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Value of the Analyst Recommendations: Is it possible for investors to profit from them?

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Abstract

This paper analyzes the informative value of the analyst recommendation, and whether it is possible for investors to profit following these recommendations. I document that analysts provide valuable stock recommendations, and abnormal returns can be generated investing in the portfolios built based on the average consensus recommendations of analysts. These abnormal returns diminish when the transaction costs are subtracted, and the net annual abnormal return is negative for the portfolios invest the most favorable recommendations. However, profitable investment strategies exist for investors by selling short the least favorable portfolios.

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Introduction

Brokerage firms invest excessive amount of capital in accumulating, interpreting, and publishing company information to investors. Stock analysts take an essential role in this process, and their recommendations represent their opinions on the securities covered. The information providers should be willing to give recommendations only if they can compensate their costly activities. Similarly, the investors should be willing follow analysts' projections about firms' future success only if their excess return from following these recommendations is at least equal to the cost of this information. Fama (1970) suggests that the stock prices in an efficient market at any point in time reflect all the available information. Consequently, according to efficient markets theory investors should not be able to generate excess returns investing in the analyst recommendations.

On the other hand, if the prices at any point in time reflect all the available information, the demand for analysts' recommendations would not exist, and brokerage firms would not be able to compensate their expenses. Grossman and Stiglitz (1980) state that if the markets are efficient and reflect the prices at any time, the informed traders would not be able to earn a return on the information that they acquire. The question that whether investors can earn excess returns following the recommendations has been inspected widely in the literature. Substantial amounts of research find that following analyst recommendations generate positive risk-adjusted returns. Barber et al. (2001) observe investing in most (least) favorable consensus recommendations generate annual abnormal gross returns. However, they also show that transactions costs drive abnormal returns to levels that they are not reliably greater than zero. Further findings in the literature are discussed in the second chapter.

This study uses the methodology in Barber et al. (2001) to place recommendations into portfolios and to evaluate the performance of the portfolios. Differently, following the methodology in Barber et al. (2006) the individual recommendations are utilized instead of consensus recommendations to capture more precise excess returns. Each of these portfolios is evaluated first by their market-adjusted returns, and then by the risk-adjusted returns estimated by the time-series regressions. For the sample period from December 1993 through December 2015, the findings of this study suggest that analyst recommendations contain an informative value for investors. However, profitable investment strategies net of transaction costs only exist for the least favorable recommendations and do not exist for the most favorable recommendations.

This research contributes to the current literature as it combines few different methodologies. Firstly, although the performance of the analyst recommendation has been investigated many times, most of the studies either use the new analyst recommendations or downgrades and upgrades of analysts to evaluate the excess returns. The portfolios in this paper contain both new recommendations and downgrades(upgrades). Secondly, I additionally present the

impact of investment holding period on the excess returns by using a shorter investment term as well. Finally, this study comprises a sample from December 1993 through December 2015, including more observations in general, and more observations for the post-regulation period as well.

In the following chapter, many different aspects of the current literature are discussed. The third chapter is about the data and how it is reduced to the sample that this study uses. Chapter 4 describes the hypotheses development, the way the portfolios are constructed and evaluated, and the approach that is applied to calculate the turnover rates. Moreover, Chapter 4 also includes information about the transaction costs. The empirical results of different methodologies and the robustness of the study are discussed in the fifth chapter. Findings and the conclusions are given in the sixth and the last chapter of this paper. References and Appendix are given after the chapter 6.

2
Literature Review

The theory of efficient markets suggests that prices at any point in time reflect all the available information. Fama (1970) tests the market efficiency by dividing the concept into three forms. It is given that weak form of market efficiency is where the only available information is the historical prices and they are fully reflected in the current prices, leaving no opportunities to use historical prices to earn excess returns. The semi-strong form is where prices efficiently adjust to other information that is unmistakably publicly accessible. Finally, the strong form is where all the information, whether public or private, is available for investors or groups. Fama (1970) concludes that the his findings support the efficient market models and the contradictory evidence is infrequent.

Whether investors can profit following the publicly accessible recommendations has been investigated extensively in the literature. According to the efficient market hypothesis, investors should not be able to trade profitably using the publicly available information, including the analyst recommendations. Controversially, Barber et al. (2001) find that with daily portfolio rebalancing, investing in the most (least) favorable consensus recommendations results in significant annual abnormal returns. However, they have shown that the assumption of daily rebalancing requires frequent trading and leads to large portfolio turnover rates. Consequently, they concluded that the market is semi-strong inefficient, meaning that there are profitable trading opportunities before the transaction costs, and once the transaction costs are taken into consideration, significant abnormal returns do not exist anymore. Womack (1996) states that investors should be willing to pay for brokerage advice on condition that the expected gain is at least the same as the cost of the advice.

Grossman and Stiglitz (1980) state the differences in beliefs generate incentives to create a market. It is given that the differences in opinions are endogenous and derive from the informativeness of the prices and the expenditure on the information. The occurrence of these markets also eliminates the existing differences in beliefs, therefore leads to the disappearance of them. They observe that information gatherers would earn no recompense for their costly activities if the market prices were able to reflect all available information flawlessly. They show that when the efficient markets exist and the information is costly, each informed trader would stop paying for the information, therefore any positive faction informed is not an equilibrium. Moreover, they state that when there is no informed traders, each trader feels that there are opportunities to profit from getting informed, thus it is not an equilibrium when there is no one informed as well. They express that there is an essential conflict between the inducement to acquire information and the efficiency of markets spreading the information.

The conclusion from a substantial amount of work is that recommendations contain information and investors can earn positive risk-adjusted returns following the recommendations. Barber and Loeffler (1993) observed 4 % mean abnormal returns and twice as much trading

volume than the normal for two days following the publication of buy recommendations. Womack (1996) find that analysts occur to have market timing and stock picking abilities. It is stated that the three-day (-1,1) recommendation-period returns are large and in the direction forecasted by the analysts. Barber et al. (2001) argue that many small investors fail to react to a new recommendation immediately as they gain access to consensus recommendation changes after few days, or it is impractical for them to follow daily portfolio rebalancing. Nonetheless, the abnormal returns remain significant. Jegadeesh et al. (2004) examined both rating levels and changes, and they find that the magnitude of consensus recommendation changes is significantly associated with future returns. They added that the relation between recommendation levels and abnormal returns convert insignificant after controlling for price and earnings momentum. Contradictorily, Barbet et al. (2010) argue that recommendation levels have explanatory significance for future returns even after controlling for price and earnings momentum. Additionally, they provide further evidence that the abnormal returns obtained from analysts' recommendations are derivable from both the recommendation levels and changes. It is stated that the predictive power of analysts' recommendations reflects their skill at collecting valuable selective information about the expected financial success of the firms they cover. Chang and Chan (2008) examine the analysts' stock recommendation revisions in terms of the magnitude and direction. They found that upward (downward) stock recommendation revisions are correlated with positive (negative) cumulative market-adjusted stock returns over the three-day event window. Moreover, their evidence suggests that there is a positive correlation between the magnitude of downward stock recommendation revisions and the three-day cumulative market adjusted returns, yet, the magnitude of upward stock recommendation revisions provide no marginal explanatory power. Their study indicates that investors recognize the importance of financial analysts' stock recommendation changes. Fang and Yasuda (2013) find that skill differences among analysts exist and All-American (AA) analysts' buy and sell portfolio excess returns significantly outperform those of non-AAs. Moreover, they find performance difference exists both before and after AAs are elected.

Conflicts of interest analysts face is another part of this subject that has grasped the attention of the academic researchers and regulators. The concern of over-optimism in analyst research considering the conflicts of interest has led to some regulatory changes in the USA.

In July 2002, the NYSE Rule 472 [1] and NASD Rule 2711 [2] were adopted to separate the ties between the research and the investment banking departments within the investment banks. Furthermore, it has been prohibited for companies to compensate analysts depending on the investment banking businesses or the trading volume they generate. Additionally, companies were banned from reviewing analyst research in advance it is published. NASD 2711 requires that every brokerage firm discloses the distribution of their stock ratings and their definition of buy, sell and hold in each of its research reports. In April 2003, the Global

[1] See: `http://finra.complinet.com/en/display/display_main.html?rbid=2403\&record_id=16349` for detailed information

[2] See: `http://finra.complinet.com/en/display/display_main.html?rbid=2403\&element_id=3675` for detailed information

settlement [3] was reached between the SEC and ten of largest investment banks in the world. The settlement enforced these banks to separate their banking and analysis departments physically, as well.

