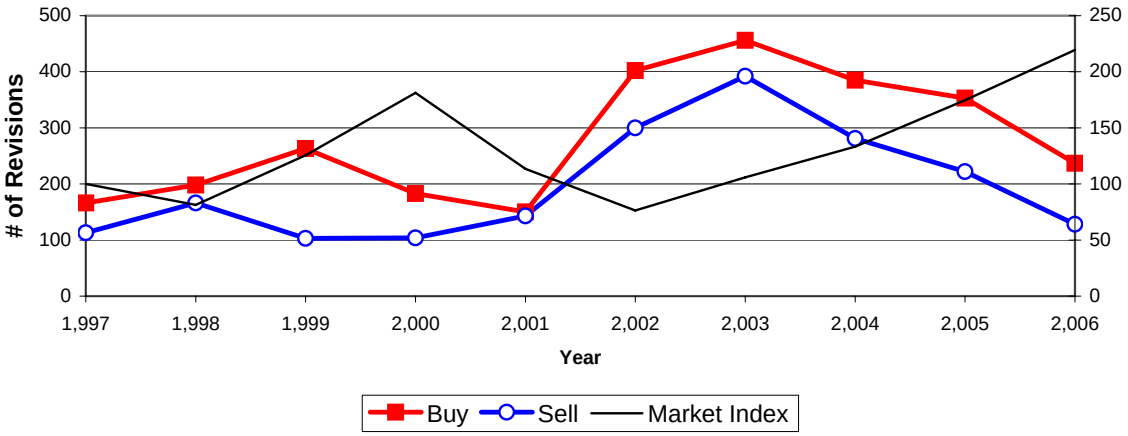

Figure 3: Cumulative Net Buy Around Recommendation Revision dates

This figure 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 recommending brokers' cumulative net buy as a percentage of cumulative daily aggregate traded value for each stock. The full sample average and the average of the ten largest brokers are presented separately. Figure B depicts recommending brokers' cumulative net purchases, measured in millions of Swedish Kronor, averaged over recommendations for three different firm size quintiles, and classified according to the type of recommendation revision ("Added to Buy" or "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.