Barber et al. (2006) document the percentage of buys decreased gradually starting in mid-2000, presumably as a result of ratings distribution disclosure obligation. The implementation of the new regulation led to a decrease from 60 to 45 percent for buy recommendations, while sell recommendations rose from 5 to 14 percent and hold recommendations increased from 35 to 41 percent during the second half of 2002. They find that upgrades to buy from the brokers issuing smallest percentages of buy recommendations significantly outperform buy recommendations issued by the brokers with the highest percentages. They conclude that disclosure of rating distribution, consequently the new rules, benefits the investors. Clarke et al. (2004) find that there is no significant difference for the long-term average abnormal returns for upgrades and downgrades between the analysts at investment banks, independent research firms, and brokerages. Contradictorily, Barber et al. (2007) find the average daily abnormal return of independent firms' buy recommendations exceeds investment banks' by 3.1 basis point daily. In contrast, investment banks are generating an excess abnormal return of 1.8 basis point daily over independent firms when the recommendation is hold/sell. Clarke et al. (2011) examine the impact of the related regulations on the recommendation performance on independent, affiliated, and unaffiliated analysts. They found that after the regulatory changes, all three types of analysts issued fewer strong buys, and stated that affiliated analysts were less likely to release an innovative recommendation. Moreover, it is given that downgrades became significantly less informative as they became more common. Cliff (2007) find that affiliated analysts underperform relative to unaffiliated analysts for the buy and hold recommendations. Michaely and Womack (1999) and Dugar and Nathan (1995) show that affiliated analysts tend to be more optimistic than unaffiliated analysts. Arand and Kerl (2015) find a positive correlation between the aggregate number of simultaneous business ties with a subject company and optimism in both the target prices and recommendations. Furthermore, they show evidence of underperformance of stocks those received a favorable recommendation from an analyst that is subject to conflict of interest.

In August 2000, SEC passed Regulation Fair Disclosure [4] (RegFD), on the basis of the belief that companies were sharing earnings-related information only with a particular group of analysts and institutional investors, consequently, resulting in an unfair advantage to clients of these analysts over other investors. RegFD prohibits selective disclosure of information, requiring companies to make public disclosure of that information, to push fair and complete disclosure. Palmon and Yezegel (2011) find that the predictive value of recommendation revisions; when there is an earnings surprise, decreased significantly. They concluded that the RegFD resulted in a decline in selective disclosure and was effective on its objective. Eleswarapu et al. (2004) find that the RegFD has a positive impact on information asymmetry, conflictingly, Gomes et al. (2007) provided evidence of an increase in the information asymmetry. Cornett et al. (2006) find that investors react to recommendation downgrades

[3] See: `http://www.finra.org/industry/2003-global-settlement` for detailed information

[4] See: `https://www.sec.gov/rules/final/33-7881.htm` for detailed information

of affiliated analysts significantly more than of those unaffiliated prior to the RegFD. Yet, this difference is not existence after the regulation. They provided evidence of a decrease in the market reaction to the recommendation changes for both group of analysts after the regulation, hence, claimed the RegFD restricted the selective disclosure to affiliated analysts.

As an additional information, Barber et al. (2003) suggest that analysts' predilection for covering small-size growth firms during 2000 and 2001, the inclusion of stock recommendations during this period will lead to significantly biased results.

3
Data

The analyst recommendations used are obtained from Institutional Brokers' Estimate System (I/B/E/S) from Thompson Reuters. The I/B/E/S provides both consensus and detail stock recommendations from November 1993 through October 2016. Taken data includes, as well as some other items, the recommendation announcement date and time, the analyst and brokerage identifiers, and a rating ranging from 1 to 5. Although not all the analyst uses the identical rating index, I/B/E/S converts analysts' ratings to a five-point scale system depending on the recommendation that they issued. *Table* 1 demonstrates the recommendation ratings and their corresponding definitions.

Table 1:

I/B/E/S Recommendation Scale

Recommendation	**I/B/E/S code**
Strong Buy	1
Buy	2
Hold	3
Sell	4
Strong Sell	5

I/B/E/S database contains 743,660 unique recommendations for US firms during the sample years. After dropping the recommendations with no Committee on Uniform Securities Identification Procedures (CUSIP) number, and the recommendations with no analyst identification, the sample size reduces to 723,174. Moreover, when there are more than one recommendation issued by the same analyst on the same day for the same firm but on different hours of the day, the recommendation that is issued latter has been taken into consideration.

Center of Research in Security Prices (CRSP) is used to download daily stock splits adjusted stock returns, stock prices, and the number of shares outstanding for the sample period. In total, 9,997 number of return series of firms could be obtained using CRSP, and recommendations without the return series are dropped from the sample. [5] Any recommendation that was issued before the initial public offering (IPO) of the firm has been dropped considering the abnormal returns are more likely to happen for the IPOs and the inclusion of these recommendations would lead to biased results. The sample period starts from the year 1993, the earliest possible data provided by I/B/E/S, to have a large enough sample for the pre-regulations period. Although there are only 2 months in the sample for the year 1993, recommendations in those months are kept as they have an effect on the portfolios in

[5]In unreported robustness check analyses, random sampling of 500 firms for each year used to test the abnormal returns and the results are similar to the full sample results. Monthly average number of firms in each portfolio is large enough and the omission does not bias the results.

the first months of 1994. The final sample that is used in this research consists of 580,718 number of recommendations.

Table 3 provides the descriptive statistics for the recommendations in the sample. It can be observed that after the new regulations requiring brokerage houses disclose their recommendation distributions, the average rating of recommendations (column 8) is worse compared to the pre-regulation recommendations. In other words, the regulations pressured analysts to issue less optimistic recommendations. Moreover, the mean and the median numbers for analysts per covered firm and covered firms per analyst has been stable after the regulations (columns 2, 3, 4 and 5).

Figure 1 demonstrates the recommendation percentages by year. It can be seen that analysts tend to provide strong buy, buy or hold recommendations rather than a sell or a strong sell recommendation. As a result of NASD 2711 and NYSE 472 rules requiring brokerage houses to disclose their recommendation distributions, the percentage of buy and strong buy recommendations faced an extensive decline after the year 2000, while the percentage of other three recommendation types, particularly the percentage of hold recommendations, increased until 2003.

A 5x5 matrix in *Table* 2 illustrates the recommendation changes or the reiterations by the same analyst for the same firm in 30 calendar day period. It can be observed that analysts' recommendation revisions tend to be mostly to a hold recommendation. Moreover, analysts often upgrade their recommendations, rather than downgrading it, when the previous recommendation is a hold.

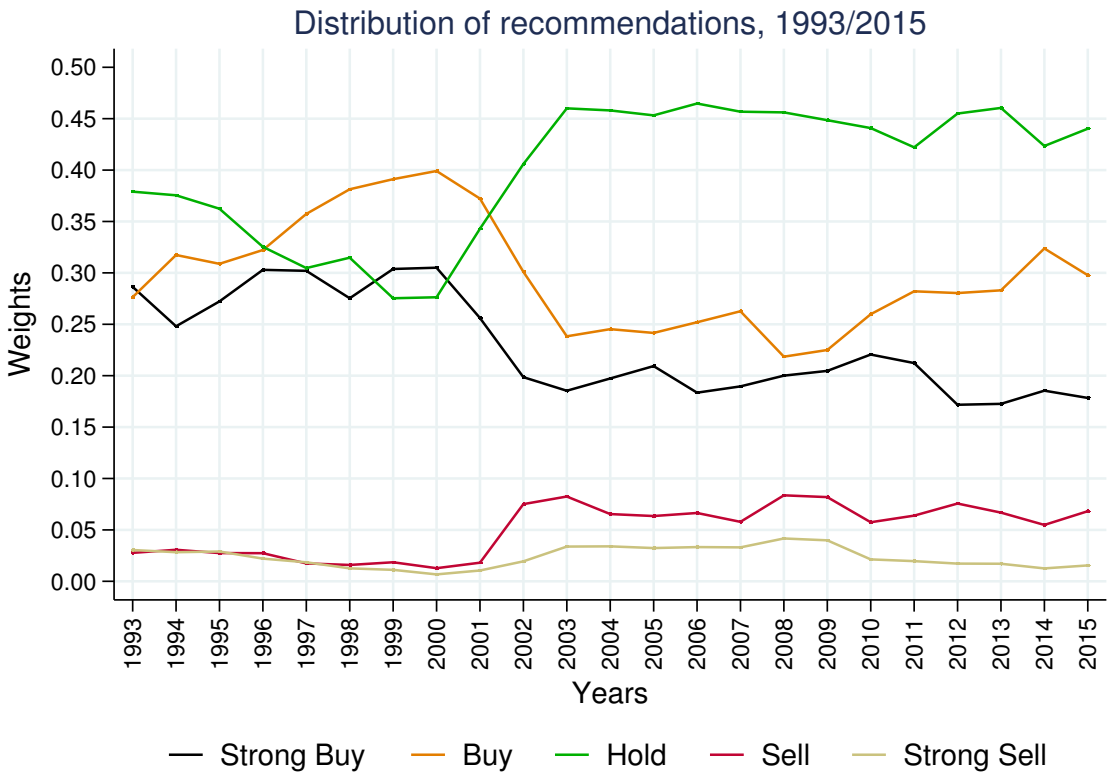

Figure 1: This figure displays the distribution of recommendations obtained from I/B/E/S, from 1993 to 2015. Each line demonstrates the corresponding recommendation's weight out of the total number of recommendation.

Table 2:

Recommendation Changes Matrix, 30 calendar days

This table shows the number of recommendation changes or reiterations issued by an analyst on the same stock in 30 calendar days. The first row represents the initial or the previous recommendation of the analyst.

From	To Recommendation of:					
Recommendation of:	1	2	3	4	5	**Total**
1	1,260	2,572	3,456	83	157	7,528
2	3,017	2,785	4,796	264	91	10,953
3	3,885	5,014	2,997	1,293	1,012	14,201
4	73	250	1,649	443	137	2,552
5	127	76	1,234	173	82	1,692
Total	8,362	10,697	14,132	2,256	1,479	36,926

Table 3:

Descriptive Statistics on Analyst Recommendations from the I/B/E/S Database, 1993 to 2015

By years, the mean and the median number of analysts issuing recommendations for each firm is shown, as is the mean and the median number of firms covered by each analyst. The number of brokers and analysts with at least one recommendation during the year are given. The last two columns represent the average of all analyst recommendations given and the total number of firms in the sample that year. The year 1993 only includes months November and December.

	Analysts per Covered Firm		Covered Firms per Analyst					
Year	**Mean**	**Median**	**Mean**	**Median**	**No. of Brokers**	**No. of Analysts**	**Average Rating**	**No. of Firms**
1993	4.85	4	8.39	7	110	1366	2.24	2381
1994	5.22	4	7.52	6	154	2056	2.26	2983
1995	4.91	4	6.88	6	155	2294	2.24	3241
1996	4.46	3	6.23	5	198	2606	2.14	3654
1997	4.45	3	5.75	4	230	2299	2.09	3887
1998	4.96	4	5.64	4	260	3479	2.11	3976
1999	5.15	4	5.50	4	249	3729	2.04	4008
2000	4.89	4	5.07	4	236	3621	2.02	3786
2001	5.26	4	5.00	5	216	3536	2.16	3447
2002	6.96	5	6.48	5	224	3731	2.42	3499
2003	6.24	4	5.88	5	285	3577	2.54	3433
2004	6.09	5	5.82	4	316	3616	2.50	3460
2005	5.51	4	5.25	4	327	3693	2.48	3525
2006	5.61	5	5.59	4	305	3630	2.51	3619
2007	5.55	4	5.50	5	289	3659	2.48	3627
2008	5.97	5	5.84	5	286	3516	2.55	3441
2009	6.22	5	5.98	4	300	3307	2.53	3178
2010	6.14	5	5.60	4	336	3546	2.40	3233
2011	6.31	5	5.64	4	297	3659	2.40	3268
2012	5.99	5	5.59	4	295	3535	2.49	3297
2013	5.65	4	5.55	4	289	3387	2.47	3329
2014	5.57	4	5.57	4	293	3414	2.39	3416
2015	5.57	4	5.78	4	289	3278	2.44	3398
Average	5.53	4	5.79	4	258	3241	2.35	3439

4

Research Design & Methodology

4.1 Hypotheses

The starting point of this thesis is to examine whether analysts are able to provide informative recommendations. Investors would be willing to follow analysts' recommendations only if their net gain from this action is greater than, or at least equal to zero. Consequently, the first hypothesis is:

Hypothesis 1: Analyst recommendations have informative value, thus generate abnormal returns.

Yet, informative value of analyst recommendations is not solely enough for investors to profit following the recommendations. Transaction costs arise when a firm is included (dropped) from the portfolio, hence even if analyst recommendations have an informative value and a portfolio constructed following these recommendations generates an abnormal return, portfolio rebalancings will increase the turnover rate and reduce the net abnormal return. Therefore, the second hypothesis is:

Hypothesis 2: Investors can profit following analysts' stock recommendations. The abnormal return net of trading costs is still positive.

Another question is that whether the regulations have an effect on analysts' recommendations as they were planned. After rules NASD 2711 and NYSE 472, the percentage of buy recommendations decreased dramatically. Since the implementation of these regulations, the brokerage houses have to disclose their recommendation distributions. Moreover, it is prohibited for the brokerage houses to compensate their analysts based on the trade volume that they generate. Additionally, investment banks have to separate their research and investment banking departments. One can assume that analysts face less conflict of interests since their compensation is not based on the trade volume they generate and they do not encounter a pressure from the investment banking businesses anymore.Consequently, the buy recommendations after the regulations should be more informative and, therefore, investors should be able to generate a greater abnormal return compared to the pre-regulation period. Accordingly, the last hypothesis is:

Hypothesis 3: Analysts face less conflict of interest, thus recommendations became more informative in the post-regulation period, therefore abnormal returns of portfolios are greater in the post-regulation period.

4.2 Portfolio Construction

Following the methodology in Barber et al. (2001), calendar-time portfolios are constructed using the consensus recommendations of firms in the previous month. Each of these portfolios invest in each new recommendation for the firms that are in the corresponding portfolio. The consensus recommendation, A_{iT-1} of firm i in month $_{T-1}$ is calculated by summing all analysts' ratings, A_{ijT-1}, and dividing it by the number of analysts covering firm i that month.

$$\bar{A}_{iT-1} = \frac{1}{n_{iT-1}} \sum_{j=1}^{n_{iT-1}} A_{ijT-1}, \tag{1}$$

Each of the covered firm is placed into portfolios using these consensus ratings at the close of trading date $_{T-1}$. These ratings change each month, consequently, firms may move to a better (worse) portfolio depending on the average rating that they have received at the close of trading date $_{T-1}$. In total, five portfolios are constructed, and the portfolio with the highest buy ratio consists of firms those have $1 \leq \bar{A}_{iT-1} \leq 1.5$. The second portfolio contains firms for which $1.5 < \bar{A}_{iT-1} \leq 2$; the third is comprised of firms those have $2 < \bar{A}_{iT-1} \leq 2.5$; the forth portfolio contains firms for which $2.5 < \bar{A}_{iT-1} \leq 3$; and finally, the fifth and the least favorable portfolio contains firm for which $\bar{A}_{iT-1} > 3$.[6]

Subsequently, the daily return series of each portfolio p for the day t is calculated as:

$$R_{pt} = \sum_{i=1}^{n_{pt-1}} x_{it-1} R_{it}, \tag{2}$$

where,

n_{pt-1} = number of firms in portfolio p as of the close of trading on day $t-1$,

x_{it-1} = the market value of firm i at the close of day $t-1$ divided by the aggregate market capitalization of the portfolio that day, and

R_{it} = return of the stock of firm i on day t.

The portfolios predominantly consist of small firms; however, the weight of large firms are much greater compared to small and medium firms.[7] Therefore, the market-value weight returns are used rather than the equally weight or the value weight returns. Yet, it is known that markets are more efficient for the large firms compared to the small and the medium firms, thus, the market-weight methodology shrinks the abnormal returns and is biased against finding abnormal returns.

[6]Portfolio cutoffs are chosen to have an equal distribution of number of recommendations in portfolios; yet, also aimed to preserve the difference in recommendations in order to retain the sufficient power for the tests. As a consequence of the intention of preserving the differentiation in portfolios, the way the 3^{rd} portfolio build leads it to contain less amount of recommendation compared to the other portfolios; however, the differentiation between the 3^{rd} and the 4^{th} is clear.