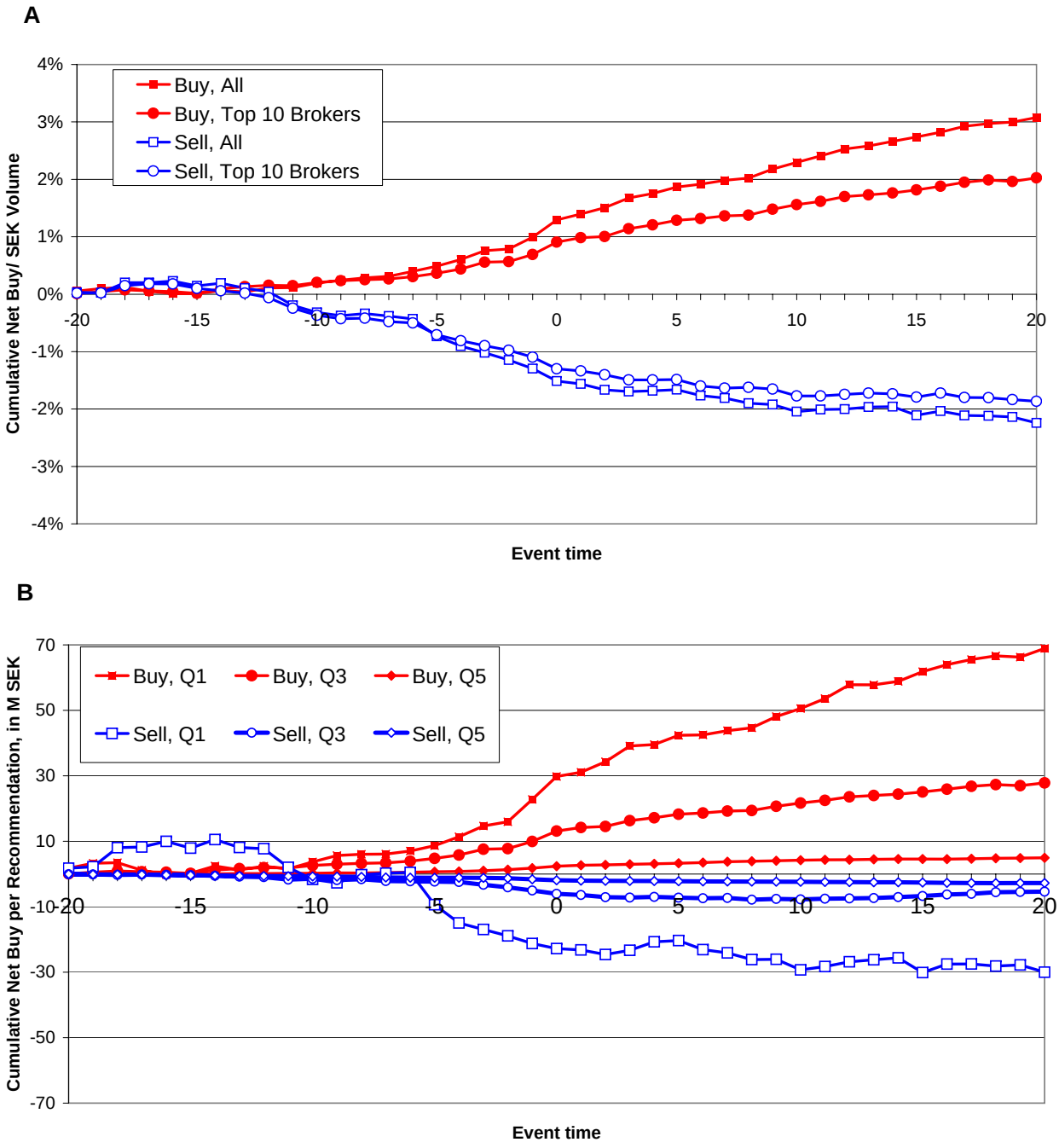

Figure 4: Abnormal Returns and Profits: Tips and Reporting Delays
If the recommendation is officially released, or reported to be released, on day $t = 0$, but some investors gain access to it with some anticipation, on day $t = t*$, measured returns will underestimate actual returns obtained by those 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.

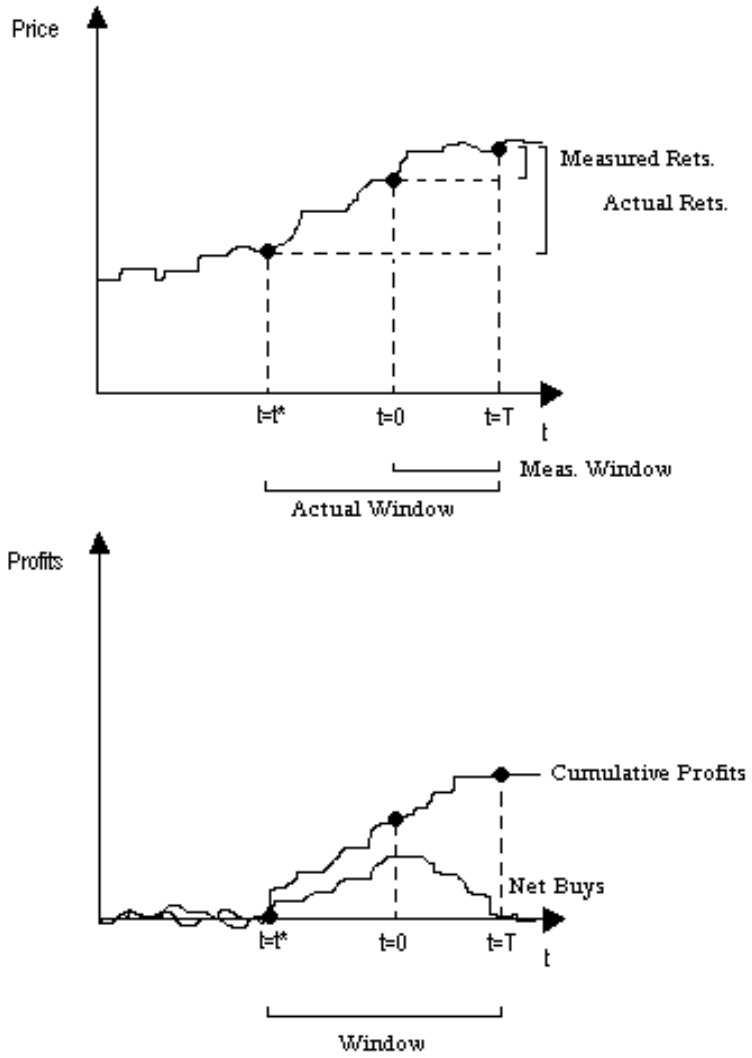

Figure 5: Abnormal Returns and Profits: Public News

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, in time and direction, 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).