[7]Will be further discussed in Chapter 5

The daily returns for each portfolio p are compounded over the n trading days in month $_T$, yielding a monthly return R_{pT}:

$$R_{pT} = \prod_{t=1}^{n}(1 + R_{pt}) - 1 \tag{3}$$

Portfolios 3 to 5 contain sell recommendations (strong sell, sell, and hold) and portfolios 1 and 2 contain buy recommendations (strong buy and buy). Each of these portfolios is daily updated, and each recommendation is hold for 30 calendar days.[8] When there is a new recommendation from an analyst, the stock enters to the portfolios the day after the recommendation, considering that some investors will not be able to react immediately. If the same analyst j issues another recommendation of the same firm i in the same direction with the previous recommendation (e.g. a strong buy after a buy recommendation) in 30 calendar days, the holding period of that recommendation is extended another 30 calendar days, instead of considering that recommendation as a completely another recommendation. In case an analyst issues a recommendation conflicting his previous recommendation (a downgrade or an upgrade), the stock is dropped from the portfolio the day after that recommendation.

Table 4 presents the descriptive characteristics for the portfolios. Monthly average number of firms is similar for the first, second and the forth portfolios. The third portfolio and the least favorable portfolio have less monthly average number of firms compared to the other portfolios. Average consensus rating represents the average rating of the portfolios in the month that they are issued. It is shown that although the first portfolio is built using a consensus recommendation equal or less than 1.5 in the previous month, the consensus recommendation in the following month, on average, is worse. Average rating represents the average recommendation rating when the sell recommendations are dropped from the buy portfolios, and when the buy recommendations are removed from the sell portfolios.

4.3 Performance Evaluation

To determine whether the analyst recommendations contain information that the investors would be able to generate abnormal returns, the performance of the portfolios constructed is compared to the market return using four different models. The first evaluation method is to calculate the market-adjusted returns for each of the five portfolios. Then the risk-adjusted returns of the portfolios calculated using the CAPM, Fama-French 3-factor model, and lastly, the Carhart four-factors model. Models are as follows:

$$R_{pT} - R_{fT} = \alpha_p + \beta_p(R_{mT} - R_{fT}) + \epsilon_{pT} \tag{4}$$

where,

[8] 21 trading days on average

R_{pT} = the portfolio p's return on date T,
R_{fT} = the month T return of one month treasury bills,
α_p = the intercept,
β_p = the sensitivity to systematic risk,
ϵ_{pT} = the regression error term.

$$R_{pT} - R_{fT} = \alpha_p + \beta_p(R_{mT} - R_{fT}) + s_p SMB_T + h_p HML_T + \epsilon_{pT} \tag{5}$$

$$R_{pT} - R_{fT} = \alpha_p + \beta_p(R_{mT} - R_{fT}) + s_p SMB_T + h_p HML_T + m_p MOM_T + \epsilon_{pT} \tag{6}$$

where SMB_T is the size, HML_T the book-to-market, and MOM_T is the momentum factor.[9] The coefficient of β_p demonstrates how portfolios react to an increase(decrease) in the market return. A β_p equals one would indicate that the portfolio replicates the market and pose the same risk as the market does. A value less or greater would indicate that the portfolio is less risky or riskier compared to the market. A positive (negative) value of s_p would indicate that the portfolio contains a greater number of small (large) firms rather than large (small) ones, and a positive (negative) value of h_p would indicate that the portfolio contains more stocks with high (low) book-to-market ratios. The coefficient on MOM will indicate if the firms in portfolios have been performing well (poorly) in the past. A significant intercept α_p indicates that portfolio p performs better compared to the market and is able to generate abnormal returns.

4.4 Turnover & Transaction Costs

4.4.1 Turnover Calculation

In order to identify whether it is possible for investors to profit using the analyst recommendations, the transaction costs arising from the bid-ask spread, and the brokerage commissions have to be taken into consideration. To include these costs to the raw and risk-adjusted returns of the portfolios, turnover for each portfolio is calculated following the methodology in Barbet et al. (2001). Turnover of a portfolio during trading day t is described as the percentage of the portfolio's holdings on the close of previous trading date $t-1$ that has been sold off as the close of date t.

Barber et al. (2001) calculate the turnover using a three-step procedure. First, the fraction of each stock i that it would have constituted in the portfolio at the end of trading day on date t is calculated as using the weight of that stock i in the portfolio as the close of

[9]See Fama and French(1993), Carhart(1997). SMB, HML and MOM factors are obtained from Kenneth French's website.

trading day $t-1$, as if no portfolio rebalancing has been done. Expressing this fraction as G_{it}, it is calculated as:

$$G_{it} = \frac{x_{it-1}(1+R_{it})}{\sum_{i=1}^{n_{pt-1}} x_{it-1}(1+R_{it})} \tag{7}$$

where,

x_{it-1} = the market value of equity for firm i at the close of trading day $t-1$,
$\sum_{i=1}^{n_{pt-1}} x_{it-1}$ = the cumulative market capitalization of all firms in
the portfolio at the close of trading day $t-1$,

Later, G_{it} is compared to the actual friction that stock i comprises, F_{it}, at the close of the trading day t allowing any portfolio rebalancing that results as a consequence of a change in the analyst recommendations. U_{it} represents the day's decrease in the percentage holding of stock i, calculated as follows:

$$U_{it} = \sum_{i=1}^{n_{pt}} \max\{G_{it} - F_{it}, 0\}. \tag{8}$$

Monthly turnover is calculated by multiplying the average U_t by the number of trading days; 21, and annual turnover is calculated by multiplying average U_t with 252.

Since the portfolios are constructed using daily rebalancing that depends on the each individual recommendation, the portfolio that has been turned over each day yields a greater rate compared to Barbet et al. (2001). The annual turnover rates are given in *Table* 4. Portfolio 3 has the highest turnover rate, which is consistent with hold recommendations having the highest recommendation changes and reiterations.

4.4.2 Transaction Costs

Barber et al. (2001) find that when the transaction costs arise from the brokerage fees and the bid/ask asymmetry are taken into consideration, the risk-adjusted returns are driven to negative for all of the portfolios except the least favorable one.

The round-trip transaction costs used in their research was 0.727, 1.94, and 4.12 percent per share value traded, respectively for large, medium, and small-cap stocks.[10] Yet, more recent research find a round-trip transaction cost lesser than those Barber et al. (2001) use. Bessembinder (2003), using second half of the year 1998 as the sample, find an effective spread of 31, 66 and 132 basis points respectively for the round-trip transaction. Peterson and Sirri (2003), find effective round-trip spread of 25, 65, and 185 basis points respectively for \$1/8 tick size and 16, 46, and 125 basis points respectively for \$1/16 tick size.

[10]Large-cap stocks are firms with market capitalization of \$10 billion or greater, mid-cap stocks are between \$2 and \$10 billion, and small-caps are the stocks with market capitalization less than \$2 billion.

On June 8, 2000, the SEC ordered that the security exchanges and the Nasdaq Stock Market adopt decimal pricing, and the period of adoption ending no later than April 9, 2001. Before the decimalization, the minimum price increment had been \$1/8 (12.5 cents) and \$1/16 (6.25 cents). The introduction of decimalization lowered the minimum allowable tick size to \$1 cent, yet, did not mandate the participants of the market to quote narrower ticks. U.S Securities and Exchange Commission; in "Report to Congress on Decimalization" in July 2012, stated that the narrower spreads have been the result of continued market forces. Furthermore, it is stated that the main empirical finding of academic literature is that both effective and quoted spreads declined after the introduction of decimalization.[11]

Although the round-trip transaction costs appear to be lower with the regulatory changes, the availability of a recent effective round-trip transaction cost has been an issue. Since the calculation of these costs is out of this research's scope, the spreads calculated by Peterson and Sirri (2003) for \$1/16 tick size is used to calculate the portfolio's transaction costs.

[11]See: `https://www.sec.gov/news/studies/2012/decimalization-072012.pdf`

Table 4:

Descriptive Characteristics of Portfolios, December 1993 - December 2015

This table presents the descriptive statistics for the portfolios. First five portfolios are based on the consensus recommendations. "Buy Recommendations" contain all of the buy and strong buy recommendations, and the "Sell Recommendations" contains all of the hold, sell and strong sell recommendations. Monthly average number of firms, and the average number of analysts per covered firm are given in the second and the third columns. Average consensus rating is calculated using all of the recommendations in that portfolio. Average rating is calculated using only the strong buy and buy recommendations for first two portfolios, and using only hold, sell, and strong sell recommendations for the third, fourth and the fifth portfolios. The last column represents the annual turnover rates of the portfolios.

Portfolio	Monthly Avg. No. of Firms	No. of Analysts	Avg. Consensus Rating	Average Rating	% Annual Turnover
1 (most favorable)	1683	2.20	1.64	1.31	1618
2	1972	2.39	2.10	1.73	1569
3	695	2.18	2.40	3.07	1744
4	2130	2.55	2.73	3.09	1578
5 (least favorable)	663	2.51	3.29	3.64	1702
Buy Recommendations	2862	3.74	1.57	-	1405
Sell Recommendations	2622	3.75	3.21	-	1472

5

Results

5.1 Portfolio Returns

Table 5 provides coefficient estimates of portfolios formed using the consensus recommendations of analysts. The coefficient on the excess market return is highly significant and close to one in all of the models and for all of the portfolios. This indicates that the portfolios pose similar level of risks as the market risk. The riskiest portfolio, not surprisingly, is the third portfolio, which has an average rating close to a hold recommendation, and the least risky portfolio is the fourth portfolio. The coefficients on *SMB* tends to move from positive to negative from the first to the fifth portfolio, and the coefficient on *HML* tends to move from negative to positive from the most favorable portfolio to the least favorable one. Significant negative coefficients on *SMB* for the second and the third portfolio indicates that these portfolios tilted towards larger firms. Consistent with this assumption, *Table* 6 display that the percentage of portfolio values of large firms are biggest in the second and the third portfolios. Moreover, a significant negative coefficient on *HML* for the first and second portfolios indicate that these portfolios contain mostly the low book-to-market ratio firms, and positive significant *HML* coefficients for the fourth and the fifth portfolios express that these portfolios are tilted toward firms with a high book-to-market ratio. Consistent with Barber et al. (2001), less favorable analyst ratings are correlated with high book-to-market ratio firms those have a lower market risk. The coefficient on *MOM* is negative significant for sell portfolios and positive significant for the forth portfolio. This indicates firms in sell portfolios performed poorly in the past and firms in the fourth portfolio performed well in the past. Yet, *MOM* factor is not significant for the fifth portfolio. In general, models are able to explain a high amount variation out of the total variation. The adjusted R^2 increases with the additional independent variables for all of the portfolios. As a result of portfolios third and fifth having a less number of firms within on average, the adjusted R^2 of these portfolios are relatively low compared to the other portfolios.

Table 6 displays the monthly mean raw return, the monthly mean market-adjusted return, and the intercept estimates of the models. As expected, the most favorable portfolio has the highest monthly return and the least favorable portfolio has the lowest mean return. Market-adjusted returns are significant for all of the portfolios except the third one, the riskiest portfolio. Moreover, the market-adjusted returns are positive significant for buy portfolios and negative significant for sell portfolios, meaning that buy portfolios over-perform the market and the sell portfolios under-perform the market.

The intercepts from all three models are significant for all of the portfolios except the third portfolio, that has no significant abnormal return. Moreover, there is a monophonic

Table 5:

Coefficient Estimates of Portfolios, December 1993 - December 2015

This table presents the time-series regression estimates of CAPM, Fama-French, and Four-Factors models. The portfolios are based on the consensus analyst recommendation in month $_{T-1}$, and each recommendation are held 30 calendar days unless there is a downgrade. Dependent variable is the portfolio return minus risk-free rate, $R_p - R_f$, and the independent variables are the market excess return ($R_m - R_f$), size variable (SMB), book-to-market variable (HML), and momentum variable (MOM). The robust t-statistics appear below the coefficient estimates. The t-statistic on the coefficient ($R_m - R_f$) represents the hypothesis that the coefficient estimate on ($R_m - R_f$) is equal to one. The t-statistics on coefficients of SMB, HML and MOM represent the null hypothesis of the coefficient being equal zero. Intercept estimates of the time-series regressions are not given in this table.

	CAPM		Fama-French				Four-Factors				
Portfolio	$R_m - R_f$	Adj R^2	$R_m - R_f$	SMB	HML	Adj R^2	$R_m - R_f$	SMB	HML	MOM	Adj R^2
1 (most favorable)	1.05	82.6	1.02	0.02	-0.17	83.6	1.03	0.02	-0.16	0.01	83.5
	28.58***		30.74***	0.46	-2.39**		29.02***	0.42	-2.10**	0.19	
2	1.09	87.0	1.06	-0.07	-0.24	88.8	1.09	-0.085	-0.22	0.06	89.1
	30.27***		34.64***	-2.15**	-5.25***		34.48***	-2.25**	-4.36***	1.97**	
3	1.12	77.7	1.13	-0.11	-0.06	77.9	1.05	-0.08	-0.13	-0.20	80.7
	23.53***		25.99***	-2.05**	-0.82		22.94***	-1.71*	-1.95*	-4.27***	
4	0.98	80.6	1.02	-0.10	0.12	81.9	0.96	-0.08	0.07	-0.15	84.0
	29.84***		28.03***	-1.11	2.05**		29.30***	-1.03	1.36	-3.87***	
5 (least favorable)	1.02	62.9	1.07	0.06	0.36	66.2	1.00	0.09	0.30	-0.18	68.5
	17.19***		18.56***	0.79	4.02***		16.76***	1.21	3.56***	-3.89***	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

increase on the abnormal returns from the least favorable portfolio to the most favorable one. These results are consistent with the *hypothesis* 1, that the analyst recommendations have informative value and investing in the analyst recommendations generate abnormal returns. *Table* 7 also displays the annual turnover of the portfolios and the net annual return when the transaction costs are taken into consideration. The annual turnover is stable across all portfolios and varies from 1578 to 1744. *Table* 6 illustrates the monthly transaction costs, distribution of the large, medium, and the small firms in the portfolios, and the monthly transaction costs for the portfolios. The net annual returns from portfolios illustrate that for the fourth and the fifth portfolios, it is possible for investors to build portfolios based on the consensus analyst recommendations and generate net annual abnormal returns. However, these investment strategies are not possible for the first three portfolios, which also indicates that analysts are more accurate with their sell recommendations compared to their buy recommendations. A strategy of selling short the least favorable or the second least favorable portfolios generates a positive net annual abnormal return from a high of 1.98 % to a low of 0.46 %. Consequently, *hypothesis 2* holds for these two portfolios, and the net abnormal returns are positive for investors.

5.2 Transaction Costs

Table 6 displays that the portfolio value of the large firms increase from the least favorable portfolio to the most favorable portfolio. Furthermore, the weight of the medium firms displays the opposite behavior, while the portfolio value of the small firms tends to be stable across the five portfolios. As a consequence, the transaction cost is highest for the least favorable portfolio and the cost decreases progressively as the portfolios receive a better rating. The most favorable portfolio has the highest percentage of small firms and the lowest percentage of large firms, yet, the portfolio value of the large firms is not the lowest compared to other portfolios. Furthermore, portfolio value of 9.10 %, the most in all the portfolios, of small firms in the most favorable portfolio indicates that analysts tend to give more buy recommendations rather than hold or sell recommendations to the small firms. Transaction costs are estimated by calculating an average round-trip cost percent share traded using the transaction costs provided by Paterson and Sirri (2003), 16 basis points for large firms, 46 basis points for medium-sized firms, and 125 basis points for small firms. While the transaction costs increase as the turnover rate increases, it also decreases when the value of the large firms increases in a portfolio.

5.3 Alternative Approaches

In this section, the abnormal returns and the net abnormal returns are investigated under the alternative approaches. *Table* 8: Panel A displays the performance of the portfolios when the holding period is reduced to 15 calendar days, Panel B displays the abnormal returns for 30 calendar days holding period but when the portfolios are based the consensus recommendation in month $_T$, and Panel C demonstrates the performance of the portfolios

Table 6:

Transaction Costs of Portfolios, 30 calendar days holding period

This table shows the monthly average transaction costs of the daily rebalanced portfolios for 30 calendar day holding period. Monthly turnover is calculated as the average of portfolio's holdings at the close of one day that has been sold the next trading day, multiplied by 21, the number of trading days in a month. Columns 3-5 demonstrates the percentage of each firm size in the portfolio, column 6-8 shows their value-weights in the portfolio. Monthly transaction cost is calculated by calculating an average round-trip cost percent share traded, using the value-weights and their corresponding transaction costs. Each portfolio's monthly transaction cost is equal to round-trip percent of its monthly turnover.