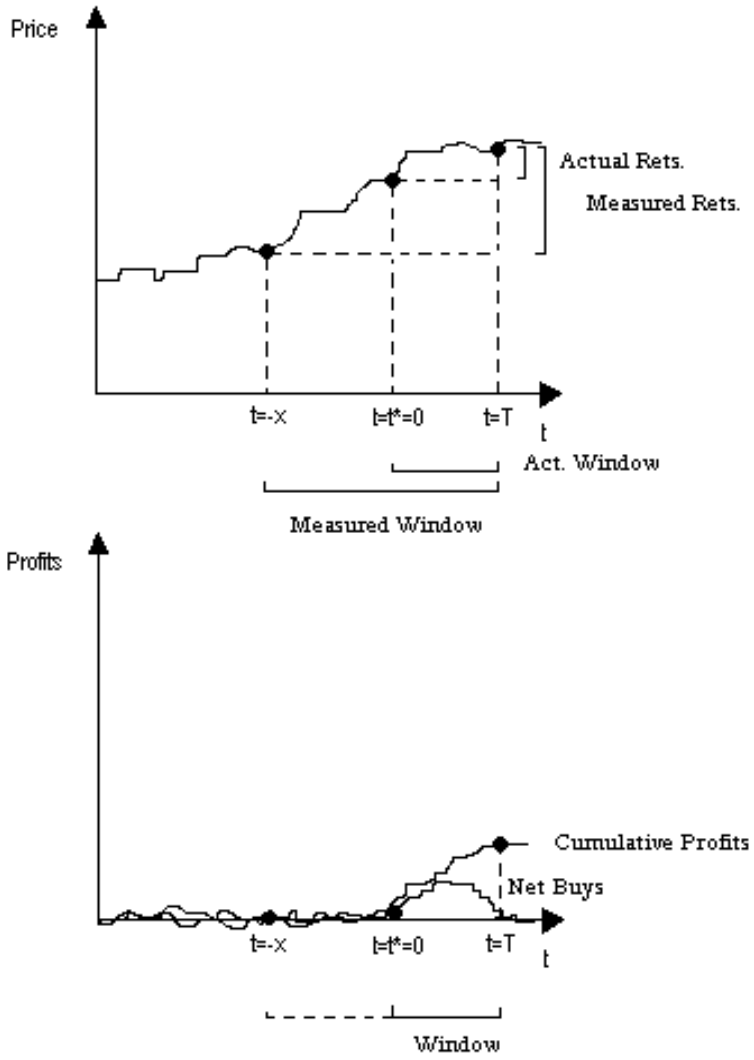

Figure 6: Abnormal Returns around Recommendation Revision Dates

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.

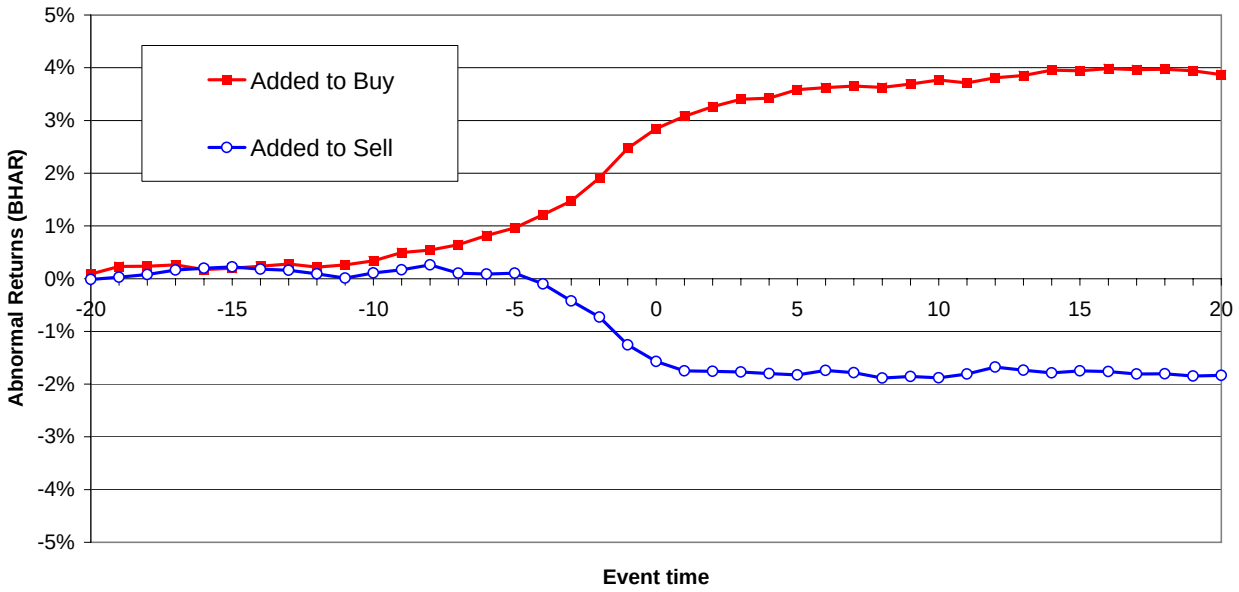

Figure 7: Brokers Abnormal Profits around Recommendation Revision Dates

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.