	%	% of Portfolio			% of Portfolio Value			Monthly
	Monthly	Large	Medium	Small	Large	Medium	Small	Transaction
Portfolio	Turnover	Firms	Firms	Firms	Firms	Firms	Firms	Cost
1 (most fv.)	135	9.61	20.49	69.90	72.27	18.63	9.10	0.425 %
2	131	13.23	23.70	63.07	77.33	16.45	6.22	0.362 %
3	145	21.14	31.77	47.09	77.29	17.99	4.72	0.386 %
4	132	11.78	26.27	61.94	67.46	24.04	8.50	0.427 %
5 (least fv.)	142	12.50	28.80	58.70	62.25	28.87	8.88	0.487 %

Table 7:

Performance of Portfolios, December 1993 - December 2015

This table displays performance measures of portfolios based on the average consensus recommendations. Mean raw returns are the average monthly returns of the portfolios. Market-adjusted returns are the mean raw returns minus the risk-free rate and the return of the market that month. CAPM intercept is the estimated intercept calculating using CAPM model by regressing portfolio return less the risk-free rate on the market excess return. The intercept from Fama-French model is the estimated intercept of time-series regression with additional independent variables of small-minus-big (SMB) and high-minus-low (HML). Four-factors intercept is the estimated intercept of time-series regression including the price momentum independent variable. Annual turnover is calculated as the average of portfolio's holdings at the close of one day that has been sold the next trading day, multiplied by 252, the number of trading days in a year. The annual return is calculated by multiplying intercepts by 12 and subtracting the annual transaction cost. The robust t-statistics for intercepts are below the coefficients.

	Mean	Mean	Intercept from				Net Annual Return from		
	Raw	Market-adjusted		Fama-	Four-	% Annual		Fama-	Four-
Portfolio	Return	Return	CAPM	French	Factors	Turnover	CAPM	French	Factors
1 (most favorable)	0.930 %	0.317 %	0.283 %	0.325 %	0.317 %	1618	-1.702 %	-1.198 %	-1.294 %
		2.405**	2.06**	2.53**	2.33**				
2	0.879 %	0.266 %	0.211 %	0.277 %	0.229 %	1569	-1.816 %	-1.024 %	-1.600 %
		2.28**	1.74*	2.46**	1.97**				
3	0.453 %	-0.159 %	-0.233 %	-0.212 %	-0.055 %	1744	-1.833 %	-2.085 %	-3.969 %
		-0.96	-1.46	-1.31	-0.35				
4	0.033 %	-0.580 %	-0.566 %	-0.592 %	-0.476 %	1578	1.667 %	1.979 %	0.587 %
		-4.47***	-4.35***	-4.61***	-4.02***				
5 (least favorable)	0.057 %	-0.555 %	-0.570 %	-0.667 %	-0.523%	1702	0.995 %	2.159 %	0.455 %
		-2.61***	-2.65***	-3.16***	-2.51**				

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

constructed using all buy and all sell recommendations with 30 calendar days investment period. [12]

5.3.1 15 Calendar days holding period

Table 8 illustrates that when the holding period of recommendations is reduced to 15 calendar days, the annual turnover rates for the portfolios are almost twice as much compared to the annual turnover ratios of the portfolios with 30 calendar days investment periods. The monthly mean raw returns are higher for all of the portfolios when the holding period is 15 days, and portfolios 4 and 5 now have negative mean returns. The intercept estimates remain significant; except for the CAPM and Four-Factors estimate of the second portfolio, and the abnormal returns increase as a consequence of higher mean returns. This indicates that the recommendations in the second portfolio tend to perform better in 30 days holding period. Moreover, the intercept estimates for the most favorable, the least favorable and the second least favorable portfolios almost doubled (and now more significant for the least favorable portfolio), implying that sell recommendations and the portfolio with a consensus recommendation close to a strong buy contain more informative value over short-term investment periods compared to longer periods.

Although a shorter holding period generates higher excess returns, as it is stated above, it also doubles the annual turnover rates. As a consequence, the net annual returns from the portfolios decrease for the first three portfolios. Moreover, the fourth portfolio has a positive net annual return above all other portfolios for 30 days investment period, yet, it has a negative net annual return for 15 days investment period. On the other hand, the least favorable portfolio has the largest excess return for 15 days investment period, and a greater net abnormal return compared to the 30 days investment period. This implies that the portfolio with the worst consensus recommendations, thus the strong sell recommendations, perform better in shorter investment period, even though the annual turnover rate is higher.

Correspondingly, *hypothesis* 1 still holds as the abnormal returns are even higher for the portfolios with 15 days investment period. In addition, the least favorable portfolio illustrates that investors can generate even higher net annual excess returns if they invest in that portfolio, suggesting that *hypothesis 2* is still is possible for one of the portfolios.

5.3.2 30 Calendar days holding period, using the consensus recommendations of the month of recommendations

Despite the fact that investors cannot calculate an average consensus recommendation rating before the recommendations are issued, this methodology still has an interpretive power on the timing ability of the analysts.

Table 8: Panel B demonstrates the intercept estimates of this methodology. The significance of the intercepts, as well as the value of the intercepts, increase substantially for the most favorable portfolio. The other estimates and the annual turnovers remain similar to

[12]The coefficient estimates for alternative approaches are given in the appendix.

the previous methodologies. Moreover, the net annual return for the most favorable portfolio is positive. These results indicate that although the abnormal returns of the portfolios based on the consensus recommendation in month $_{T-1}$ is significant and has an explanatory power for the most favorable portfolio, the timing of these recommendations has an impact on the excess returns, and the excess returns are higher when the portfolios are based on the consensus in the month $_{T}$. The analysts appear to have market timing abilities, and the timing on the strong buy recommendations has an impact on the abnormal returns, likewise it has an impact on the net annual returns. These evidence further support the *hypothesis* 1, that the analyst recommendations contain an informative value. Although, it is not possible for investors to follow such a strategy, the positive net annual abnormal return for the most favorable portfolio indicates that the possibility of new investment strategies that the investors can follow and generate abnormal returns net of transaction costs for the most favorable portfolio exists.

5.3.3 30 Calendar days holding period, the buy and sell portfolios

This methodology invests in all of the buy (sell) recommendations issued by analysts, therefore the consensus recommendations are need not used.[13] *Table* 8: Panel C illustrates the intercept estimates for the buy and sell recommendations. The intercept estimates on the sell recommendations are highly significant for all of the models, and the intercept estimates on buy recommendations are slightly significant for market-adjusted returns, not significant for CAPM model, and highly significant for Fama-French and Four-Factors models. The annual turnover rate is slightly less when compared to other 30 days investment period methodologies, possibly due to the reason that firms are not being downgraded or upgraded between portfolios, thus, more recommendations receive extensions. Investing in all of the sell recommendations generate positive net annual excess returns for CAPM and Fama-French model, however, these returns for the buy portfolios remains negative. These results suggest that even though not all the analyst have the same abilities nor have the same view on stocks, all recommendations combined provides informative value, and investors can generate net annual excess returns selling short all of the sell recommendations issued.

5.4 Impact of the Regulations

Table 9 demonstrates the intercept estimates of the Four-Factors model for three different sub-samples. For each these sub-sample pairs, the null hypothesis of abnormal returns are equal to each other is tested using the most and the least favorable portfolios of three different portfolio construction methodologies.

[13]Buy recommendations are defined as strong buy and buy recommendations, and sell recommendations are define as hold, sell and strong sell recommendations.

Table 8:

Performance of Portfolios, December 1993 - December 2015

This table displays performance measures of portfolios. Panel A display the performance measures for portfolios with 15 calendar days holding period, Panel B displays the performance measures for portfolios based on the consensus recommendations in month $_T$, and Panel C displays the performance measures for portfolios constructed using all buy recommendations and all sell recommendations. Buy recommendations are defined as strong buy and buy recommendations and Sell recommendations are defined as hold, sell, and strong sell recommendations. Mean raw returns are the average monthly returns of the portfolios. Market-adjusted returns are the mean raw returns minus the risk-free rate and the return of the market that month. CAPM intercept is the estimated intercept calculating using CAPM model by regressing portfolio return less the risk-free rate on the market excess return. The intercept from Fama-French model is the estimated intercept of time-series regression with additional independent variables of small-minus-big (SMB) and high-minus-low (HML). Four-factors intercept is the estimated intercept of time-series regression including the price momentum independent variable. Annual turnover is calculated as the average of portfolio's holdings at the close of one day that has been sold the next trading day, multiplied by 252, the number of trading days in a year. The annual return is calculated by multiplying intercepts by 12 and subtracting the annual transaction cost. The robust t-statistics for intercepts are below the coefficients.

Panel A: Portfolios constructed using consensus recommendation of previous month, 15 calender days holding period									
	Mean	Mean	Intercept from				Net Annual Return from		
Portfolio	Raw Return	Market-adjusted Return	CAPM	Fama-French	Four-Factors	% Annual Turnover	CAPM	Fama-French	Four-Factors
1 (most favorable)	1.116 %	0.503 %	0.429 %	0.486 %	0.494 %	3053	-4.710 %	-4.026 %	-3.930 %
		2.79***	2.26**	2.72***	2.72***				
2	0.911 %	0.298 %	0.228 %	0.296 %	0.221 %	2982	-5.634 %	-4.818 %	-5.718 %
		2.07**	1.55	2.14**	1.52				
3	0.627 %	0.015 %	-0.078 %	-0.045 %	0.134 %	3260	-7.896 %	-8.292 %	-7.224 %
		0.07	-0.36	-0.21	0.61				
4	-0.140 %	-0.753 %	-0.779 %	-0.789 %	-0.634 %	2990	-0.629 %	-0.509 %	-2.369 %
		-4.22***	-4.18***	-4.25***	-3.63***				
5 (least favorable)	-0.474 %	-1.086 %	-1.170 %	-1.237 %	-1.107%	3121	2.697 %	2.150 %	1.989 %
		-2.81***	-3.18***	-3.18***	-3.01***				

Table 8 (continued):

Panel B: Portfolios constructed using consensus of the month of the recommendation, 30 calender days holding period									
	Mean	Mean	Intercept from				Net Annual Return from		
	Raw	Market-adjusted		Fama-	Four-	% Annual		Fama-	Four-
Portfolio	Return	Return	CAPM	French	Factors	Turnover	CAPM	French	Factors
1 (most favorable)	1.319 %	0.706 %	0.663 %	0.710 %	0.645 %	1601	3.025 %	3.585 %	2.809 %
		6.16***	5.73***	6.46***	5.85***				
2	0.812 %	0.198 %	0.165 %	0.204 %	0.186 %	1547	-2.246 %	-1.783 %	-1.994 %
		2.00**	1.61	2.08**	1.78*				
3	0.589 %	-0.024 %	-0.066 %	-0.063 %	0.086 %	1771	-3.691 %	-3.732 %	-3.461 %
		-0.15	-0.41	-0.39	0.50				
4	0.008 %	-0.604 %	-0.593 %	-0.606 %	-0.494 %	1558	2.21 %	2.417 %	1.073 %
		-5.11***	-4.97***	-5.03***	-4.28***				
5 (least favorable)	-0.373 %	-0.986 %	-1.027 %	-1.087 %	-1.023%	1693	6.773 %	7.481 %	6.725 %
		-3.82***	-3.98***	-4.24***	-4.07***				
Panel C: Portfolios constructed using all recommendations, 30 calender days holding period									
Buy recommendations	0.730 %	0.118 %	0.090 %	0.136 %	0.140 %	1405	-2.710 %	-2.148 %	-2.105 %
		1.69*	1.26	2.12**	2.12**				
Sell recommendations	0.225 %	-0.388 %	-0.412 %	-0.409 %	-0.282 %	1472	0.729 %	0.693 %	-0.834 %
		-4.09***	-4.32***	-4.33**	-3.14***				

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The null hypotheses are as follows:

$$H0 : \alpha_{Period1} = \alpha_{Period2}$$
$$H0 : \alpha_{Period2} = \alpha_{Period3}$$
$$H0 : \alpha_{Period1} = \alpha_{Period3}$$

Findings from *Table* 9 indicate that the abnormal returns for the most favorable portfolios are significant in both Pre-regFD period and Post-rule 2711 period. Moreover, for the least favorable portfolios the abnormal returns appear to be more consistent in the Post-rule 2711 period. Yet, as Barber et al. (2003) suggest, the year 2000 and 2001 have conflicting results compared to other periods for both the most and the least favorable portfolios.

Accordingly, the most favorable portfolios performed significantly better in the Pre-regFD period compared to the interim period. Although the same statistical significance in the differences does not exist between Pre-regFD and Post-rule 2711 periods; except the portfolio based on the consensus recommendation in month $_{T-1}$, it can be observed that the intercept estimates in the Post-rule 2711 period is lower compared to the Pre-regFD period. As the results partially suggest, one claim that can be made is that the Regulation Fair Disclosure led to more efficient markets in which the abnormal returns from the analyst recommendations are less compared to Pre-regFD period, yet analysts still pose the skills to generate abnormal returns.

Nonetheless, *Table* 9 provides no evidence that the Post-rule 2711 abnormal returns are higher compared to the previous period. Consequently, the *hypothesis* 3 that the abnormal returns are higher as the buy recommendations are more informative since the recommendations face less conflict of interests in the post-regulation period is rejected.

5.5 Impact of the Interim Period on Net Annual Returns

Barber et al. (2003) suggest that due to analysts' tendency to cover small-size growth firms during 2000 and 2001, the inclusion of these years in an analysis will lead to biased results. *Table* 10 illustrates the performance of the portfolios when this interim period is removed from the sample. Compared to the results in *Table* 7, the mean monthly returns increase for all the portfolios when the interim period is removed from the sample. Moreover, the intercept estimates and the significance of these intercepts are higher for all of the portfolios, except the least favorable portfolio. Annual turnover rate and the annual transaction costs remain almost identical to their full-sample values.

As the removal of the interim period leads to higher mean returns and excess returns, it can be derived that analysts were relatively unsuccessful with their recommendations on the small-size growth firms. Although the removal of this interim period increases the excess returns in general, the most favorable portfolio as well as the second and the third portfolios remain to have negative net annual returns. The net annual returns of the fourth portfolio remained comparatively unaltered. Further, the net annual returns for the least favorable portfolio decreased. This result indicates that analysts were more accurate with their sell and

Table 9:

Impact of the Regulations on Abnormal Returns, December 1993 - December 2015

This table presents the performance of portfolios in different sub-samples. Abnormal returns are the intercept estimates of the Four-Factor time-series regression. Probabilities represent the null hypothesis of abnormal returns in sub-samples being equal to each other. Period 1 is the Pre-regFD, which is the period before 2000. Period 2 is the interim period between the regFD and the NASD rule 2711, which is the period between 2000 and 2001. Period 3 is the period after the NASD rule 2711, the period after year 2002. Each of these null hypotheses are tested for 3 different portfolio methodologies.

	% Abnormal Returns			Prob > chi^2		
	Period 1	Period 2	Period 3	Period 1 = Period 2	Period 2 = Period 3	Period 1= Period 3
	1993-9	2000-1	2003-2015	*H0: Pre-regFD=*	*H0: Interim period=*	*H0: Pre-regFD=*
Portfolio	Pre-regFD	Interim period	Post-rule 2711	*Interim period*	*Post-rule* 2711	*Post-rule* 2711
Most favorable - 30 days	0.555***	-0.578	0.276**	0.064*	0.156	0.223
Least favorable - 30 days	-0.352	1.979*	-0.631***	0.166	0.212	0.604
Most favorable - 15 days	0.82***	-1.504	0.651***	0.017**	0.023**	0.628
Least favorable - 15 days	-1.686*	-5.408**	-0.814***	0.143	0.053*	0.353
Most favorable - 30 days^{+}	1.044***	0.118	0.455***	0.006***	0.261	0.012**
Least favorable - 30 days^{+}	-1.196***	-3.478*	-0.877***	0.267	0.198	0.465

$^{+}$Portfolios based on the consensus recommendation in the month of the recommendation

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

strong sell recommendations during this interim period, thus were able to provide profitable sell recommendations.

Despite the fact that the abnormal returns are in general higher when the interim period is excluded, the removal of this period does not change the sign on the net annual excess returns. Therefore, it does not add a new profitable investment strategy nor remove the aforementioned strategy of selling short the fourth and the least favorable portfolios.

Table 10:

Performance of Portfolios, excluding years 2000 and 2001

This table displays performance measures of portfolios based on the average consensus recommendations. Mean raw returns are the average monthly returns of the portfolios. Market-adjusted returns are the mean raw returns minus the risk-free rate and the return of the market that month. CAPM intercept is the estimated intercept calculating using CAPM model by regressing portfolio return less the risk-free rate on the market excess return. The intercept from Fama-French model is the estimated intercept of time-series regression with additional independent variables of small-minus-big (SMB) and high-minus-low (HML). Four-factors intercept is the estimated intercept of time-series regression including the price momentum independent variable. Annual turnover is calculated as the average of portfolio's holdings at the close of one day that has been sold the next trading day, multiplied by 252, the number of trading days in a year. The annual return is calculated by multiplying intercepts by 12 and subtracting the annual transaction cost. The robust t-statistics for intercepts are below the coefficients.

	Mean	Mean	Intercept from				Net Annual Return from		
	Raw	Market-adjusted		Fama-	Four-	% Annual		Fama-	Four-
Portfolio	Return	Return	CAPM	French	Factors	Turnover	CAPM	French	Factors
1 (most favorable)	1.231 %	0.432 %	0.320 %	0.414 %	0.343 %	1613	-0.252 %	-0.216 %	-1.068 %
		3.75***	3.48***	3.63***	3.10***				
2	1.146 %	0.347 %	0.306 %	0.306 %	0.228 %	1563	-0.697 %	-0.697 %	-1.633 %
		2.98***	2.45**	1.93*	1.97**				
3	0.650 %	-0.149 %	-0.235 %	-0.240 %	-0.149 %	1727	-1.743 %	-1.683 %	-2.775 %
		-1.03	-1.69*	-1.73*	-1.09				
4	0.215 %	-0.584 %	-0.575 %	-0.578 %	-0.484 %	1560	1.840 %	1.876 %	0.748 %
		-5.13***	-4.95***	-4.98***	-4.31***				
5 (least favorable)	0.286 %	-0.514 %	-0.538 %	-0.539 %	-0.419%	1670	0.816 %	0.828 %	-0.612 %
		-2.47**	-2.57**	-2.75***	-2.13**				

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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Findings and Conclusions

The aim of this paper has been to examine whether analysts provide informative recommendations and to estimate the abnormal returns that can be generated using different investment strategies constructed to benefit from analysts' stock recommendations. These investment strategies are investor-oriented and aim to generate abnormal returns net of transaction costs. I provide evidence of significant abnormal returns for portfolios using the previous month's consensus recommendations over 15 and 30 calendar days of holding periods, with a high of 0.494 percent per month for the most favorable portfolio and a low of -1.237 percent per month for the least favorable portfolio. Moreover, these abnormal returns are even higher when the portfolios are based on the consensus recommendation of the month that the recommendation was given. Consequently, it has been indicated that analysts provide informative recommendations and they pose market timing abilities.

I document that short-selling portfolios that contain the least and the second least favorable recommendations generate a positive net of transaction costs abnormal returns. These net annual abnormal returns have a high of 1.98 percent for the second least favorable portfolio and a high of 2.16 percent for the least favorable portfolio over the 30 days investment horizon. It has been provided that the investment holding period has an extensive impact on the portfolio turnover rates, therefore has an extensive impact on the transaction costs related as well. On the other hand, I documented that the least favorable recommendations perform better and generate higher net annual abnormal returns over shorter investment periods. Consistent with Barber et al. (2001), I find that the transaction costs reduce the net annual abnormal returns for the favorable recommendations to negative values. In respect to this evidence, it can be said that investment strategies that generate positive net abnormal returns exist for the sell recommendations.

The semi-strong form of market efficiency suggests that investors should not be able to profit following the publicly available information, such as analyst recommendations. I present evidence of abnormal returns with very high t-statistics suggesting that the market inefficiencies exists and positive net annual returns suggesting that these market inefficiencies are exploitable by traders.

Furthermore, no evidence of increasing the abnormal returns is found after the implementation of NASD rule 2711. On the other hand, regulation fair disclosure seems to have an impact on curbing the abnormal returns that could be generated following analysts' recommendations. This could be explained by the likelihood of markets becoming more efficient with the decline in the selective disclosure that the analysts had before. Yet, the differences in abnormal returns for the Pre-regFd period and Post-rule 2711 are not significant.

Additionally, I find that the removal of the technology bubble period increases the net abnormal returns for buy portfolios. Still, the buy portfolios remain to have negative net abnormal returns. These results suggest that analysts were less accurate with their buy

recommendations during this tech-bubble and interim regulation period.

Despite the fact none of the investment strategies I build results positive abnormal returns net of transaction costs for the most favorable portfolios, the possibility of other trading strategies that could generate positive net abnormal returns still exists. Barber et al.(2001) mention that market-value weighted returns may lead to less significant abnormal returns considering that the markets are more efficient for the large firms. Consequently, another methodology resulting positive net annual returns for the favorable portfolios is probable. As aforementioned, it remains uncertain whether a recent effective round-trip cost reflecting the decimalization might lead to positive net abnormal returns for the most favorable portfolios. Regardless of these limitations, my findings indicate that analyst recommendations have informative value and investors can earn abnormal returns net of tradings costs following the profitable strategies given in this study.

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Appendix A

Coefficient Estimates of Portfolios, December 1993 - December 2015

This table presents the time-series regression estimates of CAPM, Fama-French, and Four-Factors models. Panel A display the coefficient estimates for portfolios with 15 calendar days holding period, Panel B displays the coefficient estimates for portfolios based on the consensus recommendations in month $_T$, and Panel C displays the coefficient estimates for portfolios constructed using all buy recommendations and all sell recommendations. Dependent variable is the portfolio return minus risk-free rate, $R_p - R_f$, and the independent variables are the market excess return $(R_m - R_f)$, size variable (SMB), book-to-market variable (HML), and momentum variable (MOM). The robust t-statistics appear below the coefficient estimates. The t-statistic on the coefficient $(R_m - R_f)$ represents the hypothesis that the coefficient estimate on $(R_m - R_f)$ is equal to one. The t-statistics on coefficients of SMB, HML and MOM represent the null hypothesis of the coefficient being equal zero. Intercept estimates of the time-series regressions are not given in this table.

Panel A: Portfolios constructed using consensus recommendation of previous month, 15 calender days holding period

	CAPM		Fama-French				Four-Factors				
Portfolio	$R_m - R_f$	Adj R^2	$R_m - R_f$	SMB	HML	Adj R^2	$R_m - R_f$	SMB	HML	MOM	Adj R^2
1 (most favorable)	1.12	74.4	1.07	0.06	-0.23	76.2	1.07	0.06	-0.23	0.01	76.1
	21.75***		21.62***	0.88	-2.56**		21.92***	0.91	-2.42**	-0.22	
2	1.11	82.0	1.08	-0.05	-0.25	83.8	1.12	-0.07	-0.22	0.09	84.4
	25.02***		27.58***	-1.15	-4.60***		28.14***	-1.50	-3.84***	2.48**	
3	1.15	66.7	1.15	-0.08	-0.11	66.8	1.06	-0.05	-0.19	-0.23	69.8
	19.49***		19.54***	-1.11	-1.19		17.31***	-0.72	-2.11**	-4.59***	
4	1.04	71.4	1.05	-0.02	0.04	71.3	0.97	0.00	-0.03	-0.20	74.2
	23.29***		19.85***	-0.19	0.51		18.48***	0.04	-0.40	-4.05***	
5 (least favorable)	1.14	38.7	1.19	-0.05	0.26	39.5	1.12	-0.03	0.21	-0.17	40.2
	11.13***		10.07***	-0.17	1.42		8.13***	-0.09	1.32	-1.49	

Appendix A (continued)

Panel B: Portfolios constructed using consensus of the month of the recommendation, 30 calender days holding period											
	CAPM		Fama-French				Four-Factors				
Portfolio	$R_m - R_f$	Adj R^2	$R_m - R_f$	SMB	HML	Adj R^2	$R_m - R_f$	SMB	HML	MOM	Adj R^2
1 (most favorable)	1.07	86.8	1.04	0.02	-0.18	88.1	1.07	0.01	-0.15	0.08	88.6
	32.40***		34.31***	0.65	-3.38***		35.13***	0.33	-2.80***	2.94***	
2	1.05	89.4	1.05	-0.09	-0.13	90.1	1.06	-0.97	-0.12	0.02	90.1
	37.18***		41.89***	-3.15***	-3.11***		38.79***	-3.12***	-2.77***	0.71	
3	1.07	76.6	1.07	-0.01	-0.01	76.4	0.99	0.01	-0.07	-0.19	79.2
	24.60***		28.18***	-0.20	-0.13		21.21***	0.22	-0.96	-2.62***	
4	0.98	83.4	1.01	-0.11	0.07	84.3	0.96	-0.09	0.02	-0.14	86.3
	29.67***		27.67***	-1.24	1.23		27.96***	-1.18	0.39	-3.99***	
5 (least favorable)	1.07	55.6	1.08	0.10	0.21	56.3	1.05	0.11	0.18	-0.08	56.5
	13.15***		18.69***	0.72	1.32		13.78***	0.88	1.34	-0.80	
Panel C: Portfolios constructed using all recommendations, 30 calender days holding period											
Buy Recommendations	1.05	94.5	1.03	-0.07	-0.17	95.5	1.03	-0.07	-0.17	-0.01	95.5
	52.03***		65.50***	-3.31***	-6.62***		60.22***	-3.34***	-6.73***	-0.28	
Sell Recommendations	1.04	89.8	1.05	-0.08	0.06	90.1	0.99	-0.06	-0.06	-0.16	92.6
	40.66***		39.39***	-1.20	0.06		36.70***	-1.05	-1.28	-4.63***	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